DANA RESERVE SPECIFIC PLAN

DRAFT ENVIRONMENTAL IMPACT REPORT

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PREPARED FOR

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APPENDIX F

Energy Background Information

Energy Impact Assessment for Dana Reserve Specific Plan

ENERGY
IMPACT ASSESSMENT

FOR

DANA RESERVE
SPECIFIC PLAN
NIPOMO, CA

FEBRUARY 2022

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LIST OF COMMON TERMS & ACRONYMS

°F	Fahrenheit
3CE	Central Coast Community Energy
AB	Assembly Bill
AFV	Alternative Fuel Vehicle
APS	Alternative Planning Strategy
ARB	California Air Resource Board
BSC	Building Standards Commission
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CBC	California Building Code
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CO_2	Carbon Dioxide
CPUC	California Public Utilities Commission
EAP	Energy Action Plan
EMFAC	Emissions Factor
EO	Executive Order
EPAct	Energy Policy Act
GHG	Greenhouse Gas
kBTU	Kilo British Thermal Units
kWh	Kilowatt Hour
MMBTU	Million British Thermal Units
mpg	Miles per Gallon
MPO	Metropolitan Planning Organization
NHSTA	National Highway Traffic Safety Administration
PG&E	Pacific Gas and Electric
RME	Resources Management Element
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
SAF	State Alternative Fuel
SB	Senate Bill
SBCAPCD	Santa Barbara County Air Pollution Control District
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SoCalGas	Southern California Gas Company
U.S. DOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
VMT	Vehicle Mile Traveled

INTRODUCTION

This report provides an analysis of potential energy impacts associated with the proposed development of the Dana Reserve. This report also provides a summary of existing conditions in the project area and the applicable regulatory framework pertaining to energy.

PROPOSED PROJECT SUMMARY

The proposed Dana Reserve Specific Plan will provide a combination of land uses that include residential uses, flex commercial uses, open space, trails, and a public neighborhood park within an approximately 300-acre specific plan area. The plan will include 1,291 residential dwelling units (comprised of 833 single-family units and 458 multi-family units), between 110,000-203,00 square feet of commercial space, and 49.8 acres of open space for recreation. The project site is located in the southern portion of San Luis Obispo County, this property is immediately north of the Urban Reserve Line of the Nipomo community. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west and U.S. Highway 101 to the east. The proposed Dana Reserve Specific Plan is depicted in Figure 1.

ENERGY FUNDAMENTALS

Energy use is typically associated with transportation, construction, and the operation of land uses. Transportation energy use is generally categorized by direct and indirect energy. Direct energy relates to energy consumption by vehicle propulsion. Indirect energy relates to the long-term indirect energy consumption of equipment, such as maintenance activities. Energy is also consumed by construction and routine operation and maintenance of land use. Construction energy relates to a direct one-time energy expenditure primarily associated with the consumption of fuel use to operate construction equipment. Energy-related to land use is normally associated with direct energy consumption for heating, ventilation, and air conditioning of buildings.

EXISTING SETTING

The project is located in Nipomo, an unincorporated town within San Luis Obispo County. The project area experiences a hot-summer Mediterranean climate, with an annual normal precipitation of approximately 16.10 inches. Temperatures in the project area range from an average minimum of approximately 38.7 degrees Fahrenheit (°F), in January, to an average maximum of 75.4°F, in September (WRCC 2021).

Energy Resources

Energy sources for the Nipomo are served primarily by Pacific Gas & Electric (PG&E), Central Coast Community Energy (3CE), and Southern California Gas Company (SoCalGas). Energy resources consist largely of natural gas, nuclear, fossil fuels, hydropower, solar, and wind. The primary use of energy sources is for electricity to operate buildings.

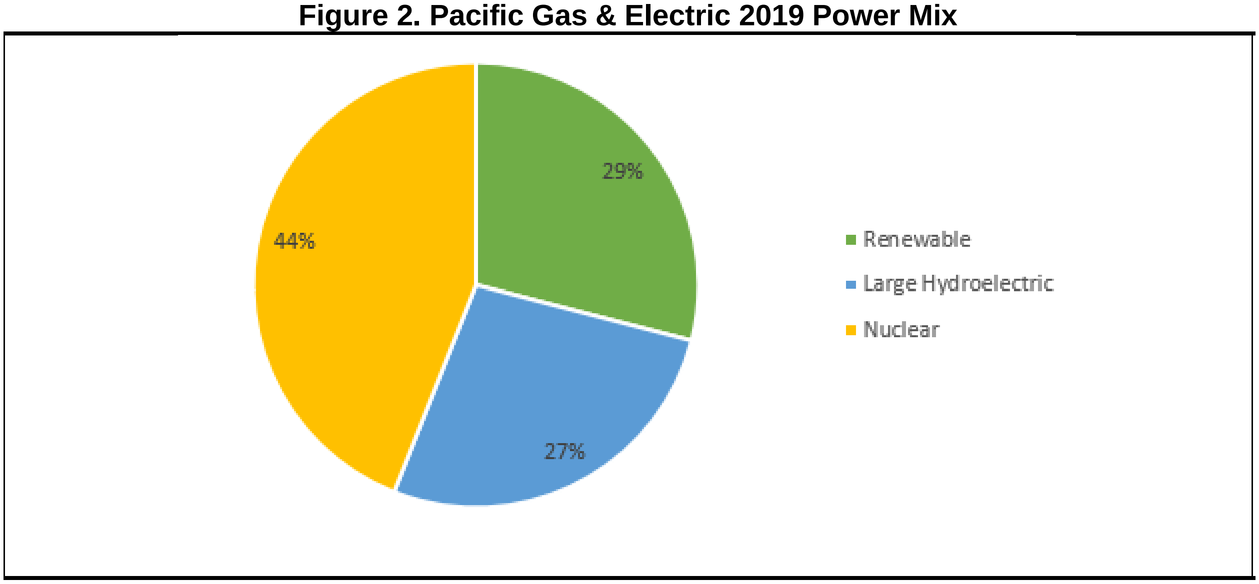
Electricity

<u>Pacific Gas & Electric</u>

The breakdown of PG&E's power mix is shown in Figure 3. As shown, PG&E energy generation was supplied from approximately 29 percent of renewable energy sources (i.e., biomass and waste, geothermal, small hydroelectric, solar, and wind), 27 percent of large hydroelectric sources, and 44 percent of nuclear sources. Participation in PG&E as an electricity provider is mandatory.

Figure 1 . Proposed Dana Reserve Specific Plan

Figure 2. Pacific Gas & Electric 2019 Power Mix



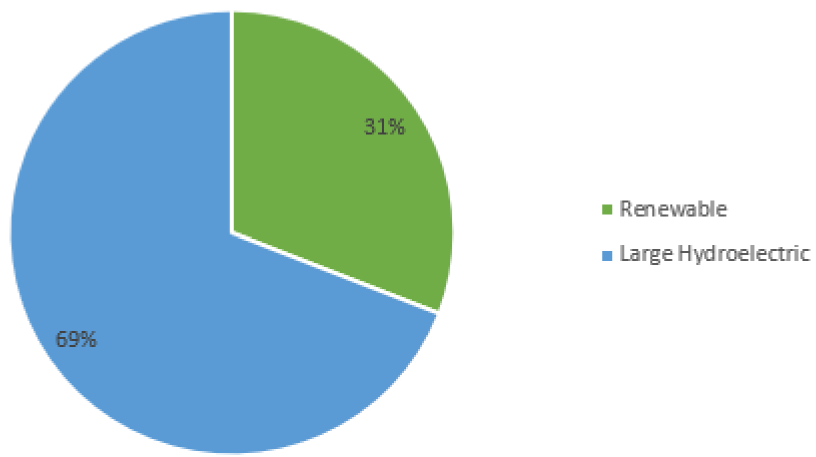
Source: PG&E 2020a

Central Coast Community Energy

3CE is a locally-controlled public agency supplying clean and renewable electricity for residents and businesses in Monterey, San Benito, parts of San Luis Obispo, Santa Barbara, and Santa Cruz Counties. 3CE is based on a local energy model called Community Choice Energy that partners with the local utility (i.e., PG&E) which continues to provide consolidated billing, electricity transmission and distribution, customer service, and grid maintenance services. 3CE provides customers with a choice for clean and renewable energy, and community reinvestment through rate benefits and local GHG reducing energy programs for residential, commercial, and agricultural customers. Participation in 3CE as an electricity provider is voluntary (3CE 2021).

The breakdown of 3CE power mix is shown in Figure 4. As shown, 3CE energy generation was supplied from approximately 31 percent of renewable energy sources (i.e., biomass and waste, geothermal, small hydroelectric, solar, and wind) and 69 percent of large hydroelectric sources.

Figure 3. Central Coast Community Energy 2019 Power Mix



Source: 3CE 2020

Natural Gas

Natural gas services in Nipomo are purchased from PG&E and SoCalGas. PG&E's natural gas system encompasses approximately 70,000 square miles in Northern and Central California. Natural gas throughput provided by PG&E totals approximately 2.6 billion cubic feet per day (PG&E 2020b). SoCalGas's natural gas system encompasses approximately 20,000 square miles in Southern California (SoCalGas 2020). Natural gas throughput provided by SoCalGas totals approximately 2.8 billion cubic feet per day (SoCalGas 2013).

Regulatory Framework

Federal

Regulations for Greenhouse Gas Emissions from Passenger Cars and Trucks and Corporate Average Fuel Economy Standards

In October 2012, the United States Environmental Protection Agency (U.S. EPA) and National Highway Traffic Safety Administration (NHSTA), on behalf of the United States Department of Transportation (U.S. DOT), issued final rules to further reduce greenhouse gas (GHG) emissions and improve corporate average fuel economy (CAFE) standards for light-duty vehicles for model years 2017 and beyond. NHTSA's CAFE standards have been enacted under the Energy Policy and Conservation Act since 1978. This national program requires automobile manufacturers to build a single light-duty national fleet that meets all requirements under both federal programs and the standards of California and other states. This program would increase fuel economy to the equivalent of 54.5 miles per gallon (mpg) limiting vehicle emissions to 163 grams of carbon dioxide (CO_2) per mile for the fleet of cars and light-duty trucks by the model year 2025.

In January 2017, U.S. EPA Administrator Gina McCarthy signed a Final Determination to maintain the current GHG emissions standards for the model year 2022-2025 vehicles. However, on March 15, 2017, U.S. EPA Administrator Scott Pruitt and U.S. DOT Secretary Elaine Chao announced that U.S. EPA intends to reconsider the Final Determination. On April 2, 2018, U.S. EPA Administrator Scott Pruitt officially withdrew the January 2017 Final Determination, citing information that suggests that these current standards may be too stringent due to changes in key assumptions since the January 2017 Determination. According to the U.S. EPA, these key assumptions include gasoline prices and overly optimistic consumer acceptance of advanced technology vehicles. The April 2, 2018, notice is not U.S. EPA's final agency action. The U.S. EPA intends to initiate rulemaking to adopt new standards. Until that rulemaking has been completed, the current standards remain in effect. (U.S. EPA 2017, U.S. EPA 2018).

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the United States would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the NHSTA, which is part of the U.S. DOT, is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 mpg. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The CAFE program, administered by U.S. EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the U.S. DOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the Act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

State

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission (CEC). The Act established a state policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Public Utilities Commission (CPUC) regulates privately-owned utilities in the energy, rail, telecommunications, and water fields.

Assembly Bill 32: Climate Change Scoping Plan and Update

In October 2008, ARB published its Climate Change Proposed Scoping Plan, which is the State's plan to achieve GHG reductions in California required by AB 32. This initial Scoping Plan contained the main strategies to be implemented in order to achieve the target emission levels identified in AB 32. The Scoping Plan included ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations were associated with improving emissions standards for light-duty vehicles, implementing the Low Carbon Fuel Standard program, implementation of energy efficiency measures in buildings and appliances, and the widespread development of combined heat and power systems, and developing a renewable portfolio standard for electricity production.

The initial Scoping Plan was first approved by ARB on December 11, 2008, and is updated every five years. The first update of the Scoping Plan was approved by the ARB on May 22, 2014, which looked past 2020 to set mid-term goals (2030-2035) on the road to reach the 2050 goals (ARB 2014). The most recent update released by ARB is the 2017 Climate Change Scoping Plan, which was released in November 2017. The measures identified in the 2017 Climate Change Scoping Plan have the co-benefit of increasing energy efficiency and reducing California's dependency on fossil fuels.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statues of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels (SAF) Plan in partnership with ARB and in consultation with other state, federal, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes the costs to California and maximizes the economic benefits of in-state production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuel use, reduce GHG emissions, and increase in-state production of biofuels without causing significant degradation of public health and environmental quality.

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), CEC and the California Air Resource Board (ARB) prepared and adopted a joint agency report in 2003, Reducing California's Petroleum Dependence. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (VMT) (ARB 2003). Further, in response to the CEC's 2003 and 2005 Integrated Energy Policy Reports, Governor Davis directed CEC to take the lead in developing a long-term plan to increase alternative fuel use. A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand by 2020.

Senate Bill 350: Clean Energy and Pollution Prevention Reduction Act of 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires a doubling of the energy efficiency savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.

Senate Bill 375

SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will address land use allocation in that MPOs regional transportation plan (RTP). ARB, in consultation with MPOs, establishes regional reduction targets for GHGs emitted by passenger cars and light trucks for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, funding for transportation projects may be withheld.

Senate Bill 1078: California Renewables Portfolio Standard Program

Senate Bill (SB) 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum of 20 percent of their supply from renewable sources by 2017. This SB will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order (EO) S-14-08, which set the Renewables Portfolio Standard (RPS) target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target. EO S-14-08 was later superseded by EO S-21-09 on September 15, 2009. EO S-21-09 directed the ARB to adopt regulations requiring 33 percent of electricity sold in the State to come from renewable energy by 2020. Statute SB X1-2 superseded this EO in 2011, which obligated all California electricity providers, including investor-owned utilities and publicly owned utilities, to obtain at least 33 percent of their energy from renewable electrical generation facilities by 2020. The State's Clean Energy Standards, adopted in 2018, require the state's utilities to generate 100 percent clean electricity by 2045 and to increase the States RPS requirements to 60 percent by 2030 (refer to SB 100).

Senate Bill 100

SB 100 was signed by Governor Jerry Brown on September 10, 2018. SB 100 sets a goal of phasing out all fossil fuels from the state's electricity sector by 2045. SB 100 increases to 60 percent, from 50 percent, how much of California's electricity portfolio must come from renewables by 2030. It establishes a further goal to have an electric grid that is entirely powered by clean energy by 2045, which could include other carbon-free sources, like nuclear power, that are not renewable.

Senate Bill 32 and Assembly Bill 197 of 2016

SB 32 was signed by Governor Brown on September 8, 2016. SB 32 effectively extends California's GHG emission-reduction goals from year 2020 to year 2030. This new emission-reduction target of 40 percent below 1990 levels by 2030 is intended to promote further GHG reductions in support of the State's ultimate goal of reducing GHG emissions by 80 percent below 1990 levels by 2050. SB 32 also directs the ARB to update the Climate Change Scoping Plan to address this interim 2030 emission-reduction target. Achievement of these goals will have the co-benefit of increasing energy efficiency and reducing California's dependency on fossil fuels.

Executive Order S-06-06

EO S-06-06, signed on April 25, 2006, establishes targets for the use and production of biofuels and biopower, and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The EO establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The EO also calls for the State to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the State can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updates the 2011 plan and provides a more detailed action plan to achieve the following goals:

- increase environmentally- and economically-sustainable energy production from organic waste;
- encourage the development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications;
- create jobs and stimulate economic development, especially in rural regions of the state; and
- reduce fire danger, improve air and water quality, and reduce waste.

In 2019, 2.87 percent of the total electrical system power in California was derived from biomass (CEC 2020).

Executive Order B-48-18: Zero Emission Vehicles

In January 2018, Governor Brown signed EO B-48-18 which required all State entities to work with the private sector to put at least 5-million zero-emission vehicles on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 zero-emissions chargers by 2025. In addition, State entities are also required to continue to partner with local and regional governments to streamline the installation of zero-emission vehicle infrastructure. Additionally, all State entities are to support and recommend policies and actions to expand infrastructure in homes, through the Low-Carbon Fuel Standard.

Energy Action Plan

The first Energy Action Plan (EAP) emerged in 2003 from a crisis atmosphere in California's energy markets. The State's three major energy policy agencies (CEC, CPUC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

In the October 2005 EAP II, CEC and CPUC updated their energy policy vision by adding some important dimensions to the policy areas included in the original EAP, such as the emerging importance of climate change, transportation-related energy issues, and research and development activities. The CEC adopted an update to the EAP II in February 2008 that supplements the earlier EAPs and examines the State's ongoing actions in the context of global climate change.

California Building Code

The California Building Code (CBC) contains standards that regulate the method of use, properties, performance, or types of materials used in the construction, alteration, improvement, repair, or rehabilitation of a building or other improvement to real property. The CBC is adopted every three years by the Building Standards Commission (BSC). In the interim, the BSC also adopts annual updates to make necessary mid-term corrections. The CBC standards apply statewide; however, a local jurisdiction may amend a CBC standard if it makes a finding that the amendment is reasonably necessary due to local climatic, geological, or topographical conditions.

Green Building Standards

In essence, green buildings standards are indistinguishable from any other building standards, are contained in the CBC, and regulate the construction of new buildings and improvements. Whereas the focus of traditional building standards has been protecting public health and safety, the focus of green building standards is to improve environmental performance.

The 2019 Building Energy Efficiency Standards (2019 Standards), previously adopted in May 2018, addressed four key areas: smart residential photovoltaic systems, updated thermal envelope standards (preventing heat transfer from the interior to the exterior and vice versa), residential and nonresidential ventilation requirements, and non-residential lighting requirements. The 2019 Standards required new residential and non-residential construction; as well as major alterations to existing structures, to include electric vehicle (EV)-capable parking spaces which have electrical panel capacity and conduit to accommodate future installation. In addition, the 2019 Standards also required the installation of solar photovoltaic (PV) systems for low-rise residential dwellings, defined as single-family dwellings and multi-family dwellings up to three-stories in height. The solar PV systems are to be sized based on the buildings annual electricity demand, the building square footage, and the climate zone within which the home is located. However, under the *2019 Building Energy Efficiency Standards,* homes may still rely on other energy sources, such as natural gas. Compliance with the *2019 Building Energy Efficiency Standards,* including the solar PV system mandate, residential dwellings will use approximately 50 to 53 percent less energy than those under the 2016 standards. Actual reduction will vary depending on various factors (e.g., building orientation, sun exposure). Non-residential buildings will use about 30 percent less energy due mainly to lighting upgrades (CEC 2018).

The recently updated 2022 Building Energy Efficiency Standards (2022 Standards), which were approved in December 2021, encourages efficient electric heat pumps, establishes electric-ready requirements when natural gas is installed and to support the future installation of battery storage, and further expands solar photovoltaic and battery storage standards. The 2022 Standards extend solar PV system requirements, as well as battery storage capabilities for select land uses, including high-rise multi-family and non-residential land uses, such as office buildings, schools, restaurants, warehouses, theaters, grocery stores, and more. Depending on the land use and other factors, solar systems should be sized to meet targets of up to 60 percent of the structure's loads. These new solar requirements will become effective January 1, 2023 and contribute to California's goal of reaching net-zero carbon footprint by 2045 (CEC 2022).

Advanced Clean Cars Program

In January 2012, ARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires a battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (ARB 2016).

Local

County of San Luis Obispo General Plan Conservation Element

The County of San Luis Obispo General Plan contains a Conservation Element (San Luis Obispo County 2010). The Element is a comprehensive long-range planning document that sets forth goals, policies, and actions to address the conservation and preservation of public services, air quality, vegetation and wildlife, mineral resources, and visual resources, historic and archeological resources, as well as energy. Applicable energy policies include, but are not limited to:

- Policy E 3.1: Ensure that new and existing development incorporates renewable energy sources such as solar, passive building, wind, and thermal energy. Reduce reliance on non-sustainable energy sources to the extent possible using available technology and sustainable design techniques, materials, and resources.
- Policy E 3.2: Require the use of energy-efficient equipment in all new development, including but not limited to Energy Star appliances, high-energy efficiency equipment, heat recovery equipment, and building energy management systems.
- Policy E 4.1: Integrate green building practices into the design, construction, management, renovation, operations, and demolition of buildings, including publicly funded affordable housing projects, through the development review and building permitting process.

IMPACT ANALYSIS

Thresholds of Significance

In accordance with Appendix F and G of the California Environmental Quality Act (CEQA) Guidelines, energy use impacts associated with the proposed project would be considered significant if it would:

a) Result in the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The CEQA Guidelines, Appendix F, requires environmental analyses to include a discussion of potential energy impacts associated with a proposed project. Where necessary, CEQA requires that mitigation measures be incorporated to reduce the inefficient, wasteful or unnecessary consumption of energy. The State CEQA Guidelines, however, do not establish criteria that define inefficient, wasteful or unnecessary consumption. Compliance with the State's building standards for energy efficiency would result in decreased energy consumption for proposed buildings. However, compliance with building codes may not adequately address all potential energy impacts associated with project construction and operation. As a result, this analysis includes an evaluation of electricity and natural gas usage requirements associated with future development, as well as, energy requirements associated with the use of on-road and off-road vehicles. The degree to which the proposed project would comply with existing energy standards, as well as, applicable regulatory requirements and policies related to energy conservation was also taken into consideration for the evaluation of project-related energy impacts.

Methodology

Construction Impacts

Regarding energy use (e.g., fuel use) during construction, it is assumed that only diesel fuel would be used in construction equipment. On-road vehicles for hauling materials and worker commute trips assumed a mix of diesel and gasoline fuel use. Construction schedules, equipment numbers, horsepower ratings, and load factors were used to calculate construction-related fuel use, based on default assumptions contained in the California Emissions Estimator Model (CalEEMod), version 2020.4.0. Diesel fuel use was estimated based on a factor of 0.05 gallons of diesel fuel per horsepower-hour derived from the South Coast Air Quality Management District's (SCAQMD) CEQA Air Quality Handbook (SCAQMD 1993). Energy uses were quantified for demolition, site preparation, grading, building construction, paving, and architectural coating of the project. Construction of Residential units will begin in 2023 and end in 2030, construction of the Commercial & Educational land uses will begin in 2024 and end in 2029 and construction of the Hotel will begin and end in 2026.

Operational Impacts

The long-term operation of the proposed project would require electricity and natural gas usage for lighting, water conveyance, and landscaping maintenance equipment. Indirect energy use would include solid waste removal. Project operation would include the consumption of diesel and gasoline fuel from on-road vehicles. Building energy use was estimated using CalEEMod, version 2020.4.0. With continued improvements in building energy efficiencies, energy use in future years would be less. Transportation fuel-use estimates were calculated by applying average fuel usage rates per vehicle mile to VMT associated with the proposed project. Annual energy usage was quantified based on CalEEMod default assumptions for PG&E, including compliance with renewable portfolio standards. Average fuel usage rates by vehicle class, fuel type (e.g., diesel, gasoline, electric, and natural gas), and calendar year were obtained from San Luis Obispo County's emissions inventory that's derived from ARB's Emissions Factors (EMFAC) 2021, version 1.0.1 (ARB 2021).

Project Impacts and Mitigation Measures

Impact E-A.	**Would the project result in the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?**

Implementation of the proposed project would increase electricity, diesel, gasoline, and natural gas consumption associated with construction activities, as well as long-term operational activities. Energy consumption associated with short-term construction and long-term operational activities are discussed in greater detail, as follows:

Construction-Related Energy Consumption

Energy consumption would occur during construction, including fuel use associated with the on-site operation of off-road equipment and vehicles traveling to and from the construction site. Table 1 summarizes the levels of energy consumption associated with project construction. As depicted, the operation of off-road construction equipment would use an estimated total of 520,373 gallons. On-road vehicles would use an estimated total of 86,878 gallons of gasoline and 33,837 gallons of diesel for Phase 1. On-road vehicles would use an estimated total of 750,947 gallons of gasoline and 81,653 gallons of diesel. In total, construction fuel use would equate to approximately 176,644 million British thermal units (MMBTU). Construction equipment use and associated energy consumption would be typical of that commonly associated with the construction of new land uses. In addition, mitigation measures have been incorporated as part of the air quality analysis that would reduce construction-related fuel use, including the use of newer and alternatively-fueled vehicles and equipment. Idling of heavy-duty diesel construction equipment and trucks would be limited to five minutes in accordance with San Luis Obispo Air Pollution Control District (SLOAPCD) requirements. Energy use associated with construction of the proposed project would be temporary and would not be anticipated to result in the need for additional capacity, nor would construction be anticipated to result in increased peak-period demands for electricity. As a result, project construction would not be anticipated to require the use of construction equipment that would be less energy efficient than those commonly used for the construction of similar facilities. As a result, the construction of the proposed project would not result in an inefficient, wasteful, or unnecessary consumption of energy. As a result, impacts are considered **less than significant**.

Table 1. Construction Energy Consumption

Source	Total Fuel Use (gallons)	Total MMBTU
Phase 1		
Off-Road Equipment Use (Diesel)	520,373	71,489
On-Road Vehicles (Gasoline)	780,947	93,937
On-Road Vehicles (Diesel)	81,653	11,218
	Total:	176,644

MMBTU = Million British thermal units
Fuel use was calculated based, in part, on construction schedules, default equipment uses, and vehicle trips identified for the construction of similar land uses contained in the CalEEMod output files prepared for the air quality analysis conducted for this project.
Refer to Appendix A for modeling assumptions and results.

Operational Mobile-Source Energy Consumption

Operational mobile-source energy consumption would be primarily associated with truck trips to and from the project. Energy use associated with commute trips are discussed in greater detail, as follows:

Table 2 summarizes the annual fuel use at build-out. As noted in Table 2, the vehicle trips associated with the proposed land uses would consume an annual estimated 247,367 gallons of diesel and 1,309,276 gallons of gasoline for operation in year 2030. The development of increasingly efficient automobile engines would result in increased energy efficiency and energy conservation. Various air quality mitigation measures have been included that would reduce long-term mobile source emissions, including incorporation of measures to reduce vehicle miles traveled, such as incorporation of site design features that would promote pedestrian connectivity, bicycle and transit use. The proposed project would not result in increased fuel usage that would be considered unnecessary, inefficient, or wasteful. This impact would be considered **less than significant**.

Table 2. Operational Fuel Consumption[1]

Source	Annual Fuel Use (gallons)	Annual MMBTU
Source		
Mobile Fuel (Diesel) - Residential	174,307	23,946
Mobile Fuel (Gasoline) - Residential	922,580	110,973
Mobile Fuel (Diesel) - Commercial & Educational	60,820	8,356
Mobile Fuel (Gasoline) - Commercial & Educational	321,914	38,722
Mobile Fuel (Diesel) - Hotel	12,240	1,681
Mobile Fuel (Gasoline) - Hotel	64,782	7,792
	Total:	191,471

MMBTU = Million British thermal units
1. Assumes a build-out year of 2030.
Fuel use was calculated based, in part, on project trip generation rates derived from the traffic analysis for the project (CCTC 2021)
Refer to Appendix A for modeling assumptions and results.

Operational Building-Use Energy Consumption

The proposed project would result in increased electricity and natural gas consumption associated with the long-term operation of the planned land uses. Estimated electricity and natural gas consumption associated with the proposed facilities are summarized in Table 3. As depicted, operation would result in the annual consumption of approximately 7,061,239 kilowatt hours (kWh) of electricity, 325,170 kWh of water, and 33,489,670 kilo British thermal units (kBTU) of natural gas. In total, the proposed facilities would consume an annual total of approximately 58,692 MMBTU at buildout. The development of increasingly efficient building fixtures would result in increased energy efficiency and energy conservation. The project would be subject to energy conservation requirements in the CEC (Title 24, Part 6, of the California Code of Regulations, California's Energy Efficiency Standards for Residential and Nonresidential Buildings) and the California Green Building Standards Code (CALGreen) (Title 24, Part 11 of the California Code of Regulations). In addition, various mitigation measures have been included as part of the air quality analysis prepared for this project what would further reduce energy use. Proposed single-family residential dwellings would also be required to incorporate solar photovoltaic systems, per current building code requirements. On average, the incorporation of solar PV systems would reduce on-site electricity use by approximately 70 percent (PG&E 2022). Adherence to Title 24 requirements and applicable GHG mitigation measures would further reduce energy use during project construction and operation and would further promote the use of energy from renewable sources. Such measures include, but are not limited to, the prohibited installation of natural gas to serve residential development, use of energy efficient appliances, future participation in Central Coast Community Energy as the electricity provider (if/when the option becomes available), and implementation of various waste recycling and water-conservation measures. For these reasons, the project would not result in wasteful and inefficient use of non-renewable resources due to building operation. This impact would be considered **less than significant**.

Table 3. Operational Electricity, Water, and Natural Gas Consumption

Source	Annual Energy Use	Annual MMBTU
Phase 1 - 2024		
Electricity (kWh)	7,061,239	24,093
Water (kWh)	325,170	1,109
Natural Gas Use (kBTU)	33,489,670	33,490
	Total:	58,692
MMBTU = Million British thermal units; kWh = Kilowatt hour; kBTU = Kilo British thermal unit		

Impact E-B. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The project would be required to be in full compliance with the CBC, including applicable green building standards and building energy efficiency standards. Furthermore, the proposed project would comply with the County's General Plan. The County's General Plan and Conservation Element ensures the conservation and preservation of energy resources by increasing the energy efficiency of buildings, appliances, and buildings to the use of alternative forms of energy. The project would not conflict with other goals and policies set forth in the general plan pertaining to renewable energy and energy efficiency. Furthermore, implementation of applicable air quality mitigation measures would ensure that the proposed project meets or exceeds building code requirements related to building energy efficiency. Therefore, the proposed project would not conflict with state or local plans for renewable energy or energy efficiency, this impact would be considered **less than significant**.

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APPENDIX A

Energy Modeling

Energy Use Summary Operational Year 2030 Mitigated

Construction Energy Use

	Gallons	Annual MMBTU
Off-Road Equipment Fuel (Diesel)	520,373	71,489
On-Road Vehicle Fuel (Gasoline)	780,947	93,937
On-Road Vehicle Fuel (Diesel)	81,653	11,218
	Total:	176,644

Operational Fuel Use

Source	Gallons	Annual MMBTU
Mobile Fuel (Diesel) - Residential	174,307	23,946
Mobile Fuel (Gasoline) - Residential	922,580	110,973
Mobile Fuel (Diesel) - Commercial & Educational	60,820	8,356
Mobile Fuel (Gasoline) - Commercial & Educational	321,914	38,722
Mobile Fuel (Diesel) - Hotel	12,240	1,681
Mobile Fuel (Gasoline) - Hotel	64,782	7,792
	Total:	191,471

Operational Electricity & Natural Gas Use

	Annual Energy	Annual MMBTU
Electricity (kWh/yr, MMBTU)	7,061,239	24,093
Water Use, Treatment & Conveyance (kWh/Yr, MMBTU)	325,170	1,109
Natural Gas (kBTU/yr, MMBTU)	33,489,670	33,490
	Total:	58,692

Construction Equipment Fuel Use

OFF-ROAD EQUIPMENT FUEL USE

Primary Construction Activity	Activity Duration (Days)	Equipment Type	Size (hp)	Number of Pieces	Hours of Daily Use/Piece of Equipment	Total Days of Use	Load Factor	Fuel Usage Rate (g/bhph)	Total Fuel Diesel (Gallons)
Demolition - Residential	108	Concrete Saw	81	1	8	108	0.73	0.05	2554
		Excavators	158	3	8	108	0.38	0.05	7781
		Rubber Tired Dozers	247	2	8	108	0.4	0.05	8536
Site Prep - Residential	108	Rubber Tired Dozers	247	3	8	108	0.4	0.05	12804
		Tractors/Loaders/Backhoes	97	4	8	108	0.37	0.05	6202
Grading - Residential	130	Excavators	158	2	8	130	0.38	0.05	6244
		Graders	187	1	8	130	0.41	0.05	3987
		Rubber Tired Dozers	247	1	8	130	0.4	0.05	5138
		Tractors/Loaders/Backhoes	97	2	8	130	0.37	0.05	3733
		Scrapers	367	2	8	130	0.48	0.05	18321
Construction - Residential	1545	Cranes	231	1	7	1545	0.29	0.05	36225
		Forklifts	89	3	8	1545	0.2	0.05	33001
		Generator Sets	84	1	8	1545	0.74	0.05	38415
		Tractors/Loaders/Backhoes	97	3	7	1545	0.37	0.05	58223
		Welders	46	1	8	1545	0.45	0.05	12793
Arch Coating - Residential	1516	Air Compressor	78	1	6	1516	0.48	0.05	17028
Paving - Residential	220	Pavers	130	2	8	220	0.42	0.05	9610
		Paving Equipment	132	2	8	220	0.36	0.05	8364
		Rollers	80	2	8	220	0.38	0.05	5350
Building Construction - Commercial	1540	Cranes	231	1	7	1540	0.29	0.05	36108
		Forklifts	89	3	8	1540	0.2	0.05	32894
		Generator Sets	84	1	8	1540	0.74	0.05	38291
		Tractors/Loaders/Backhoes	97	3	7	1540	0.37	0.05	58034
		Welders	46	1	8	1540	0.45	0.05	12751
Arch Coating - Commercial	1500	Air Compressors	78	1	6	1500	0.48	0.05	16848
Paving - Commercial	20	Pavers	130	2	8	20	0.42	0.05	874
		Paving Equipment	132	2	8	20	0.36	0.05	760
		Rollers	80	2	8	20	0.38	0.05	486
Building Construction - Hotel	230	Cranes	231	1	7	230	0.29	0.05	5393
		Forklifts	89	3	8	230	0.2	0.05	4913
		Generator Sets	84	1	8	230	0.74	0.05	5719
		Tractors/Loaders/Backhoes	97	3	7	230	0.37	0.05	8667
		Welders	46	1	8	230	0.45	0.05	1904
Arch Coating - Hotel	18	Air Compressors	78	1	6	18	0.48	0.05	202
Paving - Hotel	18	Pavers	130	2	8	18	0.42	0.05	786
		Paving Equipment	132	2	8	18	0.36	0.05	684
		Cement & Mortar Mixers	9	2	6	18	0.56	0.05	54
		Tractors/Loaders/Backhoes	97	1	8	18	0.37	0.05	258
		Rollers	80	2	8	18	0.38	0.05	438
								Total Diesel Fuel Use (Gallons):	520373
								Number of Construction Years:	8
								Average Diesel Fuel Use/Year:	65047
								BTU/Gallon:	137381
								BTU:	71489345666
								MMBTU:	71489

Equipment usage assumptions based on default assumptions contained in CalEEMod.

Construction Fuel Use - On-Road Vehicles

Residential	Demolition	Sire Prep	Grading	Construction	Architectural Coating	Paving	Total	LDA	LDT1	LDT2	MDV	HDV
Days	108	108	130	1545	1516	220						
Worker Trips	15	18	20	739	148	15						
Miles/Trip	13	13	13	13	13	13						
Total VMT	21060	25272	33800	14842815	2916784	42900	17882631	5960877	5960877	5960877	0	0
Vendor Trips	0	0	0	154	0	0						
Miles/Trip	5	5	5	5	5	5						
Total VMT	0	0	0	1189650	0	0	1189650	0	0	0	1189650	0
Haul Trips	0	0	0	0	0	0						
Miles/Trip	20	20	20	20	20	20						
Total VMT	0	0	0	0	0	0	0	0	0	0	0	0

Commercial & Educational	Construction	Architectural Coating	Paving	Total	LDA	LDT1	LDT2	MDV	HDV
Days	1540	1500	20						
Worker Trips	145	46	15						
Miles/Trip	13	13	13						
Total VMT	2902900	897000	3900	3803800	1267933.333	1267933.333	1267933.333	0	0
Vendor Trips	103	0	0						
Miles/Trip	5	5	5						
Total VMT	793100	0	0	793100	0	0	0	793100	0
Haul Trips	0	0	0						
Miles/Trip	20	20	20						
Total VMT	0	0	0	0	0	0	0	0	0

Hotel	Construction	Architectural Coating	Paving	Total	LDA	LDT1	LDT2	MDV	HDV
Days	230	18	18						
Worker Trips	25	5	20						
Miles/Trip	13	13	13						
Total VMT	74750	1170	4680	80600	26866.66667	26866.66667	26866.66667	0	0
Vendor Trips	10	0	0						
Miles/Trip	5	5	5						
Total VMT	11500	0	0	11500	0	0	0	11500	0
Haul Trips	0	0	0						
Miles/Trip	20	20	20						
Total VMT	0	0	0	0	0	0	0	0	0

	Annual VMT	Gallons/Mile*	Gallons	BTU/gallon**			BTU	MMBTU
HDT	0	0.15561021	0	137381			0	0.00
LDA	7255677	0.03071408	222851	120286			26805909669	26805.91
LDT1	7255677	0.03824357	277483	120286			33377314787	33377.31
LDT2	7255677	0.03867487	280612	120286			33753738369	33753.74
MDV	1994250	0.04094445	81653	137381			11217635787	11217.64

**Gallons per mile based on year 2030 conditions for San Luis Obispo County. Derived from Emfac2021 (v1.0.1) Emissions Inventory.*

***Energy coefficient derived from US EIA.*

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

EMFAC2021 Fuel Rate Calculation	**Fuel Consumption (1000**		**VMT (Miles/Day)****				
	Diesel	**Gasoline**	**Diesel**	**Gasoline**			**TOTAL**
LDA	0.292441302	124.9137733	12893.87861	4066987.165			
LDT1	0.000482818	14.76657951	12.53401984	386119.3244			
LDT2	0.342784081	95.90087373	11410.61277	2479668.975			
MDV	1.448096452	73.20946115	35367.3425	1536771.466			
HDT***	4.994284569	0.00907047	32094.83796	37.21737838			
Total	7.078089222	308.7997582	91779.20586	8469584.148			8561363.354
Percent of Total			1.07%	98.93%			
LDA-Miles/Gallon	44.09048427	32.55835651					
LDA-Gallons/Mile	0.022680631	0.030714081					
LDT1-Miles/Gallon	25.9601397	26.14818985					
LDT1-Gallons/Mile	0.038520594	0.038243565					
LDT2-Miles/Gallon	33.28804751	25.85658377					
LDT2-Gallons/Mile	0.030040813	0.038674869					
MDV-Miles/Gallon	24.42333344	20.99143255					
MDV-Gallons/Mile	0.040944452	0.047638483					
HDT-Miles/Gallon	6.426313423	0.000243716					
HDT-Gallons/Mile	0.155610213	4103.136521					

**Fuel consumptions derived from EMFAC2021 (v1.0.1) for year 20230 conditIons.*

***VMT derived from EMFAC2021 (v1.0.1) for year 2030 conditons.*

****HDT diesel engine T7 CAIRP construction, T7 single construction, T7 tractor construction. HDT gasoline engine T7IS.*

Fuel consumption and VMT based on the San Luis Obispo County.

Operational Fuel Use - Proposed Project Year 2030 Mitigated

LAND USE	Total Annual VMT
Residential	25,715,062
Commercial & Educational	8,972,707
Hotel	1,805,675
Total	36,493,444

Residential	VMT	Gallons/Mile*	Gallons	BTU/gallon**	BTU	MMBTU
Diesel	1739975	0.10017764	174307	137381	23946408255	23946.41
Gasoline	23975087	0.03848078	922580	120286	110973476858	110973.48
Commercial	**VMT**	**Gallons/Mile***	**Gallons**	**BTU/gallon****	**BTU**	**MMBTU**
Diesel	607126	0.10017764	60820	137381	8355574059	8355.57
Gasoline	8365581	0.03848078	321914	120286	38721761302	38721.76
Hotel	**VMT**	**Gallons/Mile***	**Gallons**	**BTU/gallon****	**BTU**	**MMBTU**
Diesel	122179	0.10017764	12240	137381	1681482655	1681.48
Gasoline	1683496	0.03848078	64782	120286	7792399366	7792.40
Total	**VMT**		**Gallons**		**BTU**	**MMBTU**
	36493444		1157707		191471102495	191471.10

**Gallons per mile based on year 2030 conditions for San Luis Obispo County. Derived from Emfac2021 (v1.0.1) Emissions Inventory.*

**Energy coefficient derived from US EIA.

https://www.eia.gov/energyexplained/index.php?page=about_energy_units

EMFAC2017 Fuel Rate Calculation	Fuel Consumption (1000		VMT (Miles/Day)**		
	Diesel	Gasoline	Diesel	Gasoline	
All Other Buses	0.258555512		2298.914477		
LDA	0.292441302	124.9137733	12893.87861	4066987.165	
LDT1	0.000482818	14.76657951	12.53401984	386119.3244	
LDT2	0.342784081	95.90087373	11410.61277	2479668.975	
LHD1	11.38251486	18.29888583	181039.8123	182904.1597	
LHD2	5.962138203	2.494852104	78770.55625	22220.33412	
MCY		0.97873604		39148.39963	
MDV	1.448096452	73.20946115	35367.3425	1536771.466	
MH	0.567003846	1.917648121	5325.133214	8466.658705	
Motor Coach	0.432778927		2531.507111		
PTO	1.122905262		5914.767936		
OBUS		0.929618707		4510.040117	
SBUS	0.584517078	0.333296083	4960.570754	3302.562495	
T6 CAIRP heavy	0.035931858		376.3269033		
T6 CAIRP small	0.009912918		92.81875019		
T6 instate heavy	2.54816783		22874.55138		
T6 instate small	8.509179867		74814.70747		
T6 OOS heavy	0.048745227		524.1760885		
T6 OOS small	0.01211547		119.7878815		
T6 Public	0.786308765		6392.761483		
T6 utility	0.126545548		1157.087197		
T6TS		2.589001305		12908.94257	
T7 CAIRP	5.503206752		37094.61879		
T7 NNOOS	6.678283539		47846.86069		
T7 NOOS	2.506949985		17381.91459		
T7 other port	1.54033134		9995.931192		
T7 Public	1.479706388		8109.449171		
T7 Single	4.812582412		29164.33169		
T7 SWCV	1.386799877		3672.195409		
T7 tractor	4.667064543		30025.56341		
T7 utility	0.113985129		681.0547425		
T7IS		0.00907047		37.21737838	
UBUS	0.412824089	0.140446118	3751.535472	1117.622559	
Total	63.57285988	336.4822425	634601.3023	8744162.868	9378764.17
Percent of Total			6.77%	93.23%	
Miles/Gallon	9.982267646	25.98699653			
Gallons/Mile	0.100177639	0.038480784			

VMT = Vehicle miles traveled

Fuel consumption and VMT based on the San Luis Obispo County.

*Fuel consumptions derived from EMFAC2021 (v1.0.1) for year 2030 conditons.

**VMT derived from EMFAC2021 (v1.0.1) for year 2030 conditons.

Operational Electricity & Natural Gas Use Year 2030 Mitigated

	kWh/yr	MWh/Yr	BTU/kWh*	BTU	MMBTU
Electricity	7061239	7061	3412	24092947468	24093

*Energy coefficient derived from US EIA.
https://www.eia.gov/energyexplained/index.php?page=about_energy_units

	kBTU/yr			BTU	MMBTU
Natural Gas	33489670			33489670000	33490

*Energy coefficient derived from US EIA.
https://www.eia.gov/energyexplained/index.php?page=about_energy_units

Water Energy Use Year 2030 Mitigated

	WATER USE*	ELECTRIC INTENSITY		ANNUAL ELECTRIC USE (kWh/Yr)		
	MGAL/YR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	TOTAL
ANNUAL INDOOR WATER USE	92.90576	3500		325170		325,170
ANNUAL OUTDOOR WATER USE	0.00		0		0	

*Based on estimated water use derived from CalEEMod.
**Energy coefficient derived from US EIA.
https://www.eia.gov/energyexplained/index.php?page=about_energy_units

BTU/kWh**	3412
BTU:	1109480586
MMBTU:	1109.48

APPENDIX G

Geology and Soils Background Information

Geotechnical Feasibility Report for
Canada Ranch Property
East of Hetrick Avenue and Cherokee Place

GEOTECHNICAL FEASIBILTY REPORT
CANADA RANCH PROPERTY
EAST OF HETRICK AVENUE AND CHEROKEE PLACE
NIPOMO AREA
SAN LUIS OBISPO COUNTY, CALIFORNIA

September 11, 2017

Prepared for

Ms. Claire Simoulis, CFO, CCIM
NKT Commercial, LLC

Prepared by

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September 11, 2017

FILE NO.: SL-18135-SA

Ms. Claire Simoulis, CFO, CCIM
NKT Commercial, LLC
684 Higuera Street, Suite B
San Luis Obispo, California 93401

PROJECT: CANADA RANCH PROPERTY
EAST OF HETRICK AVENUE AND CHEROKEE PLACE
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

SUBJECT: Geotechnical Feasibility Report

REF: Proposal for Geotechnical Feasibility Report, Canada Ranch, West of Hetrick Avenue and Cherokee Place, Nipomo Area of San Luis Obispo County, California, by Earth Systems Pacific, dated July 25, 2017, Doc. No. 1707-057.PRP

Dear Ms. Simoulis:

In accordance with your authorization of the above-referenced proposal, this geotechnical feasibility report has been prepared for your use in planning future development at the site. Two copies and an electronic copy of this geotechnical feasibility report are being furnished for your use.

Additional work, including but not limited to, subsurface exploration, sampling, testing, and engineering analyses will be needed in the future to complete a geotechnical engineering report that will form the basis of a portion of the information contained on the design plans and specifications for the project. We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Earth Systems Pacific

Phillip Madrid, PE
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP W. MADRID
PE 87519
EXP. 9/30/19
CIVIL
STATE OF CALIFORNIA

Doc. No. 1709-013.SER/ln

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Appendices

1.0 INTRODUCTION

We understand future development is planned on the Canada Ranch property, an approximately 276-acre parcel of land referred to herein as the site. The site is located east of Hetrick Road and Cherokee Place in the Nipomo area of San Luis Obispo County, California. The site is shown on the Exploration Location Map presented in Appendix A.

We understand portions of the site will be developed with residential and commercial structures and their associated surface and subsurface improvements. We have assumed that residential and commercial structures will be one to two stories, will be of wood and steel frame construction, and will utilize concrete slabs-on-grade. Masonry and/or concrete retaining walls for sitework and/or connected to and forming part of the structures are anticipated. Masonry boundary walls and/or other types of perimeter fencing may also be constructed. Maximum line loads are anticipated to be approximately 2 kips per linear foot, and maximum point loads are anticipated to be approximately 20 kips.

We have assumed surface improvements will consist of hot mix asphalt (HMA) and/or Portland cement concrete pavement over aggregate base (AB) for vehicles and concrete flatwork for pedestrians. We have assumed subsurface improvements will be the underground municipal sewer, water, power, and communications utilities that will provide service to the project. Surface runoff will be transmitted to and disposed of into Low Impact Development (LID) drainage improvements. On-site effluent disposal systems are not anticipated for this project.

We have assumed the site will be graded to develop the building and surface improvement areas, to improve access, and to improve drainage. Cuts and fills are anticipated to be on the order 5 feet or less.

2.0 SCOPE OF SERVICES

The scope of work for the geotechnical feasibility report included a general site reconnaissance, subsurface investigation, infiltration testing, geotechnical analysis of data, and preparation of this report. The analysis and subsequent conclusions were based, in part, upon information provided by the client, and are intended to identify major geotechnical constraints that might preclude development of the site.

It is our intent that this report be used exclusively by the client for planning purposes with respect to geotechnical issues. Application beyond this intent is strictly at the user's risk. If other architects/engineers wish to use this report, such use will be allowed to the extent the report is applicable, only if the user agrees to be bound by the same contractual conditions of the original client or contractual conditions that may be applicable at the time of the report use.

As there are geotechnical issues yet to be resolved, this firm should be retained to provide the geotechnical engineering report; and to provide consultation as necessary as the design progresses, to review project plans, and to assist in verifying that pertinent geotechnical issues have been addressed. In the event that any assumptions used in the preparation of this report prove to be incorrect, the conclusions contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are verified as appropriate or modified by the geotechnical engineer in writing. The opinions presented in this report are considered preliminary and subject to change based upon information obtained during future geotechnical work at the site.

3.0 SITE SETTING

The site is located east of the intersection of Hetrick Road and Cherokee Place in the Nipomo area of San Luis Obispo County, California. Gates along Hetrick Road, Cherokee Place, and the North Frontage Road provide access to the dirt roads at this wire fenced site. Rural-residential properties and undeveloped open space form the southeast, southwest, and northwest boundaries of the site; US Highway 101 forms the notheast boundary. The approximate central site coordinates and elevation from the Google Earth website are latitude 35.046 north and longitude 120.503 west, and 367 feet above mean sea level.

The site is generally undeveloped except for a few small agricultural use buildings and improvements. The site is covered with a sparse to dense growth of vegetation consisting mostly of grasslands, scrub brush, riparian plants, and mature Oak trees. The site topography is generally characterized as gently rolling terrain; however, the terrain ranges from relatively flat to moderately sloping areas. Drainage is by sheet flow.

4.0 FIELD INVESTIGATION AND INFILTRATION TESTING

On August 14, 2017, five borings were drilled at the site to depths of approximately 5 to 50 feet below the existing ground surface. Two of the borings were drilled for infiltration testing, and the other three borings were drilled for exploratory purposes. The borings were drilled with a Mobile Model B-53 Drill Rig, equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling. Standard Penetration Tests were conducted at selected depths in the borings (ASTM D 1586-11). The approximate locations of the borings are shown on the Exploration Location Map presented in Appendix A.

Soils encountered in the exploratory borings were logged and categorized in general accordance with the Unified Soil Classification System and ASTM D 2488-09a. Copies of the boring logs can also be found in Appendix A. In reviewing the boring logs and the legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the characteristics observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in subsurface descriptions that vary somewhat from the legend.

Infiltration Testing

The infiltration test borings were drilled to an approximate depth of 5 feet. A 2-inch diameter perforated polyvinyl chloride (PVC) pipe was placed in the center of each infiltration test boring. The bottom 2 inches of each boring and the annular spaces around the outside of the PVC pipe were filled with gravel to reduce caving of the area to be tested. The infiltration test borings were then filled with water as needed to maintain a relatively constant elevation or head for a period of 30 minutes. During this process, the volume of water that flowed into the borings was measured with a calibrated flow meter. The volume of water introduced ranged from 32.5 to 48.7 gallons. After completing the 30-minute constant head water volume measurement, the falling head rate of infiltration was subsequently monitored until the borings ran dry. Once the water had drained completely, the holes were refilled as necessary and allowed to drain as the falling head rate was monitored. The infiltration tests were concluded after the holes ran dry for the third time. The total infiltration test duration ranged from 100 to 125 minutes. After testing was concluded, the soil borings and infiltration test borings were backfilled with cuttings. The results are presented in Appendix B.

5.0 GENERAL SUBSURFACE PROFILE

The soil observed in the borings generally consisted of layered sand soils, with varying amounts of silt and clay within the soil matrix. All the soils were in a dry to moist condition. The consistency of the sand soils varied from loose to medium dense. No free subsurface water was observed within the depths explored. Please refer to the boring logs for a more complete description of the subsurface conditions.

6.0 CONCLUSIONS

In our opinion, the site is feasible from a geotechnical standpoint for the planned development as described in the "Introduction" section of this report, provided the preliminary geotechnical recommendations of a future geotechnical engineering report are successfully implemented.

The upper site soils were judged to be generally nonexpansive, therefore no special measures with respect to expansive soils are anticipated. The upper site soils were also judged to provide moderate to high resistance to the type of loads imposed by vehicles; therefore, unusually thick pavement sections are not anticipated. Assuming the upper soils at this site are graded and compacted to provide more uniform moisture and density, we anticipate that shallow continuous and spread (pad) footings may be used to support the structures planned at the site.

In our opinion, the primary concerns during site development from a geotechnical standpoint will be the potential for settlement, the excavation characteristics of the soils, the suitability of the soils for use as fill/backfill, the stability of the soils during grading, the erodible nature of the soils, and the potential for liquefaction and seismically induced settlement of dry sand.

<u>Settlement Potential</u>

Settlement (total and differential) can occur when foundations and surface improvements span materials having variable consolidation characteristics, such as the soils on this site with variable in-situ moisture and density. Such a situation could stress and possibly damage foundations and surface improvements, often resulting in severe cracks and displacement. To reduce this settlement potential, it is necessary for all shallow foundations and surface improvements to bear on material that is as uniform as practicable. A program of overexcavation, scarification, moisture conditioning, and compaction of the upper soils in the building and the surface improvement areas will be recommended in the future geotechnical engineering report to provide more uniform soil moisture and density, and appropriate support.

<u>Excavation Characteristics</u>

The soils are anticipated to be excavatable with conventional earthmoving equipment; however, the stability of excavations is a concern. Based on our preliminary testing, the soils are considered to be "Type C" per the 2007 Cal/OSHA classification system. This classification should be verified by the contractor's "Competent Person" at the time of construction. Excavation sloping and shoring will be needed to safely work in, and to restrict the size of the excavations. As with all construction safety issues, the methods of excavation stabilization, sloping, and/or shoring are ultimately the responsibility of the contractor.

<u>Suitability of the Soils for Use as Fill/Backfill</u>

We anticipate that the majority, if not all, of the soils excavated at the site will be acceptable from a geotechnical viewpoint for reuse as compacted fill and backfill. However, special requirements for utility trench bedding and shading per the specifications of the County of San Luis Obispo, the conduit manufacturer, and the utility companies should be anticipated.

<u>Stability of Soil During Grading</u>

The soils may be susceptible to temporary high soil moisture contents, especially during or soon after the rainy season. Attempting to compact the soils in an overly moist condition may create unstable conditions in the form of pumping, yielding, shearing, and/or rutting. These conditions will not allow proper compaction and are inappropriate for continued fill placement. Therefore, the construction schedule should allow adequate time during grading for aerating and drying the soils to near optimum moisture content prior to compaction. If unstable conditions occur, the geotechnical engineer should be consulted to provide recommendations for correction of the conditions.

Soil Erosion

The soils are considered to be highly erodible. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means *during* and *following* construction is essential to reduce the potential of erosion damage. Care should be taken to establish and maintain proper drainage around the structures and improvements.

Liquefaction and Seismically Induced Settlement of Dry Soil

Liquefaction is the loss of soil strength caused by a significant seismic event. It occurs primarily in loose, fine to medium-grained sands, and in very soft to medium stiff silts that are saturated by groundwater. During a major earthquake, the saturated sands and silts tend to compress and the void spaces between the soil particles that are filled with water decrease in volume. This causes the pore water pressure to build up in the soils. Then if the water does drain away rapidly, the soils may lose their strength and transition into a liquefied state. Due to the lack of groundwater in the upper 51.5 feet of soil, there is a very low potential for liquefaction to occur at the site.

Seismically induced settlement of dry sand is also caused by a significant seismic event, and may occur in lower density and sand and silt soils that are not saturated by groundwater. During a major earthquake, the void spaces between the unsaturated soil particles that are filled with air tend to compress which translates to a decrease in volume or settlement. The potential for a significant magnitude of seismically induced settlement of dry soils is also anticipated to be very low after the implementation of the grading program recommended in the future geotechnical engineering report. However, the actual magnitude of seismically induced settlement should be estimated based on a more comprehensive subsurface exploration and laboratory testing program implemented during the preparation of a future geotechnical engineering report. Special design and construction measures with respect to liquefaction and seismically induced settlement of dry sand are not anticipated.

Summary

The site is feasible for the planned development as described in the "Introduction" section of this report. In our opinion, no significant geotechnical engineering constraints were discovered in the borings that would preclude development of this site. It will be necessary to provide additional geotechnical work for this site (additional borings and laboratory testing, analyses, etc.) in order to complete the final geotechnical engineering report. The geotechnical engineering report should provide specific preliminary geotechnical recommendations pertaining to the design and construction of the earthwork, structures, and improvements associated with this site.

7.0 ANTICIPATED FOUNDATION DESIGN CRITERIA

The following anticipated foundation design criteria are intended to be used by the architect/engineer for cost estimation purposes only. Additional field and laboratory work is needed to provide preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, slabs-on-grade and exterior flatwork, retaining walls, pavement sections, drainage and maintenance, and construction observation and testing.

1. Continuous and spread footings are anticipated to be designed using maximum allowable bearing capacity of 1,500 psf dead plus live loads. Using this criterion, maximum total and differential settlement are expected to be on the order of 3/4-inch and 1/4-inch in 25 feet, respectively.

2. An ultimate passive equivalent fluid pressure of 350 pcf and a coefficient of friction of 0.40 are anticipated for the foundations. These are ultimate values that may require application of appropriate safety factors, load factors, depth factors, and/or other factors as deemed appropriate by the architect/engineer.

3. The allowable bearing capacity may be increased by one-third when transient loads such as wind or seismicity are included. Based on the boring logs, the Site Class is anticipated to be "D", a "Stiff Soil Profile" (ASCE, 2013). Using the Earthquake Hazards Program website (USGS, 2016), the ASCE Standard 7-10 setting, Risk Category II per CBC Table 1604.5 (CBSC, 2016), and the site coordinates from the "Site Setting" section of this report, the following seismic parameters were determined.

2016 CBC Mapped Values		**Site Class "C" Adjusted Values**				**Design Values**	
Seismic Parameters	**Values (g)**	**Site Coefficients**	**Values**	**Seismic Parameters**	**Values (g)**	**Seismic Parameters**	**Values (g)**
S_S	1.189	F_a	1.024	S_{MS}	1.218	S_{DS}	0.812
S_1	0.446	F_v	1.554	S_{M1}	0.693	S_{D1}	0.462
Peak Mean Ground Acceleration (PGA_M) = 0.494g **Seismic Design Category** = D							

8.0 CLOSURE

This report is valid for conditions as they exist at this time for planning the type of project described herein. Our intent was to assess the geotechnical feasibility in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use of the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

The preliminary opinions and conclusions of this feasibility report are based upon the geotechnical conditions encountered at and near the site at this time, and should be confirmed and augmented by a geotechnical engineering report once the project reaches an appropriate stage.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text

TECHNICAL REFERENCES

ASCE (American Society of Civil Engineers). 2013. *Minimum Design Loads for Buildings and other Structures (7-10, third printing).* Standards ASCE/SEI 7-10, ASCE.

ASTM (American Society for Testing Materials). 2016. Annual Book of Standards. ASTM

Cal/OSHA. 2007 *"Pocket Guide for the Construction Industry - Excavation, Trenches, and Earthwork."*

CBSC (California Building Standards Commission). 2016. *California Building Code (CBC).* CBSC.

Europa Technologies. 2017. U.S. Department of State Geographer. *Google Earth Website.* Retrieved from: http://www.google.com/earth/index.html

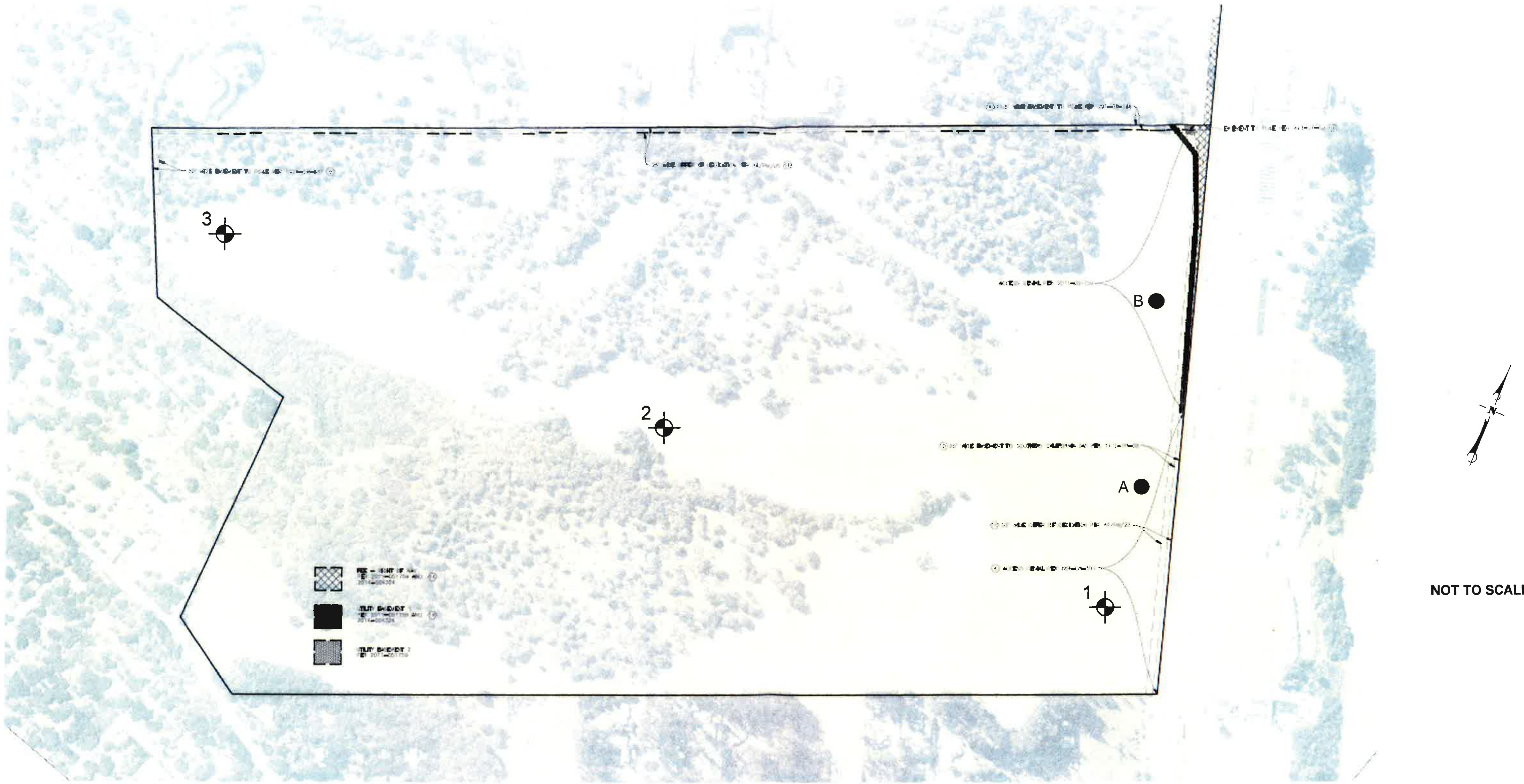
USGS (United States Geological Survey). 2016. "Earthquake Hazards Program." United States Geological Survey. Retrieved from: http://earthquake.usgs.gov/hazards/designmaps/

APPENDIX A

Exploration Location Map

Boring Log Legend

Boring Logs



Base Map Provided By: The Client

LEGEND

3 ⊕ Boring Location (Approx.)

B ● Infiltration Test Location (Approx.)

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EXPLORATION LOCATION MAP
CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, California

Date
August 14, 2017

Project No.
SL-18135-SA

Canada Ranch ELM 8-14-2017.dwg

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	■
STANDARD PENETRATION TEST (SPT)	●
SHELBY TUBE	▭
BULK	○
SUBSURFACE WATER DURING DRILLING	▼
SUBSURFACE WATER AFTER DRILLING	▽

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS	MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS	HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS

BLOWS/FOOT SPT	BLOWS/FOOT CA SAMPLER	DESCRIPTIVE TERM
0-10	0-16	LOOSE
11-30	17-50	MEDIUM DENSE
31-50	51-83	DENSE
OVER 50	OVER 83	VERY DENSE

FINE GRAINED SOILS

BLOWS/FOOT SPT	BLOWS/FOOT CA SAMPLER	DESCRIPTIVE TERM
0-2	0-3	VERY SOFT
3-4	4-7	SOFT
5-8	8-13	MEDIUM STIFF
9-15	14-25	STIFF
16-30	26-50	VERY STIFF
OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING					
# 200		# 40	# 10	# 4		3/4"		3"	12"
SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS		
	FINE	MEDIUM	COARSE	FINE	COARSE				

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend121714.dwg

Earth Systems Pacific

Boring No. 1

PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP-SM	POORLY GRADED SAND WITH SILT: light brown, dry, loose					
3		slightly moist					
5		medium dense	5.0-6.5	SPT			3 5 6
9		moist					
10		gray mottled orange, trace clay	10.0-11.5	SPT			9 11 13
15		orange-brown, clay ends	15.0-16.5	SPT			6 7 7
20			20.0-21.5	SPT			6 9 8
25		End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

PAGE 1 OF 2
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SM	SILTY SAND: brown, dry loose					
3		orange-brown, slightly moist					
5			5.0-6.5	SPT			2, 1, 2
8	SP-SM	POORLY GRADED SAND WITH SILT: yellow-brown, moist					
10			10.0-11.5	SPT			3, 4, 5
13		light brown, medium dense					
20			20.0-21.5	SPT			4, 7, 10

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

JOB NO.: SL-18135-SA
DATE: 08/14/2017

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27	SP-SM		POORLY GRADED SAND WITH SILT: as above					
30			light brown mottled orange, some clayey sand lenses ~1" thick	30.0-31.5	●			5 7 9
35			trace clay					
40	SC		CLAYEY SAND: brown, moist, medium dense					
46	SP		POORLY GRADED SAND: light brown, moist, medium dense					
50			End of Boring @ 50.0' No Subsurface Water Encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3

PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: orange-brown, dry, loose, trace silt					
3			slightly moist					
5				5.0-6.5	SPT			1 2 1
9			yellow brown					
10				10.0-11.5	SPT			2 4 5
13			medium dense					
15			light yellow brown	15.0-16.5	SPT			4 8 9
20				20.0-21.5	SPT			6 8 11
25			End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Infiltration Test Results

INFILTRATION TEST RESULTS

Infiltration Test: A
Date Drilled: August 14, 2017
Date Tested: August 14, 2017
Technician: CA

Test Hole Diameter: 6 inches
Test Hole Depth: 63 inches
Test Duration: 100 minutes

CONSTANT HEAD RESULTS

Time: 30 minutes
Water added: 48.7 gallons (6.5 cu.ft.)
Depth to constant head: 4 inches

FALLING HEAD RESULTS

INTERVAL (minutes)	READING (inches)	INCREMENTAL FALL (inches)	INFILTRATION RATE (minutes / inch)	INFILTRATION RATE (inches / hour)
Begin	6.0	--	--	--
1	28.5	22.5	0.04	1500
1	37.8	9.3	0.1	600
1	44.3	6.5	0.2	300
1	46.8	2.5	0.4	150
1	48.5	1.7	0.6	100
5	53.3	4.8	1.0	60
5	55.5	2.2	2.3	26
5	57.0	1.5	3.3	18
5	57.5	0.5	10	6
Refill	6.0	--	--	--
5	42.3	36.3	0.1	600
5	49.5	7.2	0.7	86
5	52.8	3.3	1.5	40
5	54.0	1.2	4.2	14
5	55.0	1.0	5.0	12
Refill	6.0	--	--	--
5	42.5	36.5	0.1	600
5	49.3	6.8	0.7	86
5	53.8	4.5	1.1	55
5	54.5	0.7	7.1	8

INFILTRATION TEST RESULTS

Infiltration Test: B
Date Drilled: August 14, 2017
Date Tested: August 14, 2017
Technician: CA

Test Hole Diameter: 6 inches
Test Hole Depth: 60 inches
Test Duration: 125 minutes

CONSTANT HEAD RESULTS

Time: 30 minutes
Water added: 32.5 gallons (4.3 cu.ft.)
Depth to constant head: 4 inches

FALLING HEAD RESULTS

INTERVAL (minutes)	READING (inches)	INCREMENTAL FALL (inches)	INFILTRATION RATE (minutes / inch)	INFILTRATION RATE (inches / hour)
Begin	2.0	--	--	--
1	13.5	11.5	0.09	667
1	20.5	7.0	0.1	600
1	25.5	5.0	0.2	300
1	29.5	4.0	0.3	200
1	32.8	3.3	0.3	200
5	42.5	9.7	0.5	120
5	50.0	7.5	0.7	86
5	55.5	5.5	0.9	67
Refill	2.0	--	--	--
1	16.3	14.3	0.1	600
1	23.5	7.2	0.1	600
1	26.8	3.3	0.3	200
1	30.0	3.2	0.3	200
1	32.5	2.5	0.4	150
5	38.8	6.3	0.8	75
5	44.8	6.0	0.8	75
5	48.5	3.7	1.4	43
5	51.0	2.5	2.0	30
5	53.5	2.5	2.0	30
5	55.5	2.0	2.5	24
Refill	2.0	--	--	--
5	33.5	31.5	0.2	300
5	40.0	6.5	0.8	75
5	44.3	4.3	1.2	50
5	47.8	3.5	1.4	43
5	50.8	3.0	1.7	35
5	52.3	1.5	3.3	18
5	54.8	2.5	2.0	30
5	55.5	0.7	7.1	8

Geotechnical Engineering Report and Revised Engineering Geology Report for Dana Reserve Northwest of North Frontage Road

Earth Systems
2049 Preisker Lane, Suite E | Santa Maria, CA 93454 | Ph: 805.928.2991 | www.earthsystems.com

September 15, 2021

FILE NO.: 304746-001

Mr. Nick Tompkins
NKT Development, LLC
684 Higuera Street, Suite B
San Luis Obispo, California 93401

PROJECT: DANA RESERVE
NORTHWEST OF NORTH FRONTAGE ROAD
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

SUBJECT: TRANSMITTAL LETTER

REFERENCES: See Final Page

Dear Mr. Tompkins:

This is a transmittal letter for our Geotechnical Engineering Report and Revised Engineering Geology Report (Reference Nos. 1 and 2) for the Dana Reserve project. The project is located at the northwest of North Frontage Road in the Nipomo area of San Luis Obispo County, California.

Earth Systems Pacific (ESP) previously prepared a Geotechnical Feasibility Report for the project (then named Canada Ranch) in 2017 (Reference No. 3). LandSet Engineers, Inc. reviewed this report and published a review letter (Reference No. 4). The LandSet reviewer concluded that a more robust program of subsurface exploration should be completed and that supplemental geotechnical engineering and engineering geology reports should be prepared to comply with San Luis Obispo County Land Use Ordinance, the California Geological Survey (CGS) Special Publication 117A, and the San Luis Obispo County Guidelines for Engineering Geology Reports, and CGS Note 52.

As requested by the reviewer, we performed a field investigation consisting of 9 additional soil borings. We also performed laboratory testing of selected soil samples. We prepared a geotechnical engineering report and engineering geology report (Reference Nos. 1 and 2) to identify and discuss the geologic hazards and geotechnical engineering issues of concern and to comply with the applicable considerations of the San Luis Obispo County and CGS references listed above. Reference Nos. 1 and 2 are intended to be used together. We have not identified any geologic or geotechnical engineering issues that would preclude the development of the project as currently planned and have generally concluded that the site is suitable for the proposed development as currently designed provided that the recommended geotechnical engineering and engineering geology recommendations are implemented in the planning, design, and construction of the project.

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,
Earth Systems Pacific

Phillip Madrid, PE
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP W. MADRID
PE 87519
CIVIL
STATE OF CALIFORNIA

Doc. No. 2109-015.LTR

References:

1) Geotechnical Engineering Report, Dana Reserve, by Earth Systems Pacific, dated September 9, 2021, Doc. No. 2109-001.SER (ATTACHED)
2) Revised Engineering Geology Report, Dana Reserve, by Earth Systems Pacific, dated September 10, 2021, Doc. No. 2108-042.REVGEO (ATTACHED)
3) Geotechnical Feasibility Report, Canada Ranch, by Earth Systems Pacific, dated September 11, 2017, Doc. No. 1709-013.SER
4) Review of Geotechnical Feasibility Report, Dana Reserve (APN's 091-301-073, -030, -031) Nipomo Area of San Luis Obispo County, by LandSet Engineers, Inc., File No.: 0916-01, dated June 25, 2021

GEOTECHNICAL ENGINEERING REPORT
DANA RESERVE
NORTHWEST OF NORTH FRONTAGE ROAD
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

September 9, 2021

Prepared for

Mr. Nick Tompkins
NKT Development, LLC

Prepared by

Earth Systems Pacific
2049 Preisker Lane, Suite E
Santa Maria, California 93454

Earth Systems

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September 9, 2021

FILE NO.: 304746-001

Mr. Nick Tompkins
NKT Development, LLC
684 Higuera Street, Suite B
San Luis Obispo, California 93401

PROJECT: DANA RESERVE
NORTHWEST OF NORTH FRONTAGE ROAD
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

SUBJECT: Geotechnical Engineering Report

REF: 1) Proposal for a Geotechnical Engineering and Engineering Geology Report, Dana Reserve, by Earth Systems Pacific, dated July 15, 2021, Doc. No. SM-2107-025.PRP

2) Review of Geotechnical Feasibility Report, Dana Reserve (APN's 091-301-073, -030, -031) Nipomo Area of San Luis Obispo County, by LandSet Engineers, Inc., File No.: 0916-01, dated June 25, 2021

Dear Mr. Tompkins:

In accordance with the authorization of the above-referenced proposal, this geotechnical engineering report has been prepared for the Dana Reserve project. This project is planned northwest of North Frontage Road at Sandydale Drive in the Nipomo area of San Luis Obispo County, California.

Preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, retaining walls, slabs-on-grade and exterior flatwork, pavement sections, drainage and maintenance, and construction observation and testing are presented herein. This report is also intended to respond to geotechnical engineering-related comments by Landset Engineers, Inc. on behalf of the County of San Luis Obispo (Reference 2). Two bound copies and an electronic copy of this report are being furnished for your use.

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned

Sincerely,
Earth Systems Pacific

Phillip Madrid, PE
Project Engineer

Doc. No. 2109-001.SER/ln

REGISTERED PROFESSIONAL ENGINEER
PHILLIP W. MADRID
PE 87519
CIVIL
STATE OF CALIFORNIA

signed 1-13-2021

Table of Contents

1.0 INTRODUCTION

The Dana Reserve project is a master planned community that will be constructed within a 288-acre property. The project is located northwest of North Frontage Road at Sandydale Drive in the Nipomo area of San Luis Obispo County, California. The property is referred to herein as "the site", and the site is shown on Figure 1 the Site Vicinity Map presented in Appendix A.

We understand the site will be developed with single and multi-family residences, commercial/retail buildings, recreation areas, open space, and associated surface and subsurface improvements. We have assumed that residential and commercial structures will be one to four stories, will be of wood and steel frame construction, and will utilize Portland cement concrete (PCC) slabs-on-grade. Masonry and/or concrete retaining walls for sitework and/or connected to and forming part of the structures are anticipated. Masonry boundary walls and/or other types of perimeter fencing may also be constructed. Maximum line loads are anticipated to be approximately 4 kips per linear foot, and maximum point loads are anticipated to be approximately 40 kips.

We have assumed surface improvements will consist of hot mix asphalt (HMA) and/or PCC pavement over aggregate base (AB) for vehicles and PCC flatwork for pedestrian use. We have assumed subsurface improvements will be the underground municipal sewer, water, power, and communications utilities that will provide service to the project. Surface runoff will be transmitted to and disposed of into Low Impact Development (LID) drainage disposal improvements. On-site effluent disposal systems are not anticipated for this project and are not addressed in this report.

We have assumed the site will be graded to develop the building and surface improvement areas, to improve access, and to improve drainage. Cuts and fills are anticipated to be on the order 20 feet or less. Cut and fill slopes not exceeding 15 feet in height and inclined at 3:1 or flatter may also be constructed.

2.0 SCOPE OF SERVICES

The scope of work for the geotechnical engineering report included a general site reconnaissance, a review of the geotechnical feasibility report (ESP, 2017), subsurface exploration, laboratory testing of selected samples, geotechnical analysis of data, and preparation of this report. The analysis and subsequent recommendations were based, in part, upon information provided by the client.

This report and preliminary geotechnical recommendations are intended to comply with the considerations of California Building Code (CBC) Sections 1803.1 through 1803.6, J104.3 and J104.4 (CBSC, 2019), as applicable; Special Publication 117a (CDMG, 2008); and common geotechnical engineering practice in this area under similar conditions at this time. The test procedures were performed in general conformance with the standards noted, as modified by common geotechnical engineering practice in this area under similar conditions at this time.

Preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, retaining walls, slabs-on-grade and exterior flatwork, pavement sections, drainage and maintenance, and construction observation and testing are presented to guide the development of project plans and specifications. It is our intent that this report be used exclusively by the client to form the geotechnical basis of the design of the project and in the preparation of the plans and specifications. Application beyond this intent is strictly at the user's risk. If future parties wish to use this report, such use may be allowed to the extent the report is applicable, only if the user agrees to be bound by the same contractual conditions as the original client, or contractual conditions that may be applicable at the time of the report use.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, dewatering, temporary slope angles, construction means and methods, etc. Analyses of the soil for asbestos (either naturally occurring or in man-made products), radioisotopes, mold or other microbial content, hydrocarbons, lead, and/or other chemical properties (except for geotechnical corrosivity) are beyond the scope of this report. Ancillary features such as temporary access roads, fencing, flag and light poles, signage, effluent disposal systems, drainage disposal systems, and nonstructural fills are not within our scope and are also not addressed.

The geotechnical engineer should be retained to provide consultation as the design progresses, and to review project plans as they near completion to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report. In the event that there are any changes in the nature, design, or location of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are verified or modified by the geotechnical engineer in writing. The criteria presented in this report are considered preliminary until such time as any peer review or review by any jurisdiction has been completed, conditions are observed by the geotechnical engineer in the field during construction, and the recommendations have been verified as appropriate or are modified by the geotechnical engineer in writing.

3.0 SITE SETTING

The site is an approximately 288-acre parcel located in the Nipomo area or the southwest sector of San Luis Obispo County, California. The site is northwest of North Frontage Road at Sandydale Drive. Gates along Hetrick Road, Cherokee Place, and the North Frontage Road provide access to the site. Rural-residential properties and undeveloped open space form the southeast, southwest, and northwest site boundaries; US Highway 101 forms the northeast boundary. The approximate central site coordinates and elevation obtained from the Google Earth website (Google, 2021) are latitude 35.046 degrees north, longitude 120.503 degrees west, and 371 feet.

The site is generally undeveloped except for a few unimproved access roads and is covered with a sparse to dense growth of vegetation consisting mostly of seasonal grasses, brush, and mature oak trees. The ground surface of the site generally slopes gently to the northeast towards Nipomo Creek; drainage is by sheet flow.

4.0 FIELD INVESTIGATIONS AND LABORATORY ANALYSIS

Previous Investigation

Earth Systems Pacific (ESP) prepared a geotechnical feasibility report (Reference 2) for the site which was known at the time as the Canada Ranch Property. On August 14, 2017, five borings were drilled at the site to depths of approximately 5 to 50 feet below the existing ground surface (bgs). Two of the borings were drilled for infiltration testing, and the other three borings (designated as Boring Nos. 1 through 3) were drilled for exploratory purposes. The borings were drilled with a Mobile Drill Model B-53 truck mounted drill rig, equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling. The approximate locations of the exploratory borings are shown on the Exploration Location Map presented as Figure 2, in Appendix A.

Standard Penetration Tests were conducted at selected depths in the borings (ASTM D 1586-11). Soils encountered in the exploratory borings were logged and categorized in general accordance with the Unified Soil Classification System and ASTM D 2488-09a. Copies of the boring logs can also be found in Appendix A. In reviewing the boring logs and the legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the characteristics observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in subsurface descriptions that vary somewhat from the legend.

Current Investigation

Nine additional borings (designated as Boring Nos. 4 through 12) were drilled on July 27 through 29, 2021, to depths ranging from 15 to 50 feet bgs. The borings were drilled with a Mobile Drill Model B-53 truck mounted drill rig, equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling. The approximate locations of the borings are shown on the Exploration Location Map presented as Figure 2, in Appendix A.

Soils encountered in the exploratory borings were logged and categorized in general accordance with the Unified Soil Classification System and ASTM D 2488-17. Copies of the boring logs can also be found in Appendix A. In reviewing the boring logs and the legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the characteristics observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in subsurface descriptions that vary somewhat from the legend. The reader should also consider the sampler type used when reviewing the blow counts.

As the borings were drilled, soil samples were obtained using a 3-inch outside diameter ring-lined barrel sampler (ASTM D3550-17 with shoe similar to D2937-17). Standard penetration tests (SPT) using a 2-inch outside diameter split-spoon sampler were also performed in the borings (ASTM D1586-18) at selected depths. Bulk soil samples were obtained from the auger cuttings.

Ring samples were tested for bulk density per ASTM D2937-17 (modified for ring liners). Two bulk samples were tested for maximum density and optimum moisture content (ASTM D1557-12), and direct shear tests (ASTM D3080/D3080M-11) were conducted on the same samples after they were remolded to approximately 90 percent of maximum dry density. One of the bulk samples was tested for particle size per ASTM D1140-17. Another bulk sample was tested for R-value (ASTM D2844/D2844M-18). One dimensional consolidation tests (ASTM D2435/D2435M-11(2020)) were performed on selected ring samples. Two samples were also sent to CERCO Analytical, Inc. of Concord, California for use in preparing a corrosion evaluation report. The corrosion evaluation report and associated test results are for use by the architect/engineer in determining appropriate corrosion mitigation measures. The laboratory test results and the corrosion evaluation report prepared by CERCO Analytical, Inc. are presented in Appendices B and C, respectively.

5.0 GENERAL SUBSURFACE SOIL PROFILE

The subsurface profile observed in the borings generally consisted of layered sand soils with variable amounts of silt and clay. These soils were generally in a dry to wet condition and ranged from loose to dense in consistency. Groundwater was encountered during drilling in Boring 4 at 40 feet bgs and at 39 feet bgs in Boring 5; the water level stabilized in both borings at 35 feet bgs after drilling was completed. Please refer to the boring logs presented in Appendix A for a more detailed description of the subsurface profile.

6.0 CONCLUSIONS

In our opinion, the site is suitable, from a geotechnical engineering standpoint, for the planned development as described in the “Introduction” section of this report, provided the recommendations contained herein are implemented in the design and construction. Assuming the site is designed and prepared in accordance with the “Preliminary Geotechnical Recommendations” section of this report, the structures may be supported by shallow conventional continuous and spread (pad) footings.

The geotechnical engineering topics addressed in this section are the potential for strong ground shaking, the potential for settlement, the potential for liquefaction and seismically induced settlement of dry sand, the expansion potential of the soils, the excavation characteristics of the soils, the suitability of the soils for use as fill and backfill, the stability of the soils during grading, the erodible nature of the soils, and the corrosivity of the soils.

<u>Strong Ground Shaking</u>

The site is in a region of high seismic activity, with the potential for large seismic events that could generate strong ground shaking. The CBC requires that seismic loads be considered in structural design. A seismic analysis was undertaken to provide seismic acceleration design parameters; the results are presented in the “Foundations” section of this report for use by others in the structural design process.

The ASCE 7-16 (ASCE, 2017/2018) method, available on the Structural Engineers Association of California (SEAOC) Seismic Design Map Tool website (SEAOC, 2021), was used for the seismic analysis. The risk category for buildings and structures is assigned by others in accordance with Table 1604.5 (CBSC, 2019); however, based on our current understanding of the project, we selected Risk Category II for our analysis. The site coordinates from the "Site Setting" section of this report were used in the analysis. Based on the general subsurface profile encountered and the sampler blowcounts, the Site Class per Chapter 20 Table 20.3-1 (ASCE, 2017) is "D", a "Stiff Soil Profile". A general ground motion seismic analysis was performed, assuming that Exception 2 listed in Section 11.4.8 (ASCE, 2017) will apply to the project. We also provided seismic parameters if the Simplified Lateral Force Analysis Procedure from Section 12.14.8 (ASCE, 2017) will be used in structural design.

Settlement Potential

Settlement (total and differential) can occur when foundations and surface improvements span materials having variable consolidation, moisture, and density characteristics. Such a situation can stress and possibly damage foundations and surface improvements, often resulting in severe cracks and displacement. To reduce this settlement potential, it is necessary for all foundations and surface improvements to bear on material that is as uniform as practicable. A program of overexcavation, scarification, moisture conditioning, and compaction of the upper soils in the building and the surface improvement areas is recommended to provide more uniform soil moisture and density and appropriate support.

Another concern with respect to settlement is the potential for hydroconsolidation. Hydroconsolidation is the tendency of soils to settle upon saturation, even without being subjected to increased loads. Based on our laboratory test data the soils are considered to have a slight to moderate potential to collapse when saturated. The recommended earthwork program and the installation and maintenance of drainage improvements will reduce the potential for hydroconsolidation to affect the building and surface improvements.

Another concern with respect to settlement is large-scale subsidence related to groundwater pumping or the extraction of oil or gas. The project area has not been identified as an area of concern for such subsidence (USGS, 2021a).

Settlement due to liquefaction and seismically induced settlement of dry sand is addressed below.

<u>Liquefaction and Seismically Induced Settlement of Dry Sand</u>

Liquefaction is the loss of soil strength caused by a significant seismic event. It occurs primarily in loose, fine to medium-grained sands, and in very soft to medium stiff silts that are saturated by groundwater. During a major earthquake, the saturated sands and silts tend to compress and the void spaces between the soil particles that are filled with water decrease in volume. This causes the pore water pressure to build up in the soils. Then if the water does drain away rapidly, the soils may lose their strength and transition into a liquefied state.

Seismically induced settlement of dry sand is also caused by a significant seismic event, and may occur in lower density and sand and silt soils that are not saturated by groundwater. During a major earthquake, the void spaces between the unsaturated soil particles that are filled with air tend to compress which translates to a decrease in volume or settlement.

In order to screen for the potential for liquefaction and seismically induced settlement of dry sand and their relative effects on the site, we reviewed the boring data and utilized methods suggested by the Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117a (CDMG, 2008). Considering the presence of groundwater and the density of the soils there appears to be a potential for both liquefaction and seismically induced settlement of dry sand to occur.

To further understand the magnitude and potential effects of liquefaction and seismically induced settlement of dry sand, we analyzed of boring data using the PGA_M of 0.527g from the "Foundations" section of this report, an earthquake mean magnitude over all sources of 6.74 (USGS, 2021b), and a groundwater elevation of 35 feet bgs. Our analyses indicated that the saturated soils are nonliquefiable; therefore, the potential for liquefaction to cause dynamic settlement, lateral spreading, or loss of soil bearing is considered nil. Based on our analyses of the unsaturated soils and assuming the site is prepared in accordance with the recommendations later in this report, total and differential seismically induced settlement of dry sand is not expected to exceed 0.5 inches and 0.25 inches, respectively.

Accordingly, no special measures will be needed to protect the structures and associated improvements from liquefaction and/or seismically induced settlement of dry sand.

Expansive Soils

The upper site soils were judged to be nonexpansive; therefore, no special measures with respect to expansive soils are considered necessary.

Excavation Characteristics

The soils are anticipated to be excavatable with conventional earthmoving equipment; however, the stability of excavations is a concern. Based on our preliminary testing, the soils are considered to be "Type C" soils per the 2019 Cal/OSHA classification system. This classification should be verified by the contractor's "Competent Person" at the time of construction. Excavation sloping and shoring will be needed to safely work in, and to restrict the size of, the excavations. As with all construction safety issues, the methods of excavation stabilization, sloping, and/or shoring are ultimately the responsibility of the contractor.

Suitability of the Soils for Use as Fill and Backfill

We anticipate that the majority, if not all, of the soils excavated at the site will be acceptable from a geotechnical viewpoint for reuse as compacted fill and backfill. However, special requirements for utility trench bedding and shading per the specifications of San Luis Obispo County, the conduit manufacturer, and the utility companies should be anticipated.

Stability of the Soils During Grading

The soils may be susceptible to temporary high soil moisture contents, especially during or soon after the rainy season. Attempting to compact the soils in an overly moist condition may create unstable conditions in the form of pumping, yielding, shearing, and/or rutting. These conditions will not allow proper compaction and are inappropriate for continued fill placement. Therefore, the construction schedule should allow adequate time during grading for aerating and drying the soils to near optimum moisture content prior to compaction. If unstable conditions occur, the geotechnical engineer should be consulted to provide recommendations for correction of the conditions.

Soil Erosion

The site soils are considered to be highly erodible. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means *during* and *following* construction is essential to reduce the potential of erosion damage. Care should be taken to establish and maintain proper drainage around the structures and improvements.

Soil Corrosivity

Based on the testing performed by CERCO Analytical, Inc., the upper site soils were classified as "noncorrosive to mildly corrosive" to certain construction materials that will be in contact with the soils. The engineer should refer to the CERCO Analytical, Inc. report presented in Appendix C for use in determining appropriate mitigation measures for soil corrosivity.

7.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The following preliminary geotechnical recommendations are applicable to the structures and improvements as described in the "Introduction" section of this report and assume that all floors will be above grade. If basements or cellars, taller or stacked retaining walls, or other such features are incorporated into site development, this firm should be contacted for individual assessment.

Definitions

Unless otherwise noted, the following definitions are used in these recommendations. Where specific terms are not defined, common definitions used in the construction industry are intended.

- **Building Area:** The building area is defined as the area within and extending a minimum of 5 feet beyond the perimeter of the foundations for a structure or as the entire lot in the case of single family residential or townhome/duplex-style lots. The building area also includes the foundation areas (plus 5 feet to each side) of any ancillary structure that will be rigidly attached to the main structure and is expected to perform in the same manner as the main structure. Such structures could include covered walkways, patio covers, arbors, etc.

- **Surface Improvement Area:** The area within and extending a minimum of 2 feet beyond the perimeter of the surface improvement.

- **Scarified**: Ripping the exposed soil surface in two orthogonal directions to a minimum depth of 12 inches.

- **Moisture Conditioning:** Adjusting the soil moisture to optimum moisture content or slightly above, prior to the application of compaction effort.

- **Compacted or Recompacted:** Soils placed in level lifts not exceeding 8 inches in loose thickness, and compacted to a minimum of 90 percent of maximum dry density. A minimum of 95 percent will be required in the upper 1-foot of subgrade below vehicle pavement and in all AB. The standard tests used to define maximum dry density and field density should be ASTM D1557-12 and ASTM D6938-17a, respectively, or by other methods acceptable to the geotechnical engineer and the governing jurisdiction.

- **Nonexpansive Material:** Nonexpansive material is defined as being a coarse-grained soil (ASTM D2487-17) and having an expansion index of 10 or less (ASTM D4829-19).

Site Preparation

1. The existing ground surface in the building and surface improvements areas should be prepared for construction by removing existing improvements, vegetation, large roots, debris, and other deleterious material. *Any existing fill soils should be completely*

removed and replaced as compacted fill. Any existing utilities that will not remain in service should be removed or properly abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility. Recommendations for abandonment can be made as necessary.

2. Voids created by the removal of materials or utilities, and extending below the recommended overexcavation depth, should be immediately called to the attention of the geotechnical engineer. No fill should be placed unless the geotechnical engineer has observed the underlying soil.

Grading

1. Following site preparation, the soils in the building area for one- and two-story buildings should be removed to a level plane at a minimum depth of 3 feet below the bottom of the deepest footing or 4 feet below existing grade, *whichever is deeper*. The soils in the building area for three- and four-story buildings should be removed to a level plane at a minimum depth of 4 feet below the bottom of the deepest footing or 5 feet below existing grade, *whichever is deeper.* During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface should then be scarified, moisture conditioned, and compacted prior to placing any fill soil.

2. In addition to the recommendations of Paragraph 1 of this section, we recommend that all cut or cut/fill transition areas be overexcavated such that a minimum of 5 feet of compacted fill is provided within all the building areas. Also, the minimum depth of the fill below the building area should not be less than half of the maximum depth of fill below the building area. For example, if the maximum depth of fill below the building area is 20 feet, then the minimum depth of fill below the same building area grades should be no less than 10 feet. In no case should the depth of fill be less than 5 feet on the building areas.

3. Following site preparation, the soils in the surface improvement area should be removed to a level plane at a minimum depth of 1-foot below the proposed subgrade elevation or 2 feet below the existing ground surface, whichever is deeper. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface should then be scarified, moisture conditioned, and compacted prior to placing any fill soil

4. Following site preparation, the soils in fill areas beyond the building and surface improvement areas should be removed to a depth of 2 feet below existing grade. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface should then be scarified, moisture conditioned, and compacted prior to placing any fill soil.

5. Voids created by dislodging cobbles and/or debris during scarification should be backfilled and compacted, and the dislodged materials should be removed from the area of work.

6. On-site material and approved import materials may be used as general fill. All imported soil should be nonexpansive. The proposed imported soils should be evaluated by the geotechnical engineer before being used, and on an intermittent basis during placement on the site.

7. All materials used as fill should be cleaned of any debris and rocks larger than 6 inches in diameter. No rocks larger than 3 inches in diameter should be used within the upper 3 feet of finish grade. When fill material includes rocks, the rocks should be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

8. The soils are estimated to shrink by approximately 15 to 20 percent when prepared and graded as recommended above.

Utility Trenches

1. Unless otherwise recommended, utility trenches adjacent to foundations should not be excavated within the zone of foundation influence, as shown on Typical Detail A presented in Appendix D.

2. Utilities that must pass beneath foundations should be placed with properly compacted utility trench backfill and the foundation should be designed to span the trench.

3. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utilities. Generally, the soil found at the site may be used for trench backfill above the select material.

4. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utilities. Generally, the soil found at the site may be used for trench backfill above the select material.

5. Utility trench backfill should be moisture conditioned and compacted; however, a minimum of 95 percent of maximum dry density should also be obtained where trench backfill comprises the upper 1-foot of subgrade beneath HMA or PCC pavement, and in all AB. For utility trench backfill in current or future San Luis Obispo County right of way a minimum of 95 percent of maximum dry density should also be obtained for all trench backfill (SLOCO, 2019).

6. Jetting of trench backfill should generally not be allowed as a means of backfill densification. However, to aid in *encasing* utility conduits, particularly corrugated conduits and multiple closely spaced conduits in a single trench, jetting or flooding may be useful. Jetting or flooding should only be attempted with extreme caution, and any jetting or flooding operation should be subject to review by the geotechnical engineer.

7. The Corrosion Evaluation Report prepared by CERCO Analytical, Inc. and presented in Appendix C should be used by the architect/engineer in specifying appropriate corrosion protection measures for the utility improvements.

8. The recommendations of this section are minimums only, and may be superseded by the architect/engineer based upon the soil corrosivity, or the requirements of the pipe manufacturer, the utility companies, or the governing jurisdiction.

Foundations

1. Conventional continuous and spread footings bearing on soil compacted per the "Grading" section of this report may be used to support the new structures. Grade beams should also be placed across all large entrances into the buildings. Footings and grade beams should have a minimum depth of 12 inches below lowest adjacent grade; however, footings and grade beams for commercial buildings and residential buildings two stories or greater should have a minimum depth of 18 inches below lowest adjacent grade. All spread footings should be a minimum of 2 feet square. Footing and grade beam dimensions should also conform to the applicable requirements of Section 1809 (CBSC, 2019). Footing reinforcement should be in accordance with the requirements of the architect/engineer; minimum continuous footing and grade beam reinforcement should consist of two No. 4 rebar, one near the top and one near the bottom of the footing.

2. Footings should be designed using a maximum allowable bearing capacity of 2,000 psf dead plus live load. The allowable bearing capacity may be increased by 200 psf for each additional 6 inches of embedment below a depth of 12 inches below lowest adjacent grade. The allowable bearing capacity should not exceed 3,000 psf dead plus live loads. Using these criteria, maximum total and differential settlement under static conditions are expected to be on the order of 3/4-inch and 1/4-inch in 25 feet, respectively. Footings should also be designed to withstand total and differential dynamic settlement of 1/2-inch and 1/4- inch across the largest building dimension, respectively.

3. Lateral loads may be resisted by soil friction and by passive resistance of the soil acting on foundations. Lateral capacity is based on the assumption that backfill adjacent to foundations is properly compacted. A passive equivalent fluid pressure of 375 pcf and a coefficient of friction of 0.39 may be used in design. No factors of safety, load factors, and/or other factors have been applied to any of the values.

4. The allowable bearing capacity may be increased by one-third when transient loads such as wind or seismicity are included if the structural engineer determines they are allowed per Sections 1605.3.1 and 1605.3.2 (CBSC, 2019). The following seismic parameters are presented for use in structural design.

SEISMIC DESIGN PARAMETERS

2019 CBC Mapped Values		Site Class "D" Adjusted Values				Design Values	
Seismic Parameters	Values (g)	Site Coefficients	Values	Seismic Parameters	Values (g)	Seismic Parameters	Values (g)
S_S	1.056	F_a	1.078*	S_{MS}	1.138	S_{DS}	0.759*
S_1	0.386	F_v	1.914	S_{M1}	0.739	S_{D1}	0.493
Peak Mean Ground Acceleration (PGA_M) = 0.527g **Seismic Design Category** = D * F_a should be taken as 1.4 and S_{DS} as 0.996 if the Simplified Lateral Force Analysis Procedure in Section 12.14.8 (ASCE, 2017) is used in structural design							

5. Foundation excavations should be observed by the geotechnical engineer prior to placement of reinforcing steel or any formwork. Foundation excavations should be thoroughly moistened prior to PCC placement and no desiccation cracks should be present.

Retaining Walls

1. All retaining wall foundations should be founded in soil compacted as recommended in paragraph 1 of the "Grading" section of this report. Conventional foundations for retaining walls should have a minimum depth of 12 inches below lowest adjacent grade

not including the keyway. We have assumed that retaining walls will not exceed 6 feet in height.

2. As we have assumed that retaining wall heights will not exceed a height of 6 feet, seismic design per Section 1803.5.12.1 (CBSC, 2019) is not required. If retaining walls will retain more than 6 feet of soil, seismic design will be required by the geotechnical engineer.

3. Retaining wall design should be based on the following parameters:

   Active equivalent fluid pressure
   (native soil, imported sand or gravel backfill) ....35 pcf
   At-rest equivalent fluid pressure
   (native soil, imported sand or gravel backfill) ....55 pcf
   Passive equivalent fluid pressure (compacted fill) ....375 pcf
   Maximum toe pressure (compacted fill) ....2,000 psf
   Coefficient of sliding friction (compacted fill) 0.39

4. No surcharges are taken into consideration in the above values. The maximum toe pressure is an *allowable* value to which a factor of safety has been applied. No factors of safety, load factors, and/or other factors have been applied to any of the remaining values.

5. The above pressures are applicable to a horizontal retained surface behind the wall. Walls having a retained surface that slopes upward from the wall should be designed for an additional equivalent fluid pressure of 1 pcf for the active case and 1.5 pcf for the at-rest case, for every two degrees of slope inclination.

6. The active and at-rest values presented above are for drained conditions. Consequently, retaining walls should be drained with rigid perforated pipe encased in a free draining gravel blanket. The pipe should be placed perforations downward and should discharge in a nonerosive manner away from foundations and other improvements. The gravel

blanket should have a width of approximately 1-foot and should extend upward to approximately 1-foot from the top of the wall. The upper foot should be backfilled with on-site soil, except in areas where a slab or pavement will abut the top of the wall. In such cases, the gravel backfill should extend up to the material that supports the slab or pavement. To reduce infiltration of the soil into the gravel, a permeable synthetic fabric conforming to the Standard Specifications (Caltrans, 2018) Section 96-1.02B – Class "C," should be placed between the two. Manufactured geocomposite wall drains conforming to the Standard Specifications (Caltrans, 2018) Section 96-1.02C are acceptable alternatives to the use of gravel, provided that they are installed in accordance with the recommendations of the manufacturer. Where drainage can be properly controlled, weep holes on maximum 4-foot centers may be used in lieu of perforated pipe. A filter fabric as described above should be placed between the weep holes and the drain gravel.

7. Retaining walls where moisture transmission through the wall would be undesirable should be *thoroughly* waterproofed in accordance with the specifications of the architect/engineer.

8. The architect/engineer should bear in mind that retaining walls by their nature are flexible structures, and that surface treatments on walls often crack. Where walls are to be plastered or otherwise have a finish applied, the flexibility should be considered in determining the suitability of the surfacing material, spacing of horizontal and vertical control joints, etc. The flexibility should also be considered where a retaining wall will abut or be connected to a rigid structure, and where the geometry of the wall is such that its flexibility will vary along its length.

Slabs-on-Grade and Exterior Flatwork

1. Conventional interior light duty PCC slabs-on-grade and exterior flatwork should have a minimum thickness of 4 full inches; however, the thickness of heavy duty slabs and flatwork should be specified by the architect/engineer. Conventional interior slabs-on-grade should be doweled to footings and grade beams with dowels.

2. Reinforcement size, placement, and dowels should be as directed by the architect/engineer. Interior slabs-on-grade and light duty exterior flatwork should be reinforced, at a minimum, with No. 3 rebar at 18 inches on-center each way. Heavy duty exterior flatwork should have minimum rebar sizing and spacing that meets the criteria of American Concrete Institute (ACI) 318 (ACI, 2014). A modulus of subgrade reaction (K_{30}) of 100 psi/inch may be used in the design of heavy duty slabs-on-grade founded on compacted native soil. The modulus of subgrade reaction (K_{30}) may be increased to 150 psi/inch if the slab is underlain with a minimum of 6 inches of compacted Class 2 AB (Caltrans, 2018), and to 200 psi/inch if the slab is underlain with a minimum of 12 inches of compacted Class 2 AB.

3. Due to the current use of impermeable floor coverings, water-soluble flooring adhesives, and the speed at which buildings are now constructed, moisture vapor transmission through slabs is a much more common problem than in past years. Where moisture vapor transmitted from the underlying soil would be undesirable, the slabs should be protected from subsurface moisture vapor. A number of options for vapor protection are discussed below; however, the means of vapor protection, including the type and thickness of the vapor retarder, if specified, are left to the discretion of the architect/engineer.

4. Where specified, vapor retarders should conform to ASTM E1745-17. This standard specifies properties for three performance classes, Class “A”, “B” and “C”. The appropriate class should be selected based on the potential for damage to the vapor retarder during placement of slab reinforcement and concrete.

5. Several recent studies, including those of ACI Document 302.1R-15 (ACI, 2015), have concluded that excess water above the vapor retarder increases the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination. The studies also concluded that *it is preferable to eliminate the typical sand layer beneath the slab and place the slab concrete in direct contact with a Class “A” vapor retarder*, particularly during wet weather construction.

However, placing the concrete directly on the vapor retarder requires special attention to using the proper vapor retarder (see discussion below), a very low water-cement ratio in the concrete mix, and special finishing and curing techniques.

6. Probably the next most effective option would be the *use of vapor-inhibiting admixtures in the slab concrete mix and/or application of a sealer* to the surface of the slab. This would also require special concrete mixes and placement procedures, depending upon the recommendations of the admixture or sealer manufacturer.

7. Another option that may be a reasonable compromise between effectiveness and cost considerations is *the use of a subslab vapor retarder protected by a sand layer*, however this would increase the potential for moisture damage to floor coverings and for mold growth or other microbiological contamination. If a Class “A” vapor retarder (see discussion below) is specified, the retarder can be placed directly on the material at pad grade. The retarder should be covered with a minimum 2 inches of clean sand. If a less durable vapor retarder is specified (Class “B” or “C”), a minimum of 4 inches of clean sand should be provided on top of the material at pad grade, and the retarder should be placed in the center of the clean sand layer. Clean sand is defined as well or poorly graded sand (ASTM D2487-17) of which less than 3 percent passes the No. 200 sieve. The site soils do not fulfill the criteria to be considered “clean” sand.

8. Regardless of the underslab vapor retarder selected, proper installation of the retarder is critical for optimum performance. All seams must be properly lapped, and all seams and utility penetrations properly sealed in accordance with the vapor retarder manufacturer’s recommendations. Installation should conform to ASTM E1643-18a.

9. If sand is used between the vapor retarder and the slab, it should be moistened only as necessary to promote concrete curing; saturation of the sand should be avoided, as the excess moisture would be on top of the vapor retarder, potentially resulting in vapor transmission through the slab for months or years.

10. In conventional construction, it is common to use four to six inches of sand beneath exterior flatwork. Another measure that can be taken to reduce the risk of movement of flatwork is to provide thickened edges or grade beams around the perimeters of the flatwork. The thickened edges or grade beams could be up to 12 inches deep, with the deeper edges or grade beams providing better protection. At a minimum, the thickened edge or grade beam should be reinforced by two No. 4 rebar, one near the top and one near the bottom of the thickened edge or grade beam.

11. Flatwork should be constructed with frequent joints to allow articulation as flatwork moves in response to seasonal moisture and/or temperature variations causing minor expansion and contraction of the soil, or variable bearing conditions. The soil in the subgrade should be moistened to at least optimum moisture content and no desiccation cracks should be present prior to casting the flatwork.

12. Where maintaining the elevation of the flatwork is desired, the flatwork should be doweled to the perimeter foundation as specified by the architect/engineer. In other areas, the flatwork may be doweled to the foundation or the flatwork may be allowed to "float free," at the discretion of the architect/engineer. Flatwork that is intended to float free should be separated from foundations by a felt joint or other means.

13. To reduce shrinkage cracks in PCC, the PCC aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the PCC should be properly placed and finished, contraction joints should be installed, and the PCC should be properly cured. PCC materials, placement, and curing specifications should be at the direction of the architect/engineer. The Guide for Concrete Floor and Slab Construction (ACI, 2015) is suggested as a resource for the architect/engineer in preparing such specifications.

Pavement Sections

The following preliminary pavement sections are based on the tested R-value of 63 and should only be used for cost estimation purposes. The soil exposed at the roadway subgrade should be tested during construction for R-value to verify that these preliminary pavement sections are appropriate, otherwise revised pavement sections should be prepared. Pavement design sections are provided for assumed Traffic Indices (TI) of 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, and 8.0. Determination of the appropriate TI for specific areas is left to others. The pavement sections were calculated in accordance with the Highway Design Manual (Caltrans, 2020). The calculated AB and HMA thickness are for compacted material. Normal Caltrans construction tolerances should apply.

R-value	TI	HMA (inches)	Class 2 AB (inches)
63	4.5	2.50	4.0
	5.0	2.75	4.0
	5.5	3.00	4.0
	6.0	3.25	6.0
	6.5	3.75	6.0
	7.0	4.00	6.0
	7.5	4.25	6.0
	8.0	4.50	6.0

1. The upper 12 inches of subgrade and all AB should be compacted to a minimum of 95 percent of maximum dry density.

2. Subgrade and AB should be firm and unyielding when proof-rolled by heavy rubber-tired equipment prior to paving.

3. Where HMA will lie within 5 feet of landscape or LID drainage improvements, the HMA should be separated from these items by deepened curbs or other means that will reduce the potential for moisture fluctuations in the soils beneath the HMA and improve the stability of the curbs.

4. Finished HMA surfaces should slope toward drainage facilities such that rapid runoff will occur and no ponding is allowed on or adjacent to the HMA.

Drainage and Maintenance

1. Per Section 1804.4 (CBSC, 2019) unpaved ground surfaces should be *finish graded* to direct surface runoff away from foundations and other improvements at a minimum 5 percent grade for a minimum distance of 10 feet. The site should be similarly sloped to drain away from foundations, and other improvements during construction. Where this is not practicable due to other improvements, etc., swales with improved surfaces, area drains, or other drainage facilities, should be used to collect and discharge runoff.

2. The eaves of the buildings should be fitted with roof gutters. Runoff from flatwork, roof gutters, downspouts, planter drains, area drains, etc. should discharge in a nonerosive manner away from foundations and other improvements in accordance with the requirements of the governing agencies. Erosion protection should be placed at all discharge points unless the discharge is to a pavement surface.

3. To reduce the potential for planter drainage gaining access to subslab areas, any raised planter boxes adjacent to foundations should be installed with drains and sealed sides and bottoms. Drains should also be provided for areas adjacent to the structure and in landscape areas that would not otherwise freely drain.

4. The on-site soils are highly erodible. If soils are disturbed during construction, stabilization of soils by vegetation or other means, *during* and *following* construction, is essential to reduce erosion damage. Care should be taken to establish and maintain vegetation. The landscaping should be planned and installed to maintain the surface drainage recommended above. Surface drainage should also be maintained during construction.

5. Maintenance of drainage and other improvements is critical to the long-term stability of the site and the integrity of the structures. Site improvements should be maintained on a regular basis.

6. Finished flatwork and pavement surfaces should be sloped to freely drain toward appropriate drainage facilities. Water should not be allowed to stand or pond on or

adjacent to exterior pedestrian flatwork, vehicle pavement, or other improvements as it could infiltrate into the AB and/or subgrade, causing premature deterioration of pavement, flatwork, or other improvements. Any cracks that develop in the pavement should be promptly sealed.

7. All exterior drains and drain outlets should be maintained to be free-flowing. Care should be taken to establish and maintain vegetation. Vegetation and erosion matting (if utilized) should be maintained or augmented as needed. Irrigation systems should be maintained so that soils around structures are maintained at a relatively uniform year-round moisture content, and are neither over-watered nor allowed to dry and desiccate.

8. The owner or site maintenance personnel should periodically observe the areas within and around the site for indications of rodent activity and soil instability. The owner or site maintenance personnel should also implement an aggressive program for controlling the rodent activity in the general area.

Construction Observation and Testing

1. It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered. It is assumed that the geotechnical engineer will be retained to provide consultation during the design phase, to review final plans once they are available, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

2. At a minimum, the geotechnical engineer should be retained to provide:

   - Review of final grading, utility, and foundation plans
   - Professional observation during grading, foundation excavations, and trench backfill
   - Oversight of compaction testing during grading
   - Oversight of special inspection during grading

3. Special inspection of grading should be provided as per Section 1705.6 and CBC Table 1705.6 (CBSC, 2019). The special inspector should be under the direction of the geotechnical engineer. Special inspection of the following items should be provided by the special inspector.

   - Stripping and clearing of vegetation
   - Overexcavation to the recommended depths
   - Scarification, moisture conditioning, and compaction of the soil
   - Fill quality, placement, and compaction
   - Utility trench backfill
   - Retaining wall drains and backfill
   - Foundation excavations
   - Subgrade and AB compaction and proofrolling

4. A program of quality control should be developed prior to beginning grading. The contractor or project manager should determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

5. Locations and frequency of compaction tests should be as per the recommendation of the geotechnical engineer at the time of construction. The recommended test location and frequency may be subject to modification by the geotechnical engineer, based upon soil and moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.

6. A preconstruction conference among the owner, the geotechnical engineer, the County of San Luis Obispo, the special inspector, the architect/engineer, and contractors is recommended to discuss planned construction procedures and quality control requirements.

7. The geotechnical engineer should be notified at least 48 hours prior to beginning construction operations. If Earth Systems Pacific is not retained to provide construction

observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

8.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, either in whole or in part, due to changes in building codes, regulations, standards of geotechnical or construction practice, changes in physical conditions, or the broadening of knowledge.

If changes with respect to the project become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm shall be notified for modifications to this report. Any items not specifically addressed in this report should comply with the CBC of other applicable standards, and the requirements of the governing jurisdiction.

The preliminary recommendations presented in this geotechnical report are based upon the geotechnical conditions encountered at the site, and may be augmented by additional requirements of the client, or by additional recommendations provided by the geotechnical engineer based on peer or jurisdiction reviews, or conditions exposed at the time of construction.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text

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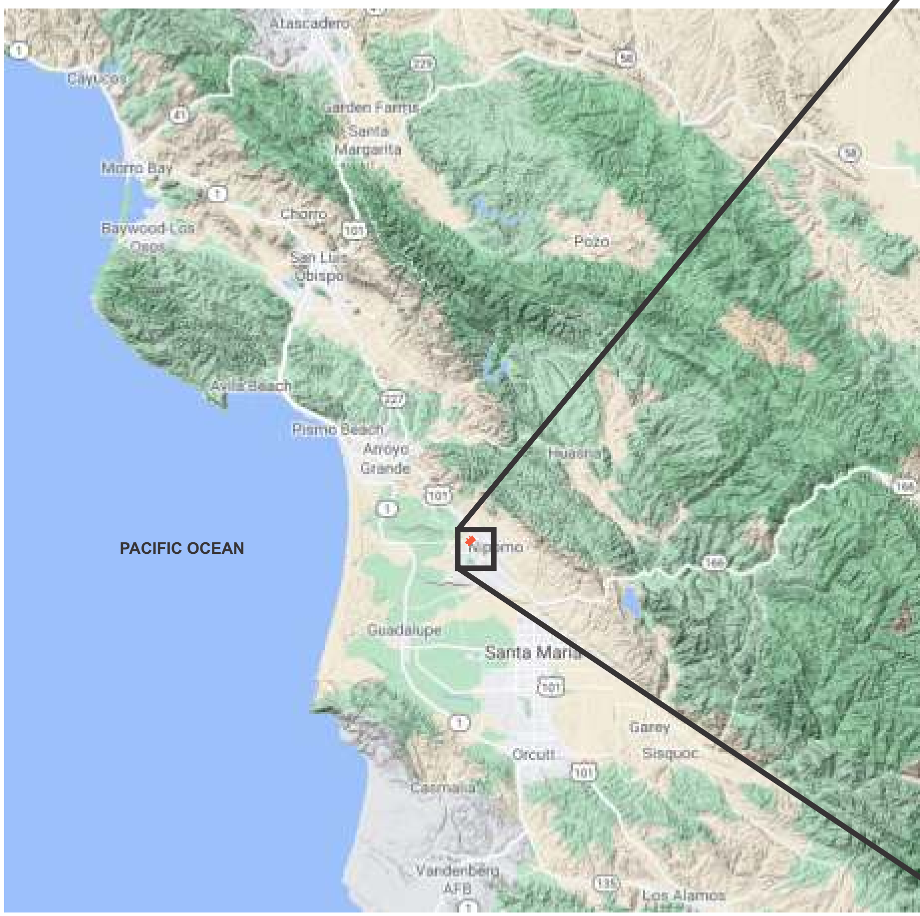
APPENDIX A

Figure 1 – Site Vicinity Map

Figure 2 – Exploration Location Map

Boring Log Legend

Boring Logs (ESP, 2017 and this report)



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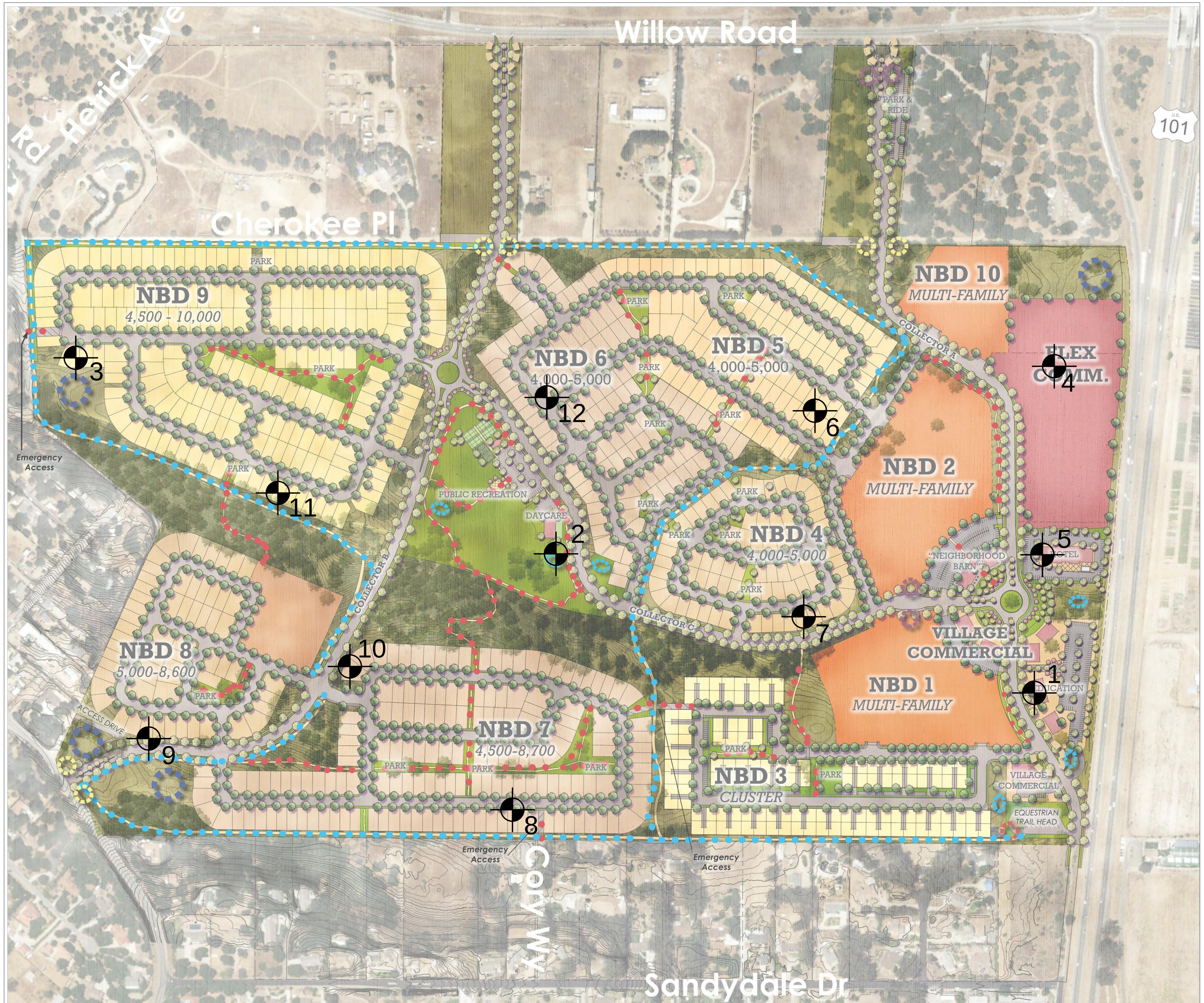
SITE VICINITY MAP

DANA RESERVE
Northeast of North Frontage Road
Nipomo Area of San Luis Obispo County, California

FIGURE 1

Date
September 2021

Project No.
304746-001



LEGEND

12 Boring Location (Approx.)

NOT TO SCALE

BASE MAP PROVIDED BY: RRM DESIGN GROUP

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EXPLORATION LOCATION MAP
DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis Obispo County, California

Date
September 2021

Figure 2

Project No.
304746-001

Dana Reserve, ELM 9-2021.dwg

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	▬
STANDARD PENETRATION TEST (SPT)	●
SHELBY TUBE	▭
BULK	○
SUBSURFACE WATER DURING DRILLING	▼
SUBSURFACE WATER AFTER DRILLING	▽

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS	MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS	HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING		
# 200	# 40	# 10	# 4	3/4"	3"	12"

SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend121714.dwg

Earth Systems Pacific

Boring No. 1

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP-SM	POORLY GRADED SAND WITH SILT: light brown, dry, loose					
3		slightly moist					
5		medium dense	5.0-6.5	SPT			3, 5, 6
9		moist					
10		gray mottled orange, trace clay	10.0-11.5	SPT			9, 11, 13
15		orange-brown, clay ends	15.0-16.5	SPT			6, 7, 7
20			20.0-21.5	SPT			6, 9, 8
25		End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 2

PAGE 1 OF 2
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SM		SILTY SAND: brown, dry loose					
3			orange-brown, slightly moist					
5				5.0-6.5	SPT			2 1 2
8	SP-SM		POORLY GRADED SAND WITH SILT: yellow-brown, moist					
10				10.0-11.5	SPT			3 4 5
13			light brown, medium dense					
20				20.0-21.5	SPT			4 7 10

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

JOB NO.: SL-18135-SA
DATE: 08/14/2017

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27	SP-SM		POORLY GRADED SAND WITH SILT: as above					
30			light brown mottled orange, some clayey sand lenses ~1" thick	30.0-31.5	● (SPT)			5 7 9
35			trace clay					
40	SC		CLAYEY SAND: brown, moist, medium dense					
46	SP		POORLY GRADED SAND: light brown, moist, medium dense					
50			End of Boring @ 50.0' No Subsurface Water Encountered					

Depth scale: 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3
PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: orange-brown, dry, loose, trace silt					
3			slightly moist					
5				5.0-6.5	SPT			1 2 1
9			yellow brown					
10				10.0-11.5	SPT			2 4 5
13			medium dense					
15			light yellow brown	15.0-16.5	SPT			4 8 9
20				20.0-21.5	SPT			6 8 11
25			End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: pale brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
4			light yellowish brown					
5				5.0 - 6.5	Ring Sample	96.7	2.5	4 6 9
6				5.0 - 10.0	Grab Sample			
9			medium dense, moist					
10				10.0 - 11.5	Ring Sample	105.0	5.0	4 8 11
11	SP-SM		POORLY GRADED SAND WITH SILT: brown, medium dense, moist					
15	SP		POORLY GRADED SAND: yellowish brown, medium dense, moist, oxidation staining	15.0 - 16.5	Ring Sample	113.0	9.0	5 16 27
20				20.0 - 21.5	SPT			7 11 14
21			pale brown					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30			mottled brown, light brown, yellowish brown	30.0 - 31.5	SPT			6 / 10 / 10
35			groundwater stabilized after drilling					
40			pale brown, dense, wet, water encountered during drilling	40.0 - 41.5	SPT			9 / 16 / 17
45			very dense	45.0 - 46.5	SPT			16 / 32 / 36
49			dense					
50				50.0 - 51.5	SPT			15 / 17 / 24
51.5			End of Boring @ 51.5' Subsurface water encountered @ 40.0' during drilling, stabilized at 35.0' after drilling					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5
PAGE 1 OF 2

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			light brown	5.0 - 6.5	Ring Sample	102.1	2.8	2 4 8
8			light yellowish brown					
10			moist	10.0 - 11.5	Ring Sample	99.3	4.3	4 5 11
12			dark yellowish brown, dense, some oxidation staining					
15				15.0 - 16.5	Ring Sample	113.1	13.1	11 21 31
16.5			light brown, medium dense					
20				20.0 - 21.5	SPT			5 11 14

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30				30.0 - 31.5	SPT			9 11 12
31.5			pale brown					
35			groundwater stabilized after drilling					
39			dense, wet, water encountered during drilling					
40				40.0 - 41.5	SPT			15 21 27
43			medium dense					
45				45.0 - 46.5	SPT			7 13 17
49			dense					
50				50.0 - 51.5	SPT			16 24 20
51.5			End of Boring @ 51.5' Subsurface water encountered @ 39.0' during drilling, stabilized at 35.0' after drilling					

LEGEND: Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 6

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: light brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5				5.0 - 6.5	Ring Sample	98.1	1.8	2 / 4 / 6
8.5			yellowish brown					
10			medium dense, moist	10.0 - 11.5	Ring Sample	101.3	4.2	4 / 7 / 11
15				15.0 - 16.5	SPT			4 / 8 / 9
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 7

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: dark yellowish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			medium dense	5.0 - 6.5	Ring Sample	108.4	3.6	7 12 21
8			light yellowish brown					
10				10.0 - 11.5	Ring Sample	124.8	2.2	7 11 16
15				15.0 - 16.5	SPT			7 8 11
16.5			End of Boring @ 16.5' No subsurface water encountered					

Depth scale (feet): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 8

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: brown, loose, slightly moist	0.0 - 4.0	Grab Sample			
4			light brown					
5				5.0 - 6.5	Ring Sample	99.3	2.6	3 5 8
8			light yellowish brown, medium dense					
10				10.0 - 11.5	Ring Sample	107.7	4.0	4 8 11
14			yellowish brown					
15				15.0 - 16.5	Ring Sample	107.5	3.5	6 11 16
20				20.0 - 21.5	SPT			5 9 12
25			oxidation staining	25.0 - 26.5	SPT			7 10 14
26.5			End of Boring @ 26.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 9
PAGE 1 OF 2
JOB NO.: 304746-001
DATE: 7/28/2021

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: reddish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			yellowish brown, medium dense	5.0 - 6.5	Ring Sample	96.0	3.7	5 8 13
6				5.0 - 10.0	Grab Sample			
10				10.0 - 11.5	Ring Sample	99.0	2.4	5 9 12
15				15.0 - 16.5	Ring Sample	104.9	2.7	5 11 14
20				20.0 - 21.5	SPT			5 9 14

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Boring No. 9
PAGE 2 OF 2
JOB NO.: 304746-001
DATE: 7/28/2021

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30				30.0 - 31.5	●			7 11 12
31			oxidation staining					
39			light yellowish brown					
40				40.0 - 41.5	●			8 12 15
49			yellowish brown					
50				50.0 - 51.5	●			7 12 13
51.5			End of Boring @ 51.5' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 10

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: light brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5				5.0 - 6.5	Ring Sample	101.7	1.1	3 5 6
9			light yellowish brown, medium dense					
10				10.0 - 11.5	Ring Sample	102.1	2.2	4 8 10
13.5			loose					
15				15.0 - 16.5	SPT			2 4 4
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 11

PAGE 1 OF 1

LOGGED BY: A. Flynn

DRILL RIG: Mobile B-53 with Automatic Hammer

AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001

DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: brown, medium dense, slightly moist					
5				5.0 - 6.5	Ring Sample	110.2	3.1	4 9 17
10				10.0 - 11.5	Ring Sample	105.6	1.6	7 11 15
11			light brown					
15				15.0 - 16.5	SPT			4 6 9
16.5			End of Boring @ 16.5' No subsurface water encountered					

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 12

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP	POORLY GRADED SAND: dark yellowish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5		medium dense	5.0 - 6.5	Ring Sample	110.0	3.7	7 / 11 / 15
9		yellowish brown					
10		moist	10.0 - 11.5	Ring Sample	105.5	4.5	5 / 9 / 12
15		slightly moist	15.0 - 16.5	Ring Sample	101.1	3.9	7 / 14 / 17
20			20.0 - 21.5	SPT			5 / 8 / 11
25			25.0 - 26.5	SPT			6 / 10 / 15
26.5		End of Boring @ 26.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Laboratory Test Results

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

August 26, 2021

Boring #4 @ 0.0 - 5.0'

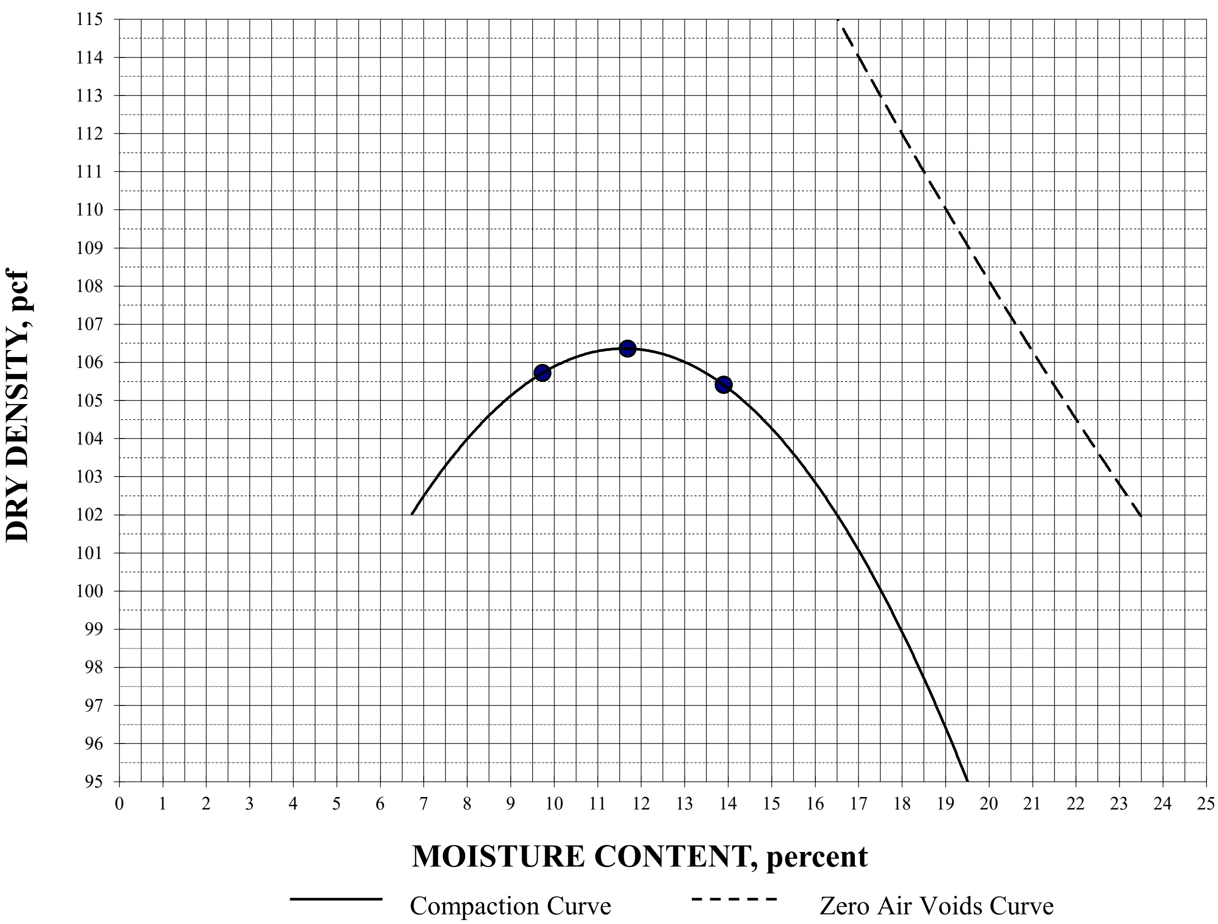
Pale Brown Poorly Graded Sand (SP)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 106.4 pcf

OPTIMUM MOISTURE: 11.6%



BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

August 26, 2021

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
4	6.0 - 6.5	2.5	99.1	96.7
4	11.0 - 11.5	5.0	110.2	105.0
4	16.0 - 16.5	9.0	123.2	113.0
5	6.0 - 6.5	2.8	105.0	102.1
5	11.0 - 11.5	4.3	103.6	99.3
5	16.0 - 16.5	13.1	127.9	113.1
6	6.0 - 6.5	1.8	99.9	98.1
6	11.0 - 11.5	4.2	105.6	101.3
7	6.0 - 6.5	3.6	112.3	108.4
7	11.0 - 11.5	2.2	127.5	124.8
8	6.0 - 6.5	2.6	101.9	99.3
8	11.0 - 11.5	4.0	112.0	107.7
8	16.0 - 16.5	3.5	111.3	107.5
9	6.0 - 6.5	3.7	99.5	96.0
9	11.0 - 11.5	2.4	101.4	99.0
9	16.0 - 16.5	2.7	107.7	104.9
10	6.0 - 6.5	1.1	102.8	101.7
10	11.0 - 11.5	2.2	104.3	102.1
11	6.0 - 6.5	3.1	113.6	110.2
11	11.0 - 11.5	1.6	107.3	105.6
12	6.0 - 6.5	3.7	114.1	110.0
12	11.0 - 11.5	4.5	110.3	105.5
12	16.0 - 16.5	3.9	105.0	101.1

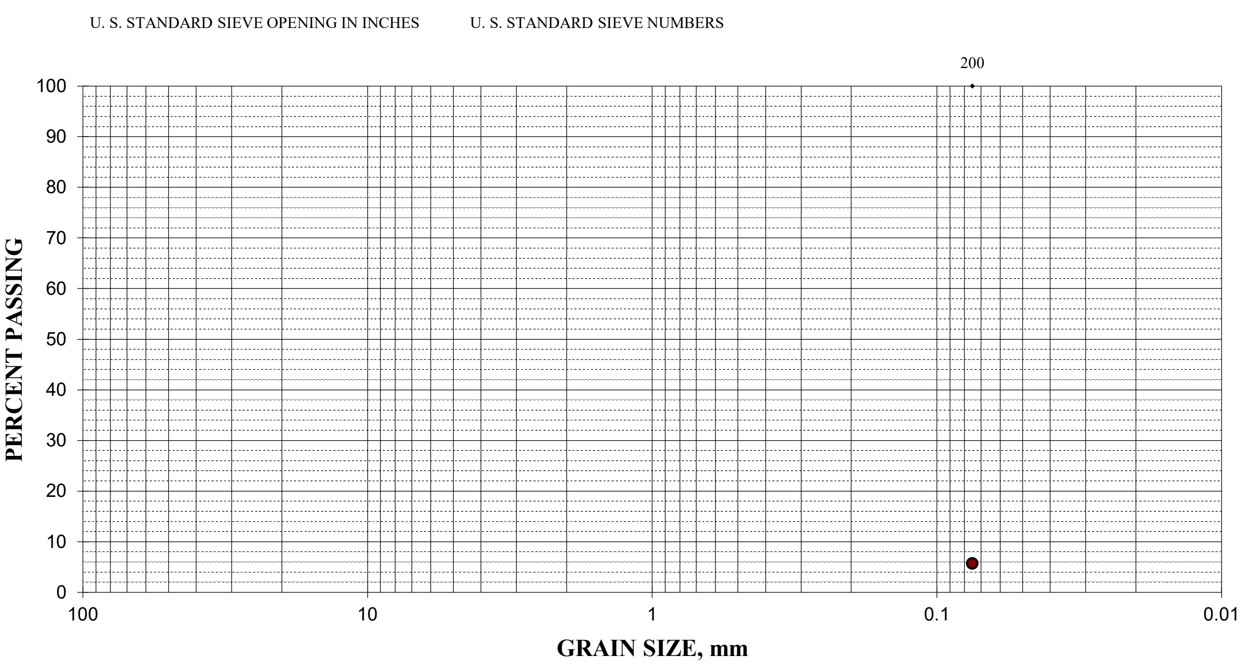
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-017

Boring #4 @ 0.0 - 5.0'
Poorly Graded Sand (SP)
Cu = 1.4; Cc = 0.9

August 26, 2021

Sieve size	% Retained	% Passing
#200 (75-µm)	94.3	5.7



DIRECT SHEAR

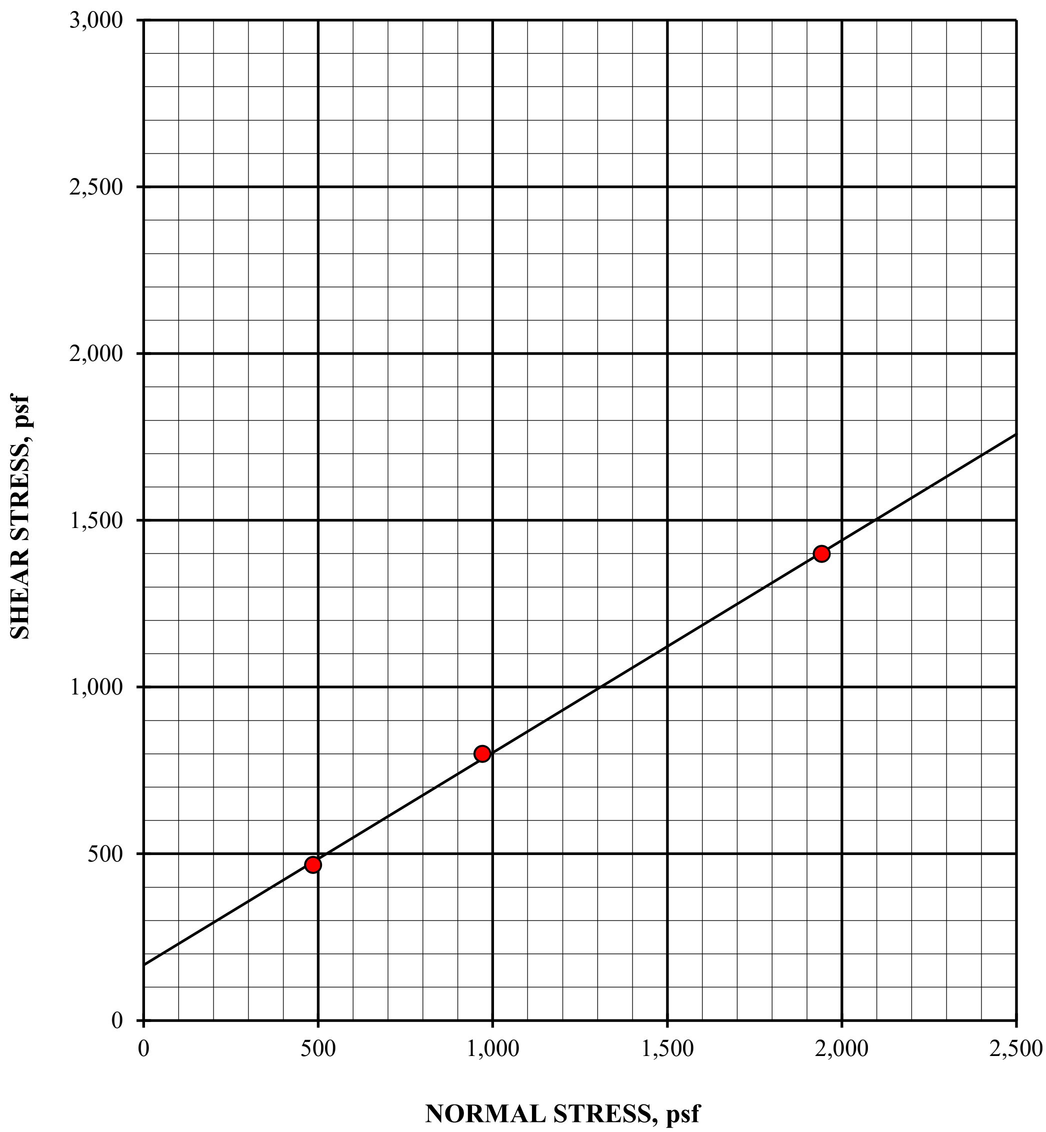
ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

August 26, 2021

Boring #4 @ 0.0 - 5.0'
Poorly Graded Sand (SP)
Compacted to 90% RC, saturated

INITIAL DRY DENSITY: 95.7 pcf
INITIAL MOISTURE CONTENT: 11.6 %
PEAK SHEAR ANGLE (Ø): 32°
COHESION (C): 167 psf

SHEAR vs. NORMAL STRESS



DIRECT SHEAR continued

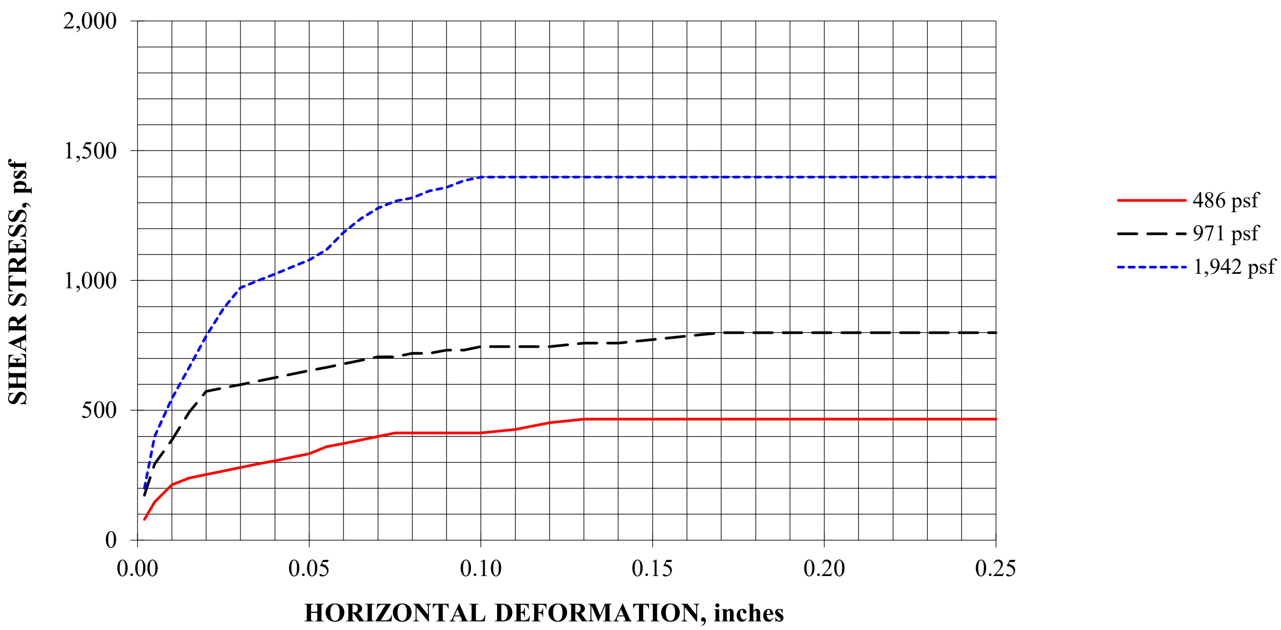
ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

Boring #4 @ 0.0 - 5.0' August 26, 2021

Poorly Graded Sand (SP)

Compacted to 90% RC, saturated SPECIFIC GRAVITY: 2.65 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	11.6	11.6	11.6	11.6
DRY DENSITY, pcf	95.7	95.7	95.7	95.7
SATURATION, %	42.3	42.3	42.3	42.3
VOID RATIO	0.727	0.727	0.727	0.727
DIAMETER, inches	2.410	2.410	2.410	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	20.0	20.0	20.7	
DRY DENSITY, pcf	96.5	97.4	99.7	
SATURATION, %	74.1	75.8	83.1	
VOID RATIO	0.714	0.698	0.658	
HEIGHT, inches	0.99	0.98	0.96	



Dana Reserve 304746-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

August 26, 2021

Boring #9 @ 0.0 - 5.0'

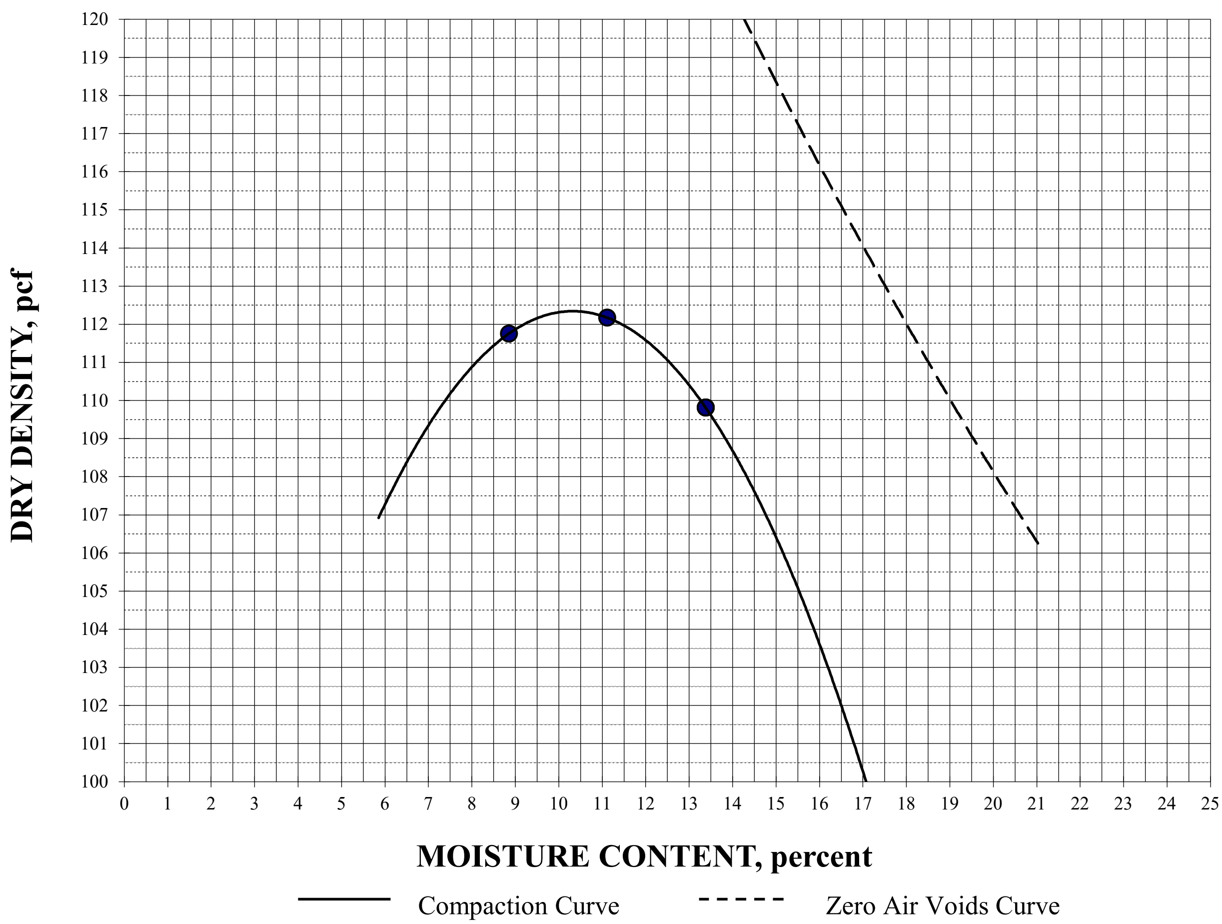
Reddish Brown Poorly Graded Sand (SP)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 112.3 pcf

OPTIMUM MOISTURE: 10.3%



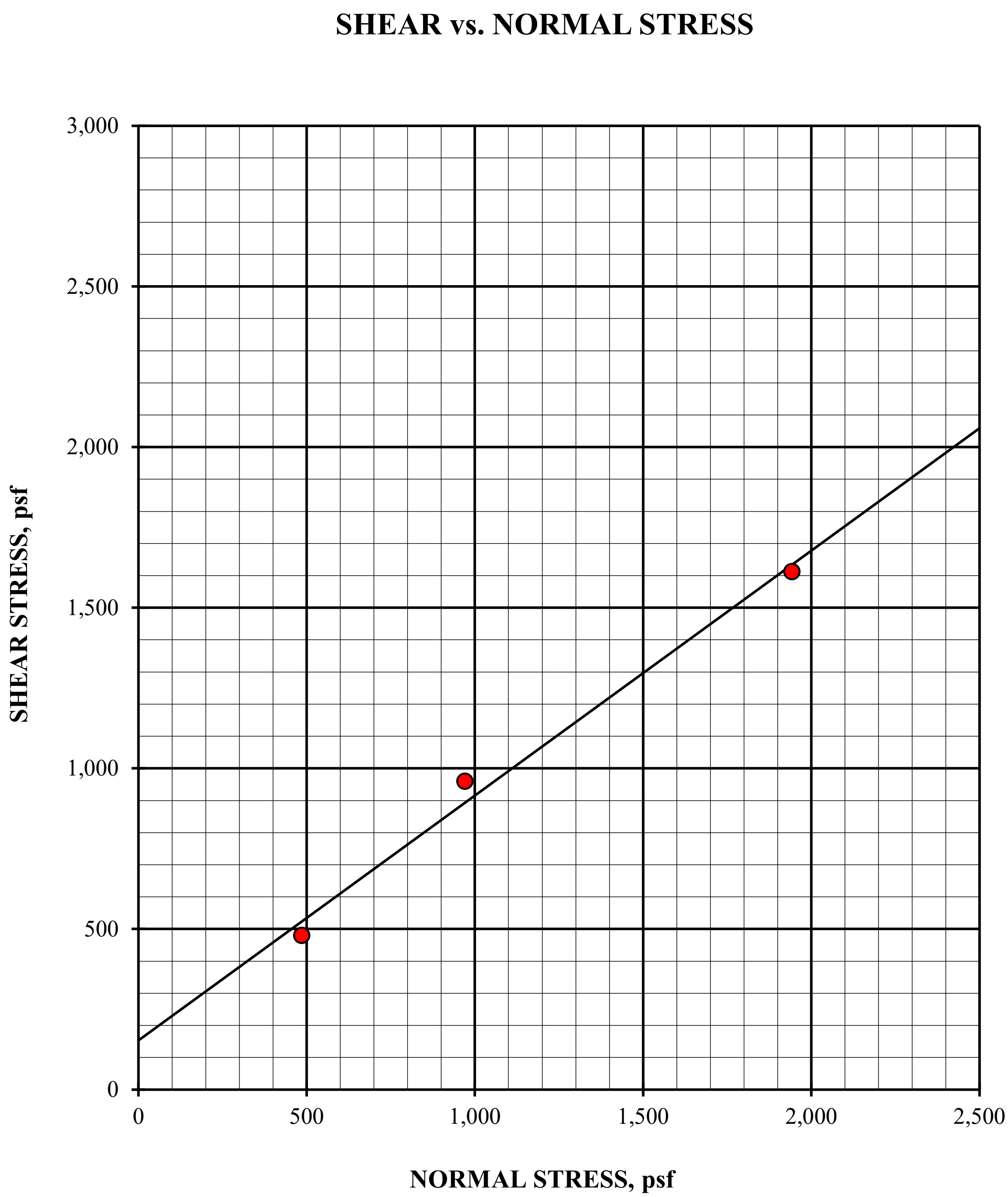
DIRECT SHEAR

ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

August 26, 2021

Boring #9 @ 0.0 - 5.0'
Poorly Graded Sand (SP)
Compacted to 90% RC, saturated

INITIAL DRY DENSITY: 101.1 pcf
INITIAL MOISTURE CONTENT: 10.3 %
PEAK SHEAR ANGLE (Ø): 37°
COHESION (C): 153 psf



DIRECT SHEAR continued

ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

Boring #9 @ 0.0 - 5.0'

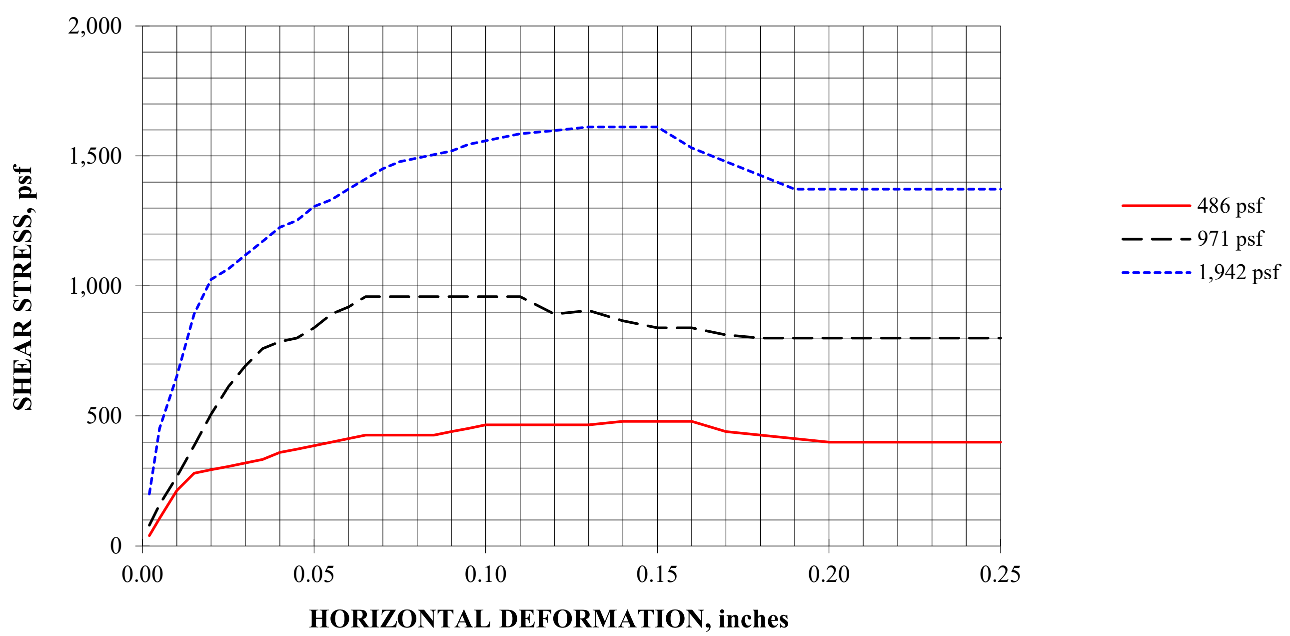
August 26, 2021

Poorly Graded Sand (SP)

Compacted to 90% RC, saturated

SPECIFIC GRAVITY: 2.65 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	10.3	10.3	10.3	10.3
DRY DENSITY, pcf	101.1	101.1	101.1	101.1
SATURATION, %	43.0	43.0	43.0	43.0
VOID RATIO	0.635	0.635	0.635	0.635
DIAMETER, inches	2.410	2.410	2.410	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	18.7	19.2	19.2	
DRY DENSITY, pcf	102.3	104.5	106.7	
SATURATION, %	80.4	87.2	92.4	
VOID RATIO	0.616	0.583	0.550	
HEIGHT, inches	0.99	0.97	0.95	



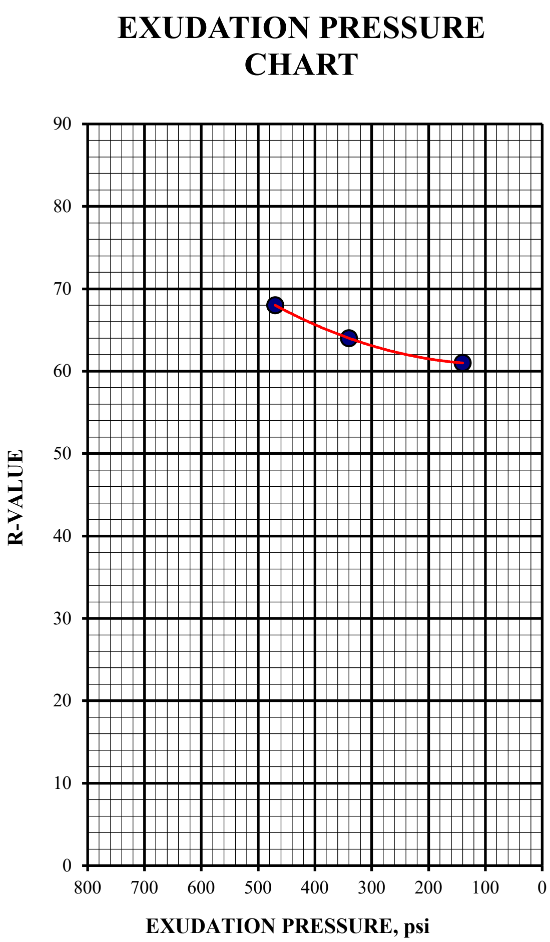
RESISTANCE '*R* ' VALUE AND EXPANSION PRESSURE

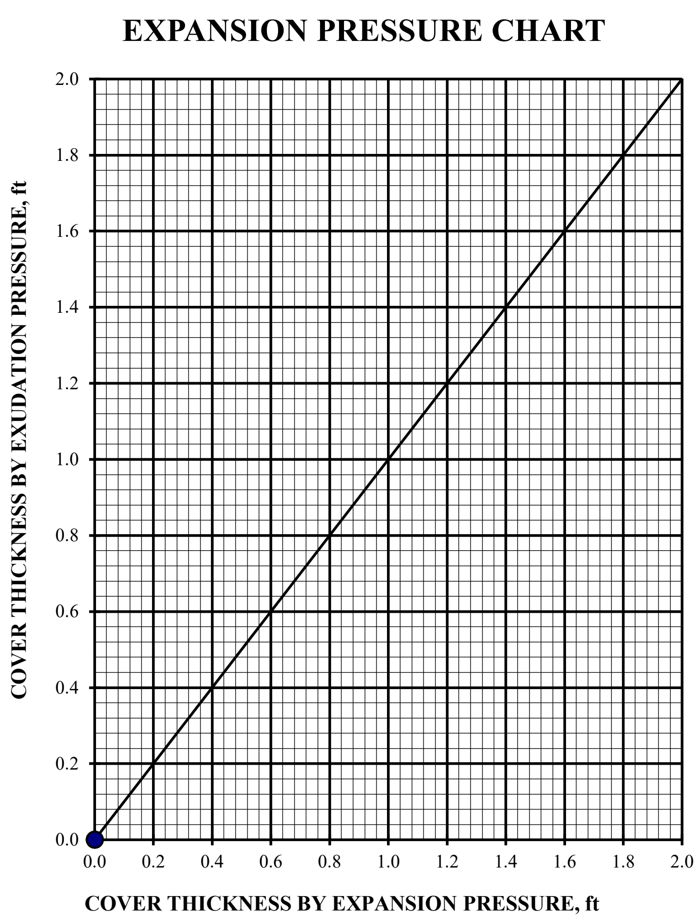
ASTM D 2844/D2844M-18

August 26, 2021

Boring #9 @ 0.0 - 5.0'
Reddish Brown Poorly Graded Sand (SP)

Dry Density @ 300 psi Exudation Pressure: 115.8-pcf
%Moisture @ 300 psi Exudation Pressure: 12.0%
R-Value - Exudation Pressure: 63
R-Value - Expansion Pressure: N/A
R-Value @ Equilibrium: 63





CONSOLIDATION TEST

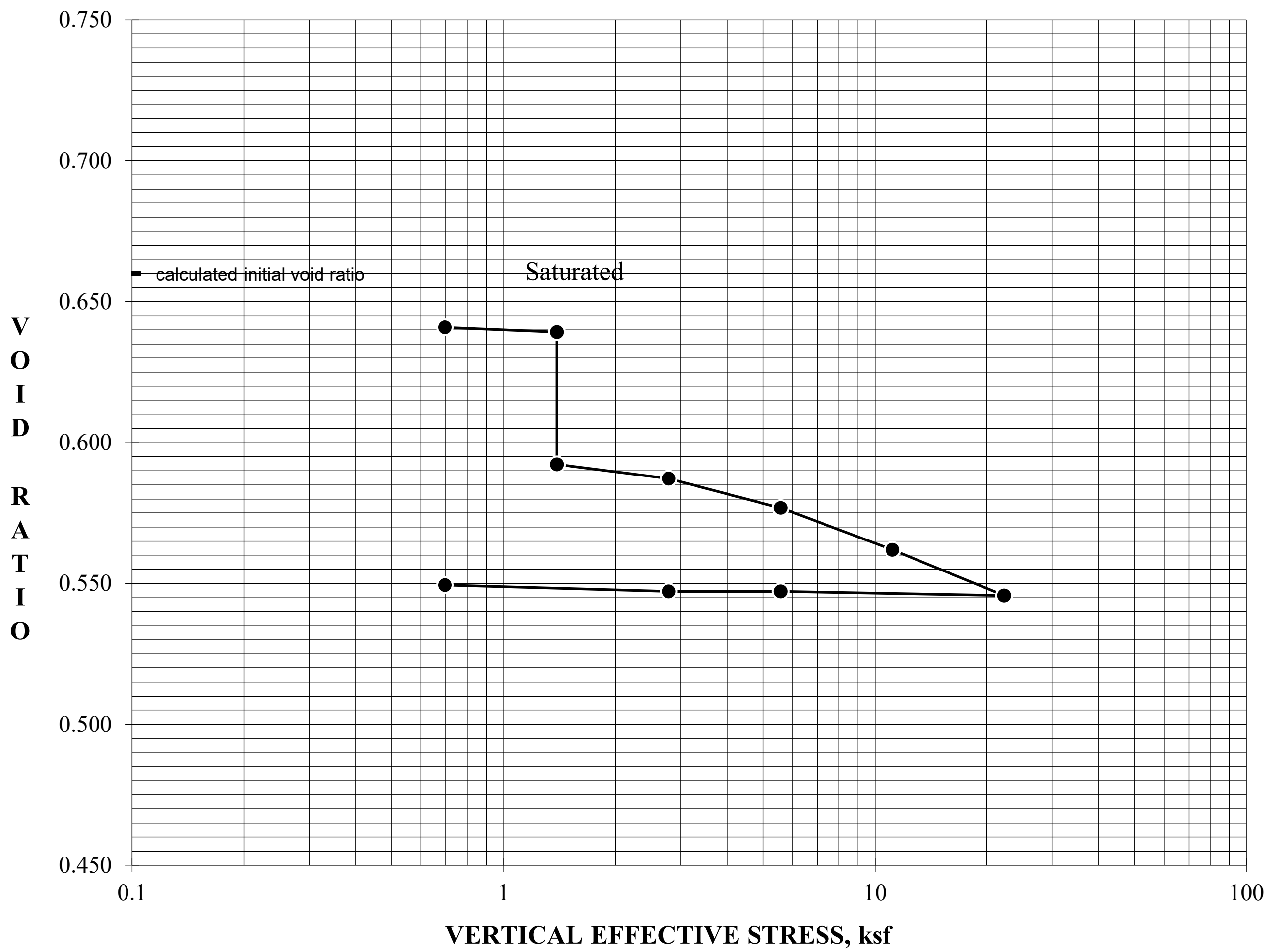
ASTM D 2435/D2435M-11(2020)

August 26, 2021

Boring #6 @ 6.0 - 6.5'
Poorly Graded Sand (SP)
Ring Sample

DRY DENSITY: 99.7 pcf
MOISTURE CONTENT: 1.8%
SPECIFIC GRAVITY: 2.65 (assumed)
INITIAL VOID RATIO: 0.660

VOID RATIO vs. NORMAL PRESSURE DIAGRAM



Dana Reserve 304746-001

CONSOLIDATION TEST

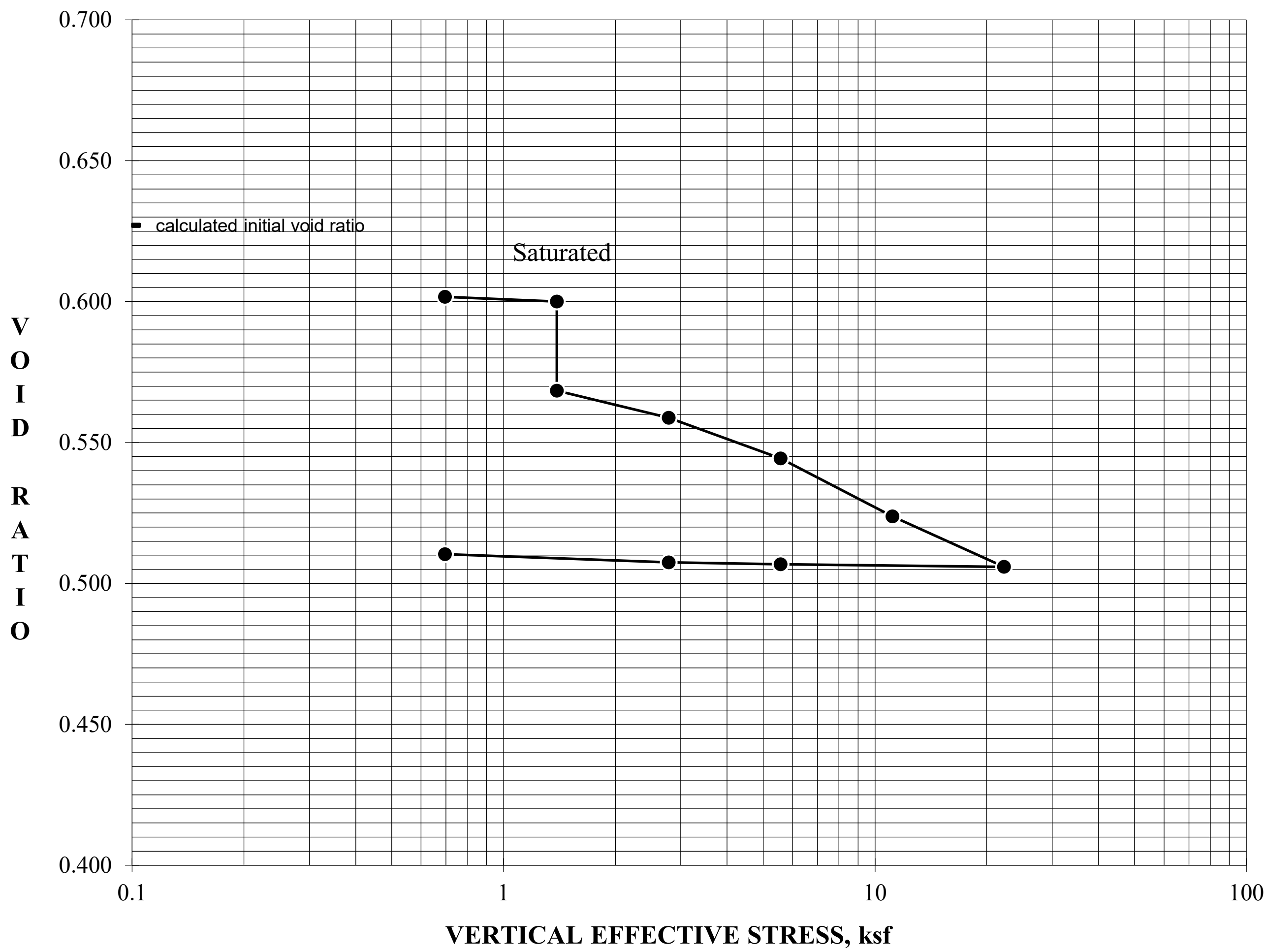
ASTM D 2435/D2435M-11(2020)

August 26, 2021

Boring #10 @ 6.0 - 6.5'
Poorly Graded Sand (SP)
Ring Sample

DRY DENSITY: 101.7 pcf
MOISTURE CONTENT: 1.1%
SPECIFIC GRAVITY: 2.65 (assumed)
INITIAL VOID RATIO: 0.627

VOID RATIO vs. NORMAL PRESSURE DIAGRAM



APPENDIX C

Corrosion Evaluation Report by CERCO Analytical, Inc.

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

Client: Earth Systems Pacific
Client's Project No.: 304746-001
Client's Project Name: Dana Reserve
Date Sampled: 07/27-28/21
Date Received: 6-Aug-21
Matrix: Soil
Authorization: Transmittal on 8/3/2021

Date of Report: 17-Aug-2021

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2108010-001	B-4 @ 0-5'	460	6.66	-	23,000	-	N.D.	N.D.
2108010-002	B-9 @ 0-5'	440	6.11	-	50,000	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	13-Aug-2021	13-Aug-2021	-	11-Aug-2021	-	13-Aug-2021	13-Aug-2021

Cheryl McMillen
Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. = None detected

__Quality Control Summary__ - **All laboratory quality control parameters were found to be within established limits**

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

17 August, 2021

Job No. 2108010
Cust. No.12651

Mr. Phillip Madrid, PE
Earth Systems Pacific
2049 Preisker Lane, Suite E
Santa Maria, CA 93454

Subject: Project No.: 304746-001
Project Name: Dana Reserve
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Madrid:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on Aug 6, 2021. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample No. 001 is classified as "mildly corrosive," and Sample No. 002 as "negligibly corrosive." All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations are none detected at 15 mg/kg.

The sulfate ion concentrations are none detected at 15 mg/kg.

The pH of the soils range from 6.11 to 6.66 which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials range from 440 to 460-mV and are classified as "noncorrosive," which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

Cheryl McNeil for

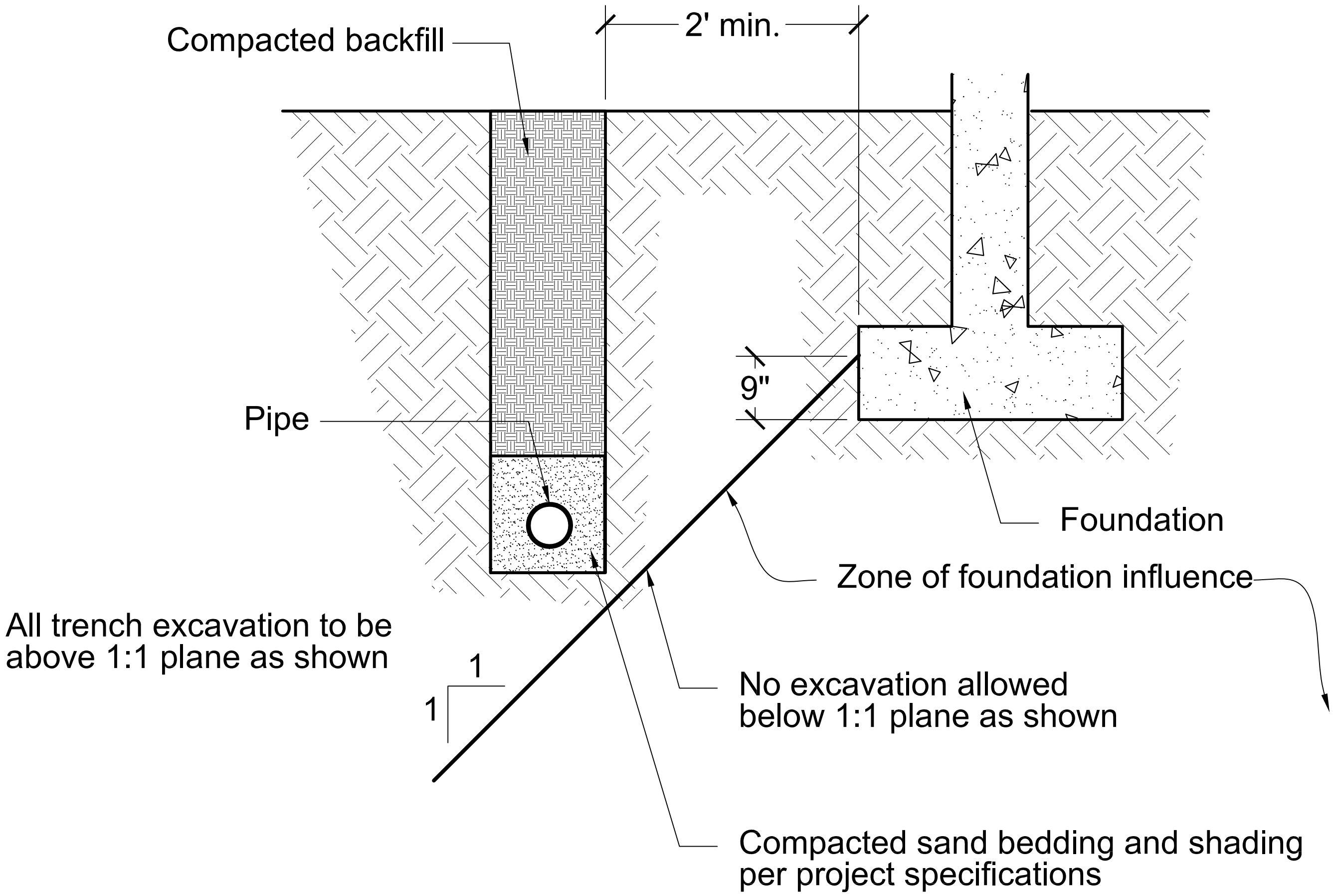
J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

APPENDIX D

Typical Detail A: Pipe Placed Parallel to Foundations

TYPICAL DETAIL A:
PIPE PLACED PARALLEL TO FOUNDATIONS



SCHEMATIC ONLY
NOT TO SCALE

Earth Systems

2049 Preisker Lane, Suite E
Santa Maria, California 93454

(805) 928-2991 • FAX (805) 928-9253
E-mail: esc@earthsystems.com

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REVISED ENGINEERING GEOLOGY REPORT
DANA RESERVE
NORTHWEST OF NORTH FRONTAGE ROAD
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

September 10, 2021

Prepared for

Mr. Nick Tompkins
NKT Development, LLC

Prepared by

Earth Systems Pacific
2049 Preisker Lane, Suite E
Santa Maria, California 93454

Earth Systems
2049 Preisker Lane, Suite E | Santa Maria, CA 93454 | Ph: 805.928.2991 | www.earthsystems.com

September 10, 2021

FILE NO.: 304746-001

Mr. Nick Tompkins
NKT Development, LLC
684 Higuera Street, Suite B
San Luis Obispo, California 93401

PROJECT: DANA RESERVE
NORTHWEST OF NORTH FRONTAGE ROAD
NIPOMO AREA OF SAN LUIS OBISPO COUNTY, CALIFORNIA

SUBJECT: Revised Engineering Geology Report

REF: 1) Proposal for a Geotechnical Engineering and Engineering Geology Report, Dana Reserve, by Earth Systems Pacific, dated July 15, 2021, Doc. No. SM-2107-025.PRP

2) Review of Geotechnical Feasibility Report, Dana Reserve (APN's 091-301-073, -030, -031) Nipomo Area of San Luis Obispo County, by LandSet Engineers, Inc., File No.: 0916-01, dated June 25, 2021

Dear Mr. Tompkins:

In accordance with your authorization of the above-referenced proposal, this engineering geology report has been prepared for the Dana Reserve project. The project is located at the northwest of North Frontage Road in the Nipomo area of San Luis Obispo County, California. This report was revised based on a phone conference with you and your consultants from RRM Design Group and Urban Planning Concepts.

This report describes the general geologic characteristics, identifies existing and potential geologic hazards, and discusses the impacts the geologic conditions may have on the project. This report is also intended to respond to comments by Landset Engineers, Inc. on behalf of the County of San Luis Obispo (Reference 2). Two bound copies and an electronic copy of this report are being furnished for your use.

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,
Earth Systems Pacific

Darrin Hasham, CEG
Associate Geologist

REGISTERED GEOLOGIST
DARRIN G. HASHAM
NO. 2423
CERTIFIED ENGINEERING GEOLOGIST
02/28/22
STATE OF CALIFORNIA

Doc. No. 2108-042.REVGEO/ln

Table of Contents

Appendices

1.0 INTRODUCTION

The Dana Reserve project is a planned community that will be constructed within a 288-acre property. The project is located northwest of North Frontage Road in the Nipomo area of San Luis Obispo County, California. The property is referred to herein as "the Site", and the site is shown on the Site Vicinity Map presented in Appendix A.

We understand portions of the site will be developed with single and multi-family residential structures, commercial structures, recreation areas, open space, and associated surface and subsurface improvements. We have assumed that residential and commercial structures will be one to four stories, will be of wood and steel frame construction, and will utilize Portland cement concrete (PCC) slabs-on-grade. Masonry and/or concrete retaining walls for sitework and/or connected to and forming part of the structures are anticipated. Masonry boundary walls and/or other types of perimeter fencing may also be constructed. Maximum line loads are anticipated to be approximately 4 kips per linear foot, and maximum point loads are anticipated to be approximately 40 kips.

We have assumed surface improvements will consist of hot mix asphalt (HMA) and/or PCC pavement over aggregate base (AB) for vehicles and PCC flatwork for pedestrian use. We have assumed subsurface improvements will include municipal sewer, water, power, and communications utilities. Surface runoff will be transmitted to and disposed of into Low Impact Development (LID) drainage disposal improvements. On-site effluent disposal systems are not anticipated for this project and are not addressed in this report.

We have assumed the site will be graded to develop the building and surface improvement areas, to improve access, and to improve drainage. Cuts and fills are anticipated to be on the order 20 feet or less. Cut and fill slopes not exceeding 15 feet in height and inclined at 3:1 or flatter may also be constructed.

2.0 SCOPE OF SERVICES

The scope of work for this engineering geology report included a review of available published geologic and geotechnical information on or near the site, conducting a geotechnical investigation including soil borings and laboratory testing (ESP, 2021), and preparation of this report. The analysis and subsequent conclusions were based, in part, upon information provided by the client and are intended to identify major geologic or geotechnical constraints that might impact the planned development of the site.

This report and preliminary geotechnical recommendations are intended to comply with the applicable considerations of the San Luis Obispo County Guidelines for Engineering Geology Reports (SLO Co, 2013), CGS Note 52 (2013) and Special Publication 117a (CDMG, 2008); and common engineering geology and geotechnical engineering practice in this area under similar conditions at this time. The test procedures were performed in general conformance with the standards noted, as modified by common engineering geology and geotechnical engineering practice in this area under similar conditions at this time.

3.0 SITE SETTING

The site is an approximately 288-acre parcel located in the Nipomo area of the southwest sector of San Luis Obispo County, California. The site is northwest of North Frontage Road. Gates along Hetrick Road, Cherokee Place, and the North Frontage Road provide access to the site. Rural-residential properties and undeveloped open space form the southeast, southwest, and northwest site boundaries; US Highway 101 forms the northeast boundary.

The site is located on the eastern part of the Nipomo Mesa. The Nipomo Mesa is a roughly triangular-shaped area of older sand dunes that are truncated by the Santa Maria Valley to the south, the Cienega Valley to the northwest, and lap onto the Newsom and Temettate Ridges of the Sierra Madre Mountains, which are parts of the Santa Lucia Ranges, to the northeast.

The site is generally undeveloped and is covered with a sparse to dense growth of vegetation consisting mostly of seasonal grasses, brush, and mature oak trees. The ground surface of the site generally slopes gently to the northeast towards Nipomo Creek, which flows southeast to the Santa Maria River through the Nipomo Valley. The approximate central site coordinates from the USGS website are latitude 35.046 degrees north and longitude 120.503 degrees west, and the elevation ranges from approximately 415 feet in the southwest to 360 feet in the northeast (USGS 2021).

NRCS Soil Resource

The Dana Reserve property is mapped by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as soil units 184 (Oceano sand, 0-9 percent slopes) and 185 (Oceano sand, 9-30 percent slopes) (NRCS, 2021). Both units are assigned to Hydrologic Soil Group "A", indicating a high infiltration rate when thoroughly wet. Both units also have an irrigated land capability classification of 4s and an unirrigated classification of 6s. Class 4 soils "have very severe limitations that restrict the choice of plants or that require very careful management, or both"; Class 6 soils "have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat" (NRCS, 2021). Map unit 184 is assigned the "Farmland of statewide importance" classification, while map unit 185 is classified as "Not prime farmland".

4.0 FIELD AND LABORATORY INVESTIGATIONS

Previous Investigation

In 2017 Earth Systems Pacific (ESP) prepared a Geotechnical Feasibility Report (Reference 3). On August 14, 2017, five borings were drilled at the site to depths of approximately 5 to 50 feet below the existing ground surface (bgs). Two of the borings were drilled for infiltration testing, and the other three borings (designated Nos. 1 through 3) were drilled for exploratory purposes. The borings were drilled with a Mobile Drill Model B-53 truck mounted drill rig, equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling. The approximate locations of the exploratory borings are shown on the Exploration Location Map presented as Figure 2, in Appendix A.

Standard Penetration Tests were conducted at selected depths in the borings (ASTM D 1586-11).

Soils encountered in the exploratory borings were logged and categorized in general accordance with the Unified Soil Classification System and ASTM D 2488-09a. Copies of the boring logs can also be found in Appendix A. In reviewing the boring logs and the legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the characteristics observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in subsurface descriptions that vary somewhat from the legend.

Current Investigation

To further characterize the subsurface conditions at the site, nine additional borings (designated Nos. 4 through 12) were drilled on July 27 through 29, 2021, to depths ranging from 15 to 50 feet bgs. The borings were drilled with a Mobile Drill Model B-53 truck mounted drill rig, equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling. The approximate locations of the borings are shown on the Exploration Location Map presented as Figure 2, in Appendix A.

Soils encountered in the exploratory borings were logged and categorized in general accordance with the Unified Soil Classification System and ASTM D 2488-17. Copies of the boring logs can also be found in Appendix A. In reviewing the boring logs and the legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the characteristics observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in subsurface descriptions that vary somewhat from the legend. The reader should also consider the sampler type used when reviewing the blow counts.

As the borings were drilled, soil samples were obtained using a 3-inch outside diameter ring-lined barrel sampler (ASTM D3550-17 with shoe similar to D2937-17). Standard penetration tests (SPT) using a 2-inch outside diameter split-spoon sampler were also performed in the borings (ASTM D1586-18) at selected depths. Bulk soil samples were obtained from the auger cuttings.

Ring samples were tested for bulk density per ASTM D2937-17 (modified for ring liners). Two bulk samples were tested for maximum density and optimum moisture content (ASTM D1557-12), and a direct shear test (ASTM D3080/D3080M-11) was conducted on each sample after they were remolded to approximately 90 percent of maximum dry density. A bulk sample was tested for R-value (ASTM D2844/D2844M-18). Consolidation tests (ASTM D2435/D2435M-11(2020)) were performed on selected ring samples. The laboratory test results are presented in ESP's geotechnical engineering report (2021).

5.0 GENERAL SUBSURFACE PROFILE

The subsurface profile observed in the borings generally consisted of layered sand soils with variable amounts of silt and clay. These soils were generally in a dry to wet condition and ranged from loose to dense in consistency. Groundwater was encountered during drilling in Boring 4 at 40 feet bgs and at 39 feet bgs in Boring 5; the water level stabilized in both borings at 35 feet bgs after drilling was completed. Please refer to the boring logs presented in Appendix A for a more detailed description of the subsurface profile.

6.0 GEOLOGY

Geologic Setting

Regionally, the subject site is located within the Coast Ranges geomorphic province of California, which are northwest trending mountain ranges that reach a maximum elevation of about 6,000 feet and are generally parallel to the San Andreas fault (CGS 2002). The ranges are formed by an asymmetrical uplifted block that forms a rugged coastline at the Pacific Ocean and dips eastward towards the Great Valley province. The Coast Ranges are geologically complex with rocks that span from middle Mesozoic to late Quaternary in age (GSA 2018). The Nipomo Mesa, is primarily an area of late Pleistocene sand dunes that are generally inactive and stabilized by vegetation and locally dissected by ephemeral streams, map symbol Qoe, however a strip of active sand dunes (Oceano and Pismo Dunes) are between the Nipomo Mesa and the Pacific Ocean to the west, as indicated on the Geologic Maps of the Oceano Quadrangle by Holland (2013) and the Nipomo Quadrangle by Delattre and Wiegers (2014). The mapped geology is consistent with the soils observed in the borings.

The Santa Lucia Range is bounded between the Pacific Ocean to the west and the Salinas River to the east (USGS 2021). Structurally, the Santa Lucia Range is bordered on the northeast by the Rinconada fault zone and to the southwest by Hosgri-San Simeon, Oceanic-West Huasna fault zone (USGS, 2013). Tectonically, the region is dominated by northwest-trending, faults, which include the Rinconada, Hosgri-San Simeon, Oceanic-West Huasna and San Luis Range faults (Lettis and Hall, 1994).

Groundwater

Limited groundwater level data is available for the eastern Nipomo Mesa area but records for wells located at Nipomo Regional Park located approximately 1 mile south of the site indicate a depth to groundwater over 250 feet bgs (DWR 2021).

Groundwater was encountered during drilling in Boring 4 at 40 feet bgs and at 39 feet bgs in Boring 5; the water level stabilized in both borings at 35 feet bgs after drilling was completed. Groundwater was not encountered in any of our other borings. The groundwater level encountered in borings 4 and 5 is consistent with groundwater levels reported for a site at the intersection of Teft Street and Carillo Street, approximately 1 mile southeast of the site (GeoTracker 2021). The groundwater condition at the eastern part of the site is probably the result of mounded groundwater proximal to Nipomo Creek and shallower bedrock associated with the proximity of Temattate Ridge and thinning sediments that lap onto the ridge. The proximity of the Wilmar Avenue fault (which is part of the San Luis Range So Margin fault system) depicted on the Regional Geologic Map, Figure 3, may also contribute to the variable depth to groundwater by creating a step in the bedrock beneath the sand dune deposits.

Groundwater is not considered to be a limiting factor for the development of the site.

Faulting

Faults are classified by the State of California based on the likelihood of generating ground motions and surface rupture. The classification system applies to known faults that have been compiled by numerous researchers through various methods of investigation. The State evaluates faults with documented ground rupture during the last 11,700 years and considers them for inclusion in Earthquake Fault Zones requiring investigation (A-P Zones) which encompass traces of *Holocene-active* faults, as defined by the State's Alquist-Priolo Earthquake Fault Zoning Act (1972). The State's guidance is intended to prohibit developments and structures for human occupancy across the trace of active faults.

There are no known *Holocene-Active* faults on the site that are included in State A-P Zones or County special studies zones. Other active faults capable of generating strong ground motion are present in the region but are not included in A-P Zones because they do not meet the criteria of "sufficiently active and well-defined." A list of faults within approximately 65 miles of the site is included in Table 1- Fault Parameters. Note that several faults are presented in the table as interpretations for fault model (FM) 3.1 and 3.2 as defined by the USGS in the Third California Earthquake Rupture Forecast (UCERF3 2013); these faults are duplicates and represent different geometry scenarios for the same fault.

Table 1 - Fault Parameters

Fault Section Name	Distance (miles)	Distance (km)	Upper Seis. Depth (km)	Lower Seis. Depth (km)	Avg Dip Angle (deg.)	Avg Dip Direction (deg.)	Trace Length (km)	Mean Mag
San Luis Range (So Margin) FM3.2	0.4	0.7	0	12	45	37	115.0	7.10
San Luis Range 2011 CFM, FM3.1	0.7	1.1	0	12	52	na	78.9	7.22
San Luis Range - Oceano 2011 CFM, FM3.1	2.1	3.3	0	12	45	na	21.0	6.64
Los Osos 2011 CFM FM3.1, 3.2	5.6	9.1	0	12	45	208	57.9	6.90
Oceanic-West Huasna FM3.1, 3.2	5.7	9.1	0	7	58	49	121.9	7.13
Casmalia 2011 CFM	10.0	16.1	0	12	75	na	47.9	6.87
San Luis Range - Pecho FM3.1, 3.2	10.5	16.9	0	12	90	na	25.6	6.58
East Huasna 2011 CFM FM3.1, 3.2	12.2	19.6	0	15	90	na	74.0	7.18
Lions Head 2011 CFM FM3.1, 3.2	14.0	22.5	0	12	75	29	65.2	6.70
San Luis Bay 2011 CFM FM3.2	14.7	23.7	0	10	90	na	16.2	6.30
Shoreline FM3.1, 3.2	14.8	23.7	0	12	90	na	22.6	6.52
South Cuyama FM3.1, 3.2	16.5	26.6	0	13.9	33	210	82.7	7.51
Rinconada 2011 CFM FM3.1, 3.2	17.7	28.4	0	8.5	82	233	122.8	7.45
Hosgri FM3.1, 3.2	17.8	28.6	0	6.8	80	59	171.2	7.25
Hosgri (Extension) FM3.1, 3.2	19.1	30.7	0	7.5	80	79	28.6	6.43
La Panza FM3.1, 3.2	20.6	33.2	0	13.9	51	45	71.9	7.26
Los Alamos 2011 CFM FM3.1, 3.2	22.0	35.5	0	12	30	na	26.9	6.91
San Juan FM3.1, 3.2	27.8	44.8	0	13	90	243	82.1	7.05
Santa Ynez River FM3.1, 3.2	27.9	44.9	0	12	70	na	72.8	7.09
Morales (West) FM3.1, 3.2	33.9	54.5	0	8.6	32	49	28.2	6.75
Los Alamos extension FM3.1, 3.2	36.6	58.9	0	12	30	na	22.3	6.82
Santa Ynez (West) FM3.1, 3.2	36.8	59.3	0	9.2	70	182	79.6	6.90
San Andreas (Cholame) rev FM3.1, 3.2	39.3	63.3	0	12	90	51	62.5	6.84
San Andreas (Carrizo) rev FM3.1, 3.2	40.4	65.1	0	15.1	90	224	59.0	6.84
Ozena FM3.1, 3.2	46.4	74.7	0	13.9	33	na	41.5	7.16
Morales (East) FM3.1, 3.2	47.1	75.8	0	8.6	32	14	17.8	6.55
Red Mountain FM3.1, 3.2	48.0	77.3	0	14.1	56	2	100.5	7.40
San Andreas (Parkfield) FM3.1, 3.2	50.1	80.6	0	10.2	90	50	36.4	6.43
Mission Ridge-Arroyo Parida-Santa Ana FM3.1, 3.2	54.7	88.0	0	7.6	70	176	68.8	6.80
North Channel FM3.2	55.5	89.4	1.1	4.5	26	10	50.6	6.70
Pitas Point (Upper) FM3.2	56.1	90.3	1.4	10	42	15	34.9	6.75
Big Pine (West) FM3.1, 3.2	56.2	90.4	0	11	50	2	18.1	6.50
Lost Hills FM3.1, 3.2	58.1	93.5	4.2	12	29	233	32.6	6.81
Pitas Point (Lower, West), FM 3.1	58.8	94.7	1.5	8.8	13	3	34.7	7.20
Oak Ridge (Offshore), west extension FM3.2	59.0	94.9	0	3.1	67	195	28.1	6.07
Channel Islands Western Deep Ramp FM3.1, 3.2	59.4	95.7	4.8	12.5	21	204	62.1	7.28
Santa Ynez (East) FM3.1, 3.2	62.0	99.8	0	13.3	70	172	68.4	7.15
San Andreas (Big Bend) FM3.1, 3.2	62.6	100.8	0	15.1	90	198	49.7	6.84

Reference: USGS OFR 2013-1165 (CGS SP 228)

Based on Site Coordinates of 35.046 Latitude, -120.503 Longitude

Mean Magnitude for Type A Faults based on 0.1 weight for unsegmented section, 0.9 weight for segmented model (weighted by probability of each scenario with section listed as given on Table 3 of Appendix G in OFR 2008-1437). Mean magnitude is average of Ellworths-B and Hanks & Bakun moment area relationship.

We reviewed geologic maps produced by multiple investigators, including the California Geological Survey (CGS) and the United States Geological Survey (USGS); each has published reports or maps that locate strands of the San Luis Range fault system near the northeastern side of the site approximately parallel to the Nipomo Valley and US Route 101. Preliminary Geologic Maps by Delattre and Wiegers (2014) locate the fault on the northeast side of US Route 101 (indicated as FM3.1 in Table 1); however, fault model 3.2 locates the San Luis Ranch So Margin, Subsection 10 on the southwest side of US Route 101 within the Dana Reserve property. The San Luis Range fault is considered active but is not classified as "sufficiently active and well defined" to be included in an Alquist-Priolo Special Studies Zone.

The UCERF3 database is an earthquake rupture forecast model for estimating the magnitude, location, and probability of significant ground shaking in California. Faults included in the model are mapped as nodes connected by straight line segments. These nodes are often miles apart and the UCERF3 report notes that faults may be several kilometers from their mapped locations. The nodes of the mapped segment that crosses the Dana Reserve Property are widely spaced, at approximately 5.5 miles to the northwest and 6.5 miles to the southeast. Therefore, we agree with Delattre and Wiegers that the San Luis Range fault is likely on the northeast side of US Route 101, aligned with Nipomo Creek, as described in fault model 3.1. The Regional Geologic map, depicting the mapped locations of the San Luis Range faults is presented in Appendix B as Figure 3.

In addition, San Luis Obispo County has mapped an inactive-inferred fault trending across the southwest portion of the site. Because poorly consolidated sand dune deposits, such as those present on site, are generally highly erodible and form subdued landforms the location of these faults are poorly constrained.

Public domain aerial photographs were reviewed and no indications of fault scarps or lineaments were observed on the site. The earliest photographs reviewed dated from 1939 and agricultural activities were occurring on the parcel prior to that date and subtle fault features may have been obscured by disking or other similar activities.

Seismicity

The site is located within a seismically active region with several mapped faults in the general vicinity of the site. A deaggregation of the probabilistic seismic hazard at the site from the USGS (2021b) indicates that an earthquake of magnitude 6.74 has a 2% probability of occurring within a 50-year period. This earthquake is anticipated to produce a peak ground acceleration (PGA) of 0.54g at the site, assuming seismic Site Class “D – a Stiff Soil Profile”.

The California Building Code requires that buildings and structures be designed for seismic forces. Future *design level* geotechnical engineering report(s) should include ground motion analysis and seismic design parameters for use in the structural design process of buildings and structures.

Slope Stability and Landsliding

The site is gently sloping with subdued landforms. The site is within an area classified by the County as low landslide potential (SLO Co 2021). No indications of slope instability were observed in the public domain aerial photographs or site reconnaissance.

Flooding

According to the Flood Insurance Rate Maps Numbers 06079C1617G and 06079C1636G (FEMA, 2012), published by the Federal Emergency Management Agency, the site is located within Flood Zone X, an area of minimal flood hazard. Local flood hazards are depicted by FEMA as being confined to the area of Nipomo Creek northeast of US Route 101. Figure 4 – the Flood Zone Map is presented in Appendix B.

Tsunami and Seiche Potential

The site is located approximately 7 miles from the Pacific Ocean at an elevation of over 300 feet; therefore, the potential for a tsunami to flood the site is considered nil.

A seiche is a single water wave that can be generated in a reservoir, lake or pond as the result of barometric pressure anomalies or long-period seismic waves generated by strong local earthquakes. There are no reservoirs, lakes, or ponds in the vicinity of the site, therefore, there is no potential for a seiche to affect the project site.

Naturally Occurring Asbestos

Asbestos minerals are generally limited to only a few types of rocks known to be present in the central coast area of California; these are ultra-mafic igneous rocks and their metamorphic equivalents, which include serpentinite and some types of schist. The regional geologic maps depict the site as being underlain by older eolian deposits (Late Pleistocene sand dune deposits) which are not considered asbestos bearing units. The potential for asbestos to be present on site in hazardous quantities is very low.

Radon

Radon is a naturally-occurring, colorless, odorless gas present in certain soils and rock, which is derived from the decay of uranium atoms. The occurrence of radon correlates with the presence of specific minerals, and its concentrations in soil or rock will vary depending on the mineralogy of the surrounding bedrock, temperature, barometric pressure, moisture and other factors. Prolonged exposure to elevated levels of radon is associated with an increased risk of lung cancer. The route of exposure is via inhalation.

The eolian deposits observed during our investigation are not considered a source of radon gas. According to the State of California interactive data viewer, the site is in an area mapped as low radon potential (Churchill 2008)). The Indoor Radon Potential Map is presented as Figure 5 in Appendix B.

Liquefaction and Seismically Induced Settlement of Dry Sand

Liquefaction is the loss of soil strength caused by a significant seismic event. It occurs primarily in loose, fine to medium-grained sands, and in very soft to medium stiff silts that are saturated by groundwater. During a major earthquake, the saturated sands and silts tend to compress and the void spaces between the soil particles that are filled with water decrease in volume. This causes the pore water pressure to build up in the soils. Then if the water does drain away rapidly, the soils may lose their strength and transition into a liquefied state.

Seismically induced settlement of dry sand is also caused by a significant seismic event and may occur in lower density and sand and silt soils that are not saturated by groundwater. During a major earthquake, the void spaces between the unsaturated soil particles that are filled with air tend to compress which translates to a decrease in volume or settlement.

In order to estimate the potential for liquefaction and seismically induced settlement of dry sand and their relative effects on the site, we reviewed the boring data and utilized methods suggested by the Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117a (CDMG, 2008). A quantitative analysis of liquefaction and seismically induced settlement of dry sand was performed as described in ESP's geotechnical engineering report (2021). The analyses indicated that the saturated soils are nonliquefiable and that seismically induced settlement of dry sand is not expected to exceed 0.5-inch. Accordingly, no special measures will be needed to protect the structures and associated improvements from liquefaction and/or seismically induced settlement of dry sand. Please refer to ESP's geotechnical engineering report (2021) for further discussion of liquefaction and seismically induced settlement of dry sand.

7.0 CONCLUSIONS

Engineering Geology

The site appears suitable for the project as generally described in the "Introduction" section of this report. In our opinion, there are no significant geologic constraints that have been identified at this point in the project that would preclude development of this site as currently planned.

Geotechnical Engineering

Geotechnical issues of concern and conclusions are presented in ESP's geotechnical engineering report (2021).

8.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for planning the type of project described herein. Our intent was to assess the geologic and geotechnical concerns for this project in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the use of the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk. The preliminary opinions and conclusions of this report are based upon the geologic and geotechnical conditions encountered at and near the site at this time.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text.

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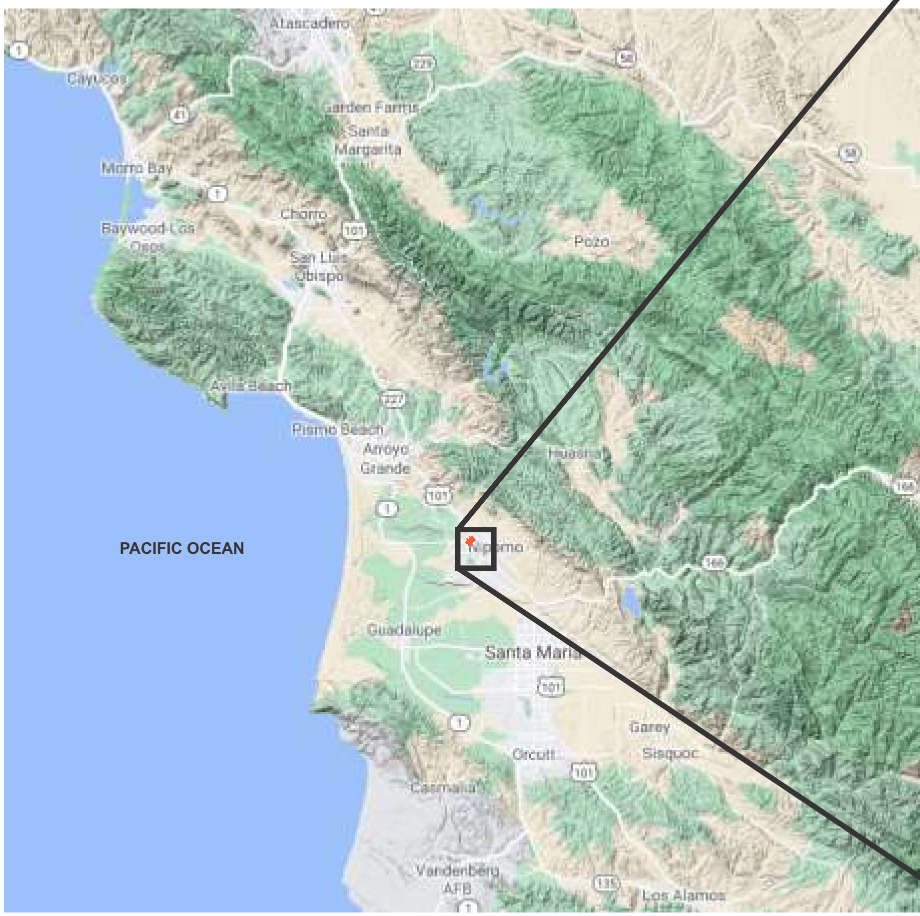
APPENDIX A

Figure 1 – Site Vicinity Map

Figure 2 – Exploration Location Map

Boring Log Legend

Boring Logs



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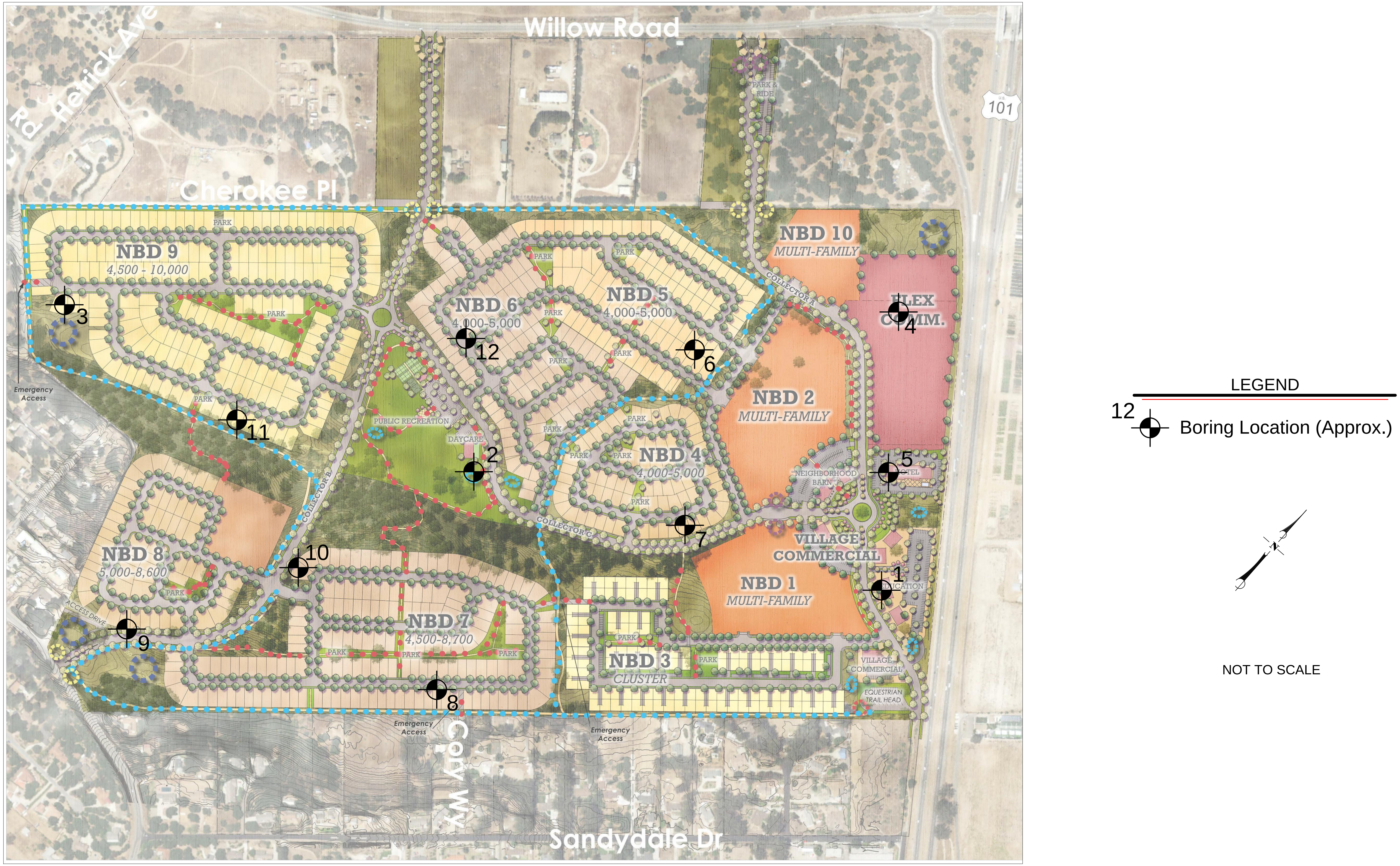
SITE VICINITY MAP

DANA RESERVE
Northeast of North Frontage Road
Nipomo Area of San Luis Obispo County, California

FIGURE 1

Date
September 2021

Project No.
304746-001



BASE MAP PROVIDED BY: RRM DESIGN GROUP

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EXPLORATION LOCATION MAP
DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis Obispo County, California

Date
September 2021

Figure 2

Project No.
304746-001

Dana Reserve, ELM 9-2021.dwg

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BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	
STANDARD PENETRATION TEST (SPT)	
SHELBY TUBE	
BULK	
SUBSURFACE WATER DURING DRILLING	
SUBSURFACE WATER AFTER DRILLING	

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS	MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS	HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE					CLEAR SQUARE SIEVE OPENING		
	# 200	# 40	# 10	# 4	3/4"	3"	12"
SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend121714.dwg

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Boring No. 1

PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP-SM		POORLY GRADED SAND WITH SILT: light brown, dry, loose					
3			slightly moist					
5			medium dense	5.0-6.5	SPT			3, 5, 6
9			moist					
10			gray mottled orange, trace clay	10.0-11.5	SPT			9, 11, 13
15			orange-brown, clay ends	15.0-16.5	SPT			6, 7, 7
20				20.0-21.5	SPT			6, 9, 8
25			End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Boring No. 2

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

JOB NO.: SL-18135-SA
DATE: 08/14/2017

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SM		SILTY SAND: brown, dry loose					
3			orange-brown, slightly moist					
5				5.0-6.5	SPT			2 1 2
8	SP-SM		POORLY GRADED SAND WITH SILT: yellow-brown, moist					
10				10.0-11.5	SPT			3 4 5
13			light brown, medium dense					
20				20.0-21.5	SPT			4 7 10

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

JOB NO.: SL-18135-SA
DATE: 08/14/2017

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27	SP-SM		POORLY GRADED SAND WITH SILT: as above					
30			light brown mottled orange, some clayey sand lenses ~1" thick	30.0-31.5	SPT			5 7 9
35			trace clay					
40	SC		CLAYEY SAND: brown, moist, medium dense					
46	SP		POORLY GRADED SAND: light brown, moist, medium dense					
50			End of Boring @ 50.0' No Subsurface Water Encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3

PAGE 1 OF 1
JOB NO.: SL-18135-SA
DATE: 08/14/2017

LOGGED BY: PWM
DRILL RIG: Mobile B-53
AUGER TYPE: 6" Hollow Stem

CANADA RANCH PROPERTY
East of Hetrick Avenue and Cherokee Place
Nipomo Area of San Luis Obispo County, CA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: orange-brown, dry, loose, trace silt					
3			slightly moist					
5				5.0-6.5	●			1 2 1
9			yellow brown					
10				10.0-11.5	●			2 4 5
13			medium dense					
15			light yellow brown	15.0-16.5	●			4 8 9
20				20.0-21.5	●			6 8 11
25			End of Boring @ 25.0' No Subsurface Water Encountered					

LEGEND: ▬ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: pale brown, loose, slightly moist	0.0 - 5.0	○			
4			light yellowish brown					
5				5.0 - 6.5	▬	96.7	2.5	4 6 9
6				5.0 - 10.0	○			
9			medium dense, moist					
10				10.0 - 11.5	▬	105.0	5.0	4 8 11
11	SP-SM		POORLY GRADED SAND WITH SILT: brown, medium dense, moist					
15	SP		POORLY GRADED SAND: yellowish brown, medium dense, moist, oxidation staining	15.0 - 16.5	▬	113.0	9.0	5 16 27
20				20.0 - 21.5	●			7 11 14
21			pale brown					

LEGEND: ▬ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30			mottled brown, light brown, yellowish brown	30.0 - 31.5	SPT			6 10 10
35			groundwater stabilized after drilling					
40			pale brown, dense, wet, water encountered during drilling	40.0 - 41.5	SPT			9 16 17
45			very dense	45.0 - 46.5	SPT			16 32 36
49			dense	50.0 - 51.5	SPT			15 17 24
51.5			End of Boring @ 51.5' Subsurface water encountered @ 40.0' during drilling, stabilized at 35.0' after drilling					

LEGEND: Ring Sample Grab Sample Shelby Tube Sample SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5
PAGE 1 OF 2
JOB NO.: 304746-001
DATE: 7/27/2021

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			light brown	5.0 - 6.5	Ring Sample	102.1	2.8	2 4 8
8			light yellowish brown					
10			moist	10.0 - 11.5	Ring Sample	99.3	4.3	4 5 11
12			dark yellowish brown, dense, some oxidation staining					
15				15.0 - 16.5	Ring Sample	113.1	13.1	11 21 31
16.5			light brown, medium dense					
20				20.0 - 21.5	SPT			5 11 14

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/27/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30				30.0 - 31.5	SPT			9 / 11 / 12
31.5			pale brown					
35			groundwater stabilized after drilling					
39			dense, wet, water encountered during drilling					
40				40.0 - 41.5	SPT			15 / 21 / 27
43			medium dense					
45				45.0 - 46.5	SPT			7 / 13 / 17
49			dense					
50				50.0 - 51.5	SPT			16 / 24 / 20
51.5			End of Boring @ 51.5' Subsurface water encountered @ 39.0' during drilling, stabilized at 35.0' after drilling					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 6

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: light brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5				5.0 - 6.5	Ring Sample	98.1	1.8	2, 4, 6
8.5			yellowish brown					
10			medium dense, moist	10.0 - 11.5	Ring Sample	101.3	4.2	4, 7, 11
15				15.0 - 16.5	SPT			4, 8, 9
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

Boring No. 7

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: dark yellowish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			medium dense	5.0 - 6.5	Ring Sample	108.4	3.6	7 12 21
8.5			light yellowish brown					
10				10.0 - 11.5	Ring Sample	124.8	2.2	7 11 16
15				15.0 - 16.5	SPT			7 8 11
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 8

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP	POORLY GRADED SAND: brown, loose, slightly moist	0.0 - 4.0	Grab Sample			
4		light brown					
5			5.0 - 6.5	Ring Sample	99.3	2.6	3, 5, 8
8.5		light yellowish brown, medium dense					
10			10.0 - 11.5	Ring Sample	107.7	4.0	4, 8, 11
14		yellowish brown					
15			15.0 - 16.5	Ring Sample	107.5	3.5	6, 11, 16
20			20.0 - 21.5	SPT			5, 9, 12
25		oxidation staining	25.0 - 26.5	SPT			7, 10, 14
26.5		End of Boring @ 26.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 9

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: reddish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			yellowish brown, medium dense	5.0 - 6.5	Ring Sample	96.0	3.7	5 / 8 / 13
6				5.0 - 10.0	Grab Sample			
10				10.0 - 11.5	Ring Sample	99.0	2.4	5 / 9 / 12
15				15.0 - 16.5	Ring Sample	104.9	2.7	5 / 11 / 14
20				20.0 - 21.5	SPT			5 / 9 / 14

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 9

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
27			POORLY GRADED SAND: as above					
30				30.0 - 31.5	SPT			7 / 11 / 12
31			oxidation staining					
39			light yellowish brown					
40				40.0 - 41.5	SPT			8 / 12 / 15
49			yellowish brown					
50				50.0 - 51.5	SPT			7 / 12 / 13
51.5			End of Boring @ 51.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 10

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: light brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5				5.0 - 6.5	Ring Sample	101.7	1.1	3 5 6
9			light yellowish brown, medium dense					
10				10.0 - 11.5	Ring Sample	102.1	2.2	4 8 10
13.5			loose					
15				15.0 - 16.5	SPT			2 4 4
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 11

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: brown, medium dense, slightly moist					
5				5.0 - 6.5	Ring Sample	110.2	3.1	4 9 17
10				10.0 - 11.5	Ring Sample	105.6	1.6	7 11 15
11			light brown					
15				15.0 - 16.5	SPT			4 6 9
16.5			End of Boring @ 16.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 12

LOGGED BY: A. Flynn
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 304746-001
DATE: 7/28/2021

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis
Obispo County, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SP		POORLY GRADED SAND: dark yellowish brown, loose, slightly moist	0.0 - 5.0	Grab Sample			
5			medium dense	5.0 - 6.5	Ring Sample	110.0	3.7	7 11 15
9			yellowish brown					
10			moist	10.0 - 11.5	Ring Sample	105.5	4.5	5 9 12
15			slightly moist	15.0 - 16.5	Ring Sample	101.1	3.9	7 14 17
20				20.0 - 21.5	SPT			5 8 11
25				25.0 - 26.5	SPT			6 10 15
26.5			End of Boring @ 26.5' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

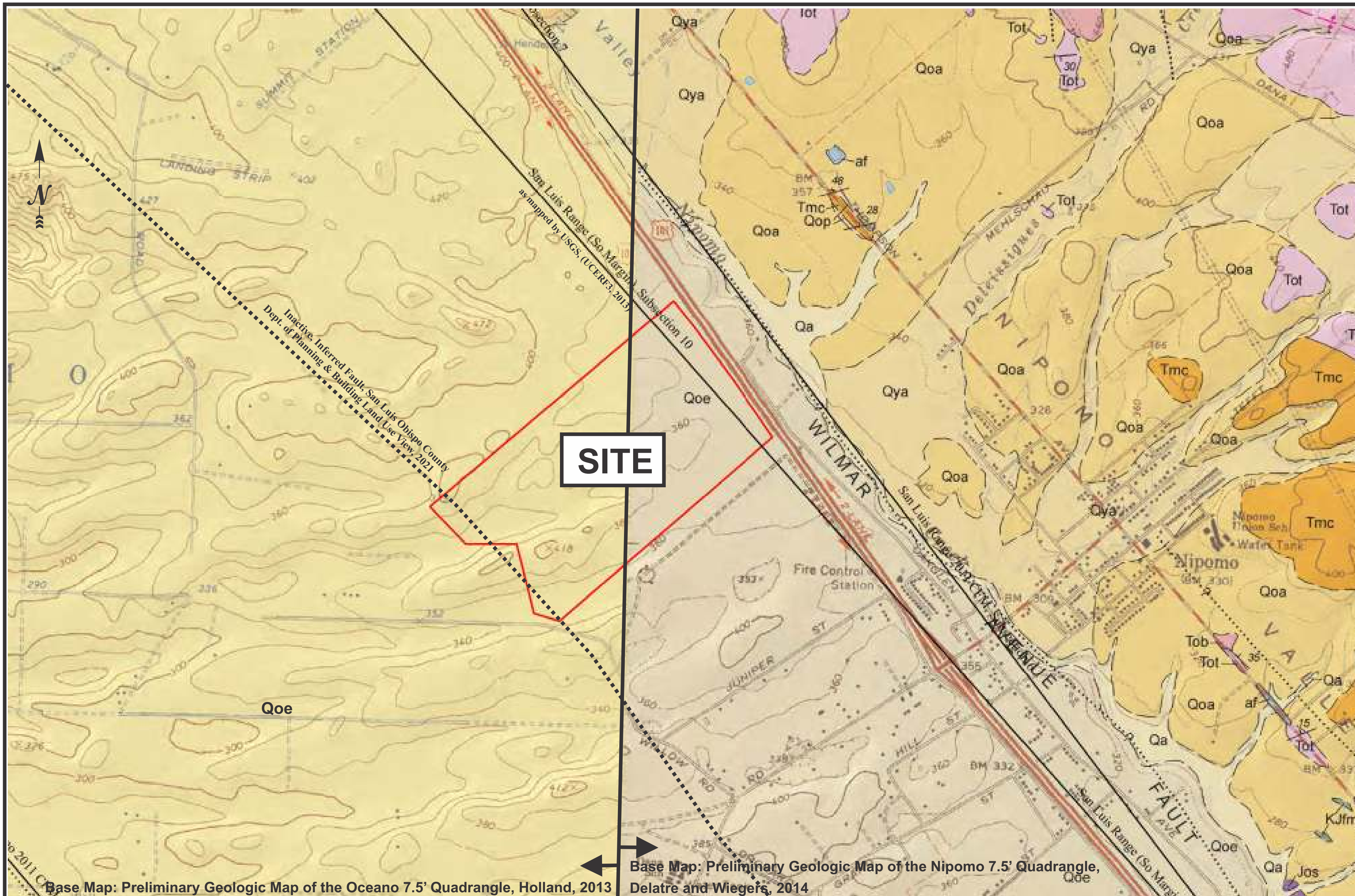
NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Figure 3 – Regional Geologic Map

Figure 4 – Flood Zone Map

Figure 5 – Indoor Radon Potential Map



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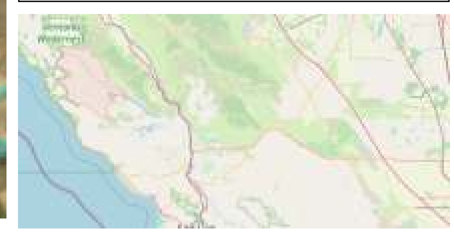
REGIONAL GEOLOGIC MAP

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis Obispo County, California

FIGURE 3

Date
September 2021

Project No.
304746-001



Source: San Luis Obispo County, Land Use View, scale 1:36,112

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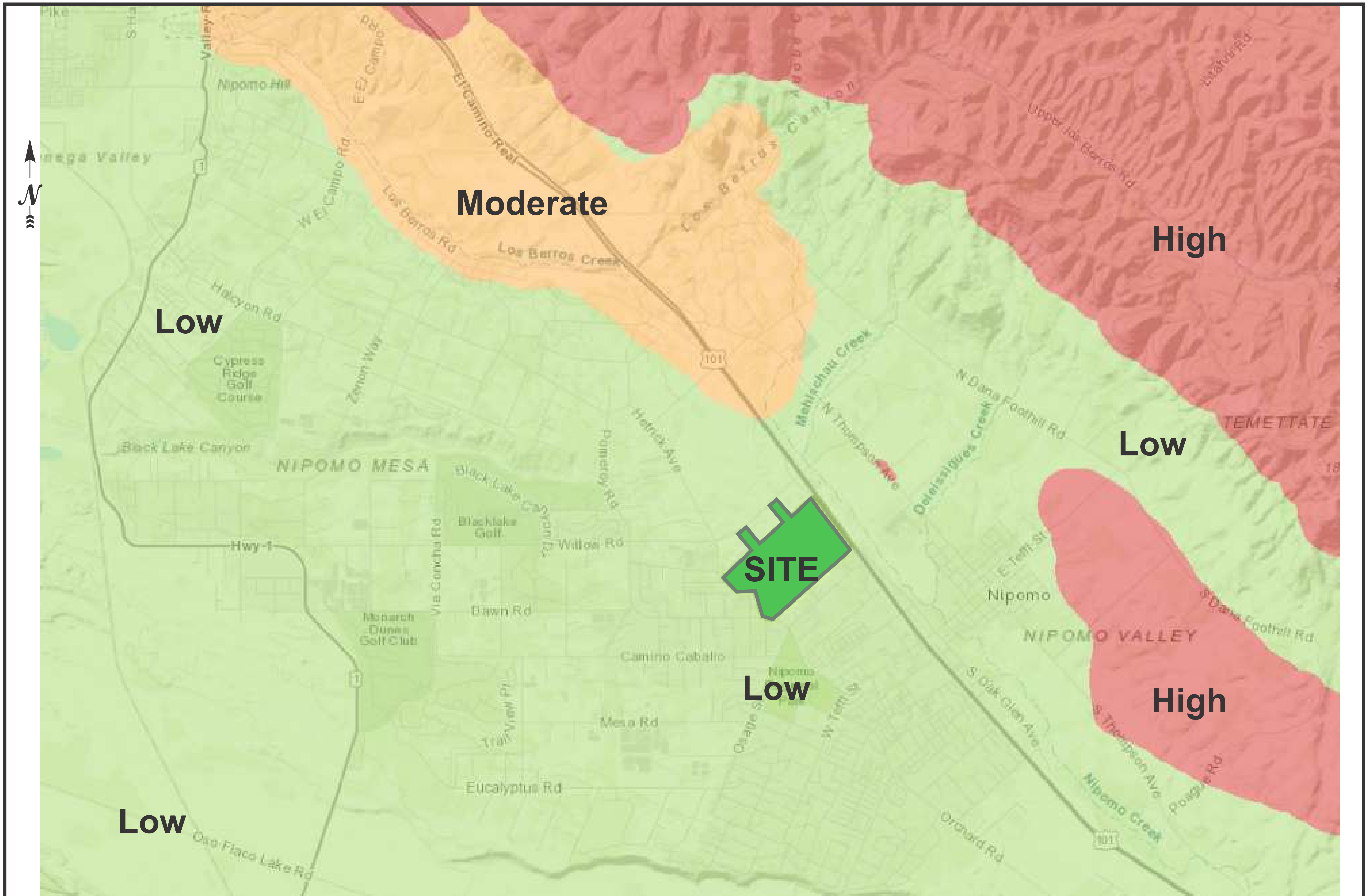
FLOOD ZONE MAP

DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis Obispo County, California

FIGURE 4

Date
September 2021

Project No.
304746-001



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INDOOR RADON POTENTIAL MAP
DANA RESERVE
Northwest of North Frontage Road
Nipomo Area of San Luis Obispo County, California

FIGURE 5
Date
September 2021
Project No.
304746-001

Review of Geotechnical Feasibility Report for Dana Reserve

LANDSET
ENGINEERS, INC.

June 25, 2021

File No.: 0916-01
SLO Co. File No. LRP2020-0007

Ms. Jennifer Guetschow, Senior Planner
County of San Luis Obispo
Department of Planning & Building
976 Osos Street, Room 300
San Luis Obispo, California 93408

Subject **Review of Geotechnical Feasibility Report**

Project: **Dana Reserve (APN's 091-301-073, -030 & -031)**
Nipomo Area of San Luis Obispo County, California

References:
1. Geotechnical Feasibility Report, Canada Ranch Property, East of Hetrick Avenue and Cherokee Place, Nipomo Area, San Luis Obispo County, California, File No. SL-18135-SA, Doc. No. 1709-013.SER, prepared by Earth Systems Pacific, dated September 11, 2017.
2. Dana Reserve Specific Plan, prepared by RRM Design Group & Urban Planning Concepts, Inc., dated June 2020, *revised April 2021*.
3. California Geological Survey Special Publication 117A, Guidelines for Evaluating and Mitigating of Seismic Hazards in California, dated September 2008.
4. San Luis Obispo County Guidelines for Engineering Geologic Reports, San Luis Obispo County Planning & Building Department, dated January 2005, revised October 2013.
5. California Geological Survey Note 52, Guidelines for Preparing Geological Reports for Regional-Scale Environmental and Resource Management Planning, dated January 2013.

Dear Ms. Guetschow:

The purpose of this letter is to summarize our review findings of the above referenced geotechnical feasibility report (Reference 1) for the proposed approximate 288-acre Dana Reserve master-planned mixed-use development located in the Nipomo area of San Luis Obispo County, California. The geotechnical feasibility report was reviewed for conformance with California Geological Survey (CGS) Special Publication 117A, the San Luis Obispo County Guidelines for Engineering Geology Reports and CGS Note 52 (References 3, 4 & 5).

Review of the County of San Luis Obispo physical environment GIS layers indicates that the subject parcels are underlain by Quaternary dune deposits with a moderate liquefaction hazard potential. Additionally, an inactive fault has been mapped to be present along the southwesterly perimeter of the proposed development area (APN 091-301-073).

The geotechnical feasibility report (Reference 1) was limited to the drilling of five borings on August 14, 2017 to depths ranging from 5 to 50 feet below the ground surface, performed four years prior to the preparation of the revised specific plan (Reference 2). The project geotechnical feasibility report did not address site geology and concluded that the potential for liquefaction is very low and seismically induced settlement is also very low. It is our opinion that insufficient subsurface exploration and engineering analysis was performed to categorically substantiate these conclusions. We recommend that a more robust subsurface exploration program to include cone penetrometer testing (CPT) should be performed. This opinion is further supported by the conclusion of the project geotechnical engineer that *"the actual magnitude for seismically induced settlement should be estimated based on a more comprehensive subsurface exploration and laboratory testing program implemented during the preparation of a future geotechnical engineering report"* (Reference 1, p.7).

We recommend that the applicant submit a supplemental engineering geology report and geotechnical report for the proposed development. These reports should be based on the latest development plans/maps as depicted in the latest version of the project specific plan and/or draft EIR. The scope of these recommended supplemental reports should be sufficient to identify existing and potential geologic and geotechnical hazards and present measures to mitigate their significance to the environment relative to the proposed project development in accordance with the requirements of the California Environmental Quality Act (CEQA).

The recommended supplemental engineering geologic and geotechnical reports for the proposed project development must be prepared in compliance with the San Luis Obispo County Land Use Ordinance, CGS Special Publication 117A, the San Luis Obispo County Guidelines for Engineering Geology Reports and CGS Note 52 (References 3, 4 & 5). Sufficient geologic and geotechnical information should be presented in accordance with the references noted above to substantiate that the site is suitable for the proposed development as designed and that existing or potential geologic and geotechnical hazards have been identified and mitigation measures have been proposed.

Upon completion, the recommended supplemental engineering geologic and geotechnical reports should be forwarded to the County's reviewing geologist for review. Once the additional information requested is received, the report(s) will be reconsidered for acceptance per CEQA requirements.

Please contact me at (831) 443-6970 or bpapurello@landseteng.com if you have questions regarding this matter.

Respectfully,
LandSet Engineers, Inc.

PROFESSIONAL GEOLOGIST
BRIAN E. PAPURELLO
Exp
No. CEG 2226
CERTIFIED
ENGINEERING
GEOLOGIST
02/28/22
STATE OF CALIFORNIA
06-25-21

Brian Papurello, CEG 2226

Doc. No. 2106-136.REV

APPENDIX H

Hydrology and Water Quality Background Information

Nipomo Community Services District
Dana Reserve Development
Water and Wastewater Service Evaluation

NIPOMO COMMUNITY SERVICES DISTRICT

DANA RESERVE DEVELOPMENT WATER AND WASTEWATER SERVICE EVALUATION

FEBRUARY 7, 2022

PREPARED FOR:

NIPOMO COMMUNITY SERVICES DISTRICT
148 SOUTH WILSON STREET
NIPOMO, CA 93444

PREPARED BY:

530B PAULDING CIRCLE
ARROYO GRANDE, CA 93420
805 . 904 . 6530

NIPOMO COMMUNITY SERVICES DISTRICT

DANA RESERVE DEVELOPMENT WATER AND WASTEWATER SERVICE EVALUATION

FEBRUARY 7, 2022

Report Prepared Under the Responsible Charge of:

REGISTERED PROFESSIONAL ENGINEER
MICHAEL K. NUNLEY
NO. C 61801
EXP. 6/30/23
CIVIL
STATE OF CALIFORNIA

Michael K. Nunley

Michael K. Nunley, PE C61801

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1.0 INTRODUCTION

1.1 Description of Proposed Project

The Dana Reserve Development (Project) is a proposed multiuse neighborhood encompassing 288 acres of currently undeveloped land. The property is not within the Nipomo Community Services District (District) service area but is within the District's Sphere of Influence (SOI). The development includes a variety of single-family residences, condominiums, townhomes, and multifamily apartments. The development also incorporates open spaces and public parks, as well as various commercial uses including a village center, flex commercial/light industrial, neighborhood barn, hotel, daycare center, and a community college campus.

The developer has applied for annexation to the Nipomo Community Services District for water and wastewater services.

1.2 Purpose of Study

This study evaluated the impact this proposed development will have on District water and wastewater facilities. Recommended improvements from the Water and Sewer Master Plan Update (Cannon, 2007) and Southland WWTF Facility Master Plan Amendment 1 (AECOM, 2010) were reviewed to identify the improvements required to provide service to the project.

1.3 Scope of Work

The Scope of Work for the project included the following tasks:

Evaluation of Water Supply, Storage, and Distribution Facilities (Offsite and Onsite)

- Review Water Supply Assessment provided by developer and compare to District projections.
- Update existing water distribution system model with current demands from billing data and future demand from proposed annexation area.
- Review Water Master Plan, confirm status of master-planned projects, and update model with completed projects that may be necessary to support the development.
- Identify Master Planned projects which should be implemented to support the development.
- Perform model runs to identify offsite improvements necessary to support development. An evaluation of fire flow requirements, typical operating pressure ranges, and ability of the system to deliver Supplemental Water were performed. System storage requirements were also identified.
- Provide master-planning level cost opinion for proposed improvements, using unit costs escalated from previous master plans or planning documents.
- Evaluate onsite improvements recommended for development to confirm pipe sizes and pressure ranges are adequate for fire protection, maximum day, and peak hour demands.

Evaluation of Wastewater Collection Facilities (Offsite and Onsite)

- Place flowmeters at three (3) locations in the District sewer system for up to 30 days (to be performed by MKN's subconsultant, ADS).
- Review wastewater flow projections provided by developer and compare to District projections.
- Update existing collection system model with current flows from water billing data and future flows from proposed annexation area.
- Review Sewer Master Plan, confirm status of master-planned projects, and update model with completed projects that may be necessary to support the development.
- Identify Master Planned projects which should be implemented to support the development.
- Perform model runs to identify offsite improvements necessary to support development.
- Provide master-planning level cost opinion for proposed improvements, using unit costs escalated from previous master plans or planning documents.

Wastewater Treatment Capacity Evaluation

- Develop design flow and loading for the Southland Wastewater Treatment Facility under existing conditions. This analysis will include a review of past flow and loading records since the Phase I facility was completed; review of flow and loading projections from the Southland Wastewater Treatment Facility Master Plan (WWTF Master Plan); and a review of the flow and loading projections from the annexation area. The total flow and loading with contribution from the annexation area will be tabulated and compared to flows anticipated in the WWTF Master Plan.
- Discuss the ability of each unit process to meet existing flows and loads including the annexation area will be discussed for each phase. A process model will not be developed but flows and loads will be compared to typical loading rates for similar facilities based on industry standards and vendor-supplied information. Provide a recommendation as to whether future phases of the WWTF Master Plan should be implemented to address increased flows and loading.
- Provide master-planning level cost opinion for proposed improvements, using unit costs escalated from the previous WWTF Master Plan or other planning documents.

2.0 WATER SYSTEM

2.1 Water Supply and Demand

Water Supply

Historically, the District has relied heavily on pumped groundwater from the Nipomo Mesa Management Area (NMMA), a subbasin within the Santa Maria Groundwater Basin. The NMMA Technical Group, which is the court-assigned entity responsible for managing groundwater within the NMMA, has declared a Stage IV water severity condition for the subbasin. This condition requires purveyors reduce groundwater deliveries to 50% of the average production recorded between years 2009 and 2013. This results in a voluntary groundwater reduction goal of 1,267 AFY of pumped groundwater for the District.

Groundwater was the sole source of the District's water supply until 2015, when the District began importing water from the City of Santa Maria (City) as part of the Nipomo Supplemental Water Project (NSWP), dictated by the Final Judgment. The District executed the Wholesale Water Supply Agreement (Wholesale Agreement) with the City on May 7, 2013. Supplemental Water consists of a "municipal mix" of both surface water from the State Water Project and groundwater from the City of Santa Maria. The Wholesale Agreement requires a minimum water delivery to the District of 2,500 AFY by the 2025-26 fiscal year, a readily available amount of 500 AFY, and a maximum allowable delivery of 6,200 AFY. Due to a current license agreement limitation, this report focuses on the minimum delivery of 2,500 and the readily available 500 AFY totaling 3,000 AFY.

In addition to the Wholesale Agreement, a Water Replenishment Agreement requires water delivery to Woodlands Mutual Water Company (WMWC), Golden State Water Company (GSWC), and Golden State Water Company Cypress Ridge (GSWCCR). Table 2-1 outlines the required Wholesale Agreement water delivery schedule.

Table 2-1: Wholesale Water Agreement Delivery Schedule

AFY	Effective Delivery Date
1,000	7/1/2020
2,500	7/1/2025
3,000	Planning Capacity
6,200	Maximum Capacity

While the District is obligated to meet the minimum delivery schedule from the Wholesale Agreement, the District still has to maintain and operate groundwater wells to meet additional demands that the NSWP cannot meet, and to comply with State regulations. **Table 2-1** outlines the required Wholesale Agreement water delivery schedule.

Table 2-2 depicts the total supply available to the District including delivered water from the NSWP based on the above delivery schedule and maximum groundwater allocation as required by the Final Judgment.

Table 2-2: Total District Water Supply	
Source	Water Supply
	AFY
NCSD Groundwater Available[1]	1,267
NSWP Allocation	2,500
Total Future Water Supply	3,767
NSWP New Development Allocation[2]	500
Maximum Future Water Supply[3]	4,267

Notes:
1. NCSD's current voluntary groundwater reduction goal based on fifty percent reduction from average production in the FY's 2009-10 through 2013-14 as required by the Final Judgment, or fifty percent of 2,533 AFY based on Stage 4.
2. While this additional allocation is available to the District for delivery under the Wholesale Agreement, it should only be taken as needed. After the District requests 3,001 AFY, the District must maintain that delivery. It is believed the District may not have enough demand to warrant additional water delivery past 2,500 AFY in the planning horizon contemplated in this report.
3. Table 7-4, NMMA Stage 4, 2020 UWMP.

2.1.1. Water Demand Projections

Existing water demands for the District are summarized in **Table 2-3** based on calendar year 2020 usage as reported in the annual water usage report submitted to DWR and the 2020 UWMP update.

Table 2-3 : Existing District Demands (2020)		
Use Type	2020 Actual	
	Level of Treatment When Delivered	Volume (AF)
Single Family	Drinking Water	1,326
Multi-Family	Drinking Water	122
Commercial	Drinking Water	76
Landscape	Drinking Water	271
Other	Drinking Water	4
Agricultural Irrigation	Drinking Water	12
Losses	Drinking Water	237
	TOTAL (AF)	**2,048**

Notes:
1. Demands = Annual water consumption by customer type as shown above.
2. Values represent use as reported to DWR for 2020.

Projections under future conditions were developed in the 2020 UWMP and are summarized in **Table 2-4**. Future demand conditions included water service to parcels within the existing service area that are not currently served. This included parcels with Reserved District Capacity allocation (parcels not currently on the District's system but have potential to be added to the system), parcels served by private wells, vacant parcels, and ADUs associated with that growth. Criteria used in this analysis for subdivision and/or adding an ADU are listed below:

1. District's GIS parcel mapping data was used to identify existing land use designation and acreage information.
2. Existing and vacant residential single family (RSF) parcels greater than 12,000 square foot (sf) and served by a community sewer are allowed by ordinance to subdivide into 6,000 sf lots.
3. Existing and vacant residential single family (RSF) parcels on septic have a 1.0-acre minimum lot size requirement.
4. Existing and vacant residential suburban (RS) parcels greater than 2.0 acres are allowed by ordinance to subdivide to 1.0 acre lots.
5. Existing and vacant residential rural (RR) parcels greater than 10.0 acres are allowed by ordinance to subdivide to 5.0 acre lots.
6. Blacklake Village residential parcels have ADU capability (based on Proposed Amendments to Title 22).
7. Residential Multi-Family (RMF) parcels do not have ADU capability, regardless of parcel size.
8. Land uses that allow ADU dwellings include the following:
    a. Commercial, Retail (CR)
    b. Office and Professional (OP)
    c. Recreation (REC)
    d. Residential, Rural (RR)
    e. Residential, Suburban (RS)
    f. Residential, Single Family (RSF)

This "Maximum Anticipated Infill Development" scenario assumes that every parcel that has the capability to subdivide based on the above criteria will subdivide. This does not affect the potential future demand for existing customers because neither the total area of the parcel nor the usage factor changes. This increase in subdivision does increase the total number of parcels available to add an ADU. It is assumed every new parcel able to add an ADU will do so. Total ADU demand is projected by multiplying all eligible parcels by a demand factor of 0.11 AFY/ADU. The "Maximum Anticipated Infill Development" scenario is a conservative approach, but is appropriate to assess future worst case scenario needs since the District does not control land use or zoning within its service area.

This scenario also includes current District water demand, as well as the required deliveries to the Woodlands Mutual Water Company (WMWC), Golden State Water Company (GSWC), and Golden State Water Company Cypress Ridge (GSWCCR) according to the Water Replenishment Agreement, and shown in **Table 2-4** below.

Table 2-4: NCSD Potential Future System Demands (Maximum Anticipated Infill Development)	
Description	Water Demand
	AFY
Current NCSD Customer Usage	
Existing District Customers[1]	2,048
Potential District Maximum Anticipated Infill	
Future Demand	340
Future Demand Subtotal[2]	**2,388**
District Interconnections	
WMWC	417
GSWC	208
GSWCCR	208
Interconnection Subtotal	**833**
Total Future Demand with Interconnections (AFY)[2]	**3,221**

Notes:
1. Table 4-1, 2020 UWMP.
2. Table 4-3, 2020 UWMP. Total District projected water demand for year 2045, excluding anticipated demand from the proposed Dana Reserve development.

2.1.2. Dana Reserve Water Demand Projections

The proposed Dana Reserve development includes approximately 1,235 residential units, 18.9 acres of commercial land use, and 31.5 acres of public parks and streetscapes. Applying usage factors derived from the 2016 NCSD Urban Water Management Plan (UWMP) and additional factors pulled from the City of Santa Barbara and the County of SLO, the Developer estimated a total water demand for the new development of 370 acre-ft/year (AFY). This estimate includes a 10% contingency to account for additional miscellaneous water use. **Table 2-5** shows the developer's water use factors used and total demand projections for the Dana Reserve development as outlined in the most recent Water Supply Assessment update by RRM Design Group (2020) as cited below.

Table 2-5: Developer Provided Water Use Factor and Demand Projections (Table 5.1 from DRSP Update)				
Land Use Category	**Number of Units or Acres**	**Water Use Factor[3] (AFY)**	**Potable Water Demand (AFY)**	**Daily Demand[2] (gpd)**
Residential				
Condos	173 units	0.13 AFY/unit	22.14	-
Townhomes	210 units	0.14 AFY/unit	30.24	-
Cluster	124 units	0.21 AFY/unit	25.79	-
4,000-5,999 SF	463 units	0.21 AFY/unit	96.30	-
6,000-7,000+ SF	225 units	0.34 AFY/unit	75.61	-
Affordable	75 units	0.14 AFY/unit	10.84	-
		Subtotal	*261.13*	*232,900*
Commercial[1]				
Village Commercial	4.4 ac	0.17 AFY/1,000 sf	8.69	-
Flex Commercial	14.5 ac	0.17 AFY/1,000 sf	28.63	-
		Subtotal	*37.32*	*33,319*
Landscape				
Village and Commercial Area[4]	6.3 ac	1.0 AFY/ac	6.30	-
Public Recreation	10.0 ac	1.0 AFY/ac	10.00	-
Neighborhood Parks	15.0 ac	1.0 AFY/ac	15.00	-
Streetscape/Parkways	6.5 ac	1.0 AFY/ac	6.50	-
		Subtotal	*37.80*	*28,121*
		Project Total	*336.25 AFY*	*300,185 gpd*
		Project Total (with 10% contingency)	*369.88 AFY*	*330,207 gpd*

Notes:
1. Assumes 0.15 gpd/sf and 33% useable site area for buildings.
2. Conversion factor: 1 AFY equals 892.742 gpd.
3. Water usage factors used by the developer in the table above are derived from the following sources: 2016 NCSD UWMP, the City of Santa Barbara and the County of San Luis Obispo.
4. Assumed 33% of the total commercial acreage is available for landscape.
5. Updated Table 5.1 provided in email dated September 23, 2020, from Robert Camacho, RRM Design Group

The water demand factors provided by the developer were compared to the standard water demand factors from the 2007 Water Master Plan referenced in the District Water and Wastewater Standards as well as calculated demand factors based on the 5-year and 10-year District average annual water production. This comparison is shown below in **Table 2-6**. The land use categories used by the developer (RRM) do not line up with categories that the District has outlined in the 2007 Water Master Plan (WMP) or within the District's current water model. As such, the District land use factors were applied to the most appropriate Dana Reserve land use category.

Table 2-6: Dana Reserve Water Demand Factor Comparison				
Land Use Category	Dana Reserve Water Supply Assessment[1] (AFY/acre)	2007 Water Master Plan (AFY/acre)	5-Year Production Average (2016-2020 – AFY/acre)	10-Year Production Average (2011-2020 – AFY/acre)
Condominiums	2.29	3.75	2.22	2.47
Townhomes	2.60	3.75	2.22	2.47
Small Lots SFR[2]	1.27	2.10	1.26	1.40
Medium Lot SFR	1.42	2.10	1.26	1.40
Affordable	2.71	3.75	2.22	2.47
Commercial	1.96	1.42	1.33	1.49
Parks/Streetscapes	1.00	0.98	0.71	0.79

Notes:

1. Developer originally used residential demand factors in the form of GPD/unit to calculate anticipated demand for residential development. Using information provided in the Dana Reserve Water Supply Assessment describing total areas for each land use category, average demand factors in the form of AFY/acre were calculated by MKN.
2. Small Lot SFR (Single Family Residence) includes "Cluster" Land Use Category shown in **Table 2-2**.

These demand factors were used to calculate average day demand, maximum day demand (MDD), and peak hour demand (PHD) for the Dana Reserve development. MDD and PHD were calculated by multiplying the average day demand by peaking factors of 1.7 and 3.78 (according to current District Standard Specifications) respectively. Each of the District projections include a 10% contingency to account for miscellaneous demand and total demands are outlined below in **Table 2-7**. We recommend using the projection calculated based on the 10-year production average, because it represents a range of years including both drought and non-drought conditions. While this is a conservative approach, it is an appropriate baseline for planning to meet future water demands. This is also the approach applied to potential annexations in the 2020 UWMP.

Table 2-7: NCSD Dana Reserve Water Demand Comparison				
Projection Method	Average Day Flow[1] (AFY)	Average Day Flow (MGD)	Maximum Day Flow (MGD)	Peak Hour Flow (MGD)
Peaking Factor	-		*1.7 x ADD*	*3.78 x ADD*
Water Supply Assessment (RRM)	358	0.32	0.54	1.21
2007 Water Master Plan Demand Factors	512	0.46	0.78	1.73
10-year Production Average Demand Factors (as applied in 2020 UWMP)	352	0.31	0.53	1.19
5-year Production Average Demand Factors	316	0.28	0.48	1.07

1. All average day demand values include a 10% contingency per the method used in the Water Supply Assessment.

Total demands for existing and future conditions within the District system, including anticipated demands from the Dana Reserve development, were compared with the future delivery capacity from the Nipomo Supplemental Water Project and groundwater allocation in **Table 2-8**.

Table 2-8: Water Supply Allocation and Demand		
Source	Existing Conditions with Deliveries to Purveyors	Maximum Anticipated Infill Development
	AFY	AFY
Average District Demand[1]	2,048	2,048
Potential District Maximum Anticipated Infill	-	340
Dana Reserve Demand	352	352
WMWC Demand[2]	417	417
GSWC Demand[2]	208	208
GSWCCR Demand[2]	208	208
Total Demand	**3,233**	**3,573**
2025 NSWP Allocation	2,500	2,500
NCSD Voluntary Groundwater Reduction Goal[3]	1,267	1,267
Total Future Water Supply	**3,767**	**3,767**
Supply Surplus / (Deficit)	**534**	**194**
NSWP New Development Allocation[4]	500	500
Maximum Future Water Supply	**4,267**	**4,267**

Notes:

1. Table 4-1, 2020 UWMP.
2. 2025 purveyor wholesale estimate, Table 4-3, 2020 UWMP
3. NCSD current voluntary groundwater reduction goal based on fifty percent reduction from average production in the FY's 2009-10 through 2013-14 as required by the Final Judgment, or fifty percent of 2,533 AFY.
4. While this additional allocation is available to the District for delivery under the Wholesale Agreement, it should only be taken as a last resort. After the District requests 3000 AFY, the District must maintain that delivery. It is believed the District does not have enough demand to warrant additional water delivery past 2500 AFY.

This analysis estimates that in 2025, even with the Dana Reserve Project, District water supplies will exceed demand by 534 AFY under existing conditions (with delivery to purveyors) and by 194 AFY under the Maximum Anticipated Infill Development scenario. If the District elects to take the New Development Allocation of 500 AFY, the remaining supply surplus will increase. A considerable challenge facing the District will be maintaining the currently operating wells within the system while continuing to meet contractual obligations for NSWP water deliveries. This is addressed in the storage discussion in Section 2.4.

2.2 Water System Facilities

2.2.1. Existing Facilities

The District's existing water system includes the following supply, storage, and distribution facilities:

Supply

- Nipomo Supplemental Water Supply: Joshua Road Pump Station currently operating between 550 and 820 GPM with capacity to operate at 1,860 GPM (3,000 AFY).
- Sundale Well: Currently operating at 890 GPM.
- Via Concha Well: Currently operating at 610 GPM.
- Black Lake Well #4: Currently operating at 360 GPM.
- Knollwood Well: Currently operating at 240 GPM.
- Eureka Well #2: Currently inoperable. Future design capacity of 1000 GPM (To be online by 2022).

Storage

- Foothill Tanks: 4 tanks totaling 3,000,000 gallons of useful storage.
- Standpipe: 280,000 gallons of useful storage.
- Joshua Road Tank: 500,000 gallons; No useful storage for District system since it is a partially-buried tank intended primarily as operational buffer for Joshua Road Pump Station. Flow from the Tank must be pumped into the District system.

Distribution

- Pipeline Statistics:

The following table summarizes pipe lengths in the distribution system as extracted from District's Water System GIS. The majority of pipelines (67%) are 8-inch diameter and smaller.

Table 2-9: Existing Water Pipeline Statistics

Pipe Diameter (inches)	Pipe Length (feet)	% of Total
2	120	0.02%
4	1,189	0.24%
6	121,722	24.18%
8	215,531	42.82%
10	81,703	16.23%
12	48,052	9.55%
14	1,265	0.25%
16	22,746	4.52%
18	101	0.02%
24	10,898	2.17%
Total	**503,327**	**100%**

2.2.2. Proposed Master Plan Facilities

MKN reviewed the District's 2007 Water and Sewer Master Plan (Master Plan) for potential proposed improvements that may be necessary to support the development. Of the proposed improvements, the following were identified:

- 12" pipeline along Northeastern length of proposed Dana Reserve development from the corner of Sandydale Drive and North Frontage Road to Willow Road to loop the water system.
- 16" pipeline from the Foothill Tanks to Sandydale Drive and North Frontage Road. The pipeline was reduced from the 24" diameter originally proposed in the WMP. A 16" pipeline is more appropriate given the updated future demands and flows necessary to meet District demand as a result of future development and the Dana Reserve Project.

As an alternative, District staff recommended MKN evaluate a 16-inch pipeline on North Oakglen Avenue from West Tefft Street to Sandydale Drive and North Frontage Road.

2.3 Hydraulic Analysis Results and Recommendations

2.3.1. Hydraulic Modeling Analysis

MKN utilized the District's current WaterCAD hydraulic model to evaluate the impact of the proposed Dana Reserve development on the existing and future District water system based on existing and future projected demands.

For the purpose of this report, scenarios were modeled for both current and future conditions within the District's Water System. All scenarios assumed delivery to the Woodlands Mutual Water Company (WMWC), Golden State Water Company (GSWC), and Golden State Water Company Cypress Ridge (GSWCCR) as outlined in **Table 2-4**. The existing conditions scenarios also assumed a delivery of 1,336 gpm (2,157 AFY) from the NSWP at the Joshua Road Pump Station (JRPS), which is based on the District's current delivery from JRPS (820 gpm) plus future required deliveries to other purveyors (516 gpm total). Model runs were performed under steady state conditions based on the following model settings:

- Existing System Demands
  - Average day demand (ADD) conditions: 1850 gpm
  - Maximum day demand (MDD) conditions: 2,784 gpm (1.7 peaking factor)
  - Peak hour demand (PHD) conditions: 5,559 gpm (3.78 peaking factor)
  - Residential fire-flow: 1,000 gpm per 2016 California Fire Code
  - Commercial fire-flow: 3,000 gpm
- Delivery to WMWC at Trail View Place: 258 gpm (417 AFY)
- Delivery to GSWC at Primavera Lane: 129 gpm (208 AFY)
- Delivery to GSWCCR at Lyn Road: 129 gpm (208 AFY)
- Joshua Road Pump Station at 1336 gpm (2157 AFY)
- Available Well Production
  - Blacklake #4: 360 gpm
  - Knollwood: 240 gpm

- Sundale: 890 gpm
- Via Concha: 610 gpm

- Foothill Tanks in service
  - Tank level during ADD: 17 feet (540 feet)
  - Tank level during MDD: 15 feet (538 feet)
  - Tank level during PHD: 13 feet (536 feet)
- Standpipe in service
  - Tank level during ADD: 80.4 feet (540 feet)
  - Tank level during MDD: 78.4 (538 feet)
  - Tank level during PHD: 76.4 (536 feet)

The scenarios were assessed based on the following criteria, in conjunction with current District Standards and Specifications for Water System Design:

- System Pressure
  - Minimum Operating Pressure (ADD, MDD, PHD) = 40 psi
  - Minimum Operating Pressure (MDD plus fire-flow) = 20 psi
  - Maximum Recommended Operating Pressure (All conditions) = 80 psi
- Pipeline Velocity
  - Maximum Pipeline Velocity (All conditions – as a goal not a requirement) = 5 ft/s

Table 2-10 provides a description of Scenarios 1 through 9 and results of the analysis for baseline conditions as well as existing conditions with the addition of the proposed Dana Reserve Development. Modeled system pressures were observed at the following nine locations within the District's water distribution system to identify pressure impacts to the District's low pressure service area customers, high pressure service area customers, interconnection with WMWC, interconnection with GSWC, interconnection with GSWCCR, and four locations within the Dana Reserve development:

- Low Pressure (high elevation) Area in Summit Station: Futura Lane
- High Pressure (low elevation) Area in Main Zone: Honeygrove Lane
- WMWC Interconnection: Trail View Place
- GSWC Interconnection: Primavera Lane
- GSWCCR Interconnection: Lyn Road west of Red Oak Way
- Dana Reserve Connection: Sandydale Drive
- Dana Reserve Connection: Pomeroy Road
- Dana Reserve Connection: Willow Road (west)
- Dana Reserve Connection: Willow Road (east)

Table 2-10: Hydraulic Analysis Scenarios 1-9

Table 2-10: Hydraulic Modeling Results with NSWP Delivery at 2157 AFY																
WaterCAD Scenario and Settings							Dana Reserve Delivery	Futura Lane (EL = 454')	Honeygrove Lane (EL = 306')	Dana Reserve at Sandydale Drive (EL = 355')	Dana Reserve at Pomeroy Road (EL = 351')	Dana Reserve at Willow Road 1 (EL = 385')	Dana Reserve at Willow Road 2 (EL = 378')	WMCC Interconnect at Trail View Place (EL = 222')	GSWC Interconnect at Primavera Lane (EL = 312')	GSWCCR Interconnect at Lyn Road (EL = 328')
Scenario	Description	Total Demand (GPM)	NSWP Delivery (GPM)	Wells	Quad Tanks Level (Feet)	Standpipe Level (Feet)	Flow (GPM)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)	Pressure (PSI)
Baseline System Conditions without Delivery to Dana Reserve																
1	Average Day Demand	1850	1336	Off	17	80.4	-	37	102	80	81	-	-	137	99	91
2	Maximum Day Demand	2784	1336	Off	15	78.4	-	37	101	79	81	-	-	136	98	91
3	Maximum Day Demand + 1000 GPM Fire-flow at Futura Lane	3784	1336	Off	15	78.4	-	19.9	101	79	80	-	-	136	98	80
4	Peak Hour Demand	5559	1336	Off	13	76.4	-	36	93	72	73	-	-	129	91	90
System Conditions with Delivery to Dana Reserve																
5	Average Day Demand	2069	1336	Off	17	80.4	218	37	102	80	81	67	70	137	99	91
6	Maximum Day Demand	3155	1336	Off	15	78.4	371	36	99	78	79	65	68	135	97	90
7	Maximum Day Demand + 1000 GPM Fire-flow at Futura Lane	4155	1336	Off	15	78.4	371	19	99	78	79	65	67	135	97	79
8	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6155	1336	Off	15	78.4	3371	35	92	68	70	54	57	127	90	89
9	Peak Hour Demand	6383	1336	Off	13	76.4	824	34	89	56	58	68	70	125	87	88

Legend:

- Falls within recommended range
- Falls under recommended pressure (40 psi for ADD, MDD, PHD; 20 psi for Fire-flow)
- Exceeds recommended pressure (80 psi for all scenarios)

Scenarios 1 through 4: Existing System Conditions

Scenarios 1-4 modeled existing pressures at the nine monitoring locations with NSWP delivery at 820 gpm, all storage tanks in service, and no wells in service under ADD, MDD, MDD plus fire-flow, and PHD conditions. Pressures throughout the water system under existing conditions vary slightly between ADD, MDD, MDD plus fire-flow, and PHD, but largely remain within the District's recommended pressure ranges. The District's high point, Futura Lane, faces pressures below the District's recommended range during all existing system condition scenarios. All purveyor interconnection sites experience high pressures (above 80 psi) throughout most existing system condition scenarios.

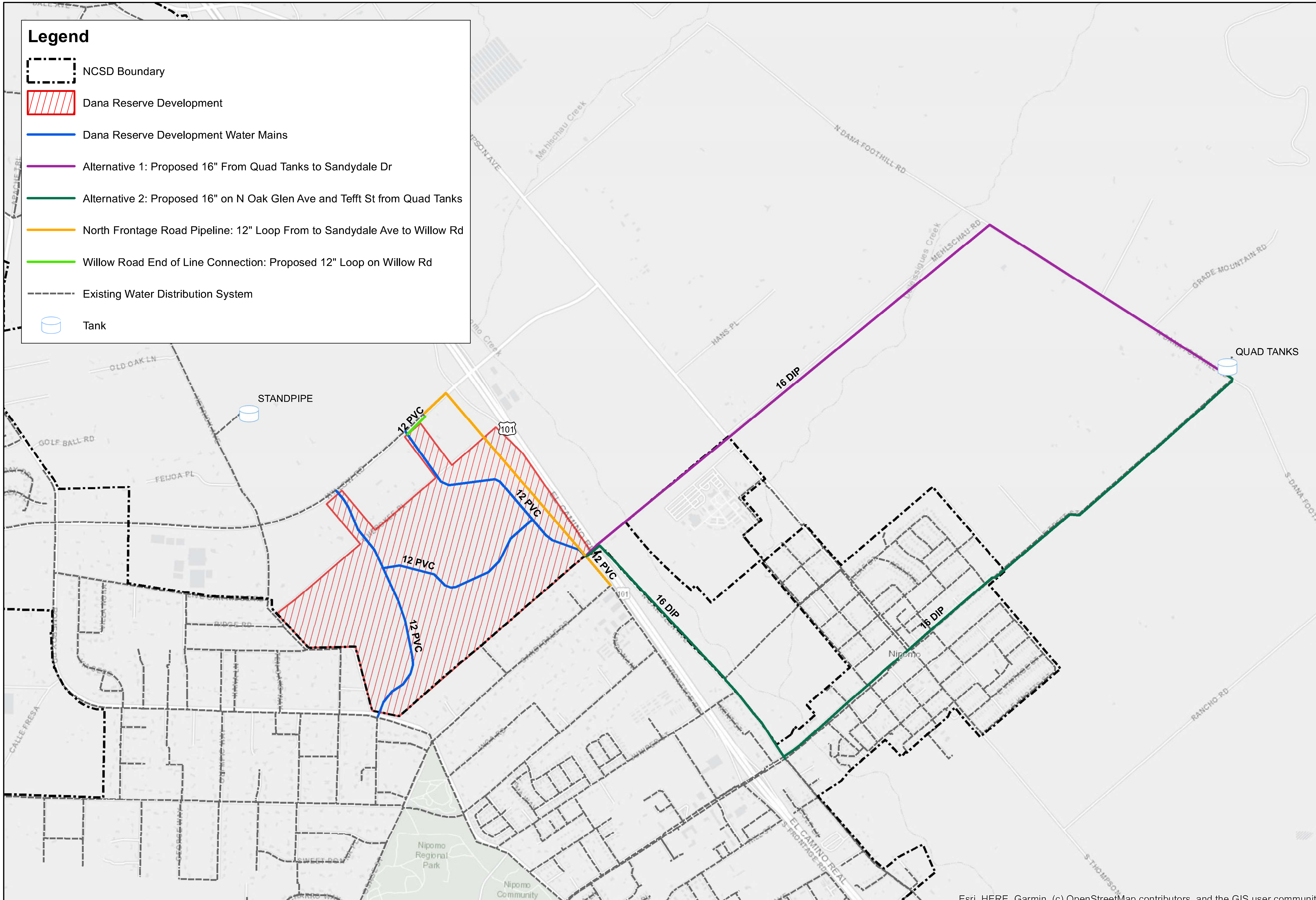
Scenarios 5 through 9: Existing System Conditions with Dana Reserve Addition

Results from Scenarios 5 through 9 show a minor decrease in system pressures (1-2 psi) during MDD plus fire-flow and PHD conditions across much of the system when compared to those same scenarios during existing conditions.

Figure 2-1 outlines the developer proposed water mains as well as four proposed improvement alternatives to mitigate the system impact made by the Dana Reserve Development. The impacts these alternatives have on the District's system in conjunction with increased future system demands were assessed in the hydraulic modeling analysis and are included in **Table 2-11** and the discussion to follow.

Table 2-11 summarizes Scenarios 10 through 23 and results of the analysis for future demands based on maximum anticipated infill development and increased NSWP delivery. These scenarios also included potential improvement projects in the analysis. The same assumptions were used as stated previously except for the following:

- ❑ Future System Demands
  - o Average day demand (ADD) conditions: 2,277 gpm
  - o Maximum day demand (MDD) conditions: 3,509 gpm (1.7 peaking factor)
  - o Peak hour demand (PHD) conditions: 7,170 gpm (3.78 peaking factor)
- ❑ Joshua Road Pump Station at 1,550 gpm (2,500 AFY)



NIPOMO COMMUNITY SERVICES DISTRICT

Nipomo Community Services District

Dana Reserve Development - Water and Wastewater Service Evaluation

Figure 2-1

Proposed Pipeline Improvements for District Water System

1 inch = 1,500 feet

0 750 1,500 Feet

mkn

Table 2-11: Dana Reserve Hydraulic Modeling Results with NSWP Delivery at 2500 AFY

WaterCAD Scenario and Settings							Dana Reserve Delivery	Futura Lane (EL = 454')	Honeygrove Lane (EL = 306')	Dana Reserve at Sandydale Drive (EL = 355')	Dana Reserve at Pomeroy Road (EL = 351')	Dana Reserve at Willow Road 1 (EL = 385')	Dana Reserve at Willow Road 2 (EL = 378')	WMCC Interconnect at Trail View Place (EL = 222')	GSWC Interconnect at Primavera Lane (EL = 312')	GSWCCR Interconnect at Lyn Road (EL = 328')
Scenario	**Description**	**Total Demand (GPM)**	**NSWP Delivery (GPM)**	**Wells**	**Quad Tanks Level (Feet)**	**Standpipe Level (Feet)**	**Flow (GPM)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**	**Pressure (PSI)**
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential																
10	Average Day Demand	2277	1550	Off	17	80.4	199	37	102	80	81	67	70	137	102	91
11	Maximum Day Demand	3509	1550	Off	15	78.4	339	36	101	78	80	65	68	136	99	90
12	Maximum Day Demand + 1000 GPM Fire-flow at Futura Lane	4509	1550	Off	15	78.4	339	19	101	78	80	65	68	135	98	79
13	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	92	68	70	54	57	126	90	89
14	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve & NO JRPS	6509	0	Off	15	78.4	3339	34	85	63	65	50	53	122	83	89
15	Peak Hour Demand	7170	1550	Off	13	76.4	754	33	92	70	72	58	60	127	90	87
16	Peak Hour Demand	7170	1550	All Wells On	13	76.4	754	34	97	76	78	63	66	137	95	88
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential with Proposed 16" Pipeline From Quad Tanks																
17	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	97	73	75	59	62	131	95	89
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential with Proposed 16" Pipeline on N Oak Glen and Tefft																
18	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	95	73	74	58	62	130	93	89
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential without 10" Pipeline from Quad Tanks on Tefft																
19	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	93	68	70	54	57	127	90	89
20	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve & NO JRPS	6509	0	Off	15	78.4	3339	34	80	59	61	45	48	117	78	88
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential with Proposed 12" Loop on North Frontage from Sandydale to Willow																
21	Maximum Day Demand + 1000 GPM Fire-flow at Futura Lane	4509	1550	Off	15	78.4	339	19	101	78	80	65	68	135	98	79
22	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	95	70	72	56	59	128	93	89
23	Peak Hour Demand	7170	1550	Off	13	76.4	754	33	92	70	72	58	60	127	90	87
System Conditions with Delivery to Dana Reserve and Future Flows Based on Subdivision Potential with Proposed 12" End-of-Line Loop on Willow																
24	Maximum Day Demand + 3000 GPM Fire-flow at Dana Reserve	6509	1550	Off	15	78.4	3339	35	92	68	70	54	57	126	90	89

Legend:
Falls within recommended range
Falls under recommended pressure (40 psi for ADD, MDD, PHD; 20 psi for Fire-flow)
Exceeds recommended pressure (80 psi for all scenarios)

Scenarios 10 through 16: Future System Conditions with Dana Reserve Addition

System pressures at the monitoring locations increased by 1-2 psi for flow conditions with the higher demands and NSWP delivery (3000 AFY) compared to existing system conditions. Futura Lane remains consistently below allowable system pressures for all conditions except MDD plus fire-flow at Dana Reserve, which is consistent with the existing conditions scenarios. It should be noted that the worst-case scenario run, MDD plus fire-flow conditions at Dana Reserve (3000 gpm) with JRPS not operating, still yielded acceptable pressures at all monitored nodes.

Scenario 17: Future System Conditions with Dana Reserve Addition and Proposed Alternative 1

Alternative 1 includes a 16” pipeline from the Foothill Tanks to the connection point at Dana Reserve as shown in **Figure 2-1**. This scenario was performed assuming MDD plus fire-flow conditions at Dana Reserve (3000 gpm) and improves system pressures by 2-3 psi at all nodes except for Futura Lane and the GSWCCR Interconnection. This improvement was modified from the original 24” Master Plan improvement recommended to account for low pipeline velocities.

Scenario 18: Future System Conditions with Dana Reserve Addition and Proposed Alternative 2

Alternative 2 includes a 16” pipeline on North Oak Glen Avenue from Tefft Street to the connection point at Dana Reserve, and the replacement of the 10” AC pipeline on Tefft with a new 16” ductile iron pipe as shown in **Figure 2-1**. This scenario was performed assuming MDD plus fire-flow conditions at Dana Reserve (3000 gpm) and the pipeline improves system pressures by 1-2 psi at the Dana Reserve site, but lowers system pressures by less than 1 psi at Honeygrove Lane (low elevation system location) and the WMCC Interconnection. It should be noted that both of those nodes are consistently above recommended system pressures for the District system, so lower pressures at these sites are of less concern.

Scenarios 19 through 20: Future System Conditions with Dana Reserve Addition and Without 10” Pipeline from Foothill Tanks on Tefft (Proposed Alternative 2)

These scenarios were run performed to demonstrate the degree to which the District relies on the 10” and 12” pipelines running from the Foothill Tanks to the rest of the District’s distribution system. The 10” pipeline is asbestos cement and is over 50 years old (originally installed in 1966). These scenarios assumed MDD plus fire-flow at Dana Reserve (3000 gpm) condition and the same condition without JRPS online, to demonstrate the effects on the distribution system without NSWP delivery and with limited flow from the Foothill Tanks. The first scenario lowers system pressures by 1-3 psi across the system, and most significantly impacted the Dana Reserve development. This scenario increased the pipeline velocity in the parallel 12” pipeline coming from the Foothill Tanks, but not above the District’s limit of 5 ft/s. Scenario 20 without JRPS online decreased system pressures by 10-15 psi when compared to Scenario 13 (Future System Conditions at MDD plus fire-flow at Dana Reserve). This scenario also increased the pipeline velocity in the parallel 12” pipeline coming from the Foothill Tanks to approximately 6.08 ft/s, exceeding the maximum recommended velocity outlined by the District Standards.

Scenarios 21 through 23: Future System Conditions with Dana Reserve Addition and North Frontage Road Pipeline

These scenarios analyze approximately 4750 LF of 12” pipeline along North Frontage Road to the existing dead-end on Willow Road as shown in **Figure 2-1**. Results from these scenarios indicate that this pipeline will not improve system pressures by a significant margin, however, this improvement promotes looping from the tanks to Dana Reserve which is an important benefit to eliminate dead end water mains and minimize water age throughout the system. The District requires looping of water mains to prevent dead ends.

<u>*Scenario 24: Future System Conditions with Dana Reserve Addition and Willow Road End-of-Line (EOL) Connection*</u>

This scenario includes a 12" loop on Willow Road to prevent a dead-end line on Willow Road as an alternative to the North Frontage Road Pipeline as shown in **Figure 2-1**. This alternative causes no change to system pressures shown in Scenario 13 (Future System Conditions at MDD plus fire-flow at Dana Reserve) but does satisfy District looping requirements with minimal off-site improvements.

2.3.2. Recommended Offsite Pipeline Improvements

The hydraulic analysis indicated that the Dana Reserve development will likely impact the District's water distribution system most significantly during MDD plus fire-flow at Dana Reserve and PHD conditions with minor decreases of less than 1 psi under other ADD and MDD conditions. The District should consider either Alternatives 1 or 2 to ensure reliable water delivery and adequate pressures throughout their system with the addition of the Dana Reserve Development.

1. <u>Alternative 1:</u> Construction of the new 16-inch pipeline (shown in Figure 2-1) from the Foothill Tanks to the Sandydale connection point would allow the District to maintain high system pressures during MDD plus fire-flow conditions at Dana Reserve and provide an additional freeway crossing, adding redundancy to the existing distribution system.

2. <u>Alternative 2:</u> Construction of the new 16-inch pipeline on North Oak Glen Drive from Tefft Street to the Sandydale connection point; and replacement of the existing 10-inch AC pipeline from the Foothill Tanks to North Oak Glen Drive on Tefft Street with a new 16-inch PVC pipeline (shown in Figure 2-1). These improvements would allow the District to maintain high system pressures during MDD plus fire-flow conditions at Dana Reserve and provide an additional freeway crossing, adding redundancy to the existing distribution system (shown in Figure 2-1). These improvements would also provide redundancy to the District's water supply from the Foothill Tanks. The existing 10-inch is at high risk of failure because of the age of the pipeline. This pipeline also provides much of the system's water supply, and if it were to fail, pressures would fall across the system.

2.3.3. Evaluation of Proposed Onsite Pipeline Improvements

The Developer proposed four connection points for the Dana Reserve water system based on anticipated projects. However one proposed connection does not connect to the District's existing system. As such, it is recommended that the southeast connection point be moved to the intersection of Sandydale Drive and North Frontage Road.

Figure 2-1 shows the Developer-proposed water mains for the Dana Reserve development per the most recent copy of the Draft DRSP (April 2020). The proposed 12-inch mains are appropriate for maintaining District recommended pressures and velocities. **Figure 2-1** shows the North Frontage Road Pipeline that provides looping for the overall system and prevents a dead end on Willow Road. While looping is required to meet District standards, it is recommended the District pursue the Willow Road EOL Connection, outlined in **Figure 2-1**, to avoid a dead-end connection, while maintaining services at the end of the 12-inch line on Willow Road. This alternative maintains looping requirements but avoids unnecessary off-site improvements.

It should be noted that the Draft DRSP only identifies transmission mains to serve the Dana Reserve development, so the extent of onsite improvements that could be reviewed and modeled was limited. Further evaluation will be needed after preliminary design of onsite improvements is submitted by the developer.

2.4 Storage Analysis and Recommendations

Table 2-13 outlines the water system storage capacity for the District system under three scenarios, with and without the Dana Reserve Development. The first scenario represents existing conditions of the current District system based on current system demands and service population. The second scenario represents the maximum anticipated infill potential based on parcels that could be added to the District system, particularly those designated NCSD Reserved Capacity, those on private wells, and vacant parcels. This scenario assumes that those parcels that can subdivide will subdivide, increasing ADU potential. The final scenario represents the future conditions outlined in the Storage Capacity Analysis of the 2007 Water and Sewer Master Plan. This scenario anticipated the construction of 1,000,000 gallons of additional storage, increasing the overall system storage to a total of 4,280,000 gallons. The 2007 Water and Sewer Master Plan analysis also included Sundale Well as an emergency supply. It was assumed that Sundale Well could reliably produce 1,000 gpm of emergency water supply for a three-day period, which is equivalent to 3,710,000 gallons. This assumption is not valid if the wells are not operated sufficiently.

The District is required by State law (California Code of Regulations Title 22) to maintain sufficient water storage capacity within its system to meet three basic needs: fire storage, equalization storage, and emergency storage. Fire flow storage must be greater than that required to produce the maximum anticipated fire-flow for a specified duration. Equalization storage is necessary to maintain availability of demand during peak conditions when system demands are greater than that being fed directly from supply sources. Emergency storage must be on hand to produce at least 50 gallons per capita per day for three days.

Fire-flow storage is calculated by multiplying fire-fighting flowrate by the duration of the fire-fighting event. A 3,000 gallon per minute flowrate for a duration of three hours was used to determine the minimum fire storage required for the system (540,000 gallons). This minimum value was assumed to be equal for both existing and future conditions.

Equalization storage is estimated by the formula: (1.5 – 1) x (MDD in GPM) x (14 hours) x (60 minutes per hour). The calculated values are displayed in **Table 2-13** for three scenarios.

Emergency storage is calculated by multiplying population by 50 gallons per day for three days. Existing population within the NCSD service area is estimated at 13,771 for the year of 2020 as calculated using the Department of Water Resources (DWR) Population Tool. Existing and future population projections from the 2020 DWR service population estimates are shown in **Table 2-12,** including future projections from the 2020 UWMP.

Table 2-12: NCSD Served Population Summary

Conditions	2020 Population	2045 Population with Maximum Anticipated Infill Development
District Service Area	13,771	16,031
District Service Area with Dana Reserve Project	13,771	18,398

Notes:
1. Per Tables 3-1 and 3-1a from the District's 2020 UWMP update.

Table 2-13: Water System Storage Capacity			
Storage Requirements	**Existing Conditions[1]**	**Existing Conditions with Dana Reserve**	**Maximum Anticipated Infill Development[2] with Dana Reserve**
	gallons	**gallons**	**gallons**
Fire	540,000	540,000	540,000
Equalization	952,489	1,108,198	1,256,843
Emergency	2,065,650	2,486,250	2,550,600
Total	**3,558,139**	**4,134,448**	**4,347,443**
Existing Above-Ground Storage Capacity	3,280,000	3,280,000	3,280,000
Gross Surplus/(Deficiency)	(278,139)	(854,448)	(1,067,443)

Notes:
1. Existing conditions based on 2019 NCSD customer usage data.
2. Maximum anticipated infill development based on current land development status and potential future development status.

The District's existing tank storage is not adequate to meet current and future needs including the Dana Reserve. While current storage does not adequately provide storage for existing conditions, the addition of Dana Reserve increases the storage need by almost 577,000 gallons.

As delivery from the NSWP increases, the District will require more operational storage for the water distribution system. Unlike wells, which can be sequenced to match daily diurnal usage fluctuations, the NSWP delivers constant flow into the District system. This requires additional equalization or "buffer" storage to prevent overflowing tanks or draining them below typical operating levels. As the District continues to operate their existing groundwater wells, the District will operate them during times when the cost for energy is low, which typically falls during low water demand hours (late night to early morning). This increased production during low consumption periods will dictate the District's need for additional storage. It is recommended that the District invest in additional aboveground storage in order to maintain enough storage to improve flexibility in operating with higher NSWP deliveries alongside continued groundwater well pumping. The preferred location for new storage is at the Foothill Tanks site.

Adding the new 1.0 MG storage tank recommended in the Water Master Plan will require that the District purchase additional land. The expanded storage capacity will allow the District to meet the identified storage requirements and will provide redundancy. The additional tank will also facilitate tank maintenance as cleaning and recoating can require taking a tank out of service for months at a time. The addition of a new tank at the Foothill Tanks site would necessitate improvements to the District's current chemical injection as well as valving between tanks. The current chemical injection system relies on manual injection of chemicals to the water stored in the elevated tanks. The construction of an additional storage tank would warrant automation and improvements to the existing chemical injection. It is also recommended that the District automate the current manual isolation valves between tanks to control water quality and manage constant flow from the NSWP.

Operational storage for NSWP delivery is another area of concern. The existing 500,000 gallon partially-buried reservoir at JRPS receives water from the City of Santa Maria. Pressure conditions in the City's system can fluctuate, necessitating the inclusion of this reservoir to provide a constant water supply to JRPS. The reservoir is one of the only major components of NSWP with no redundancy. If the existing JRPS Reservoir is taken out of service for repairs, cleaning or maintenance, NSWP may not have adequate supply from the City to operate which could leave the District unable to meet system demands. Adding a second 500,000-gallon reservoir at JRPS is recommended to provide redundancy in case the reservoir must be taken out of service for maintenance or repairs.

3.0 WASTEWATER COLLECTION SYSTEM

3.1 Wastewater Flows

3.1.1. Flow Monitoring

To aid in estimating existing wastewater flows and the distribution across the District wastewater collection system, MKN's subconsultant, ADS, placed three (3) depth-velocity flow meters in the District's collection system at locations indicated on **Figure 3-1**. MKN and District staff worked with ADS to identify manholes for placement. Five-minute depth and velocity data were collected between October 23, 2020, and November 28, 2020 and converted to flow in gallons per minute (GPM). The report from ADS (Appendix A) describes the flow meter type and data collection methodology and provides graphs of calculated flows at each location.

The sewershed upstream of Flow Meter No. 1 (FM01) includes contributions from the two other flow meters (FM02 and FM03).

The flow conditions used throughout the next two sections of the Study are defined below.

- *Average Annual Flow (AAF):* The flow rate averaged over the course of the year and the base flow for the collection system and WWTF.
- *Average Daily Flow (ADF):* The flow rate averaged by day over a monitoring period.
- *Maximum Month Flow (MMF):* The average daily flow during the month with the maximum cumulative flow. MMF is often the basis for a WWTF permitted flow limit.
- *Peak Day Flow (PDF):* The maximum daily flow rate used to design or evaluate hydraulic retention times for certain wastewater treatment processes.
- *Peak Hour Flow (PHF):* The maximum one-hour flow experienced by the facility is typically used for sizing collection system mains, WWTF piping, pump stations, flow meters and WWTF headworks systems. Peak hour flow is typically derived from facility influent records, flow monitoring, or empirical equations used to estimate PHF based on service area population.

The following table summarizes results for each flow meter during the flow monitoring period.

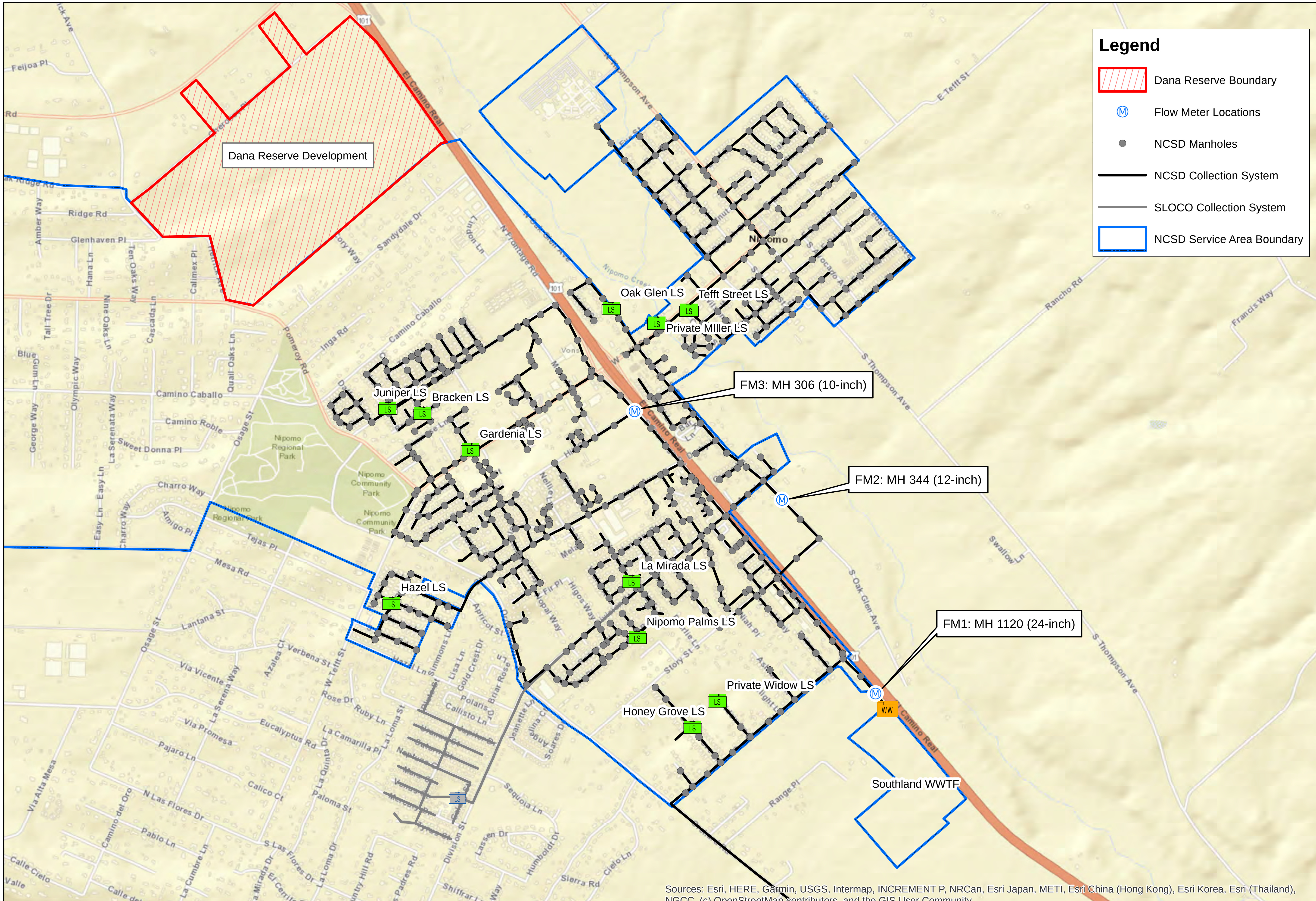
Table 3-1: Summary of Flow Monitoring Results (Oct. 23 – Nov. 28, 2020)

		Flow Meter		
Parameter	**Units**	**FM01**	**FM02**	**FM03**
Pipe Diameter	Inches	24	12	10
Average Daily Flow	GPD	560,000	191,000	74,000
Average Daily Flow	GPM	389	133	52
Average Flow Depth	Inches	4.75	2.95	2.25
Peak Hour Flow	GPM	747	258	101
Peak Hour Flow Depth	Inches	5.08	3.00	2.32
Peak Hour Peaking Factor (PHF/ADF)	-	1.9	1.9	1.9
Peak Instantaneous Flow (5-minute data)	GPM	875	643	172

Results for FM01 during the study period were compared to flows at the Southland WWTF influent flow meter during the study period and between January 2019 and December 2020.

Table 3-2: Historical Southland WWTF Influent Flow and Loading (January 2019 – December 2020)		
Parameter	**Unit**	**Value**
Average Flow During Study Period (Oct/Nov 2020)	MGD	0.50
Average Annual Flow (AAF)	MGD	0.49
Maximum Month Flow (MMF)	MGD	0.51
Peak Day Flow (PDF)	MGD	0.57
Peak Hour Flow (PHF)[1]	MGD	1.3

[1] Peak hour was determined from data collected between July 2018 and June 2020 for another study being conducted by the District.



Nipomo Community Services District

Dana Reserve Development - Water and Wastewater Service Evaluation

Figure 3-1:

Flow Meter Locations

3.1.2. District Projections

The District includes two wastewater service areas: Town and Blacklake. District staff is developing the Blacklake Sewer Consolidation Project to regionalize wastewater treatment at a central District facility. Existing influent wastewater from the Blacklake sewer collection system will be diverted from the Blacklake Water Reclamation Facility (WRF) to the Southland Wastewater Treatment Facility (WWTF). This project will require installation of a lift station at the existing Blacklake WRF site and construction of a force main to convey wastewater from the Blacklake system to the Town Sewer system for conveyance and treatment at the Southland WWTF. The existing Blacklake WRF will be decommissioned.

County sewer customers are also connected to the Town System through the Galaxy and People's Self Help (PSH) Lift Stations. These customers are identified separately in **Table 3-4**.

Future District projections in **Table 3-5** include both Blacklake and Town service areas since both will be served in the future. District GIS has identified parcels which are not yet tied into District sewer mains but could be served in the future, therefore these parcels were included. Two different methods were considered to estimate future AAF:

- Method 1: Return flows applied to 10-year (2011-2020) water production records[2].
- Method 2: Duty factors from the 2007 Water and Sewer Master Plan Update

Method 1 results were developed from average daily demand (ADD) calculated as described in Section 2.1 for the Maximum Anticipated Infill Development Scenario and potential ADUs with return factors applied based on land use of each parcel. Return factors are summarized in the table below.

Table 3-3: Sewer Flow Return Factors by Land Use

Land Use	Sewer Flow Return Factor (%)
Agriculture	-
Commercial Retail	90%
Commercial Service	90%
Multi-Land Use Category	90%
Office and Professional	90%
Open Space	65%
Public Facility	65%
Recreation	-
Rural Lands	-
Residential Multi-Family	90%
Residential Rural	90%
Residential Suburban	50%
Residential Single Family	60%

[2] Historical demands by parcel, based on billing records, were adjusted using the 10-year production average. These demands by individual parcel were then used to calculate water usage factors per acre based on land use category.

Both methods are summarized below for the entire Town Sewer service area, including the County service areas. Both methods are also compared to the flow metering results discussed in Section 3.1.

Table 3-4: Estimated Total Existing Sewer Flows

Land Use	No. of Sewered Parcels	Area (Ac)	% of Total	10-yr Water Production (gpd)	% of Total	Return Factor (%)	Estimated Sewer Flow based on Return Factors (gpd)	Estimated Sewer Flow with MP Sewer Factors (gpd)
Commercial Retail	3	57	7%	76,154	9%	90%	68,538	61,113
Commercial Service	9	8	1%	3,463	0%	90%	3,117	2,032
Multi-Land Use Category	1	3	0%	359	0%	90%	323	0
Office and Professional	18	5	1%	2,993	0%	90%	2,693	942
Public Facility	5	12	1%	4,139	0%	65%	2,691	5,188
Rural Lands	1	3	0%	271	0%	0%	-	0
Recreation	1	122	16%	86,473	10%	0%	-	0
Residential Multi-Family	525	72	9%	158,783	19%	90%	142,905	189,711
Residential Suburban	112	39	5%	21,382	3%	50%	10,691	12,817
Residential Single Family	1,878	384	49%	479,332	58%	60%	287,599	354,371
Agriculture	1	79	10%	0	0%	0%	-	0
Subtotal	**2,554**	**783**	**100%**	**833,349**	**1**	**-**	**518,557**	**626,173**
						County Service Areas	72,662	77,074
						Total Estimated Flow	**591,219**	**703,247**
						Measured Flow	559,673	559,673
						% Difference	**5%**	**23%**

Table 3-5 summarizes future flow estimates under both methods described above.

Table 3-5: Projected Future Sewer Flows (Not including Existing)								
Land Use	**No. of Sewered Parcels**	**Area (Ac)**	**% of Total**	**10-Yr Water Production (gpd)**	**% of Total**	**Return Factor (%)**	**Estimated Sewer Flow with Return Factor (gpd)**	**Estimated Sewer Flow with MP Sewer Factors (gpd)**
Commercial Retail	62	71	15%	94,467	21%	90%	85,021	75,810
Commercial Service	11	49	10%	21,710	5%	90%	19,539	12,739
Multi-Land Use Category	0	0	0%	0	0%	90%	0	0
Office and Professional	14	9	2%	5,548	1%	90%	4,993	1,746
Public Facility	2	12	2%	4,114	1%	65%	2,674	5,096
Rural Lands	0	0	0%	0	0%	0%	0	0
Recreation	0	0	0%	0	0%	0%	0	0
Residential Multi-Family	29	38	8%	60,244	13%	90%	54,221	100,939
Residential Suburban	91	132	28%	96,198	21%	50%	86,578	43,542
Residential Single Family	169	153	33%	165,158	37%	60%	148,644	141,490
Agriculture	0	0	0%	0	0%	0%	0	0
Subtotal	**378**	**464**	**100%**	**447,439**	**100%**	**-**	**401,669**	**381,362**
						Blacklake WRF[1]	58,000	58,000
						Future ADUs	26,161	26,161
						Total Flows	**485,830**	**465,523**

Notes:

1. Blacklake WRF will be decommissioned in the future with flows going to Southland WWTP instead. Future flow from the 2017 Blacklake Sewer Master Plan (MKN) was used.

Flow meter results were compared to estimated existing flows as shown in the following tables to calibrate the District's sewer model. Existing flows were estimated by applying the return factors to water billing records for each customer. The readings at FM01 and FM02, the largest sewersheds, were significantly closer to modeled AAF estimates than FM03 (3.4% and 0% compared to 28%). FM03 only represented 13% of the measured flow. Since the flow monitoring represented a limited period, but monthly flows at Southland WWTF do not vary significantly from AAF, the flow monitoring results indicate Method 1 and the assumed return factors are adequate for modeling sewer system flows in each sewershed.

Table 3-6: Estimated Sewer Flow for FM01 Basin							
Existing							
Land Use	No. of Sewered Parcels	Area (Ac)	% of Total	Water Usage (gpd)	% of Total	Reduction Factor (%)	Estimated Sewer Flow (gpd)
Commercial Retail	3	5	2%	6,533	2%	90%	5,879
Commercial Service	9	8	3%	3,463	1%	90%	3,117
Multi-Land Use Category	1	3	1%	359	0%	90%	323
Public Facility	1	0	0%	0	0%	65%	-
Rural Lands	1	3	1%	271	0%	0%	-
Residential Multi-Family	317	43	17%	95,760	29%	90%	86,184
Residential Suburban	86	35	13%	19,181	6%	50%	9,591
Residential Single Family	777	166	63%	206,869	62%	60%	124,122
Subtotal	**1,195**	**262**	**100%**	**332,437**	**100%**	**--**	**229,216**
						County Service Areas	72,662
Total							301,877
						FM01-(FM02+FM03) Measured Flow (gpd)	**294,355**
						% Difference	**3.4%**

Table 3-7: Estimated Sewer Flow for FM02							
Existing							
Land Use	No. of Sewered Parcels	Area (Ac)	% of Total	Water Usage (gpd)	% of Total	Reduction Factor (%)	Estimated Sewer Flow (gpd)
Commercial Retail	41	24	8%	31,648	12%	90%	28,484
Commercial Service	0	0	0%	0	0%	90%	0
Office and Professional	18	5	2%	2,993	1%	90%	2,693
Public Facility	4	12	4%	4,139	2%	65%	2,691
Residential Multi-Family	184	27	9%	59,391	22%	90%	53,452
Residential Suburban	26	4	1%	2,201	1%	50%	1,101
Residential Single Family	647	136	48%	170,477	63%	60%	102,286
Agriculture	1	79	28%	0	0%	0%	-
Total	**921**	**287**	**100%**	**270,850**	**100%**	--	**190,706**
						Measured Average Daily Flow (gpd)	**190,986**
						% Difference	**0.0%**

Table 3-8: Estimated Sewer Flow for FM03							
Existing							
Land Use	**No. of Sewered Parcels**	**Area (Ac)**	**% of Total**	**Water Usage (gpd)**	**% of Total**	**Reduction Factor (%)**	**Estimated Sewer Flow (gpd)**
Commercial Retail	24	29	12%	37,973	17%	90%	34,175
Office and Professional	0	0	0%	0	0%	90%	0
Public Facility	0	0	0%	0	0%	65%	0
Recreation	1	122	52%	86,473	38%	0%	-
Residential Multi-Family	24	2	1%	3,631	2%	90%	3,268
Residential Single Family	454	82	35%	101,986	44%	60%	61,192
Total	**503**	**234**	**100%**	**230,063**	**100%**	**--**	**98,635**
						Measured Average Daily Flow (gpd)	**74,332**
						% Difference	**28%**

Table 3-9 summarizes future flow estimates under both methods described above.

Table 3-9: Projected Future Sewer Flows (Not including Existing)								
Land Use	**No. of Sewered Parcels**	**Area (Ac)**	**% of Total**	**10-Yr Water Production (gpd)**	**% of Total**	**Return Factor (%)**	**Estimated Sewer Flow with Return Factor (gpd)**	**Estimated Sewer Flow with MP Sewer Factors (gpd)**
Commercial Retail	62	71	15%	89,911	21%	90%	80,920	75,810
Commercial Service	11	49	10%	20,663	5%	90%	18,597	12,739
Multi-Land Use Category	0	0	0%	0	0%	90%	0	0
Office and Professional	14	9	2%	5,280	1%	90%	4,752	1,746
Public Facility	2	12	2%	3,916	1%	65%	2,545	5,096
Rural Lands	0	0	0%	0	0%	0%	0	0
Recreation	0	0	0%	0	0%	0%	0	0
Residential Multi-Family	29	38	8%	57,339	13%	90%	51,605	100,939
Residential Suburban	91	132	28%	91,559	21%	50%	45,779	43,542
Residential Single Family	169	153	33%	157,193	37%	60%	94,316	141,490
Agriculture	0	0	0%	0	0%	0%	0	0
Subtotal	**378**	**464**	**100%**	**425,861**	**100%**	**-**	**298,515**	**381,362**
						Blacklake WRF[1]	58,000	58,000
						Future ADUs	26,161	26,161
						Total Flows	**382,676**	**465,523**

Notes:

1. Blacklake WRF will be decommissioned in the future with flows going to Southland WWTP instead. Future flow from the 2017 Blacklake Sewer Master Plan (MKN) was used.

Peaking factors for maximum month, peak day, and peak hour flow conditions were determined from historical flows at Southland WWTF between January 2019 and December 2020. Peak hour was determined from data collected between July 2018 and June 2020 for another study being conducted by the District. The following table summarizes these flows and the resulting peaking factors:

Table 3-10: Historical Southland WWTF Influent Flow			
Parameter	**Unit**	**Value**	**Calculated Peaking Factor (PF)**
AAF	MGD	0.50	--
MMF	MGD	0.51	1.02
PDF	MGD	0.57	1.14
PHF	MGD	1.3	2.6

3.1.3. Dana Reserve Wastewater Flow Projections

Approximate wastewater generation from the new development was calculated by the developers in the Dana Reserve Specific Plan totaling an average flow of 0.204 million gallons per day (MGD) and a Peak Hour Flow (assuming a peaking factor of 2.5) of 0.510 MGD. Residential wastewater generation factors were calculated as percentages of the average water demand, with single-family homes above 6000 square feet equaling 60% of the water demand, single-family homes between 4,000 to 6,000 square feet equaling 70%, and 90% for all other residential categories. Wastewater flow generation factors for commercial land uses were derived from the City of San Luis Obispo Infrastructure Renewal Strategy (Dec. 2015).

Table 3-11: Developer Provided Wastewater Generation Factor and Demand Projections (Table 5.2 from DRSP Update)				
Land Use Category	**Number of Units or Acres**	**Wastewater Generation Factor[3,4] (GPD)**	**Annual Demand (af/yr)**	**Daily Demand[2] (gpd)**
Residential				
Condos	173 units	103/unit	19.93	
Townhomes	210 units	116/unit	27.21	
Cluster	124 units	167/unit	23.21	
4,000-5,999 SF	463 units	130/unit	67.41	
6,000-7,000+ SF	225 units	180/unit	45.36	
Affordable	75 units	116/unit	9.72	
		Subtotal	*192.84[5]*	*172,245*
Commercial[1]				
Village Commercial	4.4 ac	100/k-sf	7.16	
Flex Commercial	14.5 ac	100/k-sf	23.58	
		Subtotal	*30.74*	*27,443*
Landscape				
Public Recreation	10.0 ac	0.50 af-ft/yr-acre	5.00	
Neighborhood Parks	15.0 ac	-	-	
Streetscape/Parkways	6.5 ac	-	-	
		Subtotal	*5.00*	*4,464*
		Project Total Average Day Flow:	*228.68 af/yr*	*204,152 gpd*
		Project Peak Flow (assumes 2.5 Peaking Factor):	*571.70 af/yr*	*510,381 gpd*

Notes:

1. Assumes 33% useable site area for buildings.
2. Conversion factor: 1 af/yr equals 892.742 gpd.
3. Wastewater flow generation factors for single family are a percentage of average water demand: 60% for 6,000+, 70% for 4,000-6,000, 90% for all others.
4. Wastewater flow generation factors for commercial: City of San Luis Obispo, Infrastructure Renewal Strategy (Dec. 2015).
5. Subtotal for Residential land use was identified as 192.94 in the draft table but calculated as 192.84.
6. Updated Table 5.2 provided in email dated September 23, 2020, from Robert Camacho, RRM Design Group.

In **Table 3-12**, flows estimated by the developer were compared to estimated wastewater flows developed using both methods (2007 Sewer Master Plan and water usage-based flow estimates) discussed in Section 3.1.2.

Table 3-12: Dana Reserve Wastewater Flow Projections using Water Production-Based and 2007 Sewer Master Plan-Based Methods							
Land Use	**Acres**	**10-Year Water Land-Use Factor (GPD/acre)**	**10-Year Water Production (GPD)**	**Sewer Flow Return Factor**	**Sewer Flow Rate Using Water Production and Return Factors (GPD)**	**2007 Sewer Master Plan Update Duty Factors (GPD/ acre)**	**Sewer Flow Rate Using District Duty Factors (GPD)**
Multi-Family	19.3	2205	42,557	90%	**38,301**	2,634	**50,836**
Cluster	16.2	2205	35,721	90%	**32,149**	2,634	**42,671**
4000 SF Lot	53.4	1250	66,750	60%	**40,050**	924	**49,342**
4800 SF Lot	26.7	1250	33,375	60%	**20,025**	924	**24,671**
6000 SF Lot	15.8	1250	19,750	60%	**11,850**	924	**14,599**
6000-7000 SF Lot	37.3	1250	46,625	60%	**27,975**	924	**34,465**
Affordable	4	2205	8,820	90%	**7,938**	2634	**10,536**
Subtotal	172.7	-	253,598	-	***178,288***	-	***227,120***
Flex Commercial	14.5	1326	19,227	90%	**17,304**	1064	**15,428**
Village Commercial	4.4	1326	5,834	90%	**5,251**	1064	**4,682**
Subtotal	*18.9*	-	*25,061*	-	***22,555***	-	***20,110***
Public Parks	10	357	3,570	65%	**2,321**	442	**4,420**
Neighborhood Parks	15	-	-	-	**-**	-	**-**
Streetscapes/park ways	6.5	-	-	-	**-**	-	**-**
Subtotal	*31.5*	-	*3,570*	-	***2,321***	*Subtotal*	***4,420***
Projected Average Day Flow (Rounded)					**203,000**		**252,000**

As shown, the projections provided by the developer closely match the projections using water production and return factors.

The following table summarizes peak flows from Dana Reserve using the peaking factors from **Table 3-10**.

Table 3-13: NCSD Dana Reserve Wastewater Flow Comparison				
Projection Method	**Average Annual Flow (MGD)**	**Maximum Month Flow (MGD)**	**Peak Day Flow (MGD)**	**Peak Hour Flow (MGD)**
Dana Reserve Proposed Peaking Factor	-			2.5 x AAF
Dana Reserve Specific Plan	0.204		--	0.51
Peaking Factor	-	1.02 x AAF	1.14xAAF	2.6 x AAF
2007 Sewer Master Plan Demand Factors	0.251	0.256	0.286	0.653
Water Usage / Return Flows	0.203	0.207	0.231	0.528

The following table summarizes existing District flows, future District projections, future ADU contributions, and Dana Reserve projections. These flows are the basis for evaluating capacity of District facilities and anticipating impact of the Dana Reserve development.

Table 3-14: Existing and Future Flows				
Flows	**Average Annual Flow (MGD)**	**Maximum Month Flow (MGD)**	**Peak Day Flow (MGD)**	**Peak Hour Flow (MGD)**
Existing District and County Service Area Flows	0.59	0.60	0.67	1.5
Future Blacklake Service Area	0.058	0.078	0.13	0.23
Future District Service Area Flows	0.40	0.41	0.46	1.0
ADU Contributions	0.026	0.027	0.030	0.068
Dana Reserve Projections	0.20	0.21	0.23	0.53
Total Future Flows	1.28	1.33	1.53	3.41
Notes: 1. Blacklake MMF, PDF, and PHF estimated using peaking factors of 1.34, 2.30, and 4.0 respectively from the 2017 Blacklake Sewer Master Plan.				

3.2 Collection System Facilities

3.2.1. Existing Facilities

The District wastewater system consists of ten (10) lift stations in the Town Sewer System, three (3) lift stations in the Blacklake Sewer System, gravity sewer mains, and the Blacklake WRF and Southland WWTF. Treatment facilities are discussed in Section 4 of this study.

As discussed previously in this section, the Blacklake Sewer System will ultimately be connected to the Town Sewer System through a new lift station and force main. In addition to the ten District Town System lift stations, the Town Sewer System receives flow from two County of San Luis Obispo lift stations (Galaxy and People’s Self Help or PSH). Collection system pipeline sizes and lengths for the Town Sewer System are summarized in the table below:

Table 3-15: Existing Sewer Pipeline Statistics		
Diameter (inches)	**Length (feet)**	**% of Total**
6	6,038	3.85%
8	116,994	74.67%
10	2,030	1.30%
12	22,713	14.50%
15	3,462	2.21%
18	1,162	0.74%
21	3,152	2.01%
24	1,140	0.73%
Total	**157,000 (Rounded)**	**100%**

3.2.2. Proposed Master Plan Facilities

MKN reviewed the District's 2007 Water and Sewer Master Plan (Master Plan) for proposed improvements that may be necessary to support the development. The completed Frontage Road Trunk Sewer Project implemented Master Plan recommendations between Division Street and Southland WWTF, providing additional capacity downstream of the Dana Reserve Annexation. Of the proposed improvements, the following were identified:

- Replace existing 12-inch with 15-inch between Grande and Division
- Replace existing 10-inch with 15-inch sewer main between Hill Street and Grande Street
- Replace existing 10-inch with 12-inch sewer main between Juniper Street and Hill Street
- Install 8" between Camino Caballo and Juniper Street

3.2.3. Hydraulic Analysis Results and Recommendations

MKN utilized the District's current SewerCAD hydraulic model to evaluate the impact of the proposed Dana Reserve development on the existing District wastewater collection system based on existing and future projected demands. The focus area was along the Frontage Road trunk sewer, which would convey flow from Dana Reserve to Southland WWTF.

Flow meter data was used to validate existing flow scenarios in the model as described in Section 3.1.1.

For the purpose of this report, scenarios were modeled for both current and future conditions within the District's Town Sewer System. Model runs were performed under steady state conditions as described below:

- Scenario 1: Existing Average Annual Flow (AADF) conditions
- Scenario 2: Existing Peak Hour Flow (PHF)
- Scenario 3: PHF conditions with Blacklake Sewer Consolidation, future conditions, and Tefft Street lift station (LS) pumped flows
- Scenario 4: PHF conditions with Blacklake Sewer Consolidation, future conditions, Tefft Street LS pumped flows, and Dana Reserve
- Scenario 5: PHF conditions with Blacklake Sewer Consolidation, future conditions, Tefft Street LS pumped flows, Dana Reserve, and Frontage Road improvements per Blacklake Sewer System Consolidation Study

Unless otherwise stated, lift stations were modeled assuming pumped flow is equivalent to inflow. Most of the lift stations pump for only a few minutes every hour, serve small areas or cul-de-sacs, and assuming all pumps were activated at the same time under peak hour conditions resulted in capacity exceedances that were not representative of system observations. In Scenarios 3, 4, and 5, Tefft St Lift Station was modeled to pump at 636 gpm, which is near the design point of 600 gpm at 89.1 ft total dynamic head (TDH).

The scenarios were evaluated based on the following depth over diameter (d/D) criteria, in conjunction with the 2007 Sewer Master Plan Update:

- For pipelines 12-inches or less: d/D < 50%
- For pipelines 15-inches or greater: d/D < 75%

Table 3-16 provides results of the analysis for scenarios listed above on the Frontage Road trunk main. **Figure3-2** identifies the sewer mains included in the table. The mains that do not meet the d/D criteria are highlighted in red. Under existing conditions, without Tefft Street LS pumped flows, the sewer system meets d/D criteria. However, once Tefft Street pumped flows are included in the analysis, the smaller, upstream mains are too small to meet d/D criteria due to submerged downstream conditions.

Increasing the size of Frontage Road trunk mains beyond sizes recommended in the Master Plan kept d/D within recommended ranges. The following improvements are recommended:

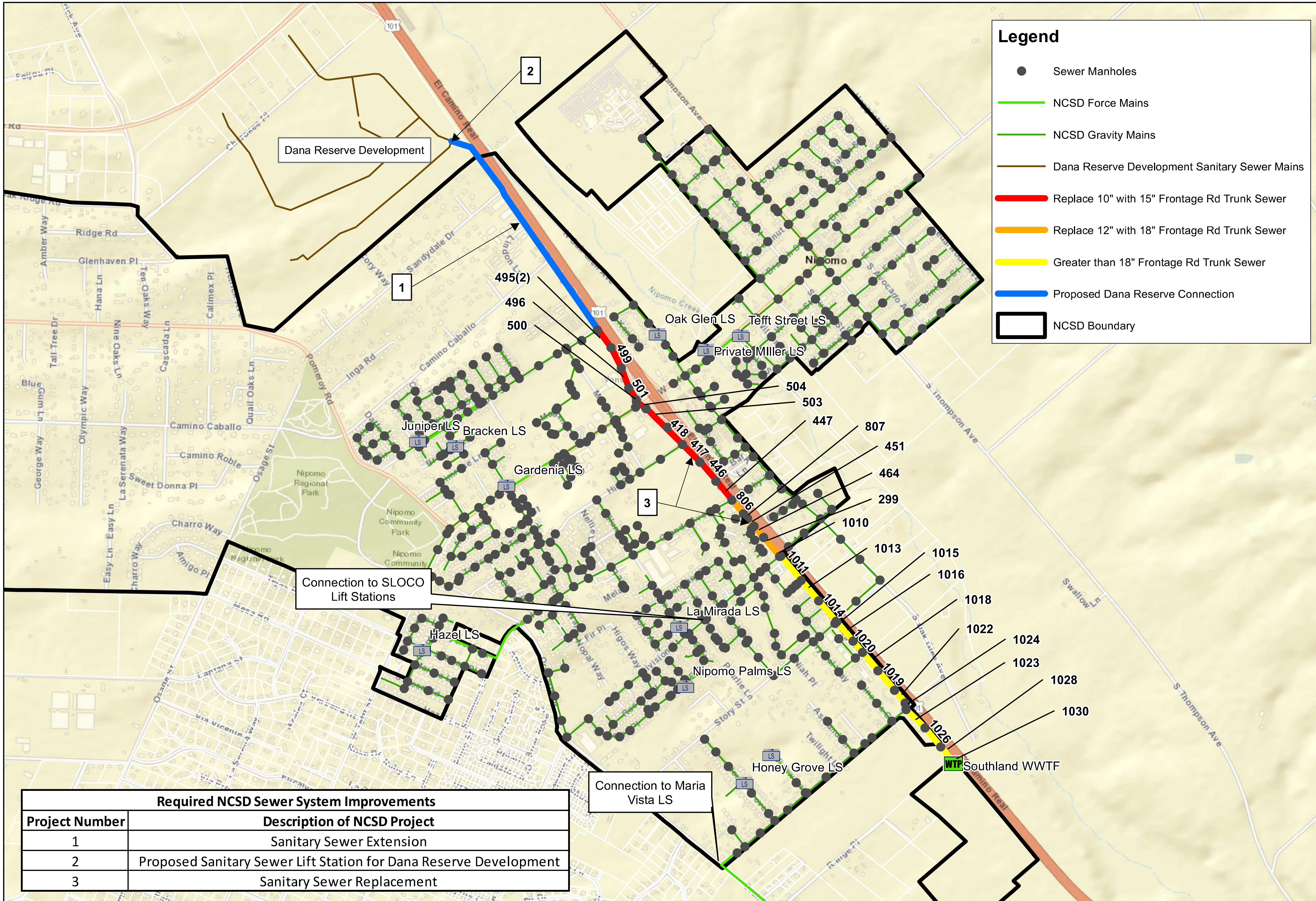
1. Replace existing 10-inch with 3,500 LF 15-inch PVC sewer main and manholes between Juniper Street and Grande Avenue; and
2. Replace existing 12-inch with 1,170 LF 18-inch PVC sewer main and manholes between Grande Avenue and Division Street.

No sewer service is available near the development. The developer will be responsible for installing a lift station with force main, gravity sewer mains, or a combination to connect Dana Reserve to the District sewer system. This decision must be approved by District staff. Installing a lift station to convey all Dana Reserve flows could result in significant impacts to the District sewer system if variable frequency drives are not utilized to reduce instantaneous peak flows from pumps. District staff should revisit the hydraulic analysis for upsizing the existing Frontage Road Trunk sewer after preliminary design for the sewer connection is submitted by the developer.

Table 3-16: Dana Reserve Sewer Model Results											
Pipe ID From Sewer Model[1]	Existing Pipe Diameter (in)	Scenario 1: Existing ADF Condition (gpm)	Scenario 1: Existing ADF Condition (d/D)	Scenario 2: Existing PHF Condition (gpm)	Scenario 2: Existing PHF Condition (d/D)	Scenario 3: Future[2] PHF with Tefft St LS Pumped Flows (gpm)	Scenario 3: Future[2] PHF with Tefft St LS Pumped Flows (d/D)	Scenario 4: Future[2] PHF with Tefft St LS Pumped Flows and Dana Reserve (gpm)	Scenario 4: Future[2] PHF with Tefft St LS Pumped Flows and Dana Reserve (d/D)	Scenario 5: Future[2] PHF with Tefft St LS Pumped Flows, Dana Reserve, and Frontage Rd Improvements[3] (gpm)	Scenario 5: Future[2] PHF with Tefft St LS Pumped Flows, Dana Reserve, and Frontage Rd Improvements[3] (d/D)
495(2)	10	24	14.6%	62	23.3%	379	80.6%	746	100.0%	746	49.4%
499	10	24	14.8%	62	23.7%	379	100.0%	746	100.0%	746	50.4%
496	10	24	15.3%	62	24.6%	379	100.0%	746	100.0%	746	52.7%
501	10	24	17.1%	62	29.5%	379	100.0%	746	100.0%	746	56.8%
500	10	24	21.1%	62	36.2%	379	100.0%	746	100.0%	746	58.8%
504	10	60	23.2%	156	38.0%	579	100.0%	946	100.0%	946	56.9%
503	10	63	24.2%	165	39.8%	588	100.0%	955	100.0%	955	59.3%
418	10	63	22.8%	165	37.5%	588	83.1%	955	100.0%	955	56.7%
417	10	66	18.2%	171	29.6%	679	61.9%	1,046	100.0%	1,046	44.2%
446	10	66	17.9%	171	29.0%	679	66.3%	1,046	100.0%	1,046	48.9%
447	10	66	33.3%	171	55.1%	684	83.2%	1,051	100.0%	1,051	69.2%
806	12	131	30.7%	339	50.7%	994	100.0%	1,361	100.0%	1,361	59.3%
807	12	132	30.2%	342	49.2%	997	100.0%	1,364	100.0%	1,364	57.1%
451	12	132	31.6%	344	51.6%	999	100.0%	1,365	100.0%	1,365	59.3%
464	12	134	29.5%	349	49.9%	1,003	100.0%	1,370	100.0%	1,370	58.8%
299	12	134	29.8%	349	50.1%	1,003	82.0%	1,370	87.5%	1,370	57.9%
1010	21	235	15.0%	609	24.2%	1,305	35.9%	1,672	41.0%	1,672	41.0%
1011	21	235	15.1%	609	24.3%	1,305	36.0%	1,672	41.0%	1,672	41.0%
1013	21	238	13.6%	619	21.8%	1,315	32.0%	1,682	36.4%	1,682	36.4%
1014	21	238	16.7%	619	27.2%	1,315	40.2%	1,682	44.7%	1,682	44.7%
1015	21	373	18.7%	968	30.5%	2,075	45.3%	2,442	49.2%	2,442	49.2%
1016	21	384	18.2%	998	29.6%	2,120	43.9%	2,486	47.9%	2,486	47.9%
1020	21	384	18.9%	998	30.8%	2,120	45.5%	2,486	49.5%	2,486	49.5%
1018	21	386	18.5%	1,004	30.0%	2,125	44.5%	2,492	48.6%	2,492	48.6%
1019	21	386	18.5%	1,004	30.1%	2,125	44.6%	2,492	48.7%	2,492	48.7%
1022	21	386	18.5%	1,004	30.0%	2,125	44.5%	2,492	48.6%	2,492	48.6%
1024	21	386	17.2%	1,004	28.2%	2,125	42.1%	2,492	49.6%	2,492	49.6%
1023	21	386	20.2%	1,004	32.8%	2,125	49.5%	2,492	53.9%	2,492	53.9%
1025	24	411	19.3%	1,068	31.2%	2,358	48.0%	2,725	52.3%	2,725	52.3%
1026	24	411	19.4%	1,068	31.4%	2,358	48.4%	2,725	52.7%	2,725	52.7%
1028	24	411	17.8%	1,068	28.9%	2,358	44.0%	2,725	47.7%	2,725	47.7%
1030	24	411	15.1%	1,068	24.4%	2,358	36.6%	2,725	39.5%	2,725	39.5%

Notes:

1. Pipelines are in order from upstream to downstream
2. Future flows include parcels that will tie into the sewer system, potential ADUs developments, and Blacklake pumped flows
3. Frontage Rd pipeline improvements include increasing pipe diameters from 10-inch to 15-inch and from 12-inch to 18-inch



Required NCSD Sewer System Improvements	
Project Number	Description of NCSD Project
1	Sanitary Sewer Extension
2	Proposed Sanitary Sewer Lift Station for Dana Reserve Development
3	Sanitary Sewer Replacement

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Figure 3-2
Wastewater Collection System Improvements

3.2.4. Recommended Offsite Improvements

The hydraulic analysis indicated that the Dana Reserve development will likely impact the District's wastewater collection system most significantly during PHF conditions. The District should consider implementing the following projects in Frontage Road:

1. Replace existing 10-inch with 3,500 LF 15-inch PVC sewer main and manholes between Juniper Street and Grande Avenue; and
2. Replace existing 12-inch with 1,170 LF 18-inch PVC sewer main and manholes between Grande Avenue and Division Street.
3. The developer will also need to extend sewer service to the Dana Reserve development from Juniper Street.

3.2.5. Evaluation of Proposed Onsite Improvements

The DRSP identifies a network of sewer mains conveying flow to the proposed connection along Frontage Road. Sizes are not identified but it is assumed all mains will be designed and constructed in accordance with District standards. Two lift stations are identified to convey flow from neighborhoods 8 and 9 (near Hetrick Avenue) to the onsite collection system. Not enough information was provided to evaluate capacity of these onsite improvements. It is recommended the developer and District evaluate onsite sewer design and the potential impact of the two lift stations on proposed offsite improvements after preliminary design proceeds.

4.0 WASTEWATER TREATMENT FACILITY

4.1 Influent Flow and Loading Analysis

4.1.1. District Projections

Historical water quality data was analyzed from the Southland WWTF between January 2019 and December 2020. Average annual and maximum monthly flows were calculated as described in Section 3.1.1 and were applied to this water quality data to calculate influent loading values for 5-day biological oxygen demand (BOD_5), total suspended solids (TSS) and Total Kjeldahl Nitrogen (TKN).

Through the Blacklake Sewer Consolidation Project, the Blacklake WRF will be decommissioned and all Blacklake flow will be sent to Southland WWTF as discussed in the previous section. In order to determine whether the Southland WWTF has the capacity to handle the added influent from the proposed Dana Reserve development, the combined existing influent flows and loading rates were analyzed.

As a result of the influent from Blacklake being transmitted through a force main and then being conveyed through a gravity sewer main, the rate of flow from Blacklake will likely be dampened to some extent before reaching the Southland WWTF. As such, using the same peak hour flowrates that were assumed for the Blacklake WRF to estimate the increased inflow to the Southland WWTF is a conservative analysis. Flow values shown in **Table 4-1** are a combination of existing flows to the Southland WWTF and anticipated flows from the Blacklake WRF.

Table 4-1: Existing and Projected Influent Flows and Loadings from District Service Area

Parameter	Unit	Existing
ADF	MGD	0.65
MMF	MGD	0.68
PHF	MGD	1.76
Average Annual BOD_5 Concentration	mg/L	403
Average Annual BOD_5 Load (Rounded)	ppd	2,170
Maximum Month BOD_5 Concentration	mg/L	537
Maximum Month BOD_5 Load (Rounded)	ppd	2,890
Average Annual TSS Concentration	mg/L	289
Average Annual TSS Load (Rounded)	ppd	1,560
Maximum Month TSS Concentration	mg/L	333
Maximum Month TSS Load (Rounded)	ppd	1,790

4.1.2. Dana Reserve Projections and Impact on Flows and Loadings at Southland WWTF

The projected flows and loading from the Dana Reserve development are summarized in **Table 4-2**. Since the District's sewer service area is primarily residential, it is assumed that the BOD and TSS concentrations in the wastewater from the development will be similar to what is currently observed at the Southland WWTF.

Table 4-2: Projected Influent Flows and Loadings from Dana Reserve Project

Parameter	Unit	Quantity
ADF	MGD	0.204
MMF	MGD	0.210
PHF	MGD	0.533
Average Annual BOD_5 Concentration	mg/L	403
Average Annual BOD_5 Load	ppd	686
Maximum Month BOD_5 Concentration	mg/L	537
Maximum Month BOD_5 Load	ppd	913
Average Annual TSS Concentration	mg/L	289
Average Annual TSS Load	ppd	492
Maximum Month TSS Concentration	mg/L	333
Maximum Month TSS Load	ppd	566

Flows from Dana Reserve will result in a 31% increase over existing District service area maximum month flows and loads. The projected flows and loads at Southland WWTF including the Dana Reserve Project are summarized in **Table 4-3**.

Table 4-3: Projected Influent Flows and Loadings from Dana Reserve Project and District Service Area

Parameter	Unit	Existing + Dana Reserve
ADF	MGD	0.85
MMF	MGD	0.89
PHF	MGD	2.30
Average Annual BOD_5 Concentration	mg/L	403
Average Annual BOD_5 Load (Rounded)	ppd	2,860
Maximum Monthly BOD_5 Concentration	mg/L	536
Maximum Monthly BOD_5 Load (Rounded)	ppd	3,800
Average Annual TSS Concentration	mg/L	289
Average Annual TSS Loading (Rounded)	ppd	2,050
Maximum Monthly TSS Concentration	mg/L	333
Maximum Monthly TSS Loading (Rounded)	ppd	2,360

4.2 Existing Facilities

Wastewater generated in and collected by the District is conveyed to Southland WWTF, a secondary wastewater treatment facility that uses an influent lift station with two (2) screw centrifugal pumps, two (2) fine screens, one (1) grit removal system with classifier, one (1) in-pond extended aeration system (Parkson Biolac®), two (2) secondary clarifiers, 10 percolation ponds. The WWTF also has an existing gravity belt thickener and twelve (12) concrete lined sludge drying beds for waste sludge dewatering. The District recently installed a dewatering screw press to assist in the waste sludge dewatering, particularly during wet weather. A 400 KVA generator provides backup power when needed.

4.3 Proposed Master Plan Facilities

The Southland WWTF site was planned to allow phased improvements as demand increases. The Phase I design included design and construction of the above listed facilities, replacing the previous treatment pond facility to maintain and improve treatment for increasing flows and loading.

Phases II and III were outlined in Southland WWTF Master Plan Amendment 1 (AECOM, 2010) to plan for anticipated increases in flow rate and loading at Southland WWTF. Equipment and processes were designed to be able to meet greater demands with additional equipment, such as additional aeration basins or sludge digesters; in a phased approach without requiring removal or replacement of previous improvements. Anticipated phases and major system components are summarized in the tables below. Planning “triggers”, or flows, at which each phase should be implemented, are also included in **Table 4-4**. At the time the master plan was developed, the 90th percentile BOD_5 and TSS were both 300 mg/L for use in sizing facilities. The existing maximum month TSS is slightly lower (289 mg/L) whereas the BOD_5 is higher (333 mg/L). Therefore, the planning “triggers” should be reconsidered based on actual flows and loadings as compared to the Amendment 1 recommendations.

In the original Amendment 1, the District had planned to construct new aerobic sludge digesters in Phases I and III. However, during the Phase I design, the District opted to install a sludge thickening system instead and twelve (12) sludge drying beds were constructed to store sludge. The aerobic digesters were no longer needed. The sludge handling system was further improved by installing a new dewatering screw press as described above.

Table 4-4: Southland WWTF Phasing Plan

Project Phase	Capacity (MMF, MGD)	Planning Trigger (MMF, MGD)
Phase 1 – Existing Facilities	0.9	--
Phase 2	1.28	0.7
Phase 3	1.80	1.4

Phase II included a new pump and associated valves, piping, and controls; aeration system, and blower for Aeration Basin #2; a second clarifier; new concrete liners and decant system in one drying bed; and a new emergency generator. The secondary clarifier, twelve (12) concrete lined drying beds with decant system, and generator were installed as part of Phase I. A third blower was recently installed in the blower building.

Phase III included a second grit removal system and classifier; new Aeration Basin #3 with liner, air piping and headers, controls, and aeration equipment; third clarifier; and new concrete liners and decant system in one drying bed. As noted above, all lined drying beds were installed as part of Phase I. The existing plant is shown on **Figure 4-1**.

Figure 4-1

Southland WWTF

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4.4 Process Capacity Analysis

The process flow diagram and design parameters from the Southland WWTF Phase 1 Improvements plans are included as Appendix B. The ability of each process to handle the anticipated combined existing flows and loads was reviewed in the following sub-sections.

4.4.1. Influent Lift Station

The existing influent lift station at the Southland WWTF consists of two screw centrifugal pumps with 20 horsepower motors, and each with a capacity of 1,700 GPM (2.45 MGD) at 30 feet of total dynamic head (TDH). The pumps alternate operation, with one pump operating and the other remaining on standby to provide 100% redundancy.

The existing combined influent PHF is estimated to be 2.30 MGD, which leaves excess capacity of 0.15 MGD while maintaining one pump for standby.

Table 4-5: Influent Lift Station Capacity (One Pump Operating)

Flow Condition	Units	Design Capacity	Existing + Dana Reserve
Peak Hour Flow	MGD	2.45	2.30
Available Capacity	MGD	-	0.15

With two pumps operating and a third on standby, the estimated capacity is approximately 4.83 MGD as shown in **Table 4-6** below.

Table 4-6: Influent Lift Station Capacity (Two Pump Operating)

Flow Condition	Units	Design Capacity	Existing + Dana Reserve
Peak Hour Flow	MGD	4.83	2.30
Available Capacity	MGD	-	2.53

The 2012 Conceptual Design Report (CDR) for Southland WWTF identified the future installment of a third pump to handle increased flow in future phases. The wetwell was sized for this anticipated upgrade and piping was installed to accommodate a third similarly-sized pump to handle the increased influent PHF while maintaining one pump in standby mode. The District plans to install a third pump to provide additional redundancy. This will also meet demands from Dana Reserve.

4.4.2. Influent Screens

Southland's existing headworks screen system consists of two shaftless screw screens designed for a peak flow of 4.83 MGD, with a maximum equipment capacity of 5.5 MGD.

With a rated equipment capacity of 5.5 MGD each, the headworks screens have the ability to handle anticipated combined existing and future peak hour flow rates.

4.4.3. Grit Removal

Southland WWTF's existing grit removal system consists of one vortex-type grit tank with a single self-priming grit pump. One grit tank was installed during the Phase I Improvements, with provisions to add a second in the future.

The grit tank was designed for a peak flow of 2.5 MGD. The combined existing influent PHF with Dana Reserve is estimated to be 2.30 MGD. Since existing flows with Dana Reserve will nearly meet capacity without redundancy, a second grit removal system is recommended. With the second grit removal system installed, the design capacity of 5.0 MGD will provide an estimated 2.7 MGD of additional capacity.

4.4.4. Extended Aeration System

Southland WWTF currently operates one extended aeration basin with a total volume of 1.41 million gallons (MG) and a design mixed liquor suspended solids (MLSS) concentration of 3,223 mg/L. The existing basin was designed for a solid retention time (SRT) of 60 to 70 days and a hydraulic retention time (HRT) of 1.63 days. The basin was sized based on a recommended range of BOD_5 loading to the aeration basin of 5 to 12 ppd per 1000 cubic feet of basin volume. The combined loads are compared with the design minimum and maximum capacity in the table below.

Table 4-7: Extended Aeration Basin Capacity (One Basin)			
Condition	**Units**	**Recommended Design Criteria (Min – Max)[3]**	**Existing + Dana Reserve**
Average Annual BOD_5 Load	ppd	943 – 2,262	2,860
Maximum Month BOD_5 Load	ppd	943 – 2,262	3,800

The existing maximum month BOD_5 load with Dana Reserve exceeds the maximum design criteria by 1,538 ppd, indicating that a second aeration basin will be needed. In addition to the aeration basin, new diffusers, and supporting electrical, mechanical, and instrumentation will be required. A new blower, new blower building or expansion of the existing blower building will be necessary if aeration is not sufficient to meet projected demands.

4.4.5. Secondary Clarifiers

Two existing 55-foot diameter concrete circular secondary clarifiers are operating at Southland WWTF, each with a design overflow rate (OFR) of 240 gallons per day per square foot (gpd/ft^2) at ADF and 694 gpd/ft^2 at PHF. Industry standards[4] recommend overflow rates of 200 – 400 gpd/ft^2 for average flow conditions and 600 – 800 gpd/ft^2 at peak flow conditions. Each clarifier is designed for a solids loading of 0.95 pounds per square foot per hour (lbs/ft^2/hr) at average conditions and 1.67 lbs/ft^2/hr at peak conditions. The design overflow rates and solids loading rates are compared with the anticipated existing combined flow and loading conditions in **Table 4-8**.

[3] Min = 5 ppd/1000 cf of basin volume. Max = 12 ppd/1000 cf of basin volume.
[4] Wastewater Engineering Treatment & Reuse, 4th Edition, Tchbanoglous, et. al.

Table 4-8: Secondary Clarifier Existing Capacity				
	Average Overflow Rate	**Peak Overflow Rate**	**Average Solids Loading Rate**	**Peak Solids Loading Rate**
Units	gpd/ft^2	gpd/ft^2	$lb/ft^2/hr$	$lb/ft^2/hr$
Design Value	240	694	0.95	1.67
Recommended Range	200 - 400	600 - 800	0.2 - 1.0	<1.4
1 Clarifier	358	967	1.00	2.71
2 Clarifiers	179	483	0.50	1.35

With one clarifier operating, the existing combined average OFR falls well within the recommended range outlined by Tchbanoglous, et al. (ibid.) However, the combined peak OFR exceeds the recommended maximum value by 167 gpd/ft^2 and the peak solids loading rate exceeds the maximum value by 1.31 $lb/ft^2/hr$.

With two clarifiers operating, both the existing combined average OFR and the peak OFR fall under the lower bound of the recommended range. However, this is not anticipated to be an issue as the District is successfully operating two clarifiers under existing conditions. The existing average solids loading rate falls within the recommended range for one clarifier and the peak solids loading rate is less than the maximum with two operating clarifiers. However, this leaves no redundancy in the event one clarifier is out of service. Therefore, a third clarifier is recommended to meet existing conditions with Dana Reserve's contribution.

The existing clarifiers have Return Activated Sludge (RAS) pump stations, consisting of two pumps, each with a capacity of 875 GPM. The Phase I Concept Design Report (CDR – AECOM, 2015) assumed RAS flowrates at 150% of the AAF and designed the RAS pumps to meet 150% of 0.84 MGD (approximately 1.2 MGD). The existing combined AAF is anticipated to be 0.85 MGD which is greater than the design range of the pumps. District staff can operate RAS pumps closer to 100% of AAF. However, it is recommended to upgrade RAS pumps to provide flexibility under increased flows from Dana.

4.4.6. Sludge Thickener

Southland WWTF currently conveys between 34,000 and 51,000 gallons of sludge per day to the existing gravity belt thickener. The waste sludge has a solids concentration between 0.35 and 0.5 percent total solids. The gravity belt thickener currently operates between 6 and 7 hours per day for approximately 35 hours per week. The annexation and Blacklake consolidation will increase the average annual flow, organic loads, and solids loads at the Southland WWTF by 44 percent, which will have a significant impact on the run time for the thickener. It is assumed sludge feed rates under the combined existing and Dana Reserve loading scenario will increase as a percentage based on average annual loading. This methodology yields an estimated sludge waste rate between 49,000 and 74,000 gallons per day for existing combined load conditions. It is anticipated that the sludge thickener may need to run for an additional 16 hours per week, between 9 and 11 hours per day, for a total of approximately 51 hours per week. This would require plant staff to work an additional two days per week to operate and observe the gravity belt thickener. An additional thickener is recommended for redundancy.

4.4.7. Sludge Dewatering Screw Press and Sludge Drying Beds

The District is completing installation of a new sludge dewatering screw press at the Southland WWTF. The sludge dewatering screw press will have a hydraulic capacity of 15 to 90 GPM and a solids capacity of 250 pounds per hour (PPH). The design feed concentration ranges from 0.5% to 3% total solids and the dewatered sludge concentration is a minimum of 15% total solids. During normal operation, the screw press will receive thickened sludge from the gravity belt thickener, and, thus, will operate for the same durations as the thickener. Two days of operation will be added to accommodate Dana Reserve loads. A second press is recommended for redundancy.

In the event a screw press is taken out of service, the District has sludge drying beds that are utilized to store dewatered sludge. They can be used to temporarily store thickened sludge in case a screw press is out of service. The remaining screw press can also be operated for longer periods during the day to accommodate a short-term outage.

4.5 Future Water Quality Requirements

The Central Coast Regional Water Quality Control Board (RWQCB) recently adopted General Waste Discharge requirements for Discharges from Domestic Wastewater Systems with Flows Greater than 100,000 gallons per day (Order No. R3-2020-0020). RWQCB staff have indicated that the Southland WWTF will likely be enrolled under this General Order. However, the schedule for this is not known. The General Order contains stricter effluent limits, including a total nitrogen limit of 10 mg/L and varying limits for salts, depending on the underlying groundwater basin. The General Order includes a provision allowing 24 months to come into compliance for dischargers that are unable to meet the effluent requirements after enrollment under the Order. Additional time may be granted through a request for a time schedule order. The effluent limits anticipated for Southland WWTF under this General Order are summarized in the table below.

Table 4-9: General Order R3-2020-0020 Secondary Treatment Effluent Limits (Tables 5 and 6 of the Order)				
Constituent	**Units**	**30-day Average**	**7-day Average**	**Sample Maximum**
BOD_5	mg/L	30	45	NA
TSS	mg/L	30	45	NA
Settleable Solids	mg/L	0.1	0.3	0.5
pH	NA	6.5 – 8.4	NA	NA
Limits based on a 25-month rolling median, for the Lower Nipomo Mesa SubBasin (1)				
Total Nitrogen	mg/L	10	--	--
Total Dissolved Solids (TDS)	mg/L	710	--	--
Chloride	mg/L	95	--	--
Sulfate	mg/L	250	--	--
Boron	mg/L	0.16	--	--
Sodium	mg/L	90	--	--
Notes: 1. The General Order indicates dischargers have two options for meeting requirements for Total Nitrogen, TDS and the other salt constituents. The discharger may comply with the effluent limitations specified, or the discharger will be required to implement a groundwater monitoring program to demonstrate compliance.				

Increasing use of Supplemental Water is anticipated to reduce discharge of TDS, chloride, and sodium from the WWTF. MKN reviewed historical effluent water quality to evaluate the existing WWTF performance regarding nitrogen reduction and ability to meet the future total nitrogen limit.

Total nitrogen in wastewater includes ammonia, nitrate, nitrite, and organic nitrogen. The Southland WWTF utilizes the Parkson Biolac® system, which when operated in the wave oxidation mode, has the ability to both nitrify (convert ammonia to nitrate) and denitrify (convert nitrate to nitrite and nitrogen gas). This will require operating the extended aeration basins at loading rates of 5 to 9 lb BOD_5/1000 cubic feet (cf), instead of the range of 5 to 12 lb BOD_5/1000 cf recommended for organics removal to meet current effluent limits.

The following table summarizes the anticipated loading of a two-basin system and the design criteria to meet this effluent nitrogen limit under current combined loading rates.

Table 4-10: Extended Aeration Basin Capacity for Denitrification via Wave Oxidation (Two Basins)			
Condition	**Units**	**System Design Criteria**	**Existing + Dana Reserve**
Average Annual BOD5 Load	lb/day	1,886 – 3,394	2,860
Maximum Month BOD5 Load	lb/day	1,886 – 3,394	3,800

As shown, a two-basin system meets the design criteria for denitrification under existing combined average annual loading but not under maximum month loading conditions.

A three-basin system was then evaluated and it was found that the capacity exceeds the requirements under each loading condition. The results of this analysis are shown in the table below.

Table 4-11: Extended Aeration Basin Capacity for Denitrification via Wave Oxidation (Three Basins)			
Flow Condition	**Units**	**Minimum System Design Criteria**	**Existing + Dana Reserve**
Average Annual BOD5 Load	lb/day	2,829-5,091	2,860
Maximum Monthly BOD5 Load	lb/day	2,829-5,092	3,800

In summary, Aeration Basins #2 and #3 will be necessary to meet future permit requirements under existing conditions with Dana Reserve. In addition to the aeration basins, new diffusers, and supporting electrical, mechanical, and instrumentation will be required. A new blower building or expansion of the existing blower building will also be necessary.

4.6 Recommended Improvements

The following table summarizes the capacity assessment described in the previous sections.

Table 4-12: Summary of Southland WWTF Evaluation		
Process	**Summary of Findings**	**Recommendations to Meet Existing Demands with Dana Reserve**
Influent Lift Station	Capacity is adequate for existing conditions.	Install a third pump, sized the same as existing
Influent Screen	Capacity is adequate for existing flowrates	–
Grit Removal	Capacity is adequate for existing conditions.	Install second grit system
Extended Aeration Basins	Additional basins required	Install Aeration Basin #2 to meet current capacity requirements. Install Aeration Basin #3 to meet anticipated permit requirements. Expand blower system as needed
Secondary Clarifiers	Overflow rate is adequate for existing conditions. Peak solids loading rate is exceeded at existing demands with Dana Reserve.	Install third clarifier for redundancy. Upgrade RAS pumping system.
Gravity Belt Thickener (GBT)	Additional operating hours will be necessary to meet existing demands with Dana Reserve. No redundancy is available if the single GBT fails.	Install second GBT
Dewatering Screw Press	Additional press required to meet combined loading.	Install second screw press

5.0 PROJECT COST OPINIONS

Appendix C includes assumptions and calculations used to develop conceptual project cost opinions. The opinions of probable project costs presented in this study were developed according to the AACE International Class 4 level cost estimate classification. The cost opinions incorporate the engineer's judgment as a design professional, are planning level budget estimates, and are supplied for the general guidance of the District.

Since MKN has no control over the cost of labor and materials, MKN does not guarantee the accuracy of such opinions as compared to contractor bids or actual cost to the District. It is recommended that an opinion of cost be developed and updated during project design. A construction contingency of 30% and allowance for engineering, construction management, and administration of 30% were applied to construction cost subtotals. All cost opinions were developed in September 2021 (ENR-LA = 13212.48).

5.1 Offsite Water Improvements

The following table summarizes project costs to connect the Dana Reserve water system as described in Section 3. Projects are identified on Figure 6-1. Costs for the developer to extend the waterline to the existing connection along Frontage Road are not included below.

Table 5-1: Water Transmission Main to Serve Dana Reserve

Project	Description	Cost
1,2,5	New 16" Main on North Oak Glen Drive and Tefft Street	$10,510,000
	Total	**$10,510,000**

Table 5-2 summarizes project costs for the end-of-line (EOL) looping at Willow Road and storage improvements at the Foothill Tank and Joshua Road sites.

Table 5-2: Water System Storage and Looping Improvements to Serve Dana Reserve

Project Number	Description	Cost
4	Willow Road EOL Project	$260,000
6	Foothill Tank Improvements	$3,920,000
7	Joshua Road Reservoir	$4,760,000
	Total	**$8,940,000**

5.2 Offsite Wastewater Collection and Treatment Improvements

The following table summarizes project costs to connect the Dana Reserve wastewater system as described in Sections 3 and 4. Costs for the developer to connect to the existing system are not included below.

Table 5-3: Wastewater Improvements to Serve Existing Conditions and Dana Reserve

Project	Description	Cost
3	Wastewater Collection Improvements	$3,630,000
4 – 9	Southland WWTF Improvements	$15,960,000
	Total	**$19,590,000**

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Water

The Dana Reserve Development will have a significant impact on District water and wastewater facilities. Groundwater and 2025 NSWP allocation are adequate to serve existing and future demands with Dana Reserve. However, pipeline and storage improvements will be needed. Figures 6-1 and 6-2 identify the projects described below.

Installing the Willow Road EOL Connection will address the District's looping requirements. Implementing the following project is recommended to convey NSWP water to Dana Reserve:

- Construction of new 16-inch pipeline on North Oak Glen Drive from Tefft Street to the Sandydale connection point.
- Replacement of the existing 10-inch AC pipeline from the Foothill Tanks to North Oak Glen Drive on Tefft Street with a new 16-inch PVC pipeline.

Storage improvements are also recommended to manage additional flow from NSWP and to meet emergency, fire flow, and operational needs. The recommended improvements for Foothill Tank site include a new 1.0 MG storage tank, chloramination improvements, and an automated valve station to improve storage and protect water quality. A new 500,000 gallon reservoir at Joshua Road Pump Station should be constructed to provide operational redundancy for NSWP.

The following table summarizes the recommended improvements

Table 6-1: Recommendations for NCSD Water System Improvements

Project	Required Improvements
1, 2, 5	New 16” Main on North Oak Glen Drive and Tefft Street
3	Frontage Road Waterline Extension
4	Willow Road EOL Project
6	Foothill Tank Improvements
7	Joshua Road Reservoir

6.2 Wastewater

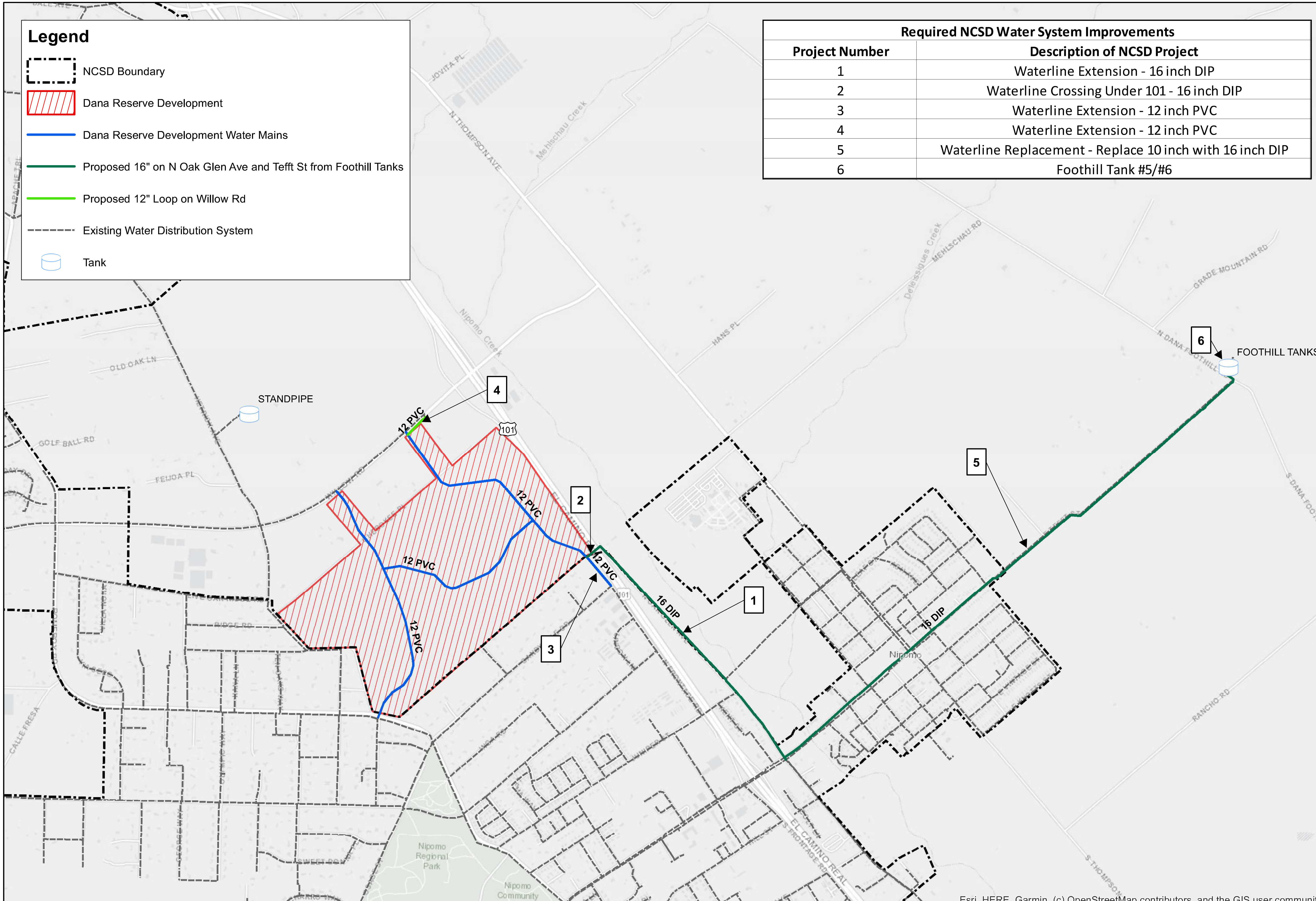
A new sewer connection from the development to Juniper Street is required which may involve a lift station and force main with sections of gravity sewer. Lift station peak flows should be managed with the use of variable frequency drives to reduce impact to receiving sewers. Improvements along Frontage Road will also be necessary to accommodate flow from the development under existing District demands. These project improvements are listed below and identified in Figures 6-3 and 6-4:

Table 6-2: Recommendations for NCSD Sewer System Improvements	
Project	**Required Improvements**
1	Connection to Dana Reserve collection area.
2	Potential sanitary sewer lift station for Dana Reserve Development
3	Replace existing 10-inch with 3,500 LF of 15-inch PVC sewer main and manholes between Juniper Street and Grande Avenue.
	Replace existing 12-inch with 1,170 LF 18-inch PVC sewer main and manholes between Grande Avenue and Division Street.

Southland WWTF will require significant improvements to meet existing demands with Dana Reserve and future demands. The table below summarizes improvements necessary to meet current Waste Discharge Requirements.

Table 6-3: Recommendations for Southland WWTF Improvements		
Project	**Process**	**Required Improvement**
4	Influent Lift Station	Install a third pump, sized the same as existing
5	Grit Removal	Install second grit system
6	Extended Aeration Basins	Install Aeration Basins #2 & #3 and expand aeration system
7	Secondary Clarifiers	Install third clarifier for redundancy. Upgrade RAS pumping system.
8	Gravity Belt Thickener (GBT)	Install second GBT
9	Dewatering Screw Press	Install second screw press

In addition to the aeration basins, new diffusers and supporting electrical, mechanical, and instrumentation will be required. A new blower building or expansion of the existing blower building will also be necessary.



Required NCSD Water System Improvements	
Project Number	Description of NCSD Project
1	Waterline Extension - 16 inch DIP
2	Waterline Crossing Under 101 - 16 inch DIP
3	Waterline Extension - 12 inch PVC
4	Waterline Extension - 12 inch PVC
5	Waterline Replacement - Replace 10 inch with 16 inch DIP
6	Foothill Tank #5/#6

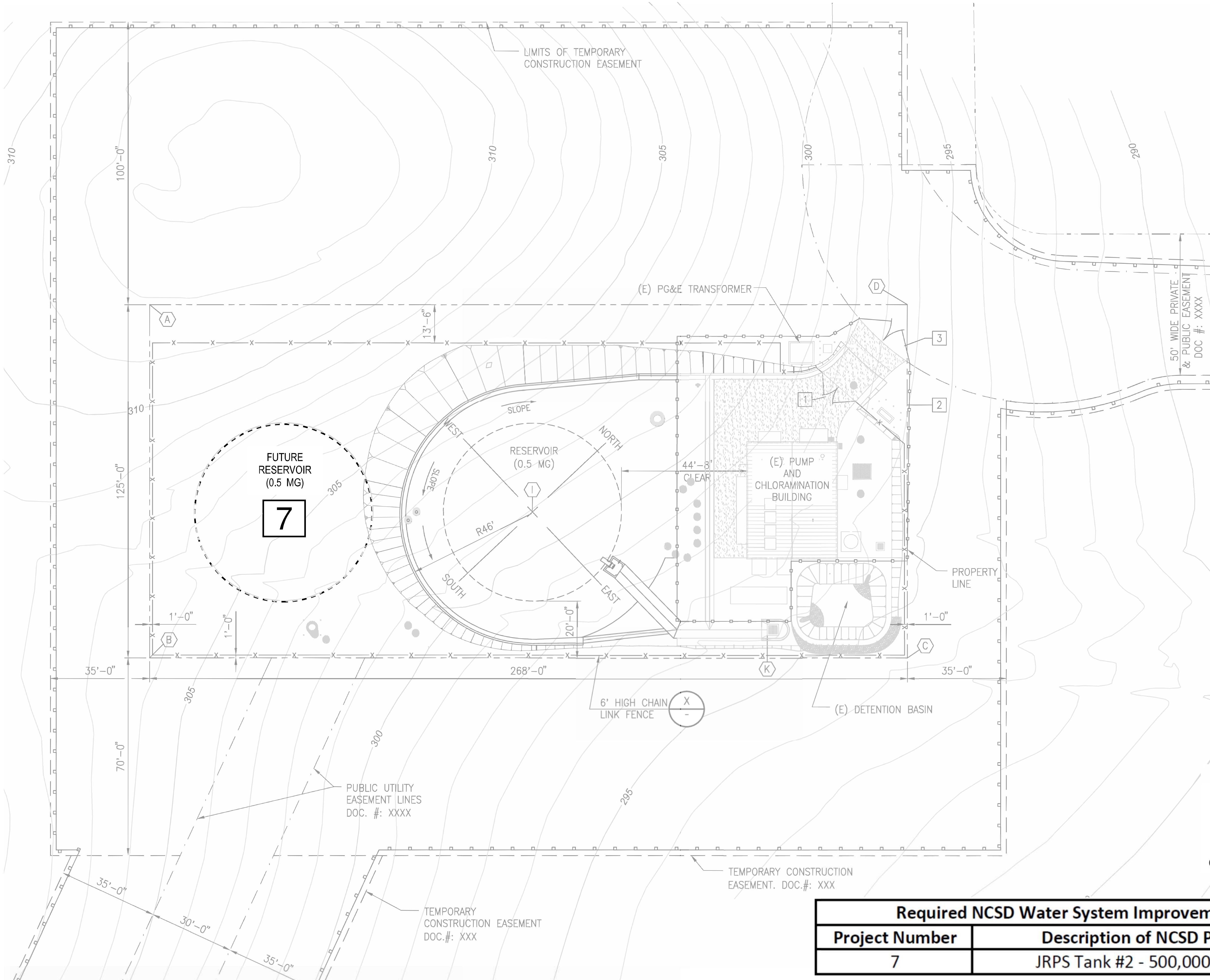
Nipomo Community Services District

Dana Reserve Development - Water and Wastewater Service Evaluation

Figure 6-1
Proposed Water Distribution System Improvements

1 inch = 1,500 feet

0 750 1,500 Feet



Nipomo Community Services District

Dana Reserve Development - Water and Wastewater Service Evaluation

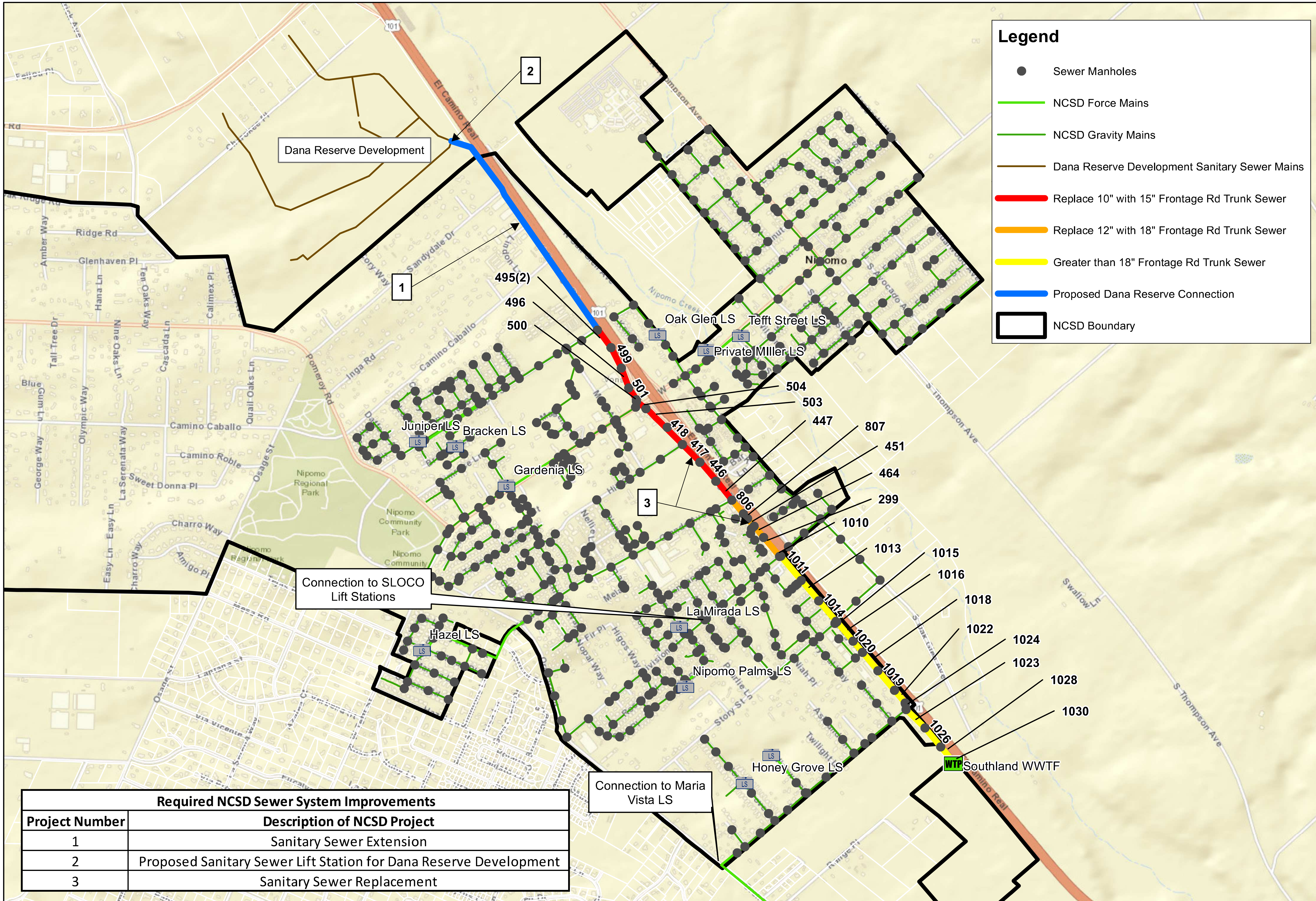
Figure 6-2

Proposed Joshua Road Pump Station Reservoir Improvements

NTS

Required NCSD Water System Improvements	
Project Number	**Description of NCSD Project**
7	JRPS Tank #2 - 500,000 Gallon

mkn



Required NCSD Sewer System Improvements	
Project Number	**Description of NCSD Project**
1	Sanitary Sewer Extension
2	Proposed Sanitary Sewer Lift Station for Dana Reserve Development
3	Sanitary Sewer Replacement

Nipomo Community Services District

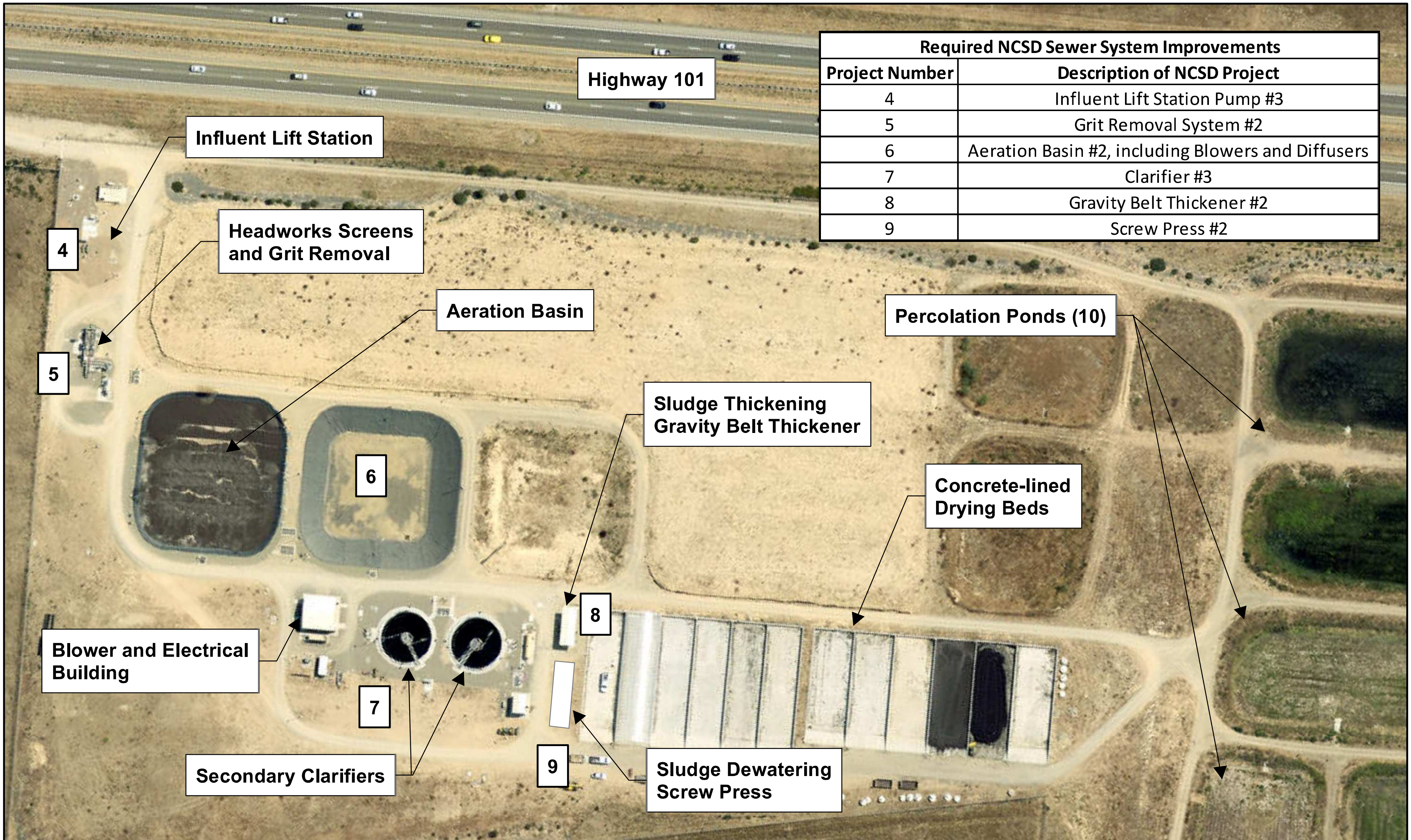
Dana Reserve Development - Water and Wastewater Service Evaluation

Figure 6-3
Wastewater Collection System Improvements

1 inch = 1,400 feet

0 700 1,400

mkn



Required NCSD Sewer System Improvements

Project Number	Description of NCSD Project
4	Influent Lift Station Pump #3
5	Grit Removal System #2
6	Aeration Basin #2, including Blowers and Diffusers
7	Clarifier #3
8	Gravity Belt Thickener #2
9	Screw Press #2

1 inch = 150 feet

0 75 150

Figure 6-4
Proposed Southland WWTF Improvements

Dana Reserve Development
Water and Wastewater Service Evaluation
Nipomo Community Services District

APPENDIX A

Sewer Flow Monitoring 2020 Nipomo, CA

October 23, 2020 – November 28, 2020

Final Report Submitted to **MKN & Associates, Inc.**
December 22, 2020

ADS ENVIRONMENTAL SERVICES

15201 Springdale Street
Huntington Beach, CA 92649

800-633-7246
www.adsenv.com

December 22, 2020

Rob Lepore, GISP
Michael K. Nunley & Associates, Inc.
P.O. Box 1604
Arroyo Grande, CA 93421

SUBJECT: Sewer Flow Monitoring 2020, Nipomo, CA Final Report

Dear Mr. Lepore,

ADS is pleased to submit the report for the Nipomo, CA Sewer Flow Monitoring Study completed on behalf of MKN & Associates, Inc. The metering was conducted at three (3) locations. The study was conducted during the period of Friday, October 23, 2020 to Saturday, November 28, 2020.

The report contains depth, velocity, and quantity hydrographs as well as daily long tables for the metering period. An Excel file containing depth, quantity, and velocity entities for the monitoring location in 5-minute format was provided previously.

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Paul Mitchell at 714-379.9778.

It has been our pleasure to be of service to you in the performance of this project. Thank you for choosing ADS products and services to meet your flow monitoring needs.

Sincerely,
ADS ENVIRONMENTAL SERVICES

Jackie Crutcher
Data Manager

ADS LLC
An IDEX Fluid & Metering Business
Accusonic
ADS Environmental
Services Hydra-Stop

Sewer Flow Monitoring 2020
Nipomo, CA

Prepared For:

Rob Lepore, GISP
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Prepared By:

ADS, LLC
15201 Springdale Street
Huntington Beach, CA 92649

Table of Contents

Scope and Methodology

Introduction

Michael K. Nunley & Associates, Inc. (mkn) entered into an agreement with ADS Environmental Services to conduct flow monitoring at (3) three locations in the Nipomo, CA Sanitary Collection System. The study was scheduled for a period of (30) thirty calendar days. Seven additional data days have been provided. Once in place, the flow monitoring equipment was be used to measure depth, velocity, and to quantify flows. The objective of this study was to confirm sanitary sewer flows in the monitored locations for planning purposes.

Project Scope

The scope of this study involved using flow monitors to quantify wastewater flow at the designated locations for the 37-day time period. Specifically, the study included the following key components.

- Investigate the proposed flow-monitoring site for adequate hydraulic conditions
- Flow monitor installation
- Flow monitor confirmations and data collections
- Flow data analysis

The monitoring period began on October 23, 2020 and was completed on November 28, 2020. Equipment was removed from the system on December 09, 2020.

Flow Monitoring Equipment

The ***ADS FlowShark Triton*** monitor was selected for this project. This flow monitor is an area velocity flow monitor that uses both the Continuity and Manning's equations to measure flow.

The ADS FlowShark Triton monitor consists of data acquisition sensors and a battery-powered microcomputer. The microcomputer includes a processor unit, data storage, and an on-board clock to control and synchronize the sensor recordings. The monitor was programmed to acquire and store depth of flow and velocity readings at 5-minute intervals.

The FS Triton monitor features cross-checking using multiple technologies in each sensor for continuous running of comparisons and tolerances. The FS Triton monitor can support two (2) sets of sensors. The sensor option used for this project was:

The Peak Combo Sensor installed at the bottom of the pipe includes three types of data acquisition technologies.

The ***up looking ultrasonic depth*** uses sound waves from two independent transceivers to measure the distance from the sensor upward toward the flow surface; applying the speed of sound in the water and the temperature measured by sensor to calculate depth.

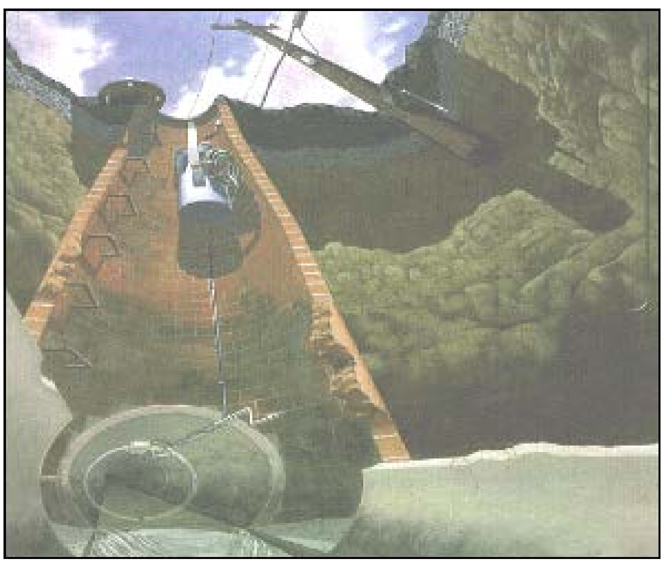
The ***pressure depth*** is calculated by using a piezo-resistive crystal to determine the difference between hydrostatic and atmospheric pressure. The pressure sensor is temperature compensated and vented to the atmosphere through a desiccant filled breather tube.

To obtain ***peak velocity*****,** the sensor sends an ultrasonic signal at an angle upward through the widest cross-section of the oncoming flow. The signal is reflected by suspended particles, air bubbles, or organic matter with a frequency shift proportional to the velocity of the reflecting objects. The reflected signal is received by the sensor and processed using digital spectrum analysis to determine the peak flow velocity.

Installation

Installation of flow monitoring equipment typically proceeds in four steps. First, the site is investigated for safety and to determine physical and hydraulic suitability for the flow monitoring equipment. Second, the equipment is physically installed at the selected location. Third, the monitor is tested to assure proper operation of the velocity and depth of flow sensors and verify that the monitor clock is operational and synchronized to the master computer clock. Fourth, the depth and velocity sensors are confirmed and line confirmations are performed.

In pipes up to 42 inches in diameter, the sensors were mounted on expandable stainless-steel rings, inserted at least a foot upstream into influent pipes and tightened against the inside walls of the pipes. Influent pipe installations reduce the influences of turbulence and backwater often caused by changes in channel geometry in manholes.



Data Collection, Confirmation, and Quality Assurance

Data collects were done remotely via wireless connect on a weekly basis. As needed, during the monitoring period, field crews visit each monitoring location to verify proper monitor operation and document field conditions. The following quality assurance steps are taken to assure the integrity of the collected data:

Measure power supplies: monitors were powered by dry cell battery packs. Voltages were recorded and battery packs replaced, as necessary. Separate batteries provided back-up power to memory allowing primary batteries to be replaced without loss of data.

Clock synchronization: Field crews synchronized monitor clocks to master clocks.

Confirm depth and velocity readings: Field crews descended into meter manholes to manually measure depths and velocities and compare them meter readings to confirm that they agreed. They also measured silt levels, if any, in the inverts of the pipes. Silt areas were subtracted from flow areas to compute true areas of flow.

Confirm average velocities through cross-sectional velocity profiles: Since ADS velocity sensors measure peak velocity, field crews collected cross-sectional velocity profiles in order to develop a relationship between peak and average velocity in lines that meet the hydraulic criteria.

Upload and Review Data: Data collected from the monitors were uploaded and reviewed by a Data Analyst for completeness, outliers and deviations in the flow patterns, which indicate system anomalies or equipment failure.

Flow Quantification Methods

There are two main equations used to measure open channel flow: the ***Continuity Equation*** and the ***Manning Equation.*** The Continuity Equation, which is considered the most accurate, can be used if both depth of flow and velocity are available. In cases where velocity measurements are not available or not practical to obtain, the Manning Equation can be used to estimate velocity from the depth data based on certain physical characteristics of the pipe (i.e. the slope and roughness of the pipe being measured). However, the Manning equation assumes uniform, steady flow hydraulic conditions with non-varying roughness, which are typically invalid assumptions in most sanitary sewers. The Continuity Equation was used exclusively for this study.

Continuity Equation

The Continuity Equation states that the flow quantity (Q) is equal to the wetted area (A) multiplied by the average velocity (V) of the flow.

$$Q = A * V$$

This equation is applicable in a variety of conditions including backwater, surcharge, and reverse flow.

Data Analysis and Presentation

Data Analysis

A flow monitor is typically programmed to collect data at 5-minute intervals throughout the monitoring period. The monitor stores raw data consisting of (1) the ultrasonic depth, (2) the peak velocity and (3) the pressure depth. The data is imported into ADS's proprietary software and is examined by a data analyst to verify its integrity. The data analyst also reviews the daily field reports and site visit records to identify conditions that would affect the collected data.

Velocity profiles and the line confirmation data developed by the field personnel are reviewed by the data analyst to identify inconsistencies and verify data integrity. Velocity profiles are reviewed and an average to peak velocity ratio is calculated for the site. This ratio is used in converting the peak velocity measured by the sensor to the average velocity used in the Continuity equation. The data analyst selects which depth sensor entity will be used to calculate the final depth information. Silt levels present at each site visit are reviewed and representative silt levels established.

Occasionally the velocity sensor's performance may be compromised resulting in invalid readings sporadically during the monitoring period. This is generally caused by excessive debris (silt) blocking the sensor's crystals, shallow flows (~< 1") that may drop below the top of the sensor or very clear flows lacking the particles needed to measure rate. In order to use the Continuity equation to quantify the flow during these periods, a Data Analyst and/or Engineer will use the site's historical pipe curve (depth vs. velocity) data along with valid field confirmations to reconstitute and replace the false velocity recordings with expected velocity readings for a given historical depth along the curve.

Selections for the above parameters can be constant or can change during the monitoring period. While the data analysis process is described in a linear manner, it often requires an iterative approach to accurately complete.

Data Presentation

This type of flow monitoring project generates a large volume of data. To facilitate review of the data, results have been provided in graphical and tabular formats. The flow data is presented graphically in the form of scattergraphs and hydrographs. Hydrographs are based on 5-minute averaging. Tables are provided in daily average format. These tables show the flow rate for each day, along with the daily minimum and maximums, the times they were observed, the total daily flow, and total flow for the month (or monitoring period). The following explanation of terms may aid in interpretation of the flow data table and hydrograph.

DEPTH - Final calculated depth measurement (in inches)

QUANTITY - Final calculated flow rate (in MGD)

VELOCITY - Final calculated flow velocity (in feet per second)

REPORT TOTAL - Total volume of flow recorded for the indicated time period (in MG)

FM01altB

Site Commentary

SITE INFORMATION

Pipe	Round (23.38 in H)
Silt	0.00 (in)

OVERVIEW

FM01altB functioned under normal conditions during the period Friday, October 23, 2020 to Saturday, November 28, 2020. The flow pattern at this site exhibits frequent changes in both depth and velocity throughout the day. The saw-toothed like pattern indicates the influence of pump station activity. Review of the Scattergraph shows that free flow conditions were maintained throughout the monitoring period. No surcharge conditions were recorded. Flow in this line is subcritical.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted and support the relative accuracy of the flow monitor at this location.

Site FM01altB was positioned downstream of FM02 and FM03. A flow balancing check was completed, and no problems were noted. An average net flow of 0.295 mgd was reported for the study period.

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Friday, October 23, 2020 to Saturday, November 28, 2020**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	4.75	1.87	0.560
Minimum	2.23	0.97	0.100
Maximum	7.11	2.68	1.261
Min Time	11/22/2020 05:10:00	10/23/2020 03:00:00	10/23/2020 03:00:00
Max Time	11/26/2020 11:00:00	11/24/2020 08:25:00	11/08/2020 10:20:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the five-minute average.

DATA UPTIME

Data uptime observed during **Friday, October 23, 2020 to Saturday, November 28, 2020** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

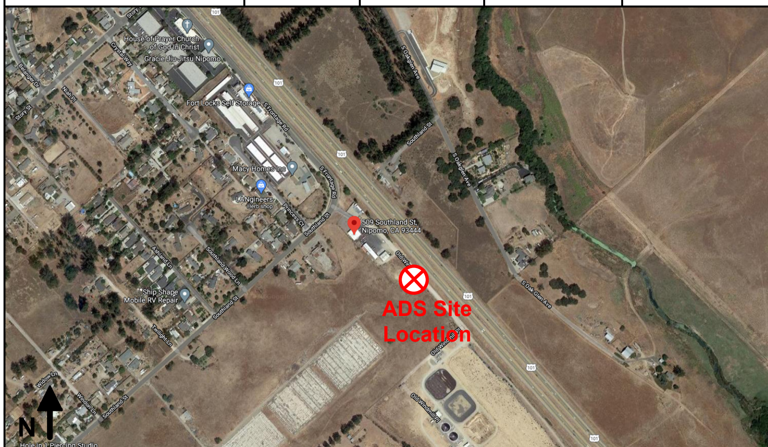
ADS Site Report

ADS ENVIRONMENTAL SERVICES

Quality Form

Project Name: Nipomo MKN TFM 2020	**City:** Nipomo	**Agency:** Nipomo	**FM Initials:** SK

Site Name: FM01	**Install Date:** 10/22/20	**Monitor Type**	Peak Doppler
Address/Location: 509 Southland St (Located on Old Windmill Pl)		**Monitor Model**	Triton +
		Data Acquisition	Manual/Wireless Collect
		Manhole ID	
Access: Drive	**Type of System:** Sanitary [X] Storm [ ] Combined [ ]	**Pipe Height:**	23.38 "
		Pipe Width:	23.38 "



Investigation Information:

Date/Time of Investigation:	10/22/20 @02:20pm
Site Hydraulics:	Good straight through flow
Upstream Input: (L/S, P/S)	--
Upstream Manhole:	Not Investigated
Downstream Manhole:	Not investigated
Depth of Flow:	4.75 " +/- 0.25"
Range (Air DOF):	+/-
Peak Velocity:	2.10 fps
Silt:	0.00 Inches

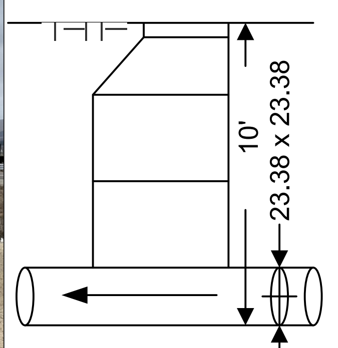
Manhole Information:

Manhole Depth:	10
Manhole Material / Condition	Precast/Good
Pipe Material / Condition:	VCP/Good
Land Use:	Residential [ ] Commercial [ ] Industrial [x] Trunk [ ]
Oxygen: 20.9	**H2S:** 0 **LEL:** 0 **CO:** 0

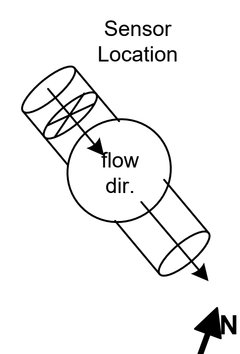
Safety Notes:

2 man crew required and one blower is to be operated at all times.

Other Information:



Cross Section



Plan

Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultrasonic/Velocity/Pressure
Surcharge Height:	0
Rain Gauge Zone:	

Backup	Yes	No	?	Distance
Trunk		x		
Lift / Pump Station		x		
WWTP		x		
Other		x		

Additional Site Information / Comments:

Standard Traffic Control with No Safety Concerns

Hydrograph Report
FM01altB

Flow Monitor

FM01altB

Pipe Height
23.38
in

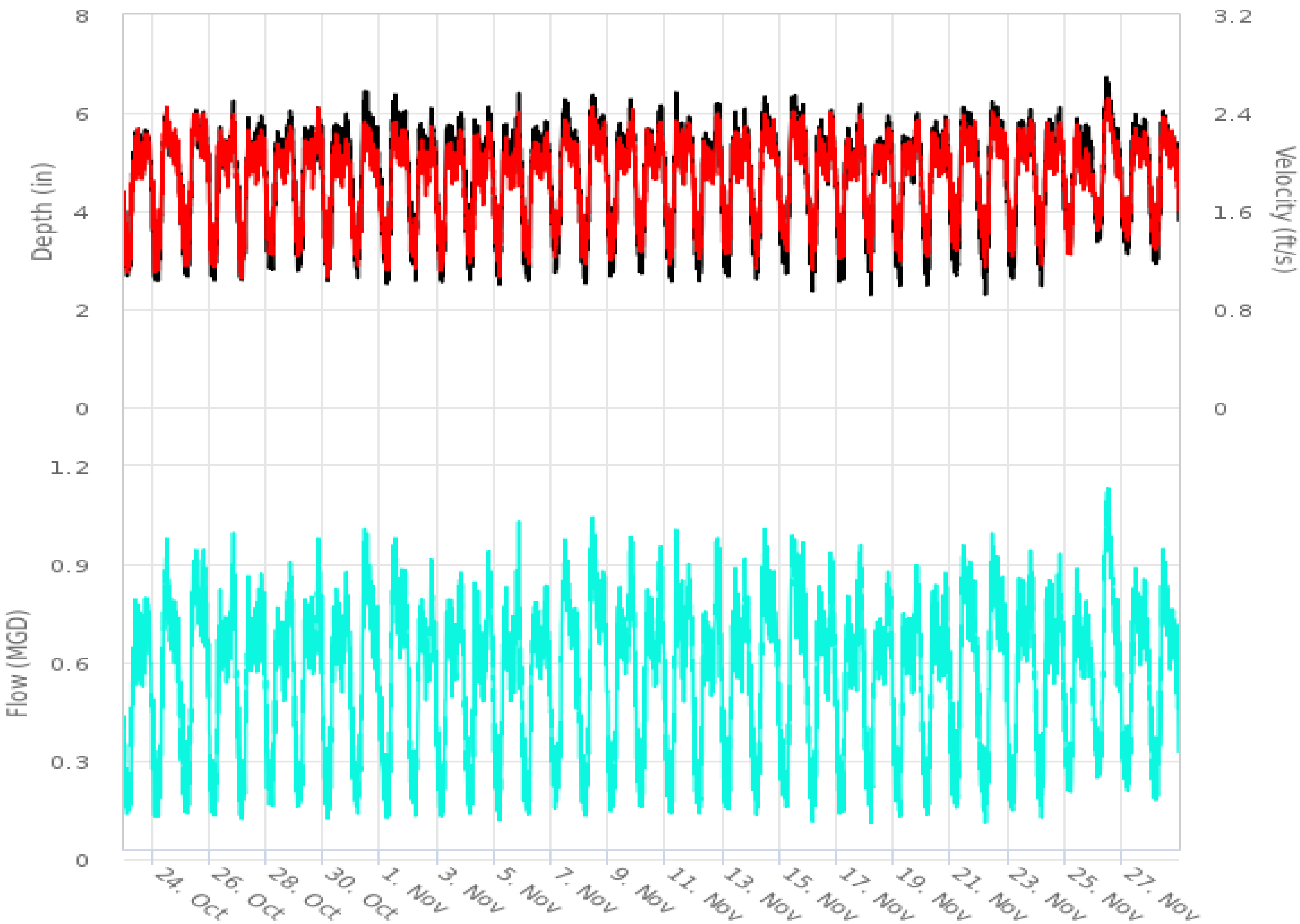
Report Period

10/23/2020
To
11/28/2020

Legend

DFINAL
VFINAL
QFINAL
RAIN FINAL

ADS ENVIRONMENTAL SERVICES



Scattergraph Report
FM01altB

Flow Monitor

FM01altB

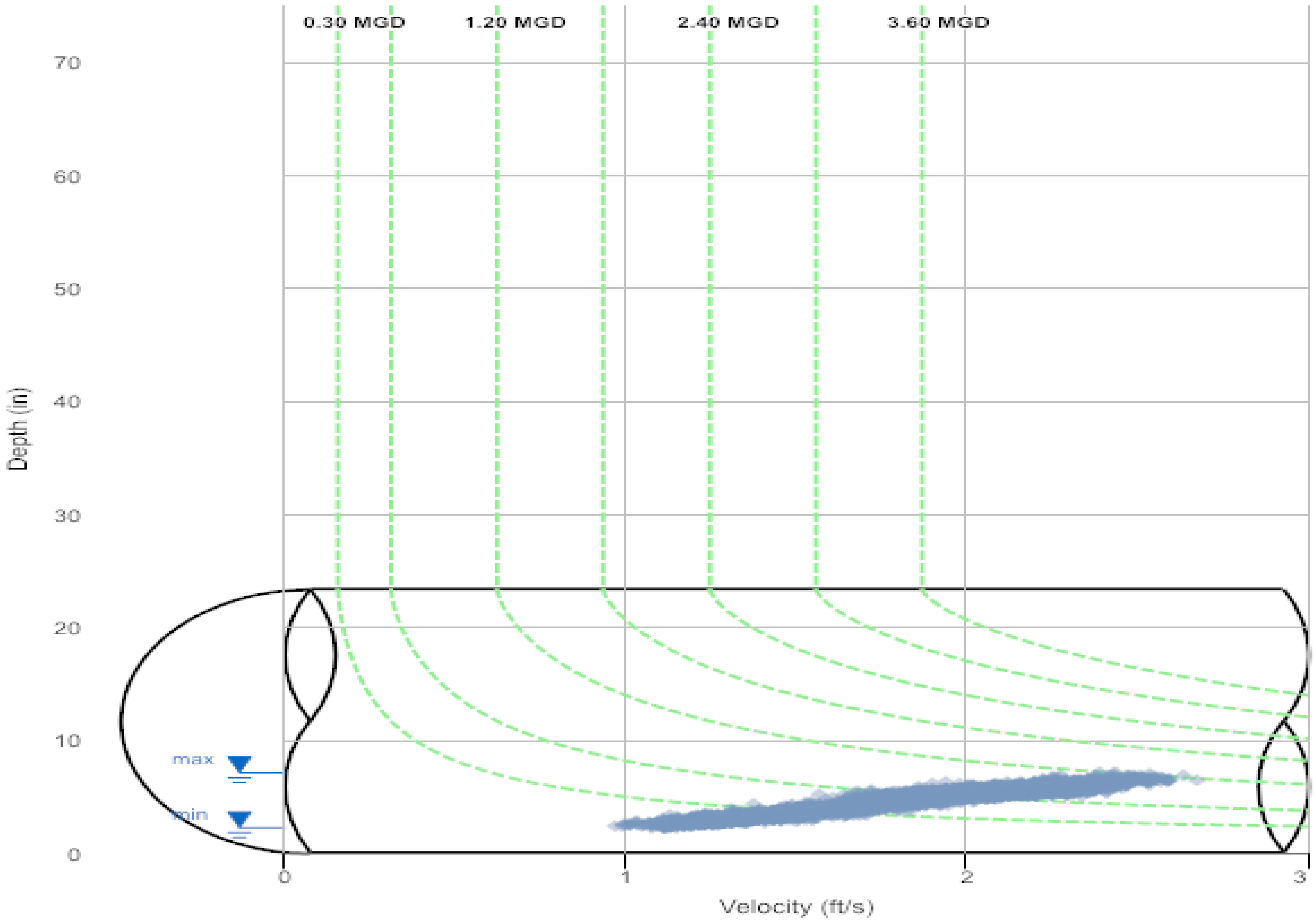
Pipe Height
23.38
in

Report Period

10/23/2020
To
11/28/2020

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



15201 Springdale Street
Huntington Beach, CA 92649

800-633-7246
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Daily Tabular Report

10/23/2020 00:00 - 11/28/2020 23:59
FM01altBPipe: Round (23.38 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)	RAIN FINAL (in)				
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total					
10/23/2020	03:05	2.37	20:35	6.10	4.61	03:00	0.97	09:30	2.47	1.84	03:00	0.100	09:30	0.963	0.526	0.526	-	-	-	-	-	-
10/24/2020	05:15	2.50	12:05	6.46	4.64	01:55	1.08	13:55	2.50	1.88	01:55	0.122	12:05	1.081	0.552	0.552	-	-	-	-	-	-
10/25/2020	05:15	2.53	11:10	6.68	4.77	06:45	1.11	11:15	2.58	1.92	05:15	0.128	11:10	1.165	0.586	0.586	-	-	-	-	-	-
10/26/2020	04:15	2.52	20:20	6.58	4.66	01:50	1.11	20:20	2.54	1.87	04:15	0.124	20:20	1.129	0.544	0.544	-	-	-	-	-	-
10/27/2020	02:05	2.49	22:00	6.27	4.76	02:05	1.01	22:00	2.38	1.85	02:05	0.111	22:00	0.990	0.555	0.555	-	-	-	-	-	-
10/28/2020	03:05	2.62	21:25	6.43	4.74	03:05	1.17	21:25	2.44	1.87	03:05	0.138	21:25	1.052	0.554	0.554	-	-	-	-	-	-
10/29/2020	02:30	2.67	19:35	6.56	4.75	02:30	1.19	19:35	2.56	1.90	02:30	0.145	19:35	1.132	0.562	0.562	-	-	-	-	-	-
10/30/2020	03:40	2.46	19:20	6.78	4.77	03:40	1.00	19:20	2.52	1.80	03:40	0.108	19:20	1.169	0.540	0.540	-	-	-	-	-	-
10/31/2020	05:10	2.57	11:25	6.95	4.83	03:45	1.13	09:50	2.54	1.83	05:10	0.132	09:50	1.216	0.565	0.565	-	-	-	-	-	-
11/01/2020	05:30	2.39	12:30	6.67	4.84	06:40	1.05	12:30	2.47	1.85	05:25	0.114	12:30	1.118	0.576	0.576	-	-	-	-	-	-
11/02/2020	05:35	2.46	17:25	6.33	4.73	05:35	1.01	10:50	2.37	1.79	05:35	0.109	17:25	0.978	0.532	0.532	-	-	-	-	-	-
11/03/2020	04:00	2.45	18:25	6.52	4.75	02:40	1.08	18:25	2.38	1.83	02:40	0.117	18:25	1.047	0.546	0.546	-	-	-	-	-	-
11/04/2020	03:20	2.53	20:30	6.50	4.74	02:30	1.08	19:10	2.45	1.82	02:30	0.122	19:10	1.059	0.541	0.541	-	-	-	-	-	-
11/05/2020	04:00	2.41	20:30	6.72	4.70	04:20	1.00	10:00	2.47	1.82	04:20	0.109	20:30	1.117	0.535	0.535	-	-	-	-	-	-
11/06/2020	04:45	2.42	19:45	6.52	4.72	04:45	1.14	19:45	2.38	1.84	04:45	0.121	19:45	1.044	0.541	0.541	-	-	-	-	-	-
11/07/2020	03:10	2.60	13:45	6.71	4.82	03:40	1.16	11:45	2.40	1.88	03:10	0.138	13:45	1.033	0.573	0.573	-	-	-	-	-	-
11/08/2020	04:55	2.42	10:20	6.93	4.87	01:40	1.04	10:20	2.64	1.90	04:55	0.120	10:20	1.261	0.597	0.597	-	-	-	-	-	-
11/09/2020	04:20	2.51	18:45	6.80	4.79	01:50	1.17	20:05	2.55	1.88	04:20	0.130	20:05	1.172	0.568	0.568	-	-	-	-	-	-
11/10/2020	04:20	2.37	20:30	6.74	4.73	04:20	1.17	19:45	2.51	1.87	04:20	0.120	19:45	1.131	0.553	0.553	-	-	-	-	-	-
11/11/2020	04:55	2.48	08:35	6.66	4.73	03:05	1.12	19:25	2.58	1.89	04:50	0.131	19:25	1.149	0.561	0.561	-	-	-	-	-	-
11/12/2020	04:10	2.49	18:15	6.69	4.70	04:10	1.18	18:15	2.54	1.88	04:10	0.130	18:15	1.155	0.551	0.551	-	-	-	-	-	-
11/13/2020	04:45	2.55	18:35	6.57	4.71	00:55	1.14	10:30	2.45	1.88	04:45	0.132	18:35	1.071	0.550	0.550	-	-	-	-	-	-
11/14/2020	04:25	2.52	14:45	6.68	4.81	04:20	1.08	11:55	2.60	1.90	04:25	0.121	11:55	1.137	0.580	0.580	-	-	-	-	-	-
11/15/2020	06:25	2.57	12:10	6.85	4.83	06:00	1.19	11:00	2.59	1.93	06:30	0.142	12:10	1.166	0.597	0.597	-	-	-	-	-	-
11/16/2020	03:25	2.27	16:20	6.57	4.70	03:50	1.08	19:40	2.49	1.89	03:55	0.107	19:15	1.054	0.553	0.553	-	-	-	-	-	-
11/17/2020	04:20	2.52	20:40	6.56	4.66	02:10	1.17	20:40	2.55	1.88	02:10	0.133	20:40	1.132	0.546	0.546	-	-	-	-	-	-
11/18/2020	04:40	2.27	19:10	6.20	4.67	05:00	1.09	18:55	2.38	1.87	04:35	0.107	19:10	0.950	0.545	0.545	-	-	-	-	-	-
11/19/2020	05:10	2.40	18:25	6.50	4.69	03:05	1.13	18:25	2.54	1.89	05:10	0.122	18:25	1.111	0.551	0.551	-	-	-	-	-	-
11/20/2020	04:00	2.45	11:20	6.46	4.64	04:00	1.14	20:35	2.43	1.87	04:00	0.122	11:20	1.046	0.538	0.538	-	-	-	-	-	-
11/21/2020	04:40	2.51	09:15	6.47	4.72	05:45	1.19	09:15	2.59	1.90	05:45	0.134	09:15	1.125	0.569	0.569	-	-	-	-	-	-
11/22/2020	05:10	2.23	14:45	6.55	4.74	05:10	1.11	11:30	2.59	1.92	05:10	0.104	11:30	1.108	0.584	0.584	-	-	-	-	-	-
11/23/2020	04:10	2.58	17:45	6.42	4.69	03:50	1.18	19:40	2.54	1.91	02:45	0.140	19:40	1.078	0.562	0.562	-	-	-	-	-	-
11/24/2020	04:25	2.40	08:25	6.47	4.71	04:25	1.15	08:25	2.68	1.92	04:25	0.120	08:25	1.165	0.563	0.563	-	-	-	-	-	-
11/25/2020	02:30	3.14	11:40	6.36	4.84	04:55	1.15	10:20	2.47	1.82	04:55	0.182	18:10	1.009	0.548	0.548	-	-	-	-	-	-
11/26/2020	05:50	3.14	11:00	7.11	5.08	05:50	1.36	12:15	2.57	1.99	05:50	0.211	11:00	1.208	0.648	0.648	-	-	-	-	-	-
11/27/2020	04:50	2.99	10:55	6.45	4.83	04:50	1.31	10:55	2.45	1.90	04:50	0.189	10:55	1.062	0.573	0.573	-	-	-	-	-	-
11/28/2020	04:30	2.80	10:50	6.43	4.71	04:30	1.24	10:50	2.53	1.90	04:30	0.162	10:55	1.091	0.557	0.557	-	-	-	-	-	-

10/23/2020 00:00 - 11/28/2020 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			20.721	
Average	4.75	1.87	0.560	

FM02

Site Commentary

SITE INFORMATION

Pipe	Elliptical (12.5 in H x 12.75 in W)
Silt	0.00 (in)

OVERVIEW

FM02 functioned under normal conditions during the period Friday, October 23, 2020 to Saturday, November 28, 2020. The flow pattern at this site exhibits frequent changes in both depth and velocity throughout the day. The saw-toothed like pattern indicates the influence of pump station activity. Review of the Scattergraph shows that although this line was impacted by debris, free flow conditions were maintained throughout the monitoring period. No surcharge conditions were recorded. Flow in this line is subcritical.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted and support the relative accuracy of the flow monitor at this location.

Site FM02 along with FM03 was positioned upstream of FM01altB. (See FM01altB Site Commentary for Balancing Details).

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Friday, October 23, 2020 to Saturday, November 28, 2020**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.95	1.42	0.191
Minimum	1.13	0.21	0.007
Maximum	6.74	3.00	0.926
Min Time	11/15/2020 04:40:00	11/26/2020 05:10:00	10/26/2020 03:55:00
Max Time	11/24/2020 08:05:00	11/24/2020 08:05:00	11/24/2020 08:05:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the five-minute average.

DATA UPTIME

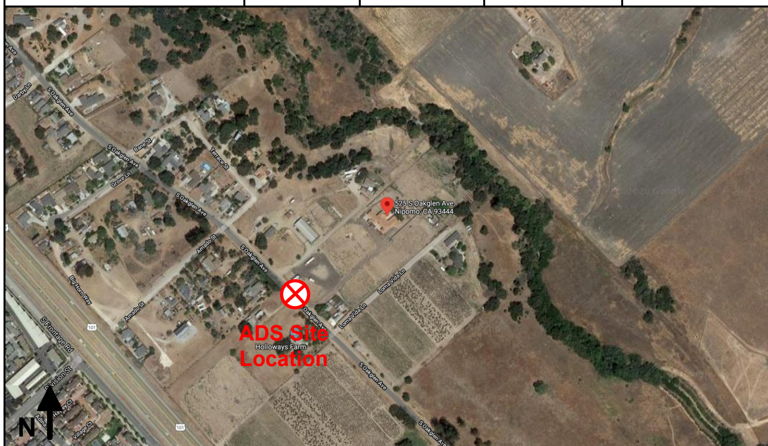
Data uptime observed during **Friday, October 23, 2020 to Saturday, November 28, 2020** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

ADS ENVIRONMENTAL SERVICES® — ADS Site Report — Quality Form

Project Name:	Nipomo MKN TFM 2020	**City:**	Nipomo	**Agency:**	Nipomo	**FM Initials:**	SK

Site Name:	FM02	**Install Date:**	10/22/20	**Monitor Type**	Peak Doppler
Address/Location:	525 S Oak Glen			**Monitor Model**	Triton +
				Data Acquisition	Manual/Wireless Collect
				Manhole ID	
Access: Drive	**Type of System:**	Sanitary: X	Storm: ☐ Combined: ☐	**Pipe Height:**	12.50 "
				Pipe Width:	12.75 "



Investigation Information:

Date/Time of Investigation:	10/22/20 @03:35pm
Site Hydraulics:	Good straight through flow
Upstream Input: (L/S, P/S)	--
Upstream Manhole:	Not Investigated
Downstream Manhole:	Not investigated
Depth of Flow:	3.25 " +/- 0.25"
Range (Air DOF):	+/-
Peak Velocity:	2.10 fps
Silt:	0.00 Inches

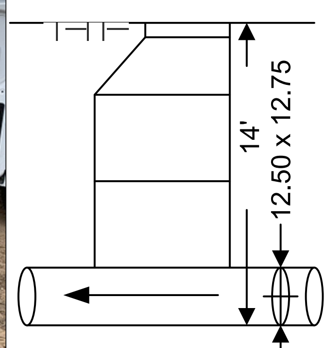
Manhole Information:

Manhole Depth:	14'
Manhole Material / Condition	Precast/Good
Pipe Material / Condition:	VCP/Good
Land Use:	Residential: X; Commercial: ☐; Industrial: ☐; Trunk: ☐
Oxygen: 20.9	**H2S:** 0 **LEL:** 0 **CO:** 0

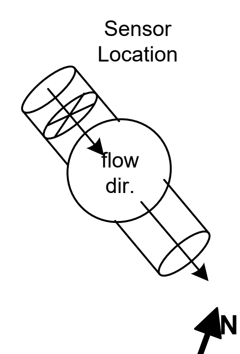
Safety Notes:

2 man crew required and one blower is to be operated at all times.

Other Information:



Cross Section



Plan

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk		x		
Sensors Devices:	Ultrasonic/Velocity/Pressure	Lift / Pump Station		x		
Surcharge Height:	0	WWTP		x		
Rain Gauge Zone:		Other		X		

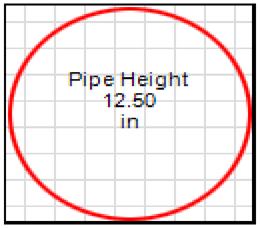
Additional Site Information / Comments:

Standard Traffic Control with No Safety Concerns

Hydrograph Report
FM02

Flow Monitor

FM02



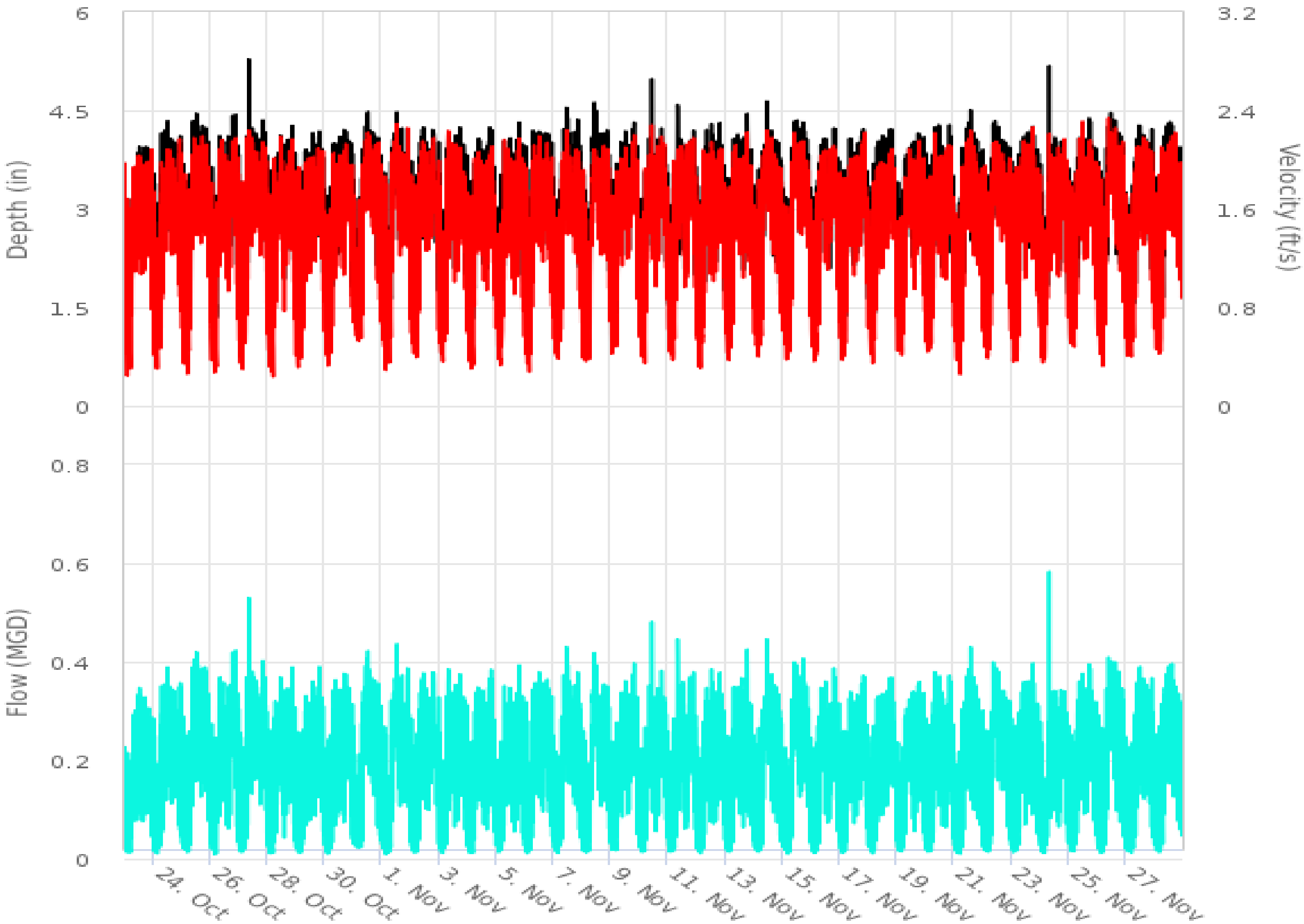
Report Period

10/23/2020
To
11/28/2020

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



15201 Springdale Street
Huntington Beach, CA 92649

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Scattergraph Report
FM02

Flow Monitor

FM02

Pipe Height
12.50
in

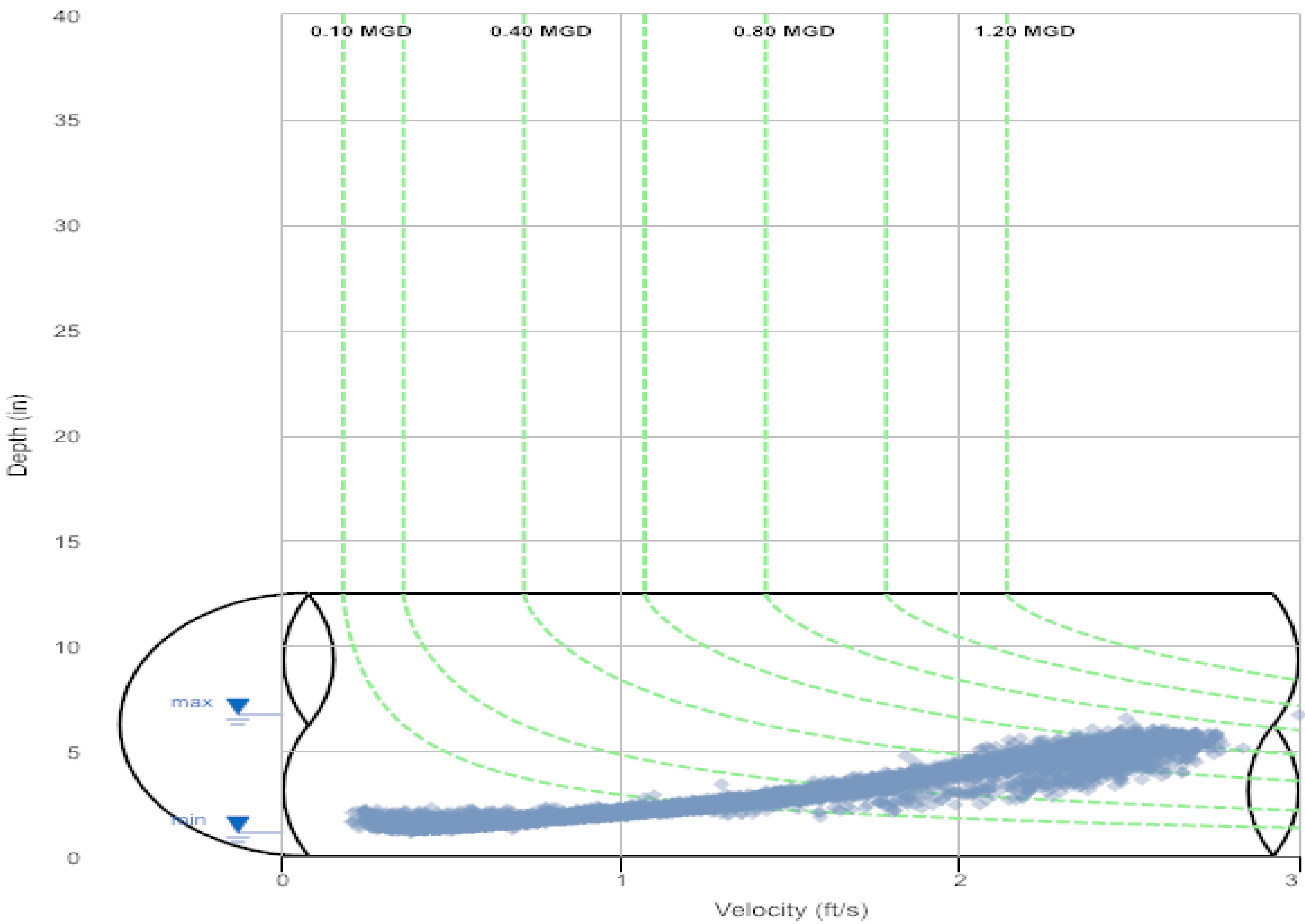
Report Period

10/23/2020
To
11/28/2020

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth

ADS ENVIRONMENTAL SERVICES



Daily Tabular Report

10/23/2020 00:00 - 11/28/2020 23:59
FM02Pipe: Elliptical (12.5 in H x 12.75 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)	RAIN FINAL (in)				
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total					
10/23/2020	04:00	1.47	12:45	5.41	2.81	02:20	0.21	12:45	2.70	1.35	04:00	0.012	12:45	0.629	0.166	0.166	-	-	-	-	-	-
10/24/2020	01:25	1.41	13:35	5.97	3.00	04:00	0.23	12:55	2.71	1.38	03:55	0.009	13:35	0.689	0.192	0.192	-	-	-	-	-	-
10/25/2020	06:15	1.42	12:20	6.09	3.15	05:15	0.22	19:50	2.76	1.45	05:15	0.010	12:20	0.699	0.213	0.213	-	-	-	-	-	-
10/26/2020	04:05	1.27	19:40	6.04	2.98	03:55	0.23	18:45	2.76	1.40	03:55	0.007	18:45	0.705	0.194	0.194	-	-	-	-	-	-
10/27/2020	05:35	1.47	08:40	6.28	3.14	03:25	0.25	08:25	2.84	1.46	02:00	0.012	08:40	0.710	0.212	0.212	-	-	-	-	-	-
10/28/2020	02:30	1.38	20:10	5.82	2.99	05:10	0.21	11:00	2.70	1.38	02:30	0.009	20:10	0.644	0.189	0.189	-	-	-	-	-	-
10/29/2020	04:35	1.31	19:50	5.87	2.96	01:55	0.31	19:50	2.70	1.41	04:30	0.012	19:50	0.700	0.189	0.189	-	-	-	-	-	-
10/30/2020	02:35	1.27	20:55	5.93	2.90	03:10	0.31	18:40	2.75	1.38	03:05	0.010	20:55	0.694	0.184	0.184	-	-	-	-	-	-
10/31/2020	01:50	1.50	09:10	5.96	3.02	23:40	0.36	10:45	2.78	1.47	04:25	0.019	11:20	0.682	0.203	0.203	-	-	-	-	-	-
11/01/2020	04:55	1.31	10:05	5.93	2.93	03:30	0.29	08:05	2.74	1.42	03:30	0.009	13:45	0.672	0.192	0.192	-	-	-	-	-	-
11/02/2020	03:10	1.27	09:50	5.51	2.92	05:30	0.36	12:50	2.74	1.42	03:10	0.012	14:55	0.634	0.188	0.188	-	-	-	-	-	-
11/03/2020	03:20	1.24	18:05	6.04	2.88	03:35	0.35	08:05	2.67	1.40	03:25	0.011	18:05	0.703	0.184	0.184	-	-	-	-	-	-
11/04/2020	04:30	1.32	20:05	5.61	2.88	03:10	0.29	20:05	2.66	1.37	03:10	0.010	20:05	0.648	0.180	0.180	-	-	-	-	-	-
11/05/2020	02:30	1.30	13:10	5.53	2.91	04:00	0.28	08:10	2.59	1.36	02:30	0.010	19:50	0.609	0.177	0.177	-	-	-	-	-	-
11/06/2020	02:35	1.34	10:50	5.72	2.99	04:00	0.24	10:50	2.66	1.40	02:20	0.011	10:50	0.666	0.190	0.190	-	-	-	-	-	-
11/07/2020	03:15	1.28	09:25	5.86	3.09	03:20	0.31	11:35	2.72	1.45	03:15	0.010	12:50	0.672	0.204	0.204	-	-	-	-	-	-
11/08/2020	03:40	1.39	11:05	5.95	3.09	03:50	0.30	10:15	2.66	1.41	03:50	0.011	10:15	0.679	0.200	0.200	-	-	-	-	-	-
11/09/2020	05:15	1.34	18:10	5.81	3.00	01:25	0.35	11:40	2.62	1.47	05:10	0.014	18:10	0.658	0.195	0.195	-	-	-	-	-	-
11/10/2020	02:30	1.30	10:45	6.08	2.87	02:25	0.32	07:40	2.66	1.42	02:25	0.011	10:45	0.649	0.181	0.181	-	-	-	-	-	-
11/11/2020	01:50	1.25	08:20	5.97	2.92	03:00	0.33	17:50	2.76	1.44	03:00	0.011	17:50	0.690	0.191	0.191	-	-	-	-	-	-
11/12/2020	05:20	1.27	19:30	5.69	2.91	02:00	0.30	13:40	2.65	1.43	01:55	0.010	20:10	0.621	0.188	0.188	-	-	-	-	-	-
11/13/2020	03:25	1.19	18:30	5.59	2.91	03:20	0.34	18:30	2.75	1.43	03:25	0.009	18:30	0.669	0.187	0.187	-	-	-	-	-	-
11/14/2020	05:35	1.36	10:10	5.67	2.96	03:50	0.38	16:05	2.65	1.44	03:50	0.014	11:00	0.634	0.194	0.194	-	-	-	-	-	-
11/15/2020	04:40	1.13	17:30	5.86	3.00	05:00	0.30	17:30	2.76	1.46	04:30	0.010	17:30	0.713	0.201	0.201	-	-	-	-	-	-
11/16/2020	01:50	1.28	19:15	5.63	2.91	02:55	0.35	19:15	2.75	1.44	02:45	0.012	19:15	0.675	0.188	0.188	-	-	-	-	-	-
11/17/2020	03:25	1.26	08:10	5.64	2.92	02:25	0.36	19:25	2.66	1.43	02:25	0.011	19:25	0.633	0.185	0.185	-	-	-	-	-	-
11/18/2020	03:50	1.29	12:40	5.66	2.94	04:10	0.32	18:40	2.68	1.42	04:05	0.011	18:40	0.653	0.188	0.188	-	-	-	-	-	-
11/19/2020	03:00	1.29	20:05	5.65	2.89	04:25	0.37	11:20	2.63	1.38	03:25	0.013	20:05	0.618	0.178	0.178	-	-	-	-	-	-
11/20/2020	01:55	1.28	08:25	5.85	2.91	02:15	0.39	12:00	2.64	1.43	02:05	0.013	12:00	0.668	0.186	0.186	-	-	-	-	-	-
11/21/2020	04:05	1.28	12:05	5.79	2.90	05:25	0.25	16:50	2.69	1.41	05:20	0.010	12:05	0.668	0.185	0.185	-	-	-	-	-	-
11/22/2020	04:15	1.20	09:00	5.79	2.97	04:15	0.33	09:00	2.76	1.45	04:15	0.009	09:00	0.703	0.197	0.197	-	-	-	-	-	-
11/23/2020	02:10	1.37	17:35	5.46	2.94	05:00	0.34	11:10	2.70	1.44	02:10	0.012	17:35	0.611	0.189	0.189	-	-	-	-	-	-
11/24/2020	04:20	1.26	08:05	6.74	2.93	02:50	0.33	08:05	3.00	1.44	02:50	0.011	08:05	0.926	0.192	0.192	-	-	-	-	-	-
11/25/2020	02:00	1.31	08:55	5.83	2.93	05:10	0.45	08:55	2.74	1.46	05:10	0.014	08:55	0.705	0.194	0.194	-	-	-	-	-	-
11/26/2020	02:45	1.28	12:35	5.91	3.00	05:10	0.21	18:30	2.72	1.49	05:10	0.009	12:50	0.683	0.205	0.205	-	-	-	-	-	-
11/27/2020	05:05	1.25	12:15	5.90	2.88	01:35	0.27	17:40	2.73	1.42	05:00	0.011	12:15	0.706	0.187	0.187	-	-	-	-	-	-
11/28/2020	04:35	1.28	11:45	6.07	3.00	05:45	0.38	13:00	2.77	1.48	04:25	0.012	11:45	0.704	0.202	0.202	-	-	-	-	-	-

10/23/2020 00:00 - 11/28/2020 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			7.071	
Average	2.95	1.42	0.191	

FM03

Site Commentary

SITE INFORMATION

Pipe	Round (9.88 in H)
Silt	0.00 (in)

OVERVIEW

FM03 functioned under normal conditions during the period Friday, October 23, 2020 to Saturday, November 28, 2020. The flow pattern at this site exhibits frequent changes in both depth and velocity throughout the day. The saw-toothed like pattern indicates the influence of pump station activity. Review of the Scattergraph shows that free flow conditions were maintained throughout the monitoring period. No surcharge conditions were recorded. Flow in this line is subcritical.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted and support the relative accuracy of the flow monitor at this location.

Site FM03 along with FM02 was positioned upstream of FM01altB. (See FM01altB Site Commentary for Balancing Details).

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Friday, October 23, 2020 to Saturday, November 28, 2020**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.25	1.14	0.074
Minimum	0.92	0.31	0.005
Maximum	4.12	1.83	0.248
Min Time	11/13/2020 05:15:00	11/05/2020 04:25:00	11/05/2020 04:25:00
Max Time	11/26/2020 09:55:00	11/26/2020 09:55:00	11/26/2020 09:55:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the five-minute average.

DATA UPTIME

Data uptime observed during **Friday, October 23, 2020 to Saturday, November 28, 2020** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

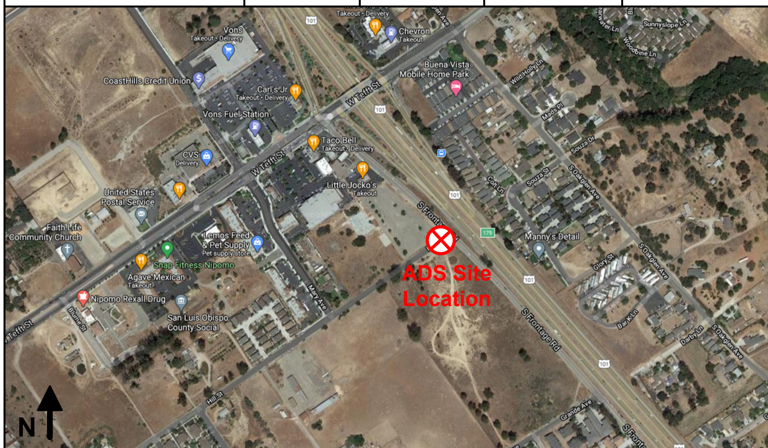
ENVIRONMENTAL SERVICES

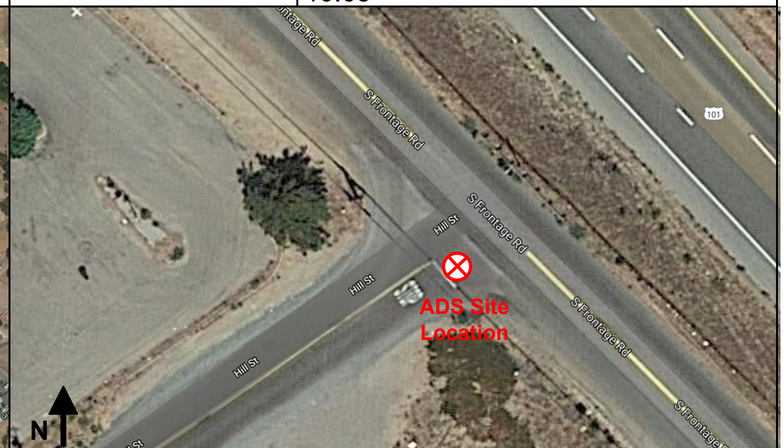
ADS Site Report

Quality Form

Project Name: Nipomo MKN TFM 2020	**City:** Nipomo	**Agency:** Nipomo	**FM Initials:** SK

Site Name: FM03	**Install Date:** 10/22/20	**Monitor Type**	Peak Doppler
Address/Location: Frontage Rd & Hill St		**Monitor Model**	Triton +
		Data Acquisition	Manual/Wireless Collect
		Manhole ID	
Access: Drive	**Type of System:** Sanitary [X] Storm [ ] Combined [ ]	**Pipe Height:**	10.88 "
		Pipe Width:	10.63 "





Investigation Information:

Date/Time of Investigation:	10/22/20 @04:40pm
Site Hydraulics:	Good straight through flow
Upstream Input: (L/S, P/S)	--
Upstream Manhole:	Not Investigated
Downstream Manhole:	Not investigated
Depth of Flow:	2.63 " +/- 0.25"
Range (Air DOF):	+/-
Peak Velocity:	1.54 fps
Silt:	0.00 Inches

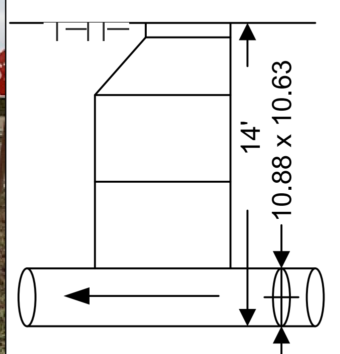
Manhole Information:

Manhole Depth:	14'
Manhole Material / Condition	Precast/Good
Pipe Material / Condition:	VCP/Good
Land Use:	Residential [x] Commercial [ ] Industrial [ ] Trunk [ ]
Oxygen: 20.9	**H2S:** 0 **LEL:** 0 **CO:** 0

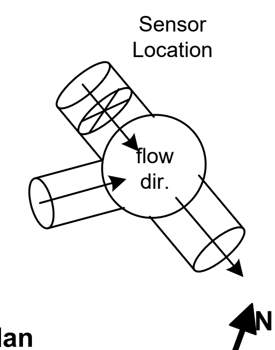
Safety Notes:

2 man crew required and one blower is to be operated at all times.

Other Information:



Cross Section



Plan

Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultrasonic/Velocity/Pressure
Surcharge Height:	0
Rain Gauge Zone:	

Backup	Yes	No	?	Distance
Trunk	[ ]	x	[ ]	
Lift / Pump Station	[ ]	x	[ ]	
WWTP	[ ]	x	[ ]	
Other	[ ]	x	[ ]	

Additional Site Information / Comments:

Standard Traffic Control with No Safety Concerns

Hydrograph Report
FM03

Flow Monitor

FM03

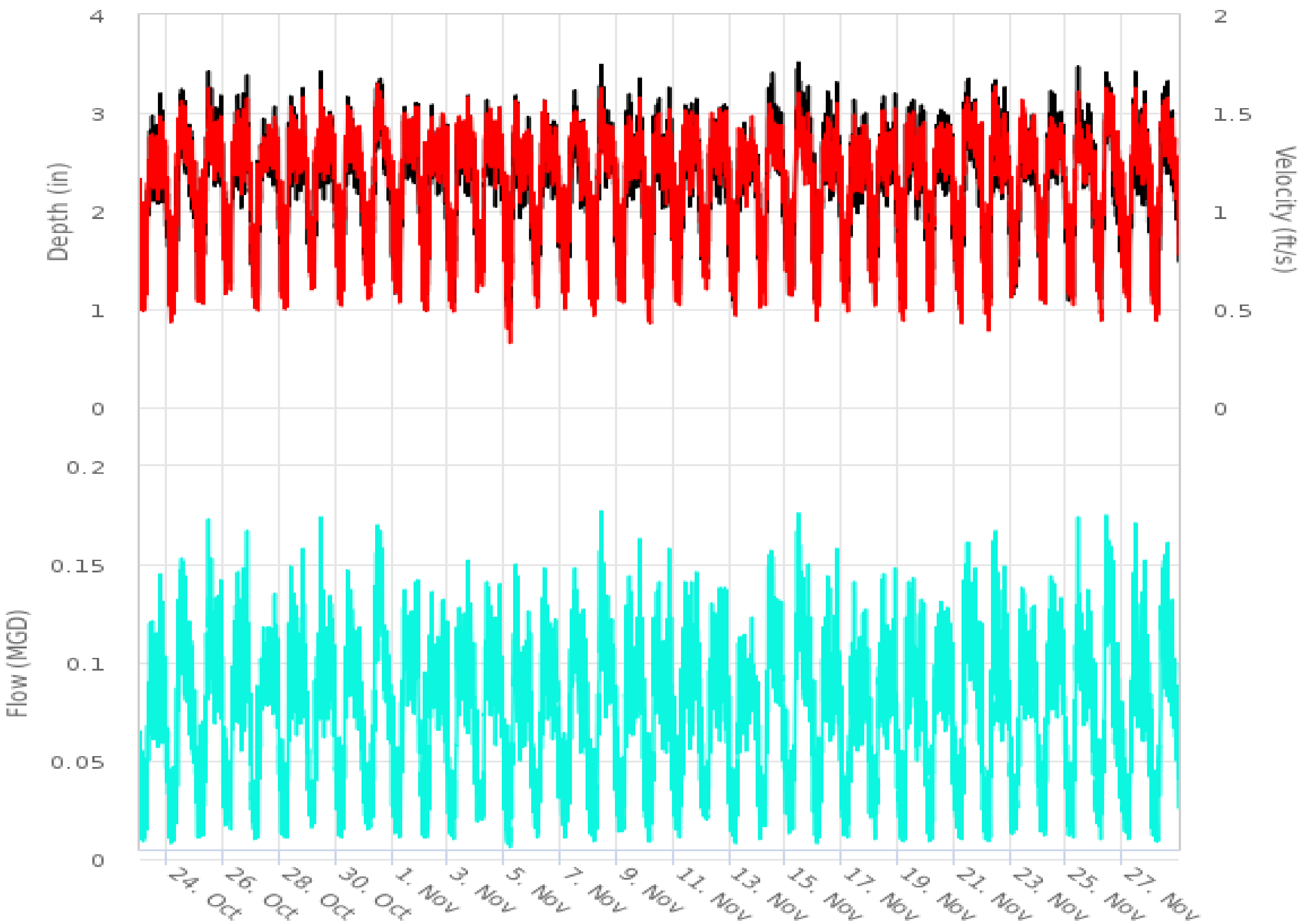
Pipe Height
9.88
in

Report Period

10/23/2020
To
11/28/2020

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



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Scattergraph Report
FM03

Flow Monitor

FM03

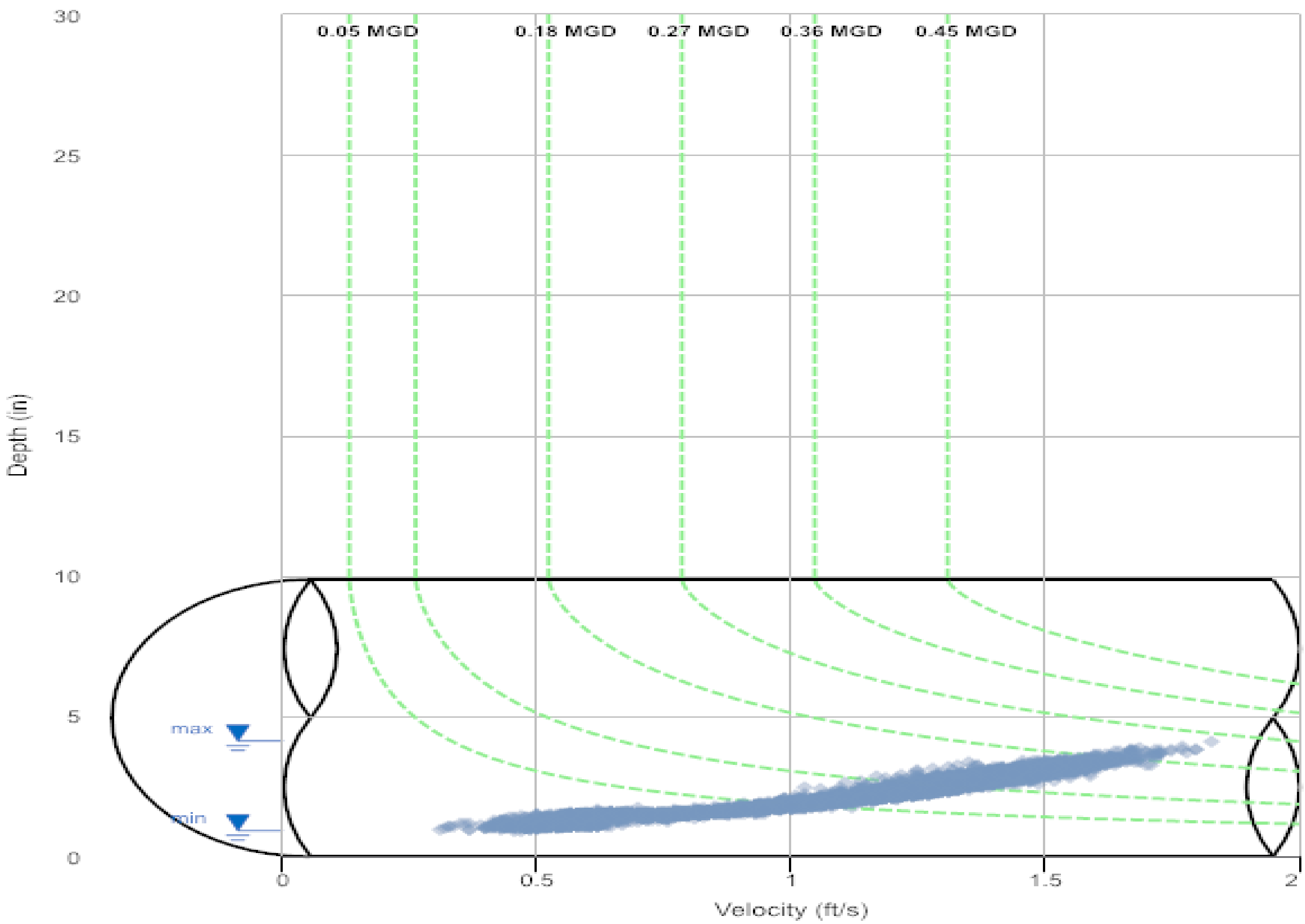
Pipe Height
9.88
in

Report Period

10/23/2020
To
11/28/2020

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



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Huntington Beach, CA 92649

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Daily Tabular Report

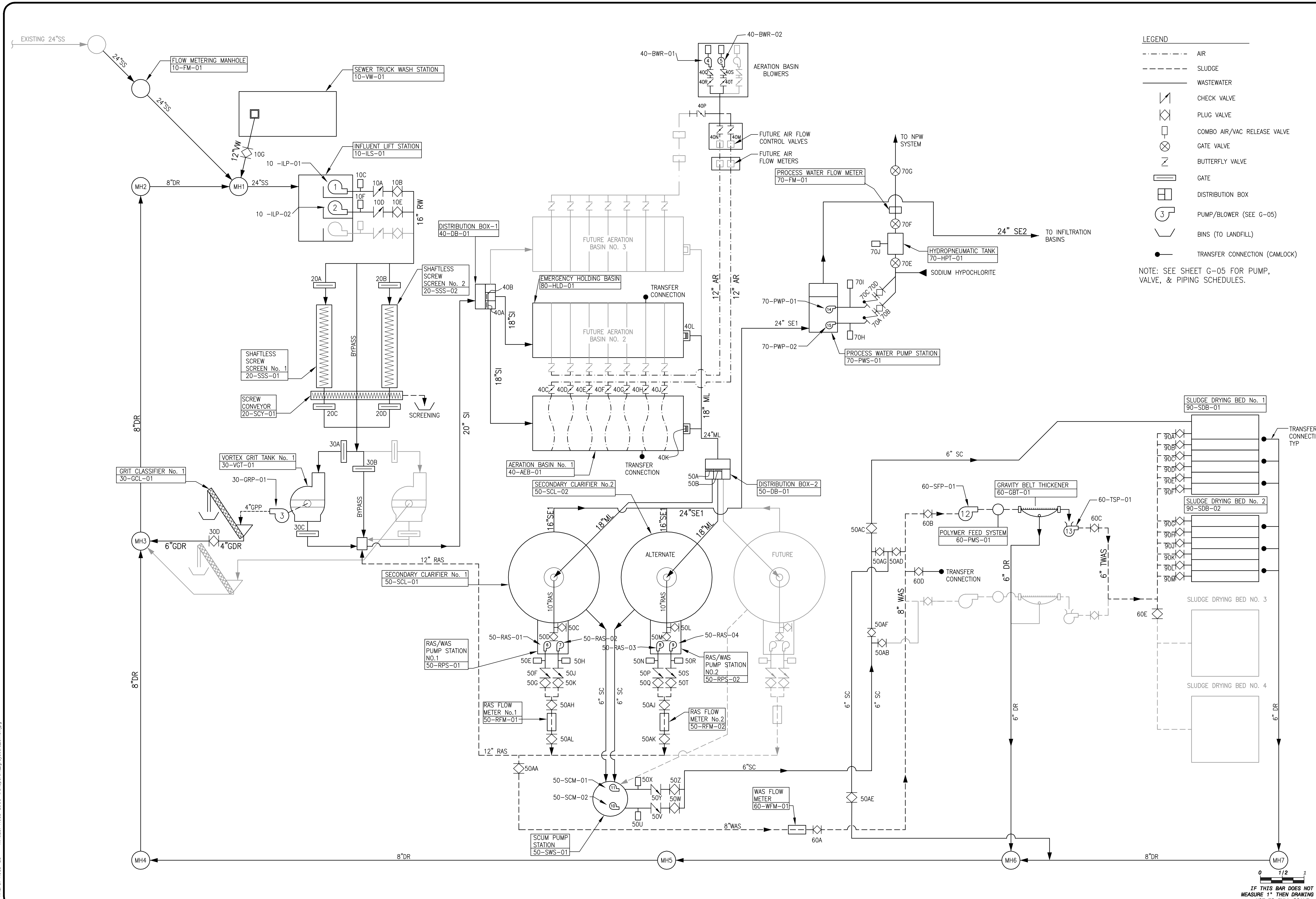
10/23/2020 00:00 - 11/28/2020 23:59
FM03Pipe: Round (9.88 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)	RAIN FINAL (in)				
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total					
10/23/2020	02:30	0.93	08:50	3.54	2.18	02:30	0.37	08:50	1.64	1.10	02:30	0.006	08:50	0.182	0.069	0.069	-	-	-	-	-	-
10/24/2020	02:50	0.99	13:15	3.71	2.21	02:45	0.42	13:15	1.70	1.12	02:25	0.008	13:15	0.201	0.073	0.073	-	-	-	-	-	-
10/25/2020	01:35	1.08	13:05	3.63	2.27	06:45	0.45	10:45	1.72	1.14	03:15	0.010	10:45	0.196	0.076	0.076	-	-	-	-	-	-
10/26/2020	06:10	1.18	19:50	3.83	2.29	23:40	0.54	19:50	1.75	1.16	06:10	0.013	19:50	0.216	0.076	0.076	-	-	-	-	-	-
10/27/2020	02:30	1.04	16:25	3.74	2.27	02:30	0.48	16:25	1.70	1.14	02:30	0.009	16:25	0.203	0.075	0.075	-	-	-	-	-	-
10/28/2020	05:35	1.07	19:30	3.63	2.25	04:30	0.48	19:30	1.72	1.16	05:35	0.010	19:30	0.197	0.075	0.075	-	-	-	-	-	-
10/29/2020	03:10	1.21	10:45	3.83	2.27	03:20	0.57	10:45	1.80	1.18	03:10	0.014	10:45	0.222	0.077	0.077	-	-	-	-	-	-
10/30/2020	02:15	1.08	10:55	3.55	2.23	02:10	0.50	10:55	1.65	1.15	02:15	0.010	10:55	0.184	0.074	0.074	-	-	-	-	-	-
10/31/2020	05:05	1.09	13:45	3.72	2.32	05:05	0.49	11:20	1.78	1.17	05:05	0.010	11:20	0.210	0.080	0.080	-	-	-	-	-	-
11/01/2020	02:35	1.08	10:45	3.67	2.29	06:20	0.51	16:40	1.63	1.17	02:25	0.011	10:45	0.188	0.078	0.078	-	-	-	-	-	-
11/02/2020	03:20	0.97	19:55	3.30	2.22	05:05	0.47	19:50	1.62	1.13	03:20	0.009	19:50	0.162	0.072	0.072	-	-	-	-	-	-
11/03/2020	04:30	1.04	16:45	3.41	2.21	02:30	0.44	16:45	1.66	1.14	02:25	0.009	16:45	0.174	0.072	0.072	-	-	-	-	-	-
11/04/2020	05:20	1.11	10:05	3.51	2.25	04:00	0.52	20:05	1.69	1.16	04:00	0.012	10:05	0.183	0.074	0.074	-	-	-	-	-	-
11/05/2020	04:20	0.96	09:35	3.54	2.16	04:25	0.31	09:35	1.68	1.11	04:25	0.005	09:35	0.186	0.069	0.069	-	-	-	-	-	-
11/06/2020	04:55	1.03	09:50	3.49	2.24	03:45	0.48	09:50	1.72	1.15	03:45	0.010	09:50	0.187	0.074	0.074	-	-	-	-	-	-
11/07/2020	03:30	1.13	09:55	3.58	2.24	03:45	0.47	09:55	1.72	1.15	03:30	0.011	09:55	0.194	0.074	0.074	-	-	-	-	-	-
11/08/2020	04:10	1.02	13:40	3.80	2.27	04:25	0.45	13:40	1.72	1.14	02:50	0.009	13:40	0.210	0.076	0.076	-	-	-	-	-	-
11/09/2020	00:30	1.04	19:30	3.55	2.24	04:00	0.43	19:30	1.65	1.13	04:00	0.009	19:30	0.183	0.072	0.072	-	-	-	-	-	-
11/10/2020	03:55	1.02	20:05	3.84	2.23	02:50	0.41	20:05	1.73	1.11	02:50	0.008	20:05	0.215	0.072	0.072	-	-	-	-	-	-
11/11/2020	04:15	1.05	19:40	3.91	2.25	05:15	0.51	19:40	1.77	1.13	05:00	0.010	19:40	0.224	0.074	0.074	-	-	-	-	-	-
11/12/2020	04:35	1.45	19:25	3.73	2.27	04:15	0.57	19:25	1.75	1.17	04:15	0.020	19:25	0.208	0.075	0.075	-	-	-	-	-	-
11/13/2020	05:10	0.92	07:40	3.27	2.17	05:20	0.43	07:40	1.71	1.12	05:10	0.007	07:40	0.170	0.069	0.069	-	-	-	-	-	-
11/14/2020	01:40	1.03	09:10	3.73	2.34	02:00	0.47	10:20	1.73	1.14	02:00	0.009	10:20	0.201	0.079	0.079	-	-	-	-	-	-
11/15/2020	02:35	1.10	11:50	3.87	2.36	02:40	0.55	11:50	1.69	1.14	02:35	0.012	11:50	0.211	0.080	0.080	-	-	-	-	-	-
11/16/2020	02:40	1.00	19:35	3.61	2.23	02:40	0.40	19:35	1.70	1.10	02:40	0.007	19:35	0.193	0.071	0.071	-	-	-	-	-	-
11/17/2020	05:05	1.04	10:20	3.50	2.19	04:55	0.46	10:20	1.64	1.11	04:55	0.009	10:20	0.179	0.070	0.070	-	-	-	-	-	-
11/18/2020	04:05	1.06	10:00	3.66	2.24	04:05	0.51	10:00	1.71	1.14	04:05	0.010	10:00	0.198	0.072	0.072	-	-	-	-	-	-
11/19/2020	02:40	1.02	08:55	3.51	2.25	04:30	0.43	19:55	1.64	1.14	02:40	0.009	08:55	0.179	0.075	0.075	-	-	-	-	-	-
11/20/2020	02:35	1.03	15:10	3.31	2.24	04:45	0.43	11:25	1.53	1.14	02:35	0.009	12:35	0.151	0.073	0.073	-	-	-	-	-	-
11/21/2020	04:05	1.06	15:40	3.84	2.28	06:20	0.42	15:40	1.80	1.17	06:25	0.009	15:40	0.222	0.078	0.078	-	-	-	-	-	-
11/22/2020	00:30	1.04	10:20	3.77	2.26	05:10	0.35	11:20	1.69	1.14	05:10	0.008	10:20	0.202	0.076	0.076	-	-	-	-	-	-
11/23/2020	00:10	1.10	09:45	3.28	2.20	00:40	0.47	09:45	1.70	1.15	00:10	0.010	09:45	0.169	0.072	0.072	-	-	-	-	-	-
11/24/2020	05:05	1.08	19:25	3.84	2.33	05:50	0.49	19:25	1.68	1.15	05:50	0.010	19:25	0.208	0.078	0.078	-	-	-	-	-	-
11/25/2020	02:25	1.05	09:50	3.77	2.33	02:30	0.50	09:50	1.64	1.15	02:30	0.010	09:50	0.198	0.078	0.078	-	-	-	-	-	-
11/26/2020	05:30	1.08	09:55	4.12	2.25	05:45	0.42	09:55	1.83	1.15	05:15	0.009	09:55	0.248	0.076	0.076	-	-	-	-	-	-
11/27/2020	00:00	1.04	19:00	3.56	2.22	04:55	0.46	19:00	1.65	1.14	04:55	0.009	19:00	0.184	0.073	0.073	-	-	-	-	-	-
11/28/2020	05:50	0.98	14:35	3.69	2.22	04:45	0.44	14:35	1.73	1.14	05:55	0.008	14:35	0.202	0.075	0.075	-	-	-	-	-	-

10/23/2020 00:00 - 11/28/2020 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			2.752	
Average	2.25	1.14	0.074	

APPENDIX B



PROJECT ENGINEER: EILEEN SHIELDS
REG NUMBER: C74757
EXP DATE: 12/31/2013

AECOM

AECOM Technical Services, Inc.
1194 Pacific Street, Suite 204
San Luis Obispo, California 93401
T 805.542.9840 F 805.542.9990
www.aecom.com

NIPOMO COMMUNITY SERVICES DISTRICT
SOUTHLAND WWTF IMPROVEMENTS

PROCESS FLOW DIAGRAM

DESIGNED: EKS
DETAILED: JPF
CHECKED:
APPROVED:
DATE: FEBRUARY 2012
AECOM PROJECT NO. 60183842
NCSD PROJECT NO.
CADD STDS. AECOM

G-04
SHEET 4 OF 181

DWG: P:\nipomo csd (19996)\southland wwtf upgrades\000_cadd (2010)\Planset\conforming set\General\G-04.dwg Layout Name: G-04 - Plotted by: Froelicher, Jim Date: 6/15/2012 - 12:59 PM
XREFS: NCSD-BD IMAGES: NCSD LOGO-transparent_grayscale_small.jpg -

INFLUENT DESIGN PARAMETERS	
AVERAGE DAILY FLOW (ADF)	0.84 MGD
PEAK HOURLY FLOW (PHF)	2.43 MGD
5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD_5), 90^{th}%	300 mg/L
5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD_5), AVE.	250 mg/L
TOTAL SUSPENDED SOLIDS (TSS), 90^{th}%	300 mg/L
TOTAL SUSPENDED SOLIDS (TSS), AVERAGE	250 mg/L
TOTAL NITROGEN (TN), 90^{th}%	60 mg/L
TOTAL NITROGEN (TN), AVERAGE	35 mg/L
EFFLUENT DESIGN PARAMETERS	
5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD_5)	20 mg/L
TOTAL SUSPENDED SOLIDS (TSS)	20 mg/L
TOTAL NITROGEN (TN)	10 mg/L

INFLUENT LIFT STATION (SYSTEM 10)	
NUMBER OF PUMPS	2
PUMP TAGS	10-ILP-01 & 10-ILP-02
TYPE	SCREW CENTRIFUGAL
CAPACITY (EACH)	1,700 GPM @ 30 FT
MOTOR HP	20 HP

HEADWORKS SCREENS (SYSTEM 20)	
NUMBER OF SCREENS	2
SCREEN TAGS	20-SSS-01 & 20-SSS-02
TYPE	SHAFTLESS SCREW
PEAK CAPACITY (EACH)	4.83 MGD
HEADLOSS (INCHES)	12"
MOTOR HP	1.5

HEADWORKS GRIT TANKS (SYSTEM 30)	
NUMBER OF GRIT TANKS	1
GRIT TANK TAGS	30-GRT-01
TYPE	VORTEX
PEAK CAPACITY	2.5 MGD
GRIT PUMPS	1
GRIT PUMP TAG	30-GRP-01
TYPE	SELF-PRIMING
CAPACITY	250 GPM @ 13 FT TDH
MOTOR HP	2.0 HP
GRIT CLASSIFIER	1
GRIT CLASSIFIER TAG	30-GCL-01
MOTOR HP	1.5 HP

AERATION BASINS (SYSTEM 40)	
NUMBER OF BASINS	1
BASIN TAGS	40-AEB-01
SIZE (WxL) (AT GRADE)	170 FT x 156 FT
DEPTH (AT WATER SURFACE)	11.8 FT
VOLUME	1.41 MG
MIXED LIQUOR SUSPENDED SOLIDS (MLSS)	3,223 mg/L
SOLID RETENTION TIME (SRT)	60-70 DAYS
HYDRAULIC RETENTION TIME (HRT)	1.63 DAY
BLOWERS	
NUMBER OF BLOWERS	2
BLOWER TAGS	40-BWR-01 & 02
TYPE	POSITIVE DISPLACEMENT
CAPACITY (EACH)	1954 ICFM/1738 ICFM
AERATION CHAINS	
NUMBER OF CHAINS	7
DIFFUSER ASSEMBLIES	98
DIFFUSERS	392

SECONDARY CLARIFIERS (SYSTEM 50)	
NUMBER OF CLARIFIERS	2*
TYPE	CIRCULAR
CLARIFIER TAGS	50-SCL-01 & 50-SCL-02*
DIAMETER	55 FT
SIDE WATER DEPTH	15 FT
OVERFLOW RATE (ONE CLARIFIER ONLINE)	
@ ADF	240 gpd/FT^2
@ PHF	694 gpd/FT^2
CENTER DRIVE HP (MIN)	0.5
SLUDGE COLLECTION MECHANISM	SPIRAL SCRAPER
RAS PUMPS	
NUMBER (PER CLARIFIER)	2
TYPE	SUBMERSIBLE
CAPACITY (EACH)	875 GPM
MOTOR HP	10 HP
PUMP TAGS	50-RAS-01 & 50-RAS-02
	50-RAS-03* & 50-RAS-04*
*CLARIFIER 50-SCL-02, 50-RAS-03, AND 50-RAS-04 ARE PART OF BID ALTERNATE X	

SLUDGE THICKENING SYSTEM (SYSTEM 60)	
WAS FEED PUMP	
NUMBER	1
TYPE	PROGRESSIVE CAVITY
CAPACITY	0 to 120 GPM
MOTOR HP	10 HP
PUMP TAG	60-SFP-01
POLYMER SYSTEM	
METERING PUMP	
NUMBER	1
TYPE	PROGRESSIVE CAVITY
CAPACITY	3.0 GPH
POLYMER TYPE	LIQUID
TAG	60-PMS-01
GRAVITY BELT THICKENER	
NUMBER	1
CAPACITY	50 to 100 GPM
WIDTH	0.5 METER
FEED CONCENTRATION	0.5 to 1.0% TSS
THICKENED SLUDGE CONCENTRATION	4 to 8% TSS
DRIVE MOTOR	1 HP
HYDRAULIC POWER	3 HP
WASHWATER PUMP	
MOTOR	5 HP
CAPACITY	0 to 40 GPM
TAG	60-GBT-01
THICKENED SLUDGE PUMP	
NUMBER	1
CAPACITY	0 to 40 GPM
MOTOR HP	10 HP
PUMP TAG	60-TSP-01

NONPOTABLE WATER PUMP STATION (SYSTEM 70)	
NUMBER OF PUMPS	2
PUMP TAGS	70-PWP-01 & 70-PWP-02
TYPE	VERTICAL TURBINE
CAPACITY	200 GPM @ 60 PSI
MOTOR HP	10
HYDROPNEUMATIC TANK	
TAG	70-HPT-01
SIZE	5,000 GAL
PRESSURE SETTINGS	
MIN	40
MAX	60

EMERGENCY HOLDING BASIN (SYSTEM 80)	
NUMBER OF BASINS	1
BASIN TAG	80-HLD-01
SIZE	150 FT x 180 FT
DEPTH (AT MAX. WATER SURFACE)	11 FT
VOLUME	1.17 MGAL

SLUDGE DRYING BEDS (SYSTEM 90)	
NUMBER OF SLUDGE DRYING BEDS	2
TAGS	90-SDB-01 & 02
NUMBER OF CELLS PER BED	6
AREA PER CELL	5,200 FT^2
TOTAL AREA	62,640 FT^2
MAXIMUM DEPTH	15"

INFILTRATION BASINS*	
NUMBER	2
TOTAL SURFACE AREA	7.76 AC
TOTAL DEPTH	8 FT
MAX WATER DEPTH	6 FT
*INFILTRATION BASINS ARE BID ALTERNATE Y	

NOTE:
1. SYSTEM 45 INCLUDES BLOWER AND ELECTRICAL BUILDING.

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

REV | DATE | DESCRIPTION | APPR
PROJECT ENGINEER ELIEEN SHIELDS | REG NUMBER C74757 | EXP DATE 12/31/2013

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NIPOMO COMMUNITY SERVICES DISTRICT

NIPOMO COMMUNITY SERVICES DISTRICT SOUTHLAND WWTF IMPROVEMENTS

DESIGN PARAMETERS

DESIGNED: EKS
DETAILED: JPF
CHECKED:
APPROVED:
DATE: FEBRUARY 2012
AECOM PROJECT NO. 60183842
NCSD PROJECT NO.
CADD STDS. AECOM

G-06
SHEET 6 OF 181

DWG: P:\nipomo csd (19996)\southland wwtf upgrades\000_cadd (2010)\Plotset\conforming set\General\G-06.dwg Layout Name: G-06 - Plotted by: Froelicher, Jim Date: 6/15/2012 - 1:06 PM
XREFS: NCSD-BD IMAGES: NCSD LOGO-transparent_grayscale_small.jpg -

APPENDIX C

Nipomo Community Services District

Dana Reserve Water and Wastewater Evaluation

Recommended: New 16-Inch Main on North Oak Glen Drive and Tefft Street

OPINION OF PROBABLE PROJECT COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization/Demobilization	1	LS	$313,000	$313,000
2	Stormwater Pollution Prevention Plan	1	LS	$60,000	$60,000
3	Environmental mitigation measures and permits	1	LS	$40,000	$40,000
4	Traffic Control	14,900	LF	$10	$149,000
5	Furnish and install 16-inch diameter AWWA DIP pipe and appurtenances within paved streets	15,200	LF	$320	$4,864,000
6	Furnish and install 30-inch diameter steel casing pipe via trenchless installation with 16-inch diameter AWWA DIP pipe	300	LF	$1,800	$540,000
7	Pipe connections to existing system (valves and tee)	13	EA	$24,000	$312,000
8	Install service lateral and connect to existing water meters	38	EA	$4,000	$152,000
9	Install air release valve	9	EA	$5,000	$45,000
10	Install hydrant lateral and connect to existing hydrant	10	EA	$9,000	$90,000
				Subtotal	$6,565,000
	Administration, Engineering, and Construction Management			30%	$1,970,000
	Construction Contingency			30%	$1,970,000
				Estimated Total Project Cost (Rounded)	$10,510,000

Notes:

1. Pipeline installation costs include pavement removal/ restoration and pipeline disinfection.
2. Service replacement based on number of parcels along frontage of pipeline alignment. Final estimate to be determined during design.
3. Number of hydrant laterals to be reconnected based on District GIS

Nipomo Community Services District
Dana Reserve Water and Wastewater Evaluation
Willow Road End of Line Connection
OPINION OF PROBABLE PROJECT COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization/Demobilization	1	LS	$8,000	$8,000
2	Traffic Control	500	LF	$10	$5,000
3	Furnish and install 12-inch diameter AWWA C900 PVC pipe and appurtenances within paved streets	500	LF	$250	$125,000
4	Pipe connections to existing system (valves and tee)	2	EA	$12,000	$24,000
				Subtotal	$162,000
	Administration, Engineering, and Construction Management			30%	$49,000
	Construction Contingency			30%	$49,000
				Estimated Total Project Cost	$260,000

Notes:
1. Pipeline installation costs include pavement removal/ restoration and pipeline disinfection.

Nipomo Community Services District
Dana Reserve Water and Wastewater Evaluation
New 1.0 MG Reservoir at Foothill Tank Site
OPINION OF PROBABLE PROJECT COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (5%)	1	LS	$117,000	$117,000
2	Earthwork	1	LS	$100,000	$100,000
3	Demolition and Site Preparation	1	LS	$30,000	$30,000
4	New 1.0 MG Welded Steel Reservoir	1000000	Gal	$1.25	$1,250,000
5	Tank Foundation and Anchorage	1	LS	$250,000	$250,000
6	Disinfection Booster Facility	1	LS	$200,000	$200,000
7	Piping and Valves	1	LS	$300,000	$300,000
8	Electrical (Allowance)	1	LS	$100,000	$100,000
9	Instrumentation and Controls (Allowance)	1	LS	$100,000	$100,000
				Subtotal	$2,447,000
	Administration, Engineering, and Construction Management			30%	$735,000
	Construction Contingency			30%	$735,000
				Estimated Total Project Cost (Rounded)	$3,920,000

Nipomo Community Services District

Dana Reserve Water and Wastewater Evaluation

New 0.5 MG Reservoir at Joshua Road Pumping Station

OPINION OF PROBABLE PROJECT COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	Amount
1	2016 Cost Estimate	1	LS	$2,500,000	$2,500,000
2	ENR Adjustment				$471,693
				Subtotal	$2,971,693
	Administration, Engineering, and Construction Management			30%	$892,000
	Construction Contingency			30%	$892,000
				Estimated Total Project Cost (Rounded)	$4,760,000

Notes:

1. Construction cost opinion was escalated from Jan 2016 estimate to September 2021 using the ENR-CCI LA cost index (Jan 2016 = 11,115.28 to Sep 2021 = 13,212.48).

Nipomo Community Services District
Dana Reserve Water and Wastewater Evaluation
Alternative: New 16-Inch Main from Foothill Tanks to Sandydale
OPINION OF PROBABLE PROJECT COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization/Demobilization	1	LS	$254,000	$254,000
2	Stormwater Pollution Prevention Plan	1	LS	$60,000	$60,000
3	Environmental mitigation measures and permits	1	LS	$40,000	$40,000
4	Traffic Control	13,200	LF	$10	$132,000
5	Furnish and install 16-inch diameter AWWA DIP pipe and appurtenances within paved streets	13,500	LF	$320	$4,320,000
6	Furnish and install 30-inch diameter steel casing pipe via trenchless installation with 16-inch diameter AWWA DIP pipe	300	LF	$1,800	$540,000
7	Pipe connections to existing system (valves and tee)	2	EA	$24,000	$48,000
8	Install air release valve	5	EA	$5,000	$25,000
				Subtotal	$5,419,000
			Administration, Engineering, and Construction Management	30%	$1,626,000
			Construction Contingency	30%	$1,626,000
				Estimated Total Project Cost (Rounded)	$8,680,000

Notes:
1. Pipeline installation costs include pavement removal/ restoration and pipeline disinfection.

Nipomo Community Services District
Dana Reserve Water and Wastewater Evaluation
Offsite Wastewater Collection System Improvements
OPINION OF PROBABLE CONSTRUCTION COST - PLANNING

Item	Description	Quantity	Unit	Unit Price	ENR Adjustment	Amount (Rounded)
1	Mobilization/Demobilization	1	LS	$93,920	1.09	$103,000
2	Stormwater Pollution Prevention Plan	1	LS	$60,000	1.09	$66,000
3	Environmental mitigation measures and permits	1	LS	$40,000	1.09	$44,000
	Upgrade Frontage Road 15-in Gravity Sewer Main					
4	15-in Gravity Sewer	3500	LF	$250	1.09	$955,000
5	Precast Manholes w/Coating	12	EA	$20,000	1.09	$262,000
6	Laterals	5	EA	$3,000	1.09	$17,000
7	Traffic Control/Regulation	3500	LF	$12	1.09	$46,000
8	Pavement Repair (Full Lane Width)	1	LS	$147,000	1.09	$161,000
9	Abandon Existing Sewerline & Manholes	3500	LF	$10	1.09	$39,000
	Upgrade Frontage Road 18-in Gravity Sewer Main					
10	18-in Gravity Sewer	1200	LF	$280	1.09	$367,000
11	Precast Manholes w/Coating	4	EA	$20,000	1.09	$88,000
12	Laterals	10	EA	$3,000	1.09	$33,000
13	Traffic Control/Regulation	1200	LF	$12	1.09	$16,000
14	Pavement Repair (Full Lane Width)	1	LS	$52,000	1.09	$57,000
15	Abandon Existing Sewerline & Appurtenances	1200	LF	$10	1.09	$14,000
				Subtotal		$2,268,000
	Administration, Engineering, and Construction Management			30%		$681,000
	Construction Contingency			30%		$681,000
				Estimated Total Project Cost (rounded)		$3,630,000

Notes:

1. Lateral replacement based on number of parcels along frontage of pipeline alignment. Final estimate to be determined during design.

2. Construction cost opinion was escalated from July 2019 Blacklake Consolidation Study Engineering Report (MKN) to September 2021 using the ENR-CCI LA cost index (June 2019 = 12113.16 to Sep 2021 = 13212.48).

Nipomo Community Services District
Dana Reserve Water and Wastewater Evaluation
Wastewater Treatment Plant Improvements
Basis for Unit Process Costs (Planning-Level)

OPINION OF PROBABLE CAPITAL COST

Item	Description	Unit	Unit Price	Quantity	ENR Adjustment*	Amount
GRIT REMOVAL SYSTEM						
1	Grit Removal Equipment	EA	$162,000	1	1.28	$207,800
2	Civil	LS	$73,000	1	1.28	$93,600
3	Structural	LS	$97,000	1	1.28	$124,400
4	Electrical	LS	$9,000	1	1.28	$11,500
5	Instrumentation	LS	$4,000	1	1.28	$5,100
	Subtotal					$442,400
BIOLAC WAVE OXIDATION SYSTEM - BASIN						
1	BioLac Equipment	EA	$628,000	1	1.28	$805,600
2	Civil	LS	$86,000	1	1.28	$110,300
3	Structural	LS	$179,000	1	1.28	$229,600
4	Electrical	LS	$18,000	1	1.28	$23,100
5	Instrumentation	LS	$3,000	1	1.28	$3,800
	Subtotal					$1,172,400
BIOLAC WAVE OXIDATION SYSTEM - BASIN 3						
1	BioLac Equipment	EA	$628,000	1	1.28	$805,600
2	Civil	LS	$344,000	1	1.28	$441,300
3	Structural	LS	$179,000	1	1.28	$229,600
4	Electrical	LS	$18,000	1	1.28	$23,100
5	Instrumentation	LS	$3,000	1	1.28	$3,800
	Subtotal					$1,503,400
BLOWER BUILDING						
1	Civil	LS	$89,000	1	1.28	$114,200
2	Structural	LS	$267,000	1	1.28	$342,500
3	Electrical	LS	$286,000	1	1.28	$366,900
4	Instrumentation	LS	$140,000	1	1.28	$179,600
	Subtotal					$1,003,200
SECONDARY CLARIFIER						
1	Clarifier Equipment	EA	$203,000	1	1.28	$260,400
2	RAS/WAS Pump Equipment	EA	$33,000	2	1.28	$84,700
3	RAS/WAS Flow Meter	EA	$11,000	1	1.28	$14,100
4	Scum Pump Equipment	EA	$69,000	1	1.28	$88,500
5	Civil	LS	$440,000	1	1.28	$564,400
6	Structural	LS	$740,000	1	1.28	$949,200
7	Electrical	LS	$39,000	1	1.28	$50,000
8	Instrumentation	LS	$25,000	1	1.28	$32,100
	Subtotal					$2,043,400
SLUDGE THICKENING SYSTEM						
1	Sludge Thickening Equipment	EA	$255,000	1	1.28	$327,100
2	Flow Meter	LS	$9,000	1	1.28	$11,500
3	Civil	LS	$93,000	1	1.28	$119,300
4	Structural	LS	$77,000	1	1.28	$98,600
5	Electrical	LS	$28,000	1	1.28	$35,900
6	Instrumentation	LS	$16,000	1	1.28	$20,500
	Subtotal					$612,900

Cost opinions were estimated by averaging bids from the District's 2012 Southland Wastewater Treatment Improvements Project. Construction cost opinion was escalated from May 2012 to September 2021 using the ENR-CCI LA cost index. May 2012 (10300.05) and Sep 2021 (13212.48) values were used to escalate estimated cost to present value.

Item	Description	Unit	Unit Price	Quantity	ENR Adjustment*	Amount
SLUDGE DEWATERING SCREW PRESS						
1	Screw Press, Building, Structural, Mechanical, Electrical, and Instrumentation	EA	$1,037,022	1	1.10	$1,135,900

Cost opinions were estimated by averaging bids from the District's 2020 Southland Wastewater Treatment Facility Dewatering Screw Press Project. Construction cost opinion was escalated from September 2020 to September 2021 using the ENR-CCI LA cost index. September 2020 (12062.34) and Sep 2021 (13212.48) values were used to escalate estimated cost to present value.

Nipomo Community Services District

Dana Reserve Water and Wastewater Evaluation

Wastewater Treatment Plant Improvements Under Future Permit Requirements

OPINION OF PROBABLE CONSTRUCTION COST - PLANNING

Planning Level Project Cost - Southland WWTF Improvements to Meet Existing Demands with Dana Reserve					
Item	**Description**	**Quantity**	**Unit**	**Unit Price**	**Amount (Rounded)**
1	Mobilization (5% of Items 2 through 9)	1	LS	$474,700	$475,000
2	General Site Grading and Paving (4% of Items 4 through 9)	1	LS	$293,172	$294,000
3	General Site Civil (10% of Items 4 through 9)	1	LS	$732,930	$733,000
4	Influent Lift Station Pump Improvements	1	LS	$50,000	$50,000
5	New Grit Chamber System	1	LS	$442,400	$443,000
6	New Aeration Basin #2 and #3	1	LS	$2,675,800	$2,676,000
7	New Blower Building and Blower System Improvements	1	LS	$1,504,800	$1,505,000
8	New Clarifier and RAS Pumping Improvements	1	LS	$2,043,400	$2,044,000
9	New Sludge Thickening System	1	LS	$612,900	$613,000
10	New Screw Press	1	LS	$1,135,900	$1,136,000
	Subtotal				$9,969,000
	Construction Contingency			30%	$2,991,000
	Engineering, Administrative, and Construction Management Allowance			30%	$2,991,000
				Total	***$15,960,000***

ENR (LA) September 2021 = 13212.48

Stormwater Control Plan for Dana Reserve

STORMWATER CONTROL PLAN

for

Dana Reserve

Vesting Tentative Tract Map No. 3159

Nipomo, California

APN: 091-301-073

December 14, 2021

Dana Reserve, LLC
Nick Tompkins

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rrm design group

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FIGURES

ATTACHMENTS

Project Data

Table 1: Project Data

Project Name/Number	Dana Reserve, Tract No. 3159
Application Submittal Date	02/28/2020
Project Location	APN: 091-301-073
Project Phase No.	VTM
Project Type and Description	A mixed-use development primarily consisting of single-family detached neighborhoods. The proposed project includes 12 neighborhoods, commercial space, and public recreation areas. Residential neighborhoods consist of 1,160 units. The site is located in WMZ 1 and will be subjected to PCR's 1, 2, 3, and 4.
Total Limit of Disturbance (acres)	289.2 Acres
Total New Impervious Surface Area*	10,078,042 sq. ft
Total Replaced Impervious Surface Area	0 sq.ft.
Total Pre-Project Impervious Surface Area	0 sq. ft.
Total Post-Project Impervious Surface Area*	10,078,042 sq. ft
Net Impervious Area* (Exhibit shall be provided to justify net impervious area results)	10,078,042 sq. ft
Watershed Management Zone(s)	WMZ 1
Design Storm Frequency and Depth	85^{th} : 0.9" 95^{th} :1.5"
Storm Water Control Plan Name	Preliminary SWCP- Dana Reserve

*for reference only, assumed 80% impervious area used for calculation

Setting

I.A. Project Location and Description

The Dana Reserve Specific Plan (DRSP) is in the southern portion of San Luis Obispo County, California (see Exhibit 1-1). This property is immediately north of the Urban Reserve Line of the Nipomo community. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west, and U.S. Highway 101 to the east. The property is less than a mile north of the Tefft Street corridor, a primary commercial corridor servicing the community, and is within 1,500 feet of the prominent Nipomo Regional Park from the property's southwest corner.

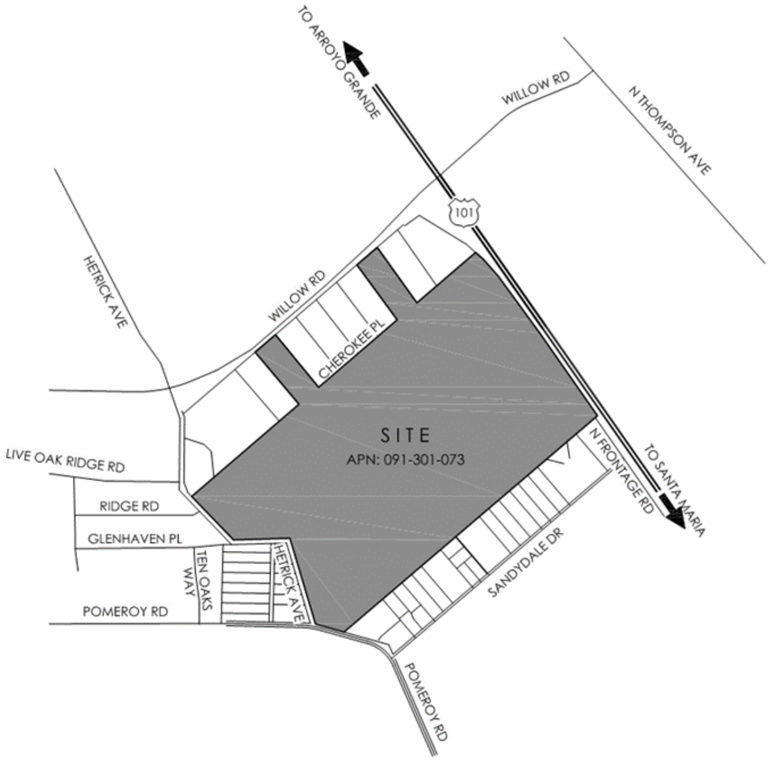

Exhibit 1-1

I.B. Existing Site Features and Conditions

Per the USDA NRCS Web Soil Survey, the hydrologic soil group for the development area is listed as Type A Soils, Oceano Sand. Per the geotechnical feasibility report prepared by Earth Systems Pacific dated September 2017, the site is well drained and there are high infiltration rates across the site.

Most of the existing terrain across the property is gradually sloped between 2% - 10% with localized mounds and some rolling hills. The average existing slope for the entire property is 5%. Localized low spots and depressions occur throughout the site. An existing hillside, or ridge, that runs from the Hetrick Avenue and the Glenhaven Place intersection to the southeast varies between 10% - 25% slope. Another localized ridge runs north-south from Willow Road to the north and Sandydale Drive to the south. See Attachment 1 for the existing water shed exhibit.

I.C. Opportunities and Constraints for Stormwater Control

The opportunities for stormwater control on the site include a sandy soil environment resulting in high infiltration rates across the site.

Post-Construction Stormwater Management Requirements

This project is subject to California Water Board Central Coast Region post-construction stormwater management requirements (PCRs). The project site is in Watershed Management Zone (WMZ) 1, see WMZ map attached. The management zone is subjected to PCRs 1, 2, 3, and 4 per the PCR flowchart seen in Attachment 3.

PCR 1 **Site Design and Runoff Reduction**

Low-impact design measures, minimizing impervious surfaces, and limiting of native grading and vegetation.

PCR 2 **Water Quality Treatment**

Onsite stormwater treatment will be achieved through biofiltration and low impact development systems designed to retain stormwater runoff equal to the volume of runoff generated by the 85^{th} percentile 24-hr storm event, based on San Luis Obispo County rainfall data. See Stormwater Control Measure(SCM) table below for basin and swale details.

PCR 3 **Runoff Retention**

In WMZ 1, the 95^{th} percentile rainfall event is to be retained and stored in onsite retention basins as defined in the SCM table below. Rainfall data is from San Luis Obispo County data.

PCR 4 **Peak Management**

State requirements of post-development flows not exceeding pre-development 2-through 10-year storms are not subjected to this project instead peak flow management shall be detained on site per San Luis Obispo County standards. Post-development 50-year peak flows, discharged from the site, shall not exceed pre project 2-year peak flows. San Luis Obispo County rainfall data will be used to calculate these values, see Drainage Report for descriptions and calculations.

Retention Volume Calculations

The Runoff Coefficient "C" for the DMA was calculated using the following equation:

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where "i" is the fraction of the impervious area divided by the total area. The 85^{th} and 95^{th} rain depth map excerpts from the Central Coast Post Construction Requirements handbook (See Attachment 6) provide the rain depths(in) for the site locaiton. The 85^{th} percentile volume is included within the retention calculation for the 95^{th} percentile volume. To calculate the required retention volume, the following equation is used:

$$Retention\ Volume\ (CF) = C * (\frac{I}{12}) * A$$

$$C = runoff\ Coefficient$$

$$I = 95^{th}\ percentile\ Rain\ Depth\ in\ inches$$

$$A = area\ in\ square\ feet$$

See the calculated volumes for each DMA and SCM in the summary tables in Attachment 4.

Low Impact Development Design Strategies

I.D. Limitation of development envelope

Disturbance will be limited to some re-grading and re-vegetation of the slope.

I.E. Preservation of natural drainage features

Historic draining patterns will be preserved.

I.F. Setbacks from creeks, wetlands, and riparian habitats

There are no riparian creeks, wetlands, or riparian habitats on site.

I.G. Minimization of imperviousness

Stormwater runoff from the site will be minimized with detention basins. Runoff from smaller storms will be retained and infiltrated onsite, while runoff from larger storms will be detained to pre-developed rates.

I.H. Use of drainage as a design element

The proposed development areas were created to reduce the amount of grading and limit the impact on native vegetation and habitat areas.

Documentation of Drainage Design

Site Specified Notes

As depicted on Attachment 2, Drainage Management Areas (DMAs) and Structural Control Measures (SCMs) are clustered accordingly to their overall watershed (A, B, or C). The cumulative stormwater volume requirement for each watershed will be met by the cumulative SCMs within that watershed. PCR 2 for backbone roads will be handled in roadside bioswales. Future neighborhood buildouts will provide PCR 2 stormwater mitigation measures for any impervious areas they create. Provided here is mitigation for the backbone infrastructure and rough graded super pads only.

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I.I. Drainage Management Area Characterization

DMA 1: totaling 49,427 square feet, draining to SCM 5.
DMA 2: totaling 30,844 square feet, draining to SCM 5.
DMA 3: totaling 78,477 square feet, draining to SCM 5.
DMA 4: totaling 40,394 square feet, draining to SCM 5.
DMA 5: totaling 53,709 square feet, draining to SCM 5.
DMA 6: totaling 135,734 square feet, draining to SCM 5.
DMA 7: totaling 116,472 square feet, draining to SCM 5.
DMA 8: totaling 40,644 square feet, draining to SCM 5.
DMA 9: totaling 52,726 square feet, draining to SCM 5.
DMA 10: totaling 239,835 square feet, draining to SCM 5.
DMA 11: totaling 79,100 square feet, draining to SCM 5.
DMA 12: totaling 552,000 square feet, draining to SCM 1.
DMA 13: totaling 1,443,719 square feet, draining to SCM 1.
DMA 14: totaling 1,564,301 square feet, draining to SCM 4,6,7,8,9,10, & 11
DMA 15: totaling 962,576 square feet, draining to SCM 4,6,7,8,9,10, & 11
DMA 16: totaling 582,012 square feet, draining to SCM 4,6,7,8,9,10, & 11.
DMA 17: totaling 1,207,488 square feet, draining to SCM 4,6,7,8,9,10, & 11.
DMA 18: totaling 1,071,526 square feet, draining to SCM 2 & 3.
DMA 19: totaling 1,876,030 square feet, draining to SCM 2 & 3.
DMA 20: totaling 1,566,740 square feet, draining to SCM 4,6,7,8,9, 10, & 11.
DMA 21: totaling 204,401 square feet, draining to SCM 1.
DMA 22: totaling 435,594 square feet, draining to SCM 4,6,7,8,9, 10, & 11.
DMA 23: totaling 166,057 square feet, draining to SCM 4,6,7,8,9, 10, & 11.
DMA 24: totaling 46,255 square feet, draining to SCM 12.

The DMA numbers below correspond with DMA numbers of DMA exhibit as seen in attachment 5. DMAs listed include all impervious surfaces and all vegetated areas except those designated as structural control measures (SCMs).

Pervious areas are further categorized as either self-treating or self-retaining areas.

- Areas designated as self-treating areas are undisturbed areas, or areas planted with native, drought-tolerant, or LID-appropriate vegetation and do not receive runoff from other areas.

- Areas designated as self-retaining are low-lying areas that receive runoff from adjoining areas. Site retaining areas may have natural vegetation, or be landscape, or may be porous pavements (where the soils underlying the porous pavements drain well enough to handle the additional run-on).

Table 2: Table of Drainage Management Area

DMA ID	Surface Type & Description	Area (SF)	Drains To (Provide DMA or SCM DMA ID)			Notable or Exception Characteristics or Conditions
			Self-Treating	Self-Retaining	SCM	
1	AC, Conc, *Landscape	49,427			5	Backbone Road DMAs (1-11) will drain into onsite bioswale (SCM 5) and will be treated in accordance with PCR 2. SCM 5 occupies over 20% of the combined DMAS 1-11.
2	AC, Conc, *Landscape	30,844			5	II
3	AC, Conc, *Landscape	78,477			5	II
4	AC, Conc, Landscape*	40,394			5	II
5	AC, Conc, *Landscape	53,709			5	II
6	AC, Conc, *Landscape	135,734			5	II
7	AC, Conc, *Landscape	116,472			5	II
8	AC, Conc, *Landscape	40,644			5	II
9	AC, Conc, *Landscape	52,726			5	II
10	AC, Conc, *Landscape	239,835			5	II

11	AC, Conc, *Landscape	79,100			5	II
12	*Landscape, †Proposed Development	552,000			4,6,7,8,9, 10,11,	
13	*Landscape, †Proposed Development	1,443,719			4,6,7,8,9, 10,11	
14	*Landscape, †Proposed Development	1,564,301			4,6,7,8,9, 10,11	
15	*Landscape, †Proposed Development	962,576			4,6,7,8,9, 10,11	
16	*Landscape, †Proposed Development	582,012			4,6,7,8,9, 10,11	
17	*Landscape, †Proposed Development; Mixed Use	1,207,488			4,6,7,8,9, 10,11	
18	*Landscape, †Proposed Development	1,071,526			2,3	
19	*Landscape, †Proposed Development	1,876,030			2,3	
20	*Landscape, †Proposed Development	1,566,740			4,6,7,8,9, 10,11	
21	*Landscape, †Proposed Development	204,401			1	
22	*Landscape, †Proposed Development: Park	435,594			4,6,7,8,9, 10,11	

23	*Landscape, †Proposed Development	166,057			4,6,7,8,9, 10,11	
24	AC, Conc, *Landscape	46,255			12	

*Landscaped Areas Assumed to be self-treating (for purposes of these calculations)

† Proposed development assumed to be 80% Impervious

I.J. Descriptions of Each Stormwater Control Measure

SCM 1: Basin providing 273,120 cubic feet of retention.

SCM 2: Basin providing 48,300 cubic feet of retention.

SCM 3: Basin providing 203,110 cubic feet of retention.

SCM 4: Basin providing 552,020 cubic feet of retention.

SCM 5: Bioswale providing 79,324 cubic feet of retention.

SCM 6: Shallow basin providing 9,130 cubic feet of retention.

SCM 7: Shallow basin providing 14,720 cubic feet of retention.

SCM 8: Shallow basin providing 9,420 cubic feet of retention.

SCM 9: Shallow Basin providing 37,100 cubic feet of retention.

SCM 10: Shallow Basin providing 4,700 cubic feet of retention.

SCM 11: Shallow Basin providing 18,160 cubic feet of retention.

SCM 12: Bioswale providing 4,710 cubic feet of retention.

TABLE 3: Summary Table of Stormwater Mitigation

	STORMWATER MITIGATION VOLUME SUMMARY			
WATERSHED	DMA	DRAINS TO	REQ.VOLUMES	PROV. VOLUME
A	12	SCM 1	164,858	273,120
	13			
	21			
C	14	SCM 4,6,7,8,9, 10,11	595,209	645,250
	15			
	16			
	17			
	20			
	22			
	23			
	24	SCM 12	3,466	4,710
B	18	SCM 2,3	220864	251,410
	19			
	1-11	SCM 5	68,739	79,324
	TOTAL		1,086,134	1,249,104

Roadside swale volume was calculated assuming 6" maximum ponding, 2' BSM (0.2 void ratio), 2' gravel (0.4 void ratio) with 9' or 10' parkway width. Proposed design includes (2) swales running paralell to back bone roads. To mitigate swale overflow, 6" perforated pipe will be installed at the bottom of the swales. See DMA Exhibit attachment for swale cross section detail.

Source Control Measures

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
On-site storm drain inlets	Inlets marked with warning labels showing, "No Dumping! No Tire Basura!"	Inlets to be periodically maintained and stormwater pollution prevention information to be provided for new site owners/lessees/operators.

Outdoor maintenance & pesticide use (building / grounds / landscape)	Preservation of existing native trees, shrubs, and ground cover considered as high priority. Landscaping designed with minimal irrigation and runoff requirements; emphasis on surface infiltration and minimal fertilizer/pesticide use. Specific plants, tolerant of saturated soil conditions, implemented in landscaped areas intended for stormwater detention.	Special emphasis on maintaining landscaped areas with minimal to no pesticide use. Use of non-toxic chemicals and recyclable cleaning agents for maintenance, where applicable. Encourage proper onsite recycling of yard trimmings and use of integrated pest management techniques for pest control.
Roofing, gutters, and trim	Contractor to implement satisfactory building materials for roofing, gutters, and trim, at their discretion- in conformance with final design specs and applicable construction standards. (Special emphasis on non-metallic or otherwise unprotected metallic materials are to be used at the contractor's discretion.)	
Sidewalks / parking areas/ Roadway	Sidewalks drain runoff toward landscaping and bioretention areas.	Regular maintenance of sidewalks, parking areas and roadways to remove litter and debris. Wash water containing any cleaning agent/degreaser to be disposed of directly into sanitary sewer system. (Not into storm drain.)

I.K. Features, Materials, and Methods of Construction of Source Control BMPs

Stormwater Facility Maintenance

I.L. Ownership and Responsibility for Maintenance in Perpetuity

The applicant accepts responsibility for the operation and maintenance of stormwater treatment and flow-control facilities for the life of the project. Any future change or alteration, or the failure to maintain any feature described herein can result in penalties including but not limited to fines, property liens, and other actions for enforcement of a civil judgment.

A detailed maintenance plan and formal maintenance agreement will be submitted separately and will be signed and recorded with the Map.

Construction Checklist

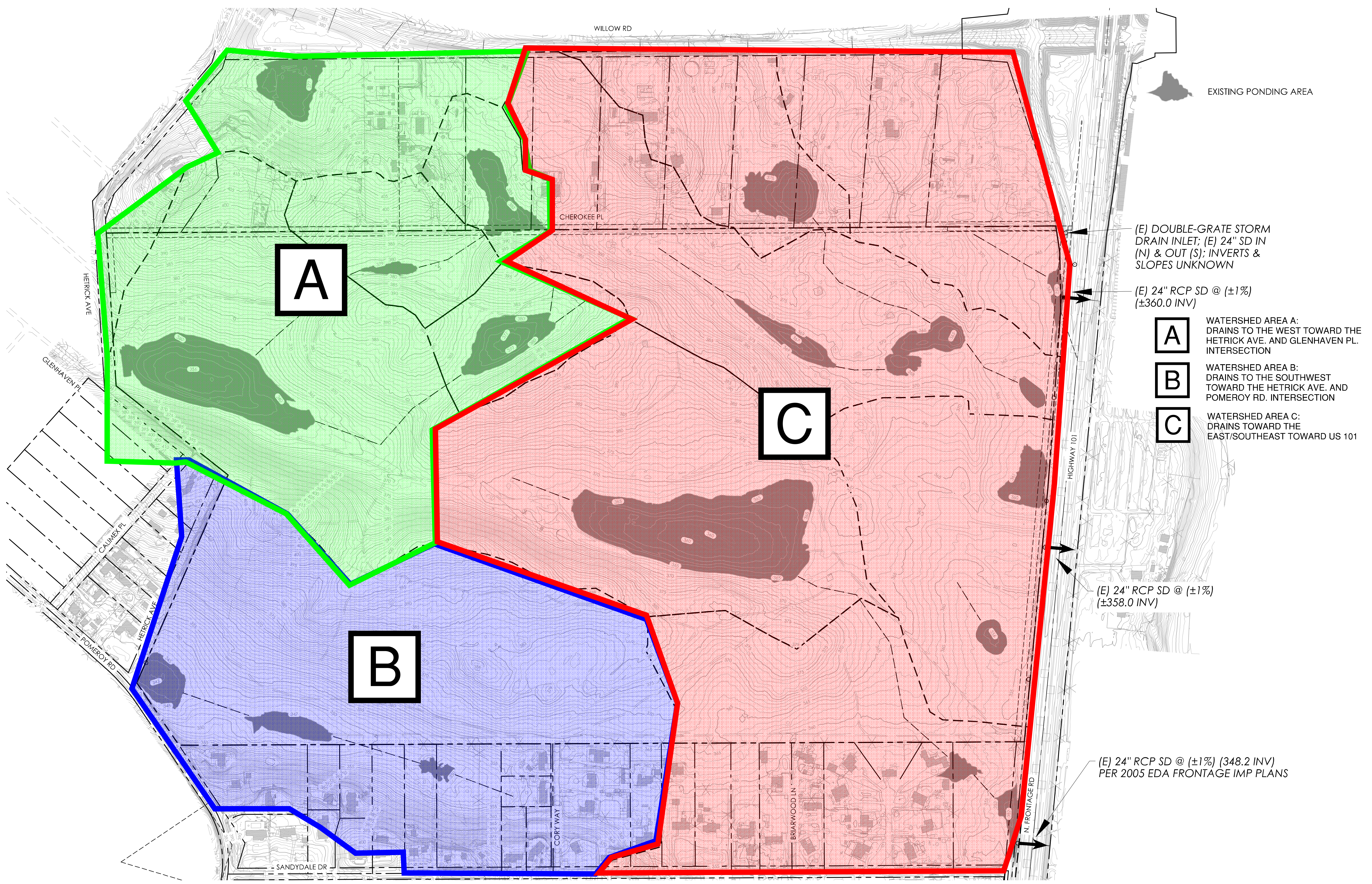
Table 4: Construction Checklist Table

Stormwater Control Plan Page #	Source Control or LID Facility	See Plan Sheet #
10	**SCM 1 -** detention facility	C12
10	**SCM 2 -** detention facility	C12
10	**SCM 3 -** detention facility	C12
10	**SCM 4 -** detention facility	C12
10	**SCM 5-** treatment facility	C12
10	**SCM 6-** detention facility	C12
10	**SCM 7-** detention facility	C12
10	**SCM 8-** detention facility	C12
10	**SCM 9 -** detention facility	C12
10	**SCM 10-** detention facility	C12

Certifications

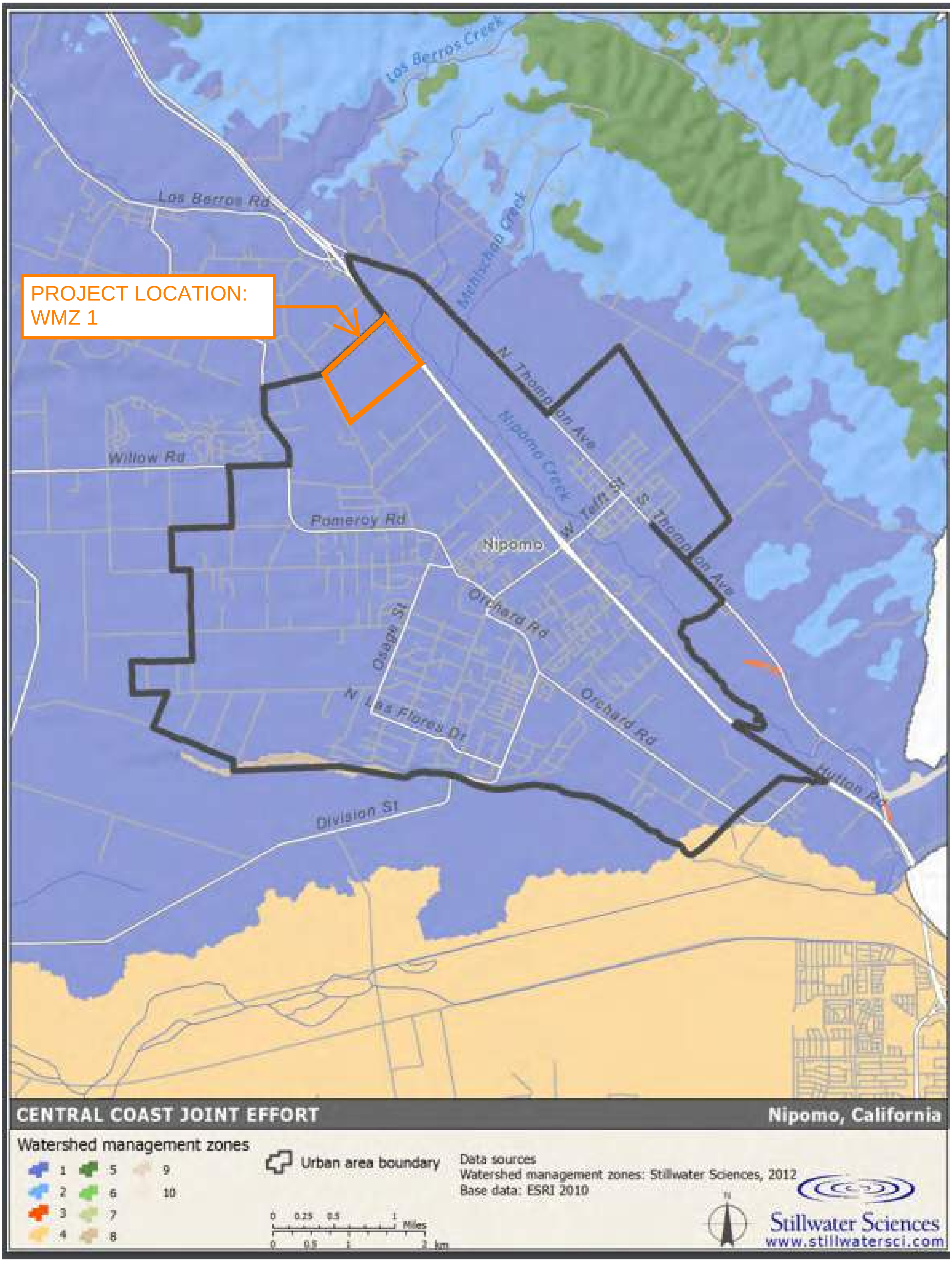
The design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the Post-Construction Stormwater Management Resolution R3-2013-0032 and the current edition of the County's LID Handbook

ATTACHMENT 1



WILLOW RD
EXISTING PONDING AREA
CHEROKEE PL
(E) DOUBLE-GRATE STORM DRAIN INLET; (E) 24" SD IN (N) & OUT (S); INVERTS & SLOPES UNKNOWN
(E) 24" RCP SD @ (±1%) (±360.0 INV)
A
WATERSHED AREA A: DRAINS TO THE WEST TOWARD THE HETRICK AVE. AND GLENHAVEN PL. INTERSECTION
B
WATERSHED AREA B: DRAINS TO THE SOUTHWEST TOWARD THE HETRICK AVE. AND POMEROY RD. INTERSECTION
C
WATERSHED AREA C: DRAINS TOWARD THE EAST/SOUTHEAST TOWARD US 101
HETRICK AVE
GLENHAVEN PL
CALIMEX PL
HETRICK AVE
POMEROY RD
HIGHWAY 101
(E) 24" RCP SD @ (±1%) (±358.0 INV)
(E) 24" RCP SD @ (±1%) (348.2 INV) PER 2005 EDA FRONTAGE IMP PLANS
N. FRONTAGE RD
CORY WAY
BRIARWOOD LN
SANDYDALE DR

ATTACHMENT 2


PROJECT LOCATION:
WMZ 1
Los Berros Creek
Los Berros Rd
Mehlschau Creek
N. Thompson Ave
Nipomo Creek
Willow Rd
W. Tefft St
S. Thompson Ave
Pomeroy Rd
Nipomo
Orchard Rd
Osage St
N Las Flores Dr
Orchard Rd
Hutton Rd
Division St
CENTRAL COAST JOINT EFFORT
Nipomo, California
Watershed management zones
1
2
3
4
5
6
7
8
9
10
Urban area boundary
Data sources
Watershed management zones: Stillwater Sciences, 2012
Base data: ESRI 2010
0 0.25 0.5 1 Miles
0 0.5 1 2 km
N
Stillwater Sciences
www.stillwatersci.com

ATTACHMENT 3

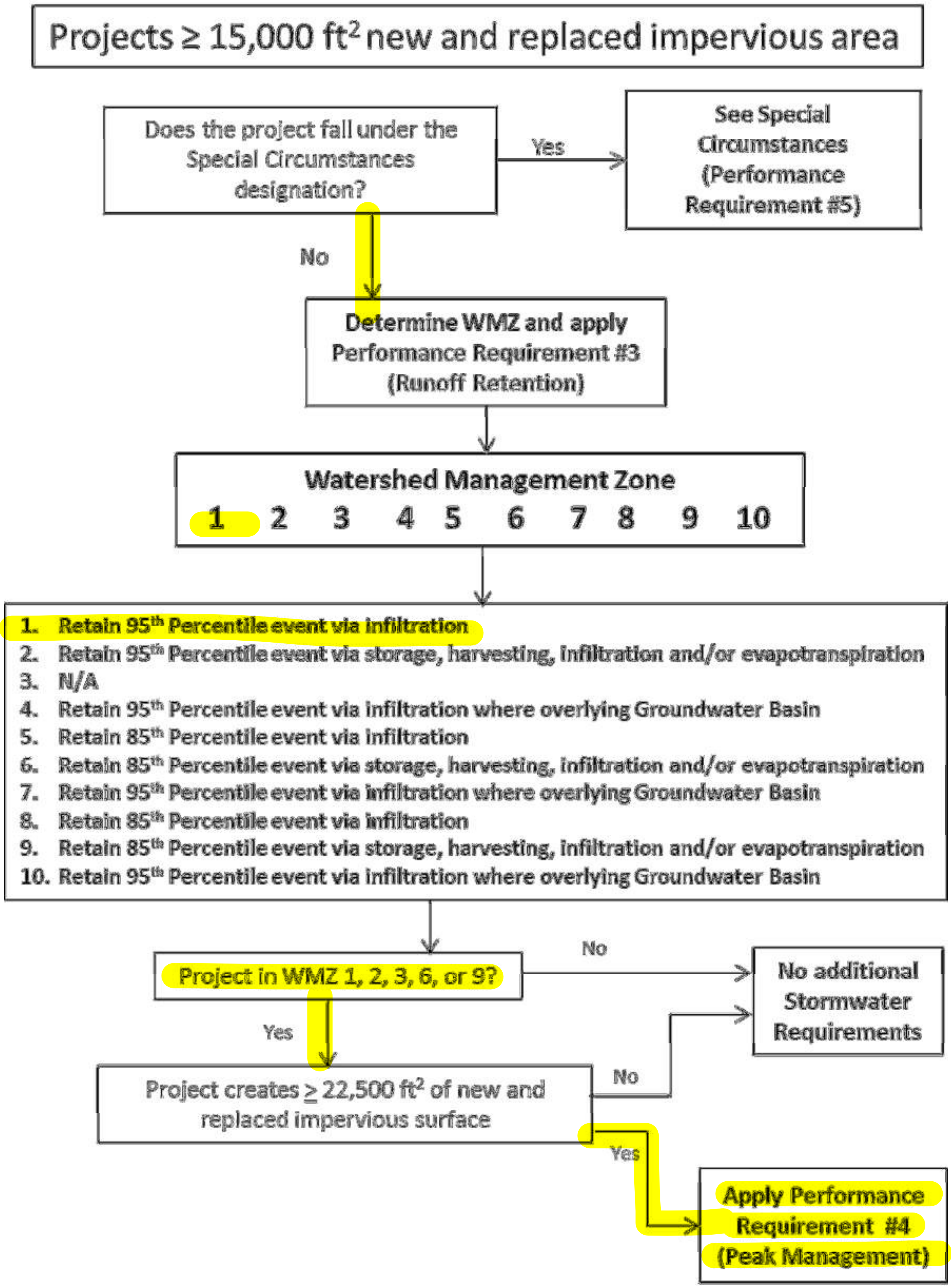


Figure 1c. Requirements for Large Development Projects

ATTACHMENT 4

Preliminary Post-construction Stormwater Requirement Calculations

PCR #1 Site Design and Runoff Reduction: Minimize impervious surfaces, disconnected roof downspouts, direct runoff onto vegetated areas

PCR #2 Water Quality Treatment: Treat / retain 85th percentile 24-hour storm on-site

PCR #3 Runoff Retention: Retain 95th percentile 24-hour storm on-site.

PCR #4 Peak Management: Post-development peak flows, discharged from the site shall not exceed the pre-developed peak flows for the 2- through 10-year storm events.

Dana Reserve

		(in)	(ft)
WMZ	1		
PCRs Req'd	1,2,3,4		
85th Percentile 24-hr Storm Depth (in)		0.9	0.075
95th Percentile 24-hr Storm Depth (in)		1.5	0.125

(BOTH FROM SLO COUNTY SPECIFICATIONS)

DMA	Area (sf)	Area (ac)	C' VALUE where, i=.8	VOLUME REQUIREMENTS PCR RETENTION[1]	SLOCO DETENTION[2]	Required
1	49,427	1.1	0.6	3,704	N/A	3,704
2	30,844	0.7	0.6	2,311	N/A	2,311
3	78,477	1.8	0.6	5,880	N/A	5,880
4	40,394	0.9	0.6	3,027	N/A	3,027
5	53,709	1.2	0.6	4,024	N/A	4,024
6	135,734	3.1	0.6	10,171	N/A	10,171
7	116,472	2.7	0.6	8,727	N/A	8,727
8	40,644	0.9	0.6	3,046	N/A	3,046
9	52,726	1.2	0.6	3,951	N/A	3,951
10	239,835	5.5	0.6	17,971	N/A	17,971
11	79,100	1.8	0.6	5,927	N/A	5,927
12	552,000	12.7	0.6	41,362	16,854	41,362
13	1,443,719	33.1	0.6	108,180	43,926	108,180
14	1,564,301	35.9	0.6	117,215	47,642	117,215
15	962,576	22.1	0.6	72,127	29,329	72,127
16	582,012	13.4	0.6	43,611	77,042	77,042
17	1,207,488	27.7	0.6	90,479	159,258	159,258
18	1,071,526	24.6	0.6	80,291	32,646	80,291
19	1,876,030	43.1	0.6	140,573	57,197	140,573
20	1,566,740	36.0	0.6	117,398	124,485	124,485
21	204,401	4.7	0.6	15,316	4,278	15,316
22	435,594	10.0	0.6	32,640	9,585	32,640
23	166,057	3.8	0.6	12,443	3,459	12,443
24	46,255	1.1	0.6	3,466	N/A	3,466
Total	12,596,061	289.2	-	943,838	605,701	1,053,136

Notes:

1 PCR 95TH PERCENTILE 24-HR STORM RETENTION VOLUME REQUIRED ASSUMES i = 0.8 (80% IMPERVIOUS)

REQ. AREA= A * 'C' VALUE * 95TH STORM DEPTH

SEE PRELIMINARY DRAINAGE REPORT ATTACHMENT 4 FOR 95TH PERCENTILE REQUIRED VOLUME CALCULATIONS

2 SAN LUIS OBISPO COUNTY DETENTION VOLUME IS 50-YEAR POST-DEVELOPED RUNOFF VOLUME METERED OUT AT PRE-DEVELOPED 2-YEAR PEAK FLOW RATE. IDF CURVE DATA IS FROM THE NOAA ATLAS 14 RAINFALL INTENSITY DATA SEE PRELIMINARY DRAINAGE REPORT ATTACHMENT 4 FOR HYDRAFLOW ANALYSIS RESULTS.

3 PROPOSED BACKBONE ROADS DRAINAGE IS INTO ROADSIDE BIOSWALES (SCM 5). ROADSIDE BIOSWALES ARE SIZED FOR PCR 3 REQUIREMENTS

	STORMWATER MITIGATION VOLUME SUMMARY			
WATERSHED	DMA	DRAINS TO	REQ.VOLUMES	PROV. VOLUME
A	12	SCM 1	164,858	273,120
	13			
	21			
C	14	SCM 4,6,7,8,9,10,11†	595,209	645,250
	15			
	16			
	17			
	20			
	22			
	23			
	24	SCM 12 (OFFSITE SWALES)	3,466	4,710
B	18	SCM 2‡	220,864	251,410
	19	SCM 3‡		
	1-11	SCM 5 (Swales)	68,739	79,324 *
	TOTAL		1,053,136	1,253,814

*ROADSIDE SWALE VOLUME CALCULATED BY ASSUMING 6" MAX PONDING, 2' BSM, AND 2' ROCK BOTTOM, & NET 6' or 8' WIDE SWALES ALONG EITHER SIDE OF ENTIRE ROAD LENGTHS. SEE DETAIL A BELOW.

†SCMs 6-11 ULTIMATELY DISCHARGE TO SCM 4
‡SCMs 2 & 3 ARE INTERCONNECTED VIA A STORM DRAIN CULVERT

Dana Reserve

Post-construction Stormwater Requirements

Retention Volume = (c) * Rainfall Depth * Area

i = percent impervious $c = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

		(in)	(ft)
WMZ	1		
PCRs Req'd	1,2,3,4		
85th Percentile 24-hr Storm Depth (in)		0.9	0.075
95th Percentile 24-hr Storm Depth (in)		1.5	0.125

i	c
0.60	0.41
0.70	0.49
0.80	0.60
0.90	0.73
1.00	0.89

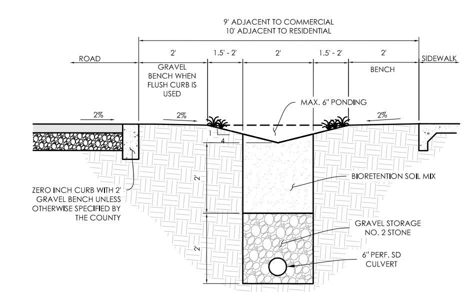
95th Percentile Retention Volume (CF) = (c) * Rainfall Depth * Area

DMA	Area (sf)	i = 0.60	i = 0.70	i = 0.80	i = 0.90	i = 1.00
1	49,427	2,527	3,052	3,704	4,513	5,513
2	30,844	1,577	1,905	2,311	2,816	3,440
3	78,477	4,012	4,846	5,880	7,166	8,753
4	40,394	2,065	2,494	3,027	3,688	4,505
5	53,709	2,746	3,317	4,024	4,904	5,991
6	135,734	6,939	8,382	10,171	12,394	15,139
7	116,472	5,955	7,192	8,727	10,635	12,991
8	40,644	2,078	2,510	3,046	3,711	4,533
9	52,726	2,696	3,256	3,951	4,815	5,881
10	239,835	12,261	14,810	17,971	21,900	26,751
11	79,100	4,044	4,884	5,927	7,223	8,823
12	552,000	28,221	34,086	41,362	50,405	61,569
13	1,443,719	73,809	89,149	108,180	131,830	161,029
14	1,564,301	79,973	96,595	117,215	142,840	174,478
15	962,576	49,211	59,439	72,127	87,895	107,363
16	582,012	29,755	35,939	43,611	53,145	64,916
17	1,207,488	61,732	74,562	90,479	110,259	134,680
18	1,071,526	54,781	66,166	80,291	97,844	119,515
19	1,876,030	95,910	115,844	140,573	171,305	209,248
20	1,566,740	80,098	96,746	117,398	143,063	174,750
21	204,401	10,450	12,622	15,316	18,664	22,798
22	435,594	22,269	26,898	32,640	39,775	48,585
23	166,057	8,490	10,254	12,443	15,163	18,522
24	46,255	2,365	2,856	3,466	4,224	5,159
Total	12,596,061.0	643,962	777,802	943,838	1,150,179	1,404,933

ATTACHMENT 5

Preliminary Post-construction Stormwater Requirement Calculations

Dana Reserve



A ROADSIDE INFILTRATION BIOSWALE
SCALE: 1"=2'

LEGEND

	PROJECT BOUNDARY LINE
	EXISTING PROPERTY LINE (OTHERS)
	EXISTING CAL. TRANS. RIGHT OF WAY LINE
	EXISTING EASEMENT LINE
385	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	EXISTING TREE DRIP LINE
	EXISTING FENCE LINE
	EXISTING PISMO CLARKIA
375	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	PROPOSED RIGHT-OF-WAY
	PROPOSED NEIGHBORHOOD BOUNDARY
	PROPOSED DMA
	PROPOSED SCM
	EXISTING WATERSHED BOUNDARIES

rrm design group

STORMWATER MANAGEMENT PLAN

December 14, 2021

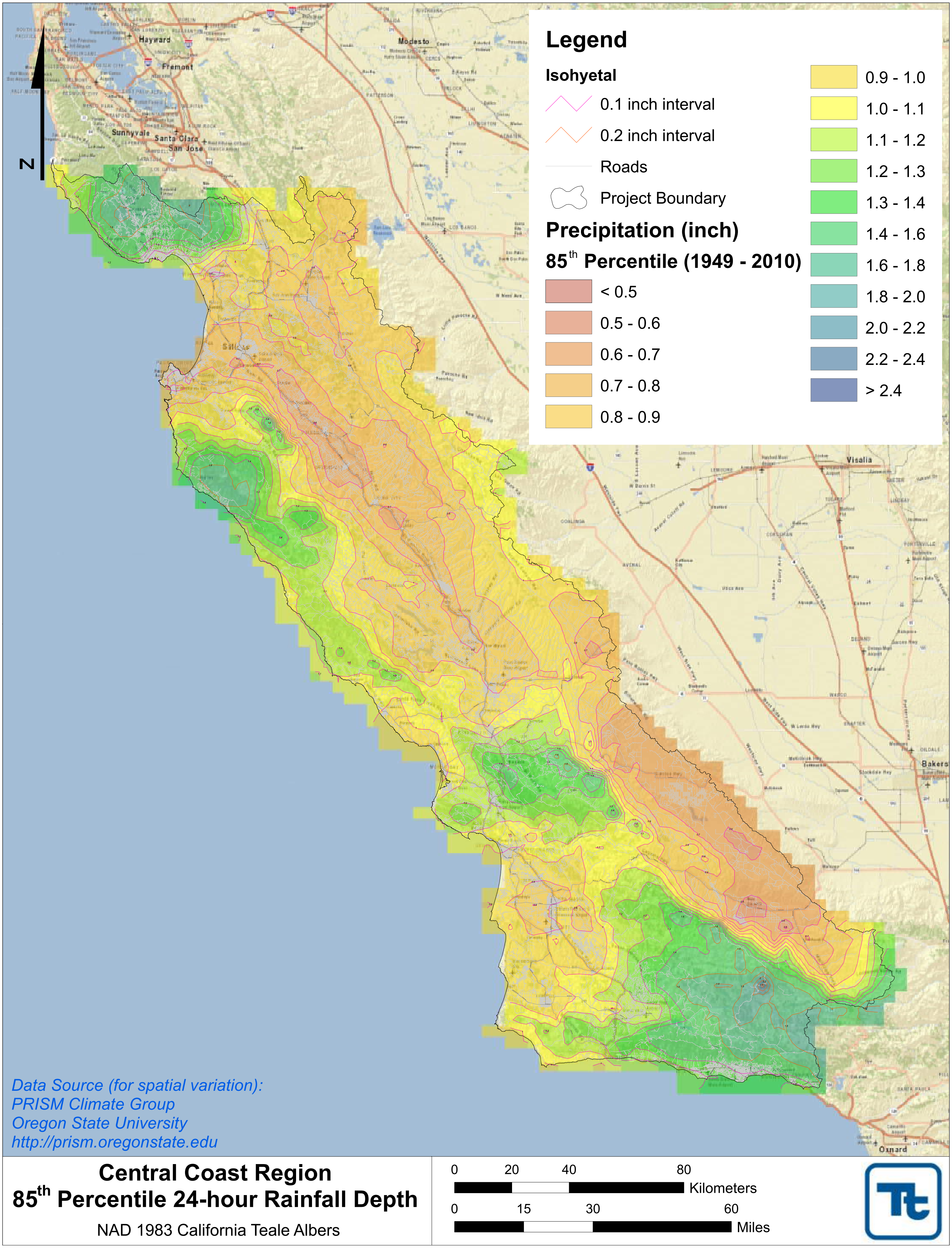
Dana Reserve - Tract No. 3159

County of San Luis Obispo

C12

Job No: 0998-02-LP19

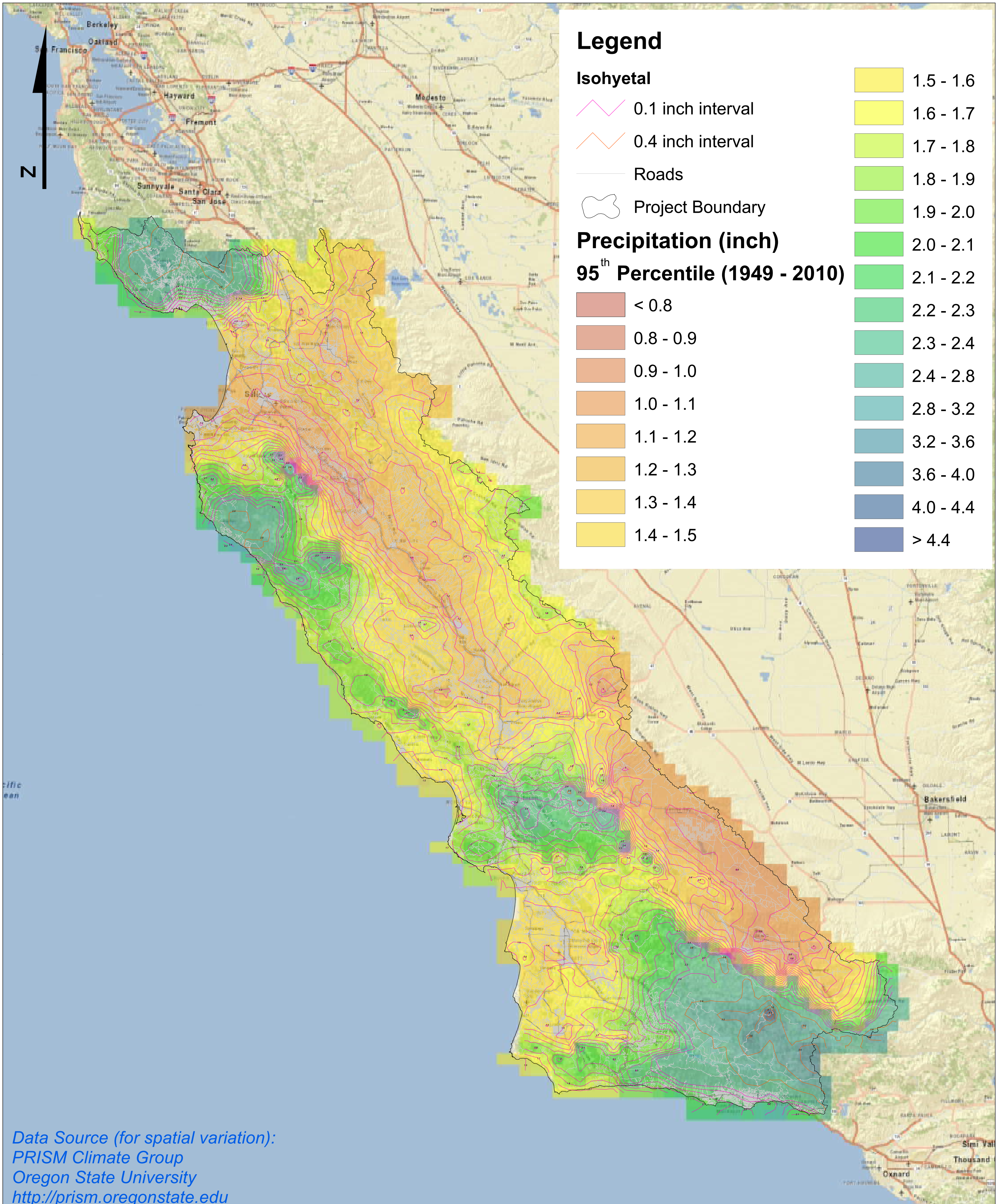
ATTACHMENT 6



Central Coast Region

85th Percentile 24-hour Rainfall Depth

NAD 1983 California Teale Albers



Central Coast Region
95th Percentile 24-hour Rainfall Depth
NAD 1983 California Teale Albers

0 20 40 80 Kilometers
0 20 40 80 Miles

Preliminary Drainage Report for Dana Reserve

PRELIMINARY DRAINAGE REPORT

for

Dana Reserve

Nipomo, California

APN: 091-301-073

March 16, 2020

Dana Reserve, LLC
Nick Tompkins

684 Higuera St., Ste B

San Luis Obispo, CA 93401

(805) 541-9007

Prepared by:

Tessa Kemper

Under the direction of, Scott Yoshida, PE

rrm design group

3765 S. Higuera Street, Suite 102

San Luis Obispo, CA 93401

(805) 543-179

TABLE OF CONTENTS

ATTACHMENTS

INTRODUCTION

Dana Reserve is located in the southern portion of San Luis Obispo County, California (See Figure 1 and 2). This property is immediately north of the Urban Reserve Line of the Nipomo community. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west, and U.S. Highway 101 to the east (see Exhibit 1-2). The property is less than a mile north of the Tefft Street corridor, a primary commercial corridor servicing the community, and is within 1,500 feet of the prominent Nipomo Regional Park from the property's southwest corner. Dana Reserve is a 288-acre mixed-use development primarily consisting of single-family detached neighborhoods. The proposed project includes 12 neighborhoods, commercial space, and public recreation areas. Residential neighborhoods consist of 1,160 units. The site is located in WMZ 1 and will be subjected to the Regional Water Quality Control Board's (RWQCB) Post-Construction Stormwater Requirements (PCR's) 1, 2, 3, and 4.

Figure 1: Vicinity Map

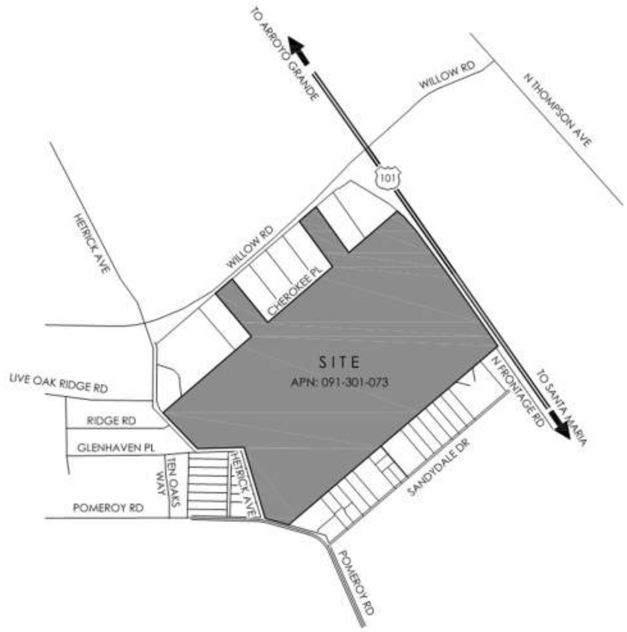


Figure 2: Project Location

DRAINAGE DESIGN BACKGROUND

Proposed drainage design, in reference to the outlined proposal in the Dana Reserve Stormwater Control Plan, was intended to limit current site impact, maximize onsite retention, and overall generate Low Impact Design standards.

EXISTING TOPOGRAPHY AND WATERSHEDS

The project site falls within the San Luis Obispo County jurisdiction and is located at the intersection of three watersheds. As seen on Attachment 1, Watershed A takes up the northwest corner and drains west towards the Hetrick Ave. and Glenhaven Pl. intersection. Watershed B is located on the proposed site's south west corner and drains towards the Hetrick Ave. and Pomeroy Rd. intersection. The final and largest, Watershed C, takes up the eastern half of the site and drains toward the east/southeast towards Highway 101.

Dana Reserve is currently located adjacent to the Nipomo Urban Reserve Line (URL). The Dana Reserve Specific Plan (DSRP) properties are identified by the Nipomo Community Services District (NCSD) within their Future Service Boundary, which determines where water and wastewater services are planned to be extended in the future. As part of the DRSP, these properties will be brought into the URL and be brought into the NCSD service boundary through the County of San Luis Obispo and Local Agency Formation Commission (LAFCO) processes.

ONSITE ANALYSIS

The proposed site was separated into 22 corresponding Drainage Management Areas (DMAs). Each area was analyzed for pre-development Peak Flow. Peak Flow calculations were determined for 2, 5, 10, 25, 50, and 100-year storms. Calculations for pre-development peak flows are tabulated in Attachment 3.

POST-DEVELOPMENT HYDROLOGY

DRAINAGE

The project includes Low Impact Design (LID) measures to minimize development impacts to existing conditions at the site. These measures include roadside bioswales and bioretention/detention basins along the perimeter of the project site. The overall grading and drainage for the site has been designed to maintain the historic drainage patterns to the maximum extent feasible, with integration of water quality and drainage facilities to meet or exceed State Post-Construction Stormwater Management Requirements.

The site is presently unimproved, and all new impervious areas shall be treated in compliance with State Post-Construction Stormwater Management Requirements. Refer to *Attachment 2* for proposed site drainage conditions.

SIZING METHODOLOGIES

The following methods were used for sizing stormwater collection and conveyance components. Rainfall intensity values for all sizing methodologies are based on San Luis Obispo County hydrology requirements.

RATIONAL METHOD

$Q = C * i * A$

The rational method was used to calculate the peak flows. The Hydraflow Express Extension was used to calculate estimated volume requirements using applicable rainfall events.

C= weighted C value was calculated based on existing and proposed surface types per table below.

Assumed Runoff Coefficient (c) Value Summary				
Using SLOCO Std H-3 and H-3a				
Existing Pre-developed Conditions				
Open Space	0.31	(undeveloped areas)		
Developed	0.35	(developed areas north and south of project)		
Proposed Post-developed Conditions				
Open Space	0.31	(undeveloped open space areas)		
Developed	0.95	Impervious area		
	0.75	Commercial		

i = Rainfall intensity was determined through San Luis Obispo County standards and Water Management Zone 1 storm depths.

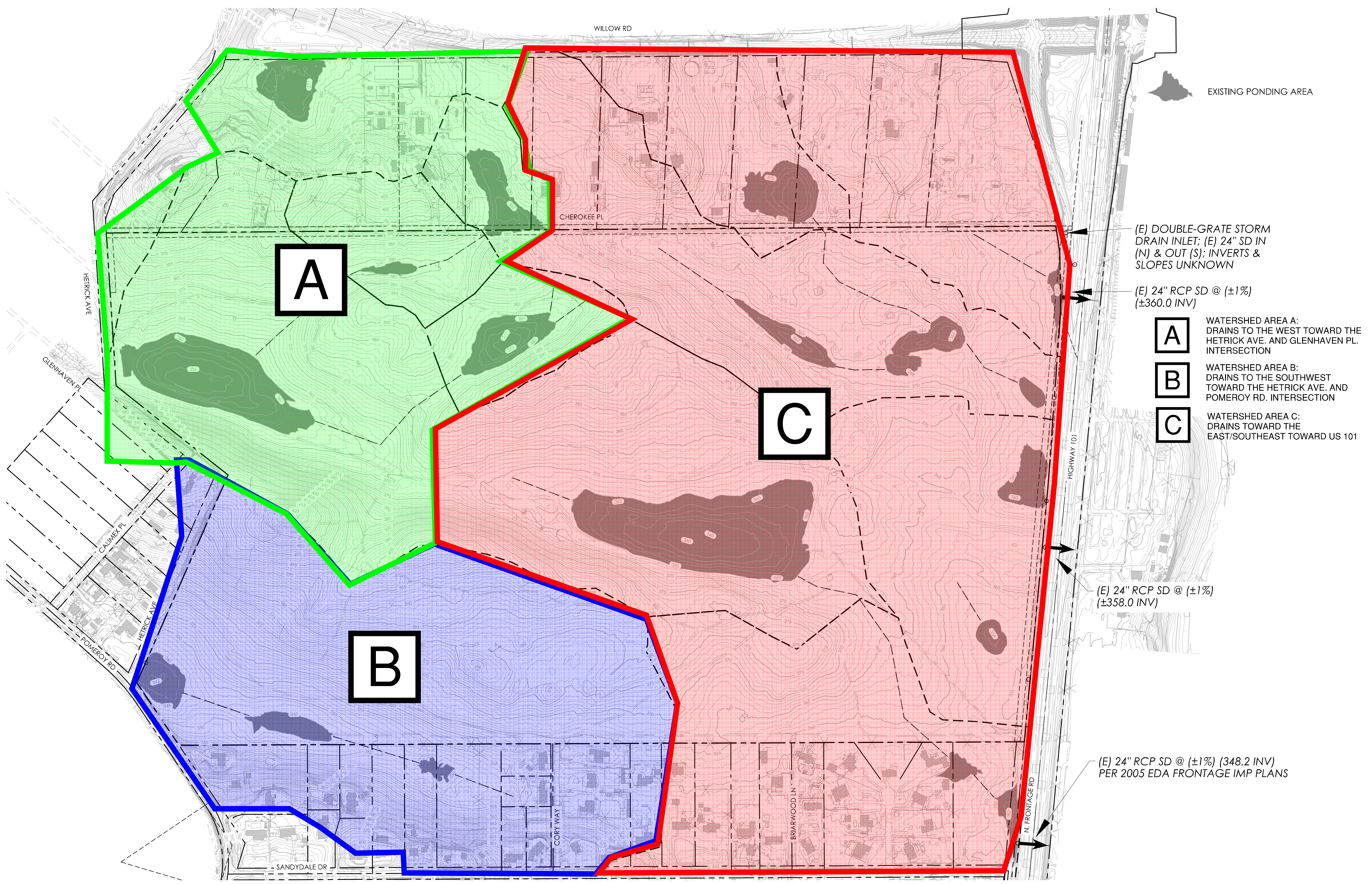
A = the worst-case—or largest—sub-watershed.

Regional Water Board PCR calculations were used to size shallow and deep basin retention basins.

SITE-SPECIFIED NOTES

As depicted on Attachment 2, Drainage Management Areas (DMAs) and Structural Control Measures (SCMs) are clustered accordingly to their overall watershed (A, B, or C). The cumulative stormwater volume requirement for each watershed will be met by the cumulative SCMs within that watershed. PCR 2 for backbone roads will be handled in roadside bioswales. Future neighborhood buildouts will provide PCR 2 stormwater mitigation measures for any impervious areas they create. Provided here is mitigation for the backbone infrastructure and rough graded super pads only.

ATTACHMENT 1



WILLOW RD
EXISTING PONDING AREA
CHEROKEE PL
A
(E) DOUBLE-GRATE STORM DRAIN INLET; (E) 24" SD IN (N) & OUT (S); INVERTS & SLOPES UNKNOWN
(E) 24" RCP SD @ (±1%) (±360.0 INV)
A
WATERSHED AREA A: DRAINS TO THE WEST TOWARD THE HETRICK AVE. AND GLENHAVEN PL. INTERSECTION
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WATERSHED AREA B: DRAINS TO THE SOUTHWEST TOWARD THE HETRICK AVE. AND POMEROY RD. INTERSECTION
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HETRICK AVE
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HIGHWAY 101
CALIMEX PL
HETRICK AVE
(E) 24" RCP SD @ (±1%) (±358.0 INV)
POMEROY RD
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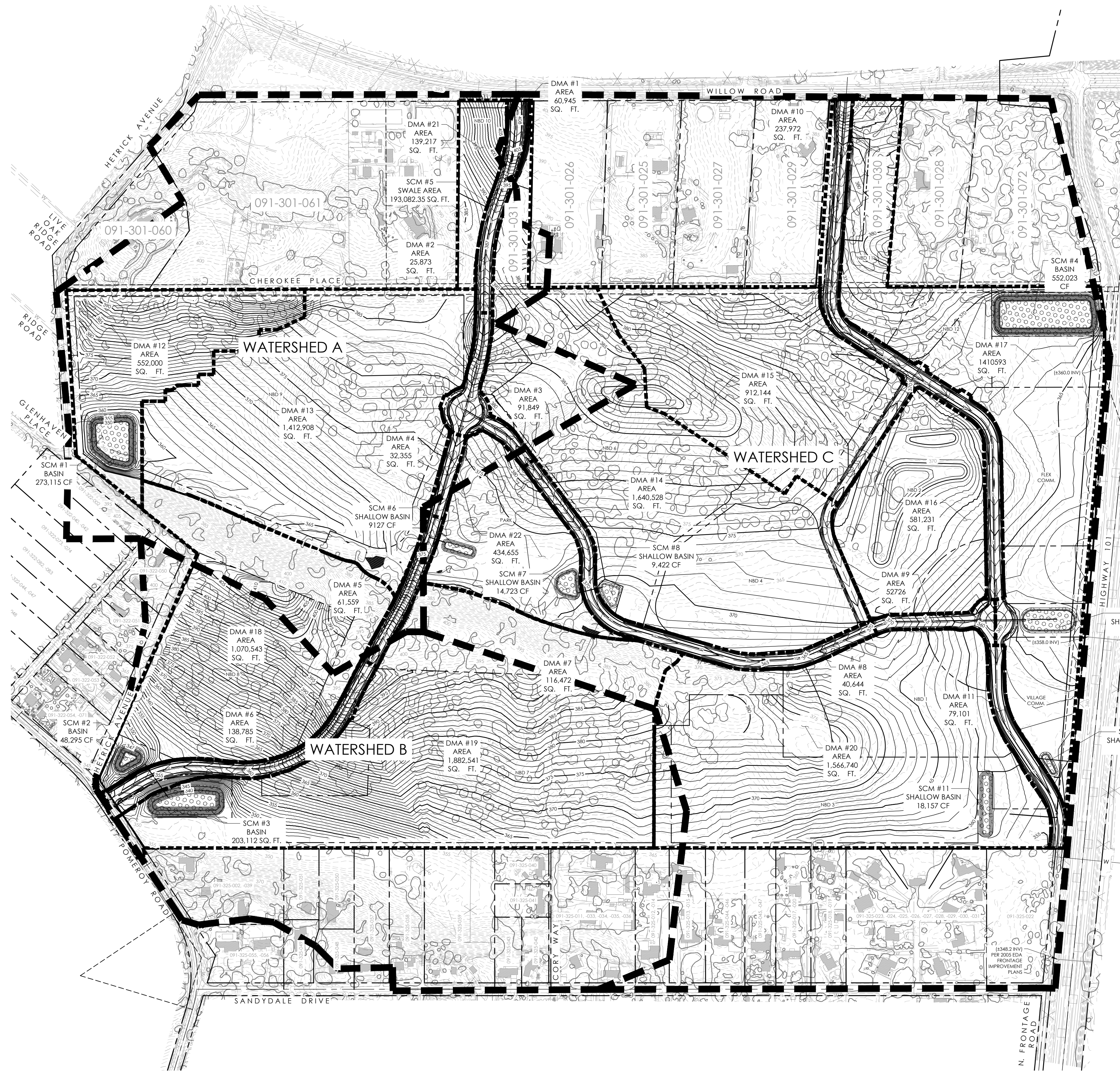
(E) 24" RCP SD @ (±1%) (348.2 INV) PER 2005 EDA FRONTAGE IMP PLANS
CORY WAY
BRIARWOOD LN
N. FRONTAGE RD
SANDYDALE DR

ATTACHMENT 2



Preliminary Post-construction Stormwater Requirement Calculations

PCR #1 Site Design and Runoff Reduction: Minimize impervious surfaces, disconnected roof downspouts, direct runoff onto vegetated areas

PCR #2 Water Quality Treatment: Treat / retain 85th percentile 24-hour storm on-site

PCR #3 Runoff Retention: Retain 95th percentile 24-hour storm on-site.

PCR #4 Peak Management: Post-development peak flows, discharged from the site shall not exceed the pre-developed peak flows for the 2- through 10-year storm events.

Dana Reserve

		(in)	(ft)
WMZ	1		
PCRs Req'd	1,2,3,4		
85th Percentile 24-hr Storm Depth (in)		0.9	0.075
95th Percentile 24-hr Storm Depth (in)		1.5	0.125

(BOTH FROM SLO COUNTY SPECIFICATIONS)

DMA	Area (sf)	Area (ac)	C' VALUE i=.8	VOLUME REQUIREMENTS PCR RETENTION[1]	SLOCO DETENTION[2]	TOTAL
1	60,940	1.4	0.6	4,570	220	4,790
2	25,870	0.6	0.6	1,940	240	2,180
3	91,850	2.1	0.6	6,880	820	7,700
4	32,360	0.7	0.6	2,420	270	2,690
5	61,560	1.4	0.6	4,610	540	5,150
6	142,060	3.3	0.6	10,640	1,280	11,920
7	116,470	2.7	0.6	8,730	1,050	9,780
8	40,640	0.9	0.6	3,050	350	3,400
9	52,730	1.2	0.6	3,950	470	4,420
10	237,970	5.5	0.6	17,830	880	18,710
11	79,100	1.8	0.6	5,930	290	6,220
12	552,000	12.7	0.6	41,360	4,470	45,830
13	1,412,910	32.4	0.6	105,870	11,780	117,650
14	1,640,530	37.7	0.6	122,930	13,710	136,640
15	912,140	20.9	0.6	68,350	7,600	75,950
16	581,230	13.3	0.6	43,550	4,840	48,390
17	1,410,590	32.4	0.6	105,700	11,780	117,480
18	1,070,540	24.6	0.6	80,220	8,650	88,870
19	1,879,380	43.1	0.6	140,820	15,160	155,980
20	1,566,740	36.0	0.6	117,400	12,660	130,060
21	139,220	3.2	0.6	10,430	920	11,350
22	434,660	10.0	0.6	32,570	3,520	36,090
Total	12,541,490	287.9	-	939,750	101,489	1,041,239

Notes:

1 PCR 95TH PERCENTILE 24-HR STORM RETENTION VOLUME REQUIRED ASSUMES i = 0.8 (80% IMPERVIOUS)

REQ. AREA= A * 'C' VALUE * 95TH STORM DEPTH

SEE PRELIMINARY DRAINAGE REPORT ATTACHMENT 4 FOR 95TH PERCENTILE REQUIRED VOLUME CALCULATIONS

2 SAN LUIS OBISPO COUNTY DETENTION VOLUME IS 50-YEAR POST-DEVELOPED RUNOFF VOLUME METERED OUT AT PRE-DEVELOPED 2-YEAR PEAK FLOW RATE. IDF CURVE DATA IS FROM THE NOAA ATLAS 14 RAINFALL INTENSITY DATA SEE PRELIMINARY DRAINAGE REPORT ATTACHMENT 4 FOR HYDRAFLOW ANALYSIS RESULTS.

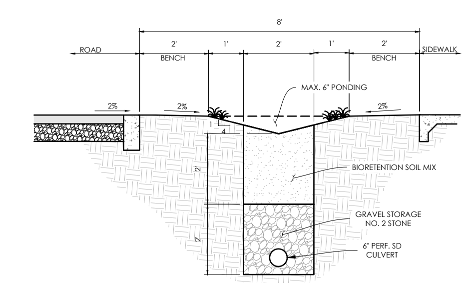
3 PROPOSED BACKBONE ROADS DRAINAGE IS INTO ROADSIDE BIOSWALES (SCM 10) ROADSIDE BIOSWALES ARE SIZED FOR PCR 2 REQUIREMENTS

	STORMWATER MITIGATION VOLUME SUMMARY			
WATERSHED	DMA	DRAINS TO	REQ.VOLUMES	PROV. VOLUME
A	12	SCM 1	174,830	273,120
	13			
	21			
C	14	SCM 8†	544,610	645,250
	15	SCM 9†		
	16	SCM 9†		
	17	SCM 9, 10†		
	20	SCM 11†		
	22	SCM 6, 7†		
B	18	SCM 2‡	244,850	251,410
	19	SCM 3‡		
	1-11	SWALES[3]	76,960	80,590 *
	TOTAL		1,041,250	1,250,370

*ROADSIDE SWALE VOLUME CALCULATED BY ASSUMING 6" MAX PONDING, 2' BSM, AND 2' ROCK BOTTOM, & NET 8' WIDE SWALES ALONG EITHER SIDE OF ENTIRE ROAD LENGTHS. SEE DETAIL A BELOW.

†SCMs 6-11 ULTIMATELY DISCHARGE TO SCM 4

‡SCMs 2 & 3 ARE INTERCONNECTED VIA A STORM DRAIN CULVERT



A ROADSIDE INFILTRATION BIOSWALE
SCALE: 1"=2'

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE (OTHERS)
- EXISTING EASEMENT LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING TREE DRIP LINE
- EXISTING FENCE LINE
- EXISTING PISMO CLARKIA
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED DMA
- PROPOSED SCM
- EXISTING WATERSHED BOUNDARIES

rrm design group

STORMWATER MANAGEMENT PLAN

March 6, 2020

Dana Reserve

County of San Luis Obispo

C12

Job No: 0998-02-LP19

ATTACHMENT 3

Hydrology Report

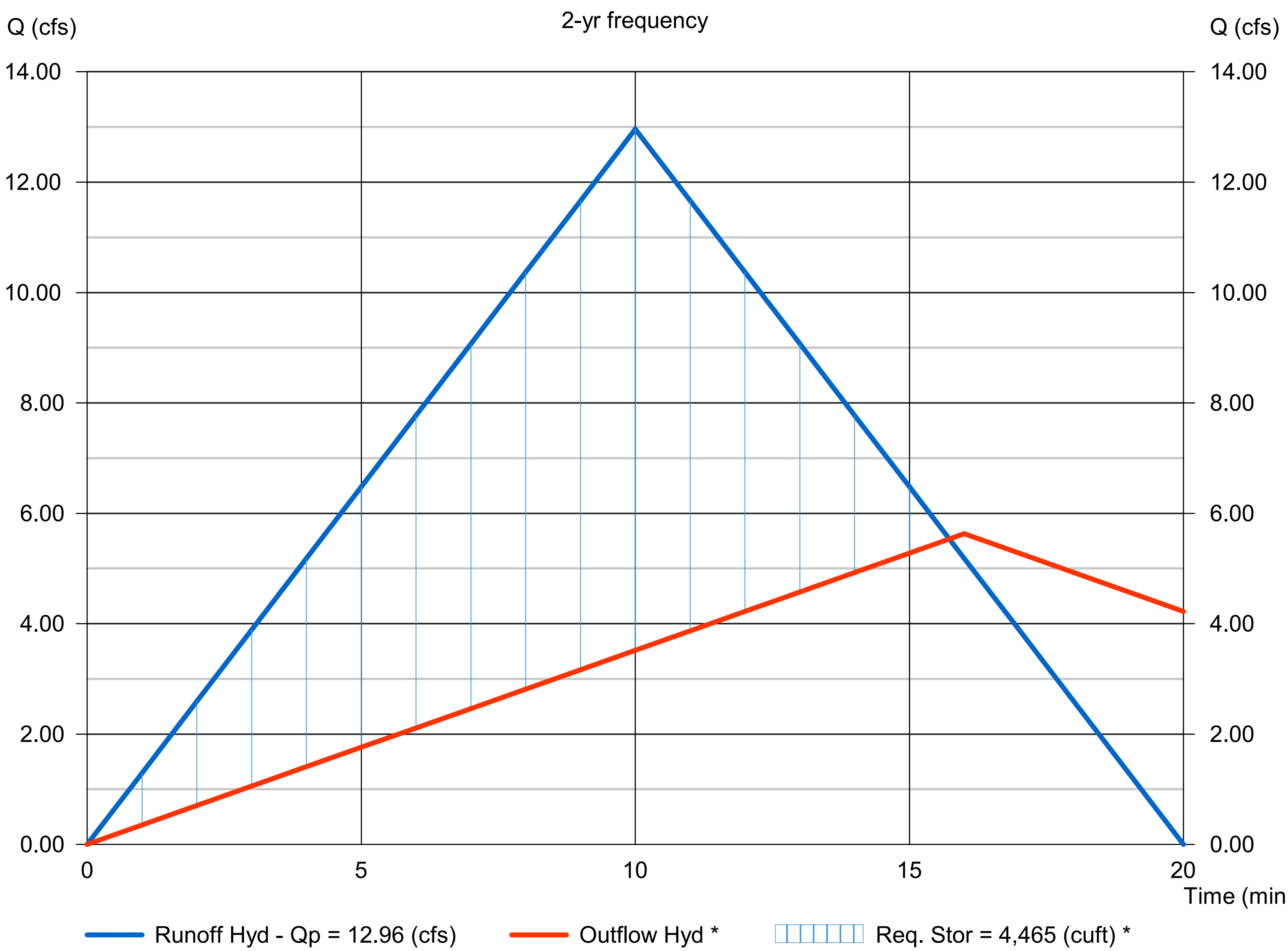
Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. | Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 12.96
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 12.700	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 7,776 (cuft); 0.179 (acft)

Runoff Hydrograph



** Estimated*

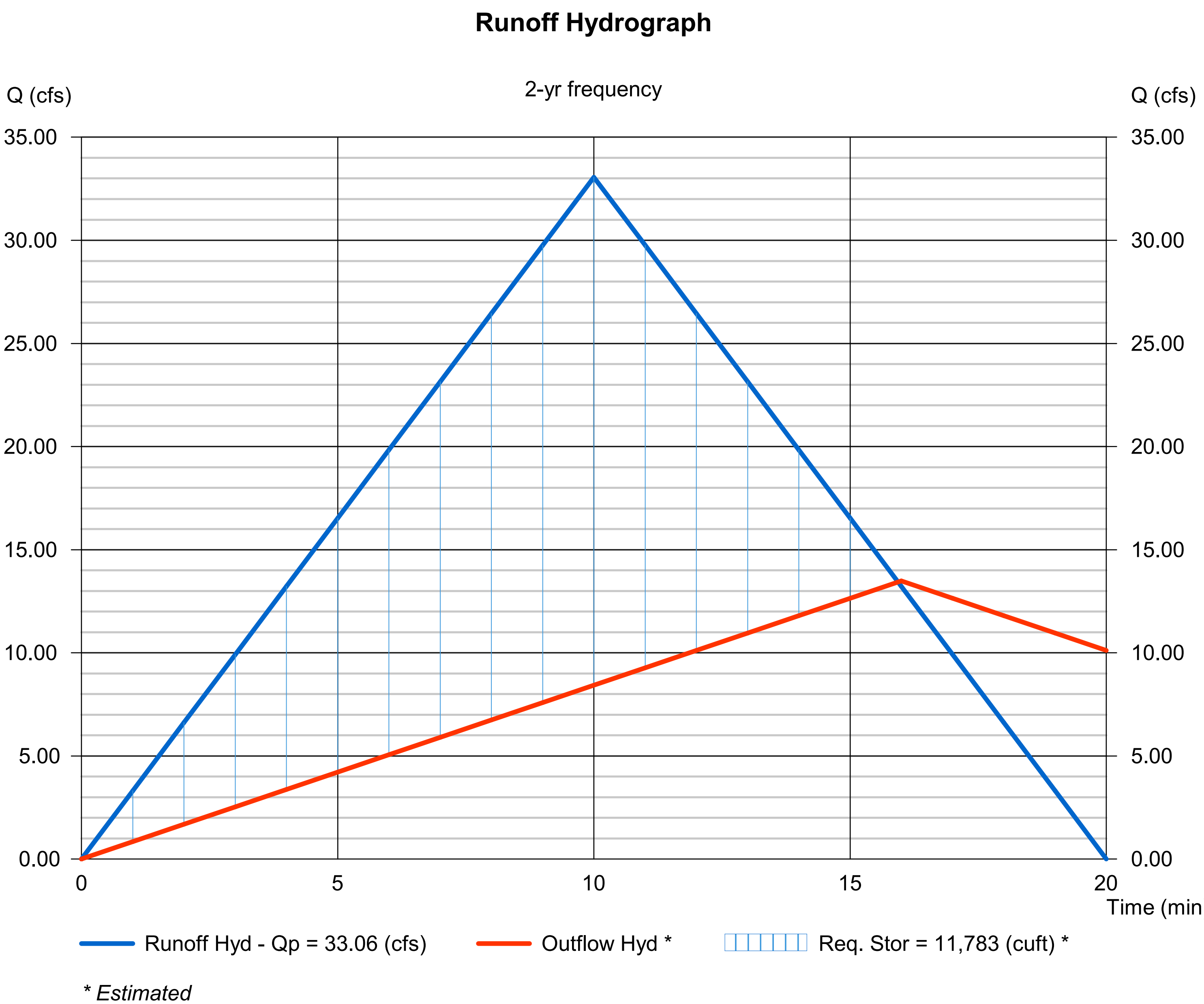
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 33.06
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 32.400	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 19,837 (cuft); 0.455 (acft)



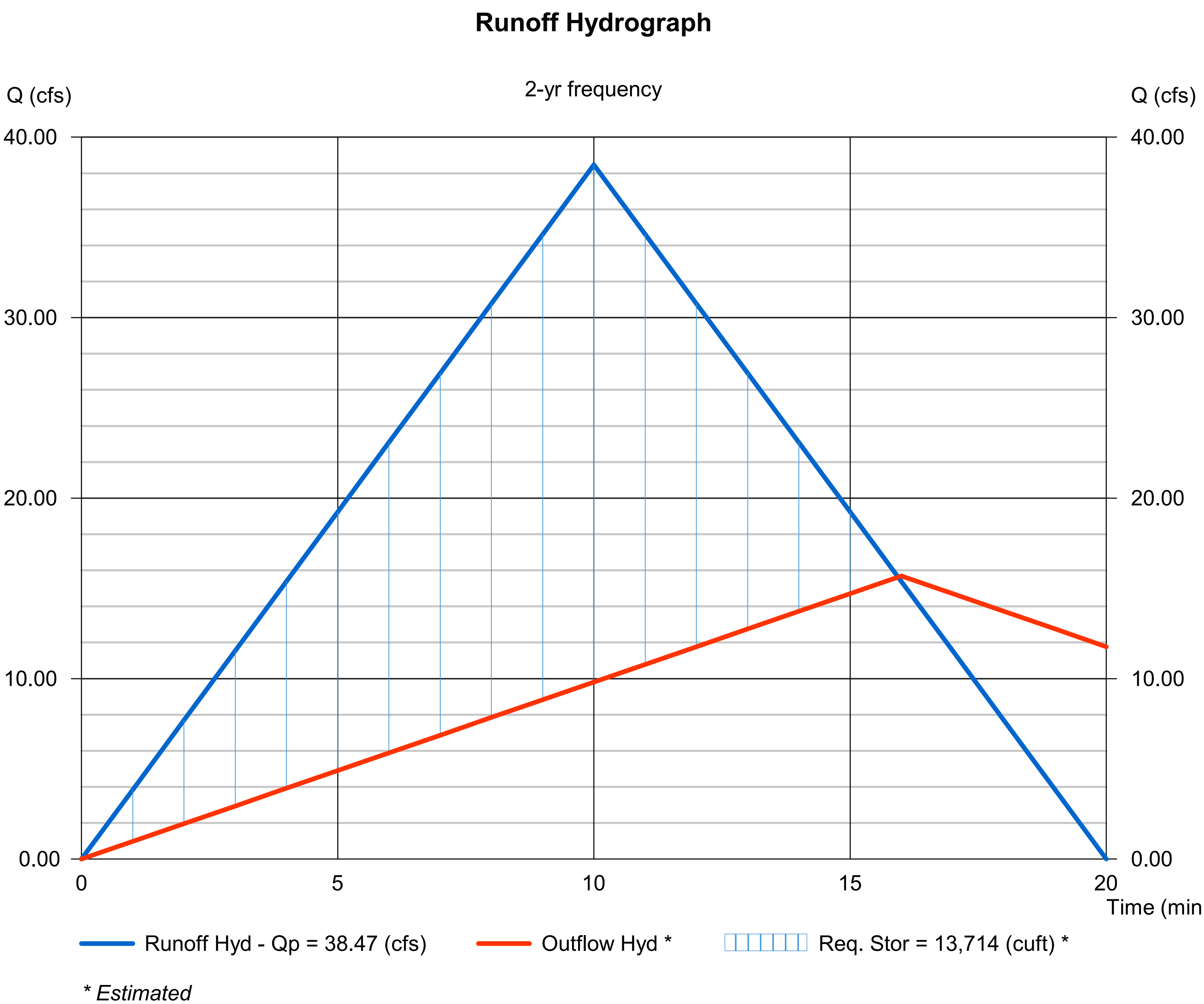
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. | Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 38.47
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 37.700	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 23,082 (cuft); 0.530 (acft)



Hydrology Report

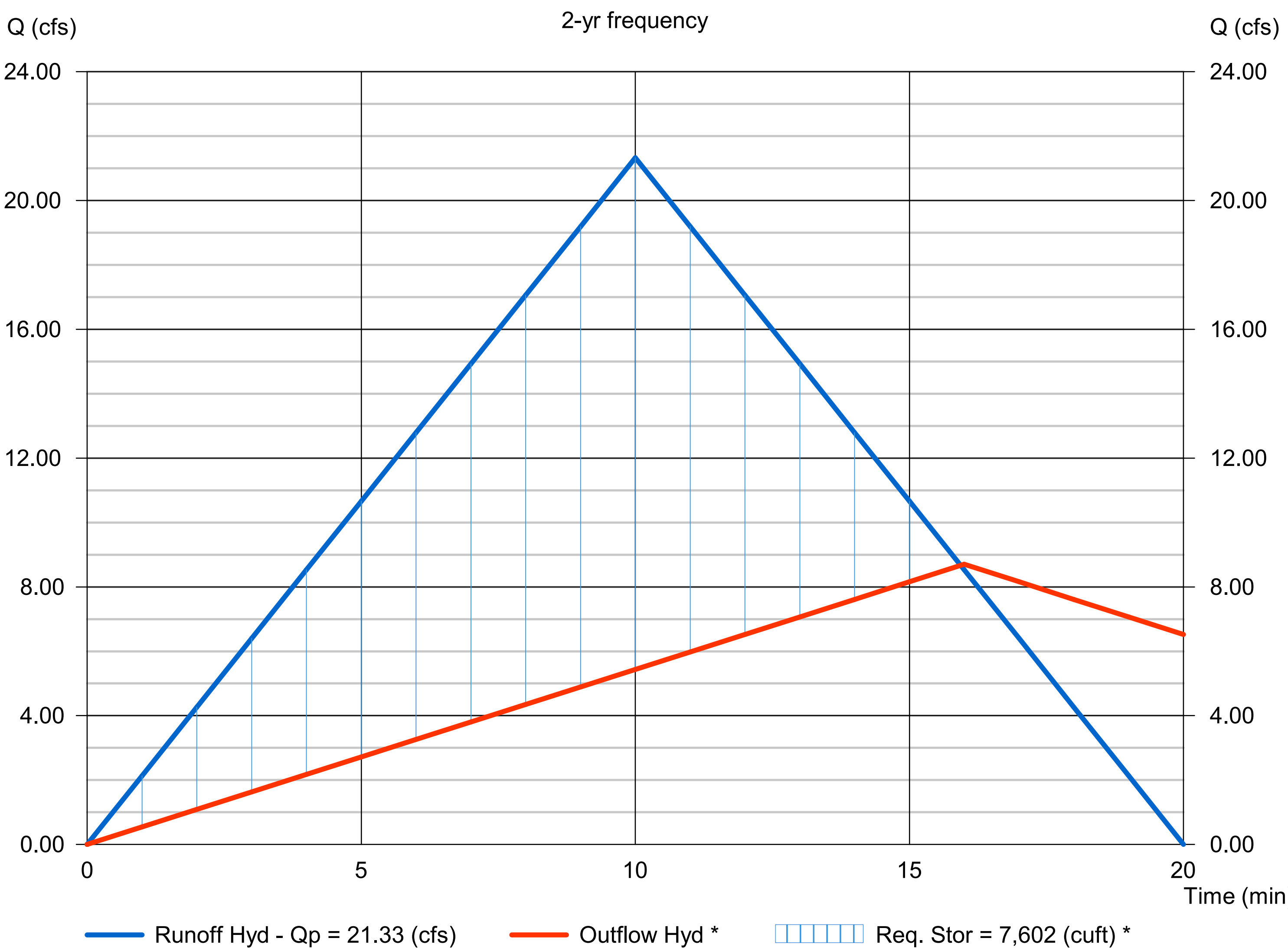
Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 21.33
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 20.900	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 12,796 (cuft); 0.294 (acft)

Runoff Hydrograph



** Estimated*

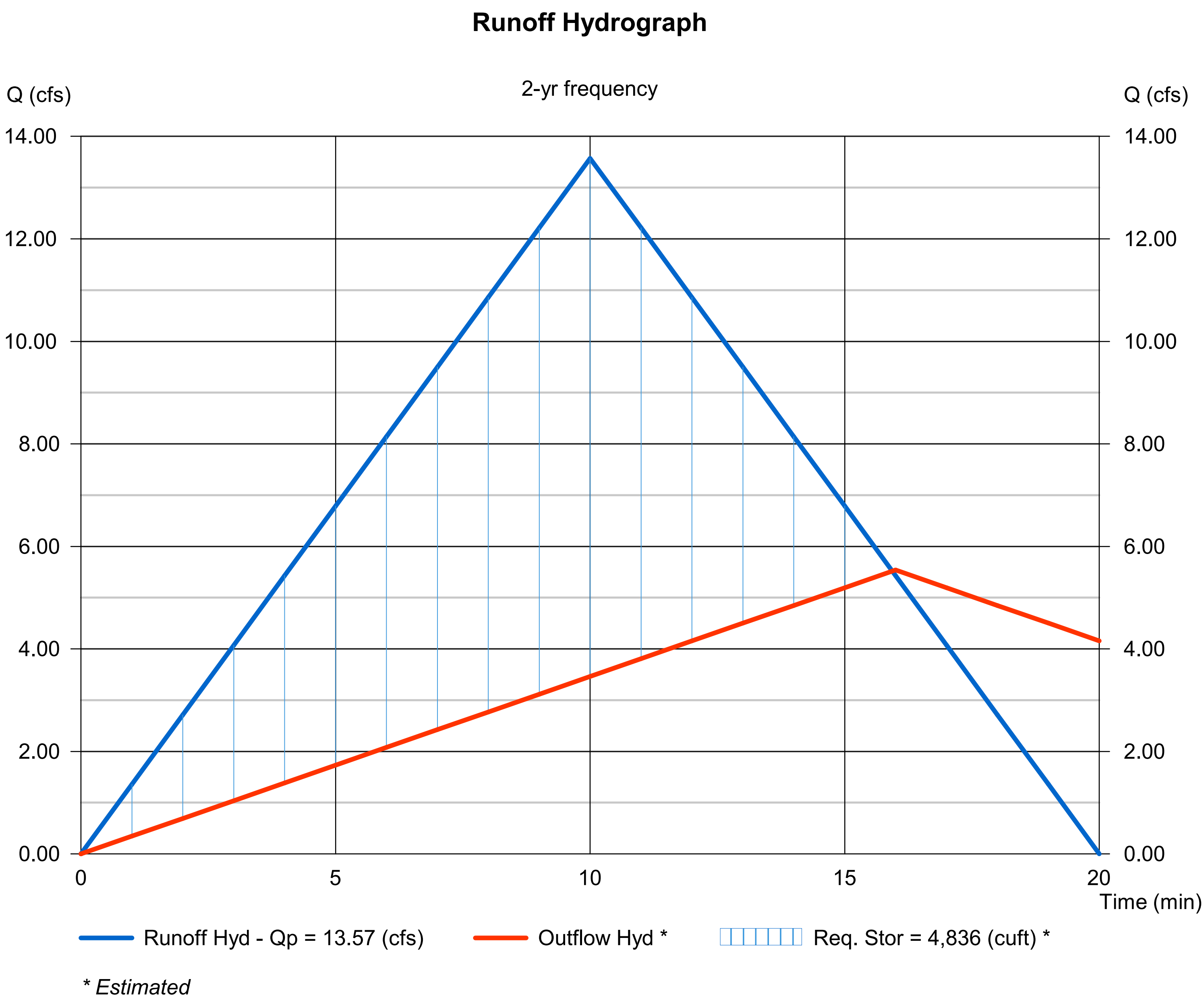
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 13.57
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 13.300	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 8,143 (cuft); 0.187 (acft)

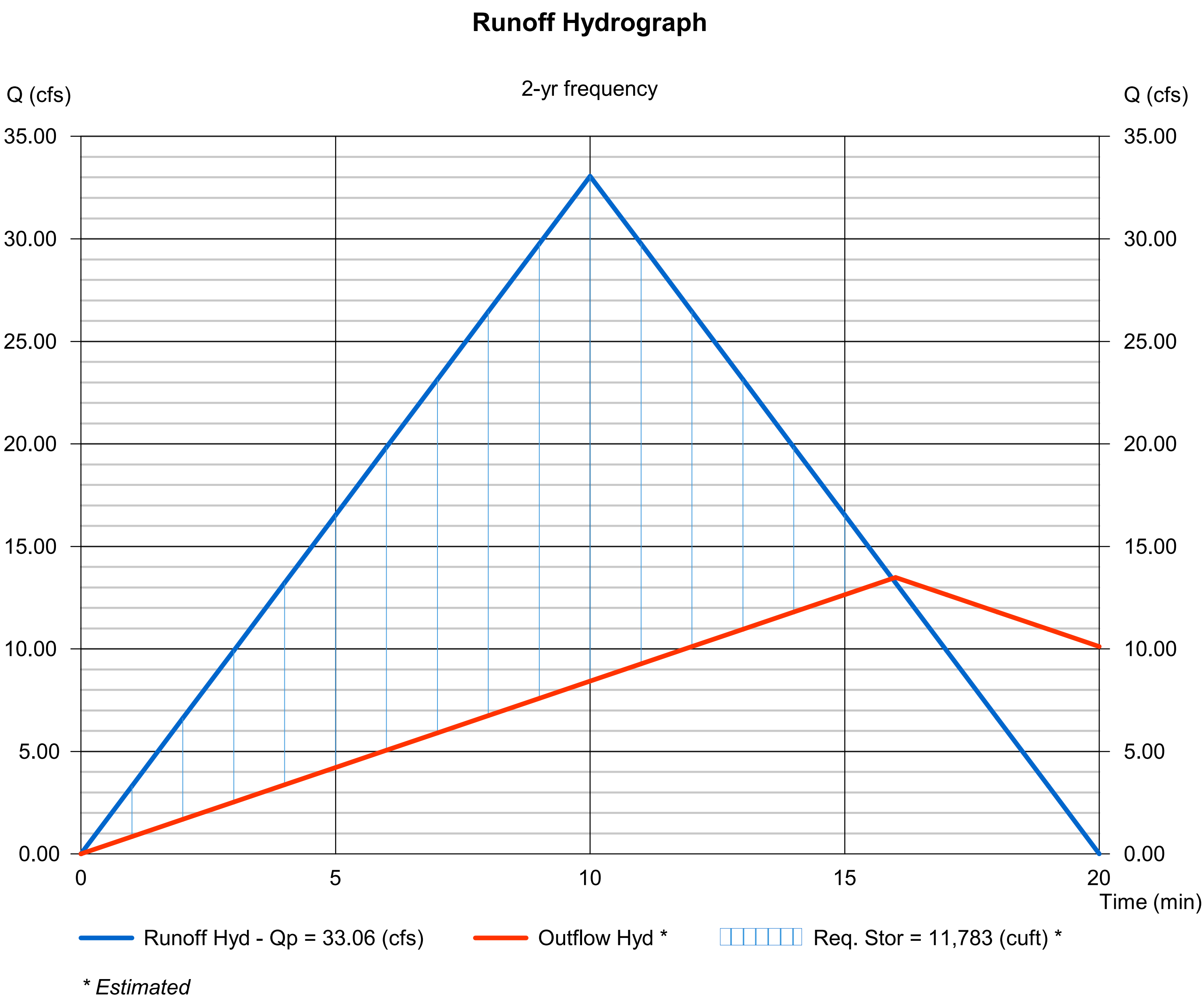


Hydrology Report

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 33.06
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 32.400	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 19,837 (cuft); 0.455 (acft)



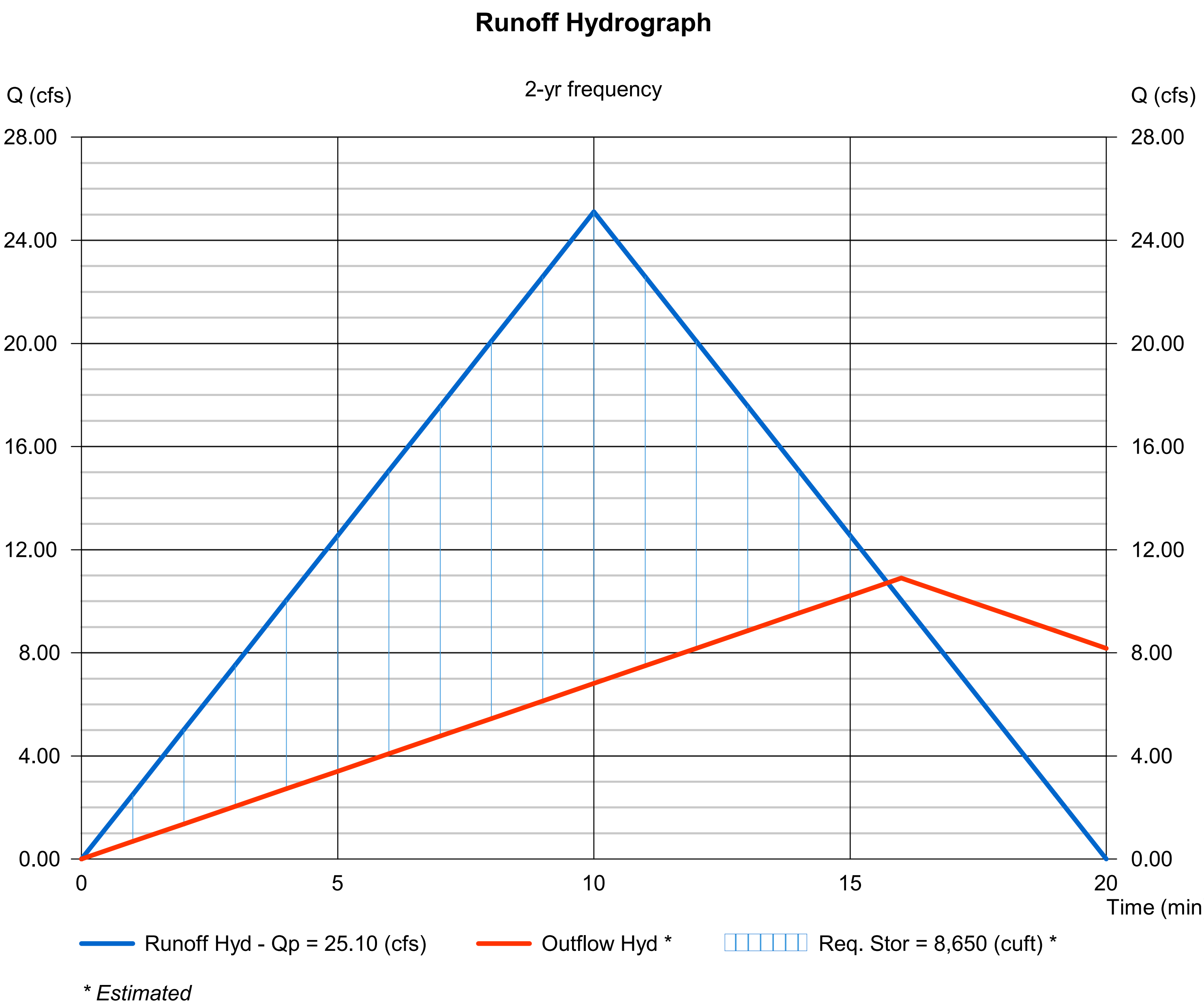
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 25.10
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 24.600	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 15,062 (cuft); 0.346 (acft)



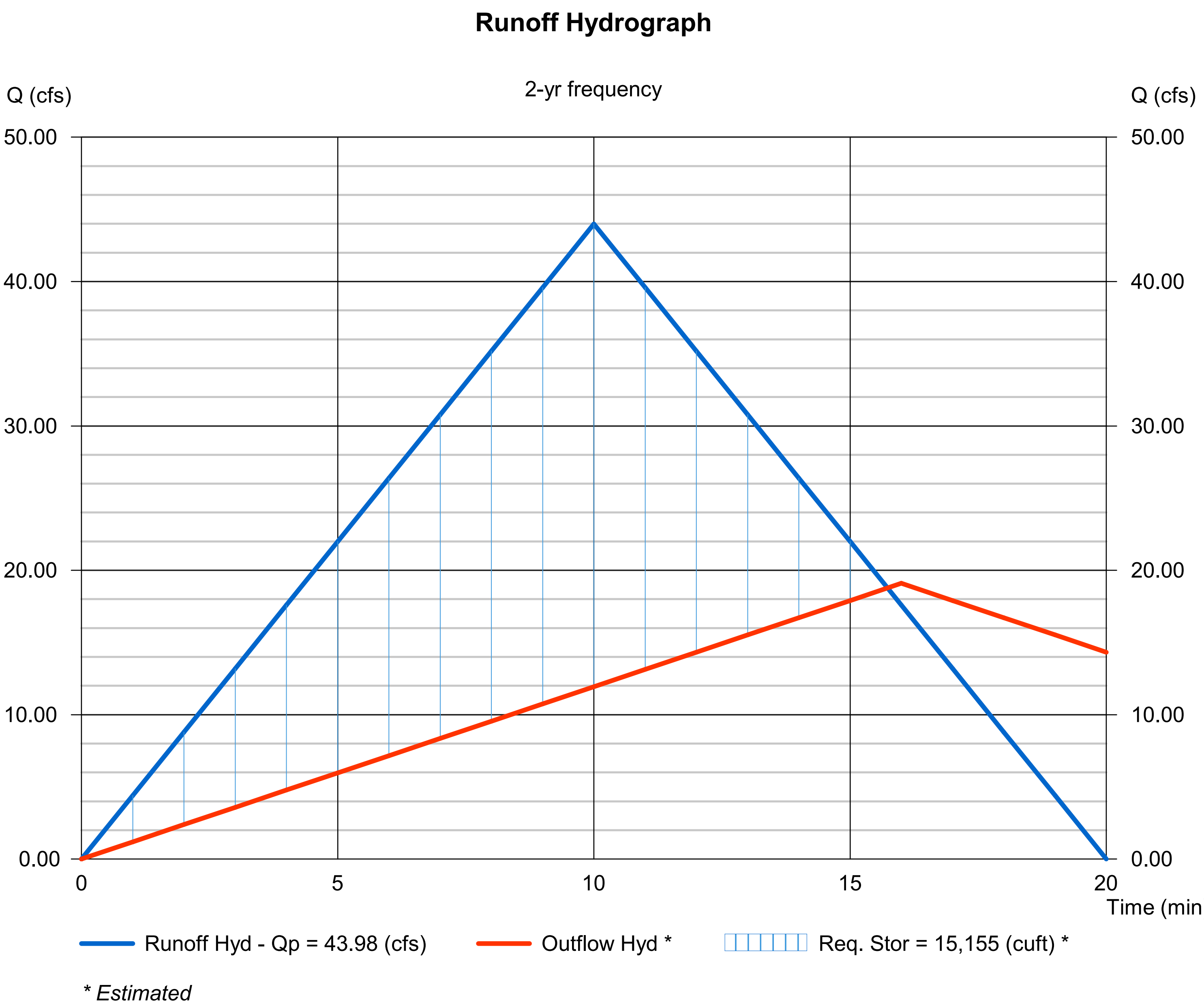
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 43.98
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 43.100	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 26,388 (cuft); 0.606 (acft)



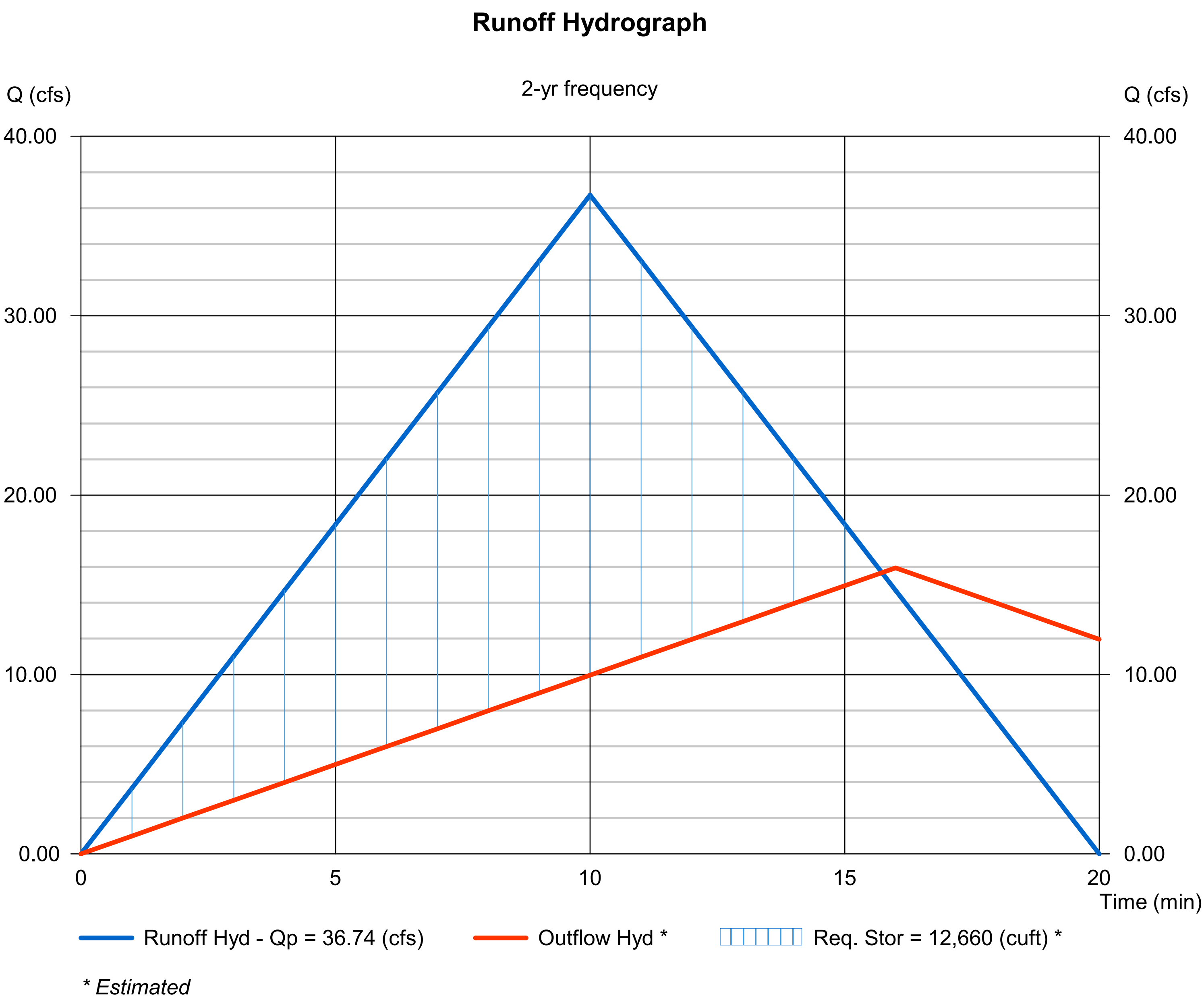
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. | Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 36.74
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 36.000	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 22,041 (cuft); 0.506 (acft)

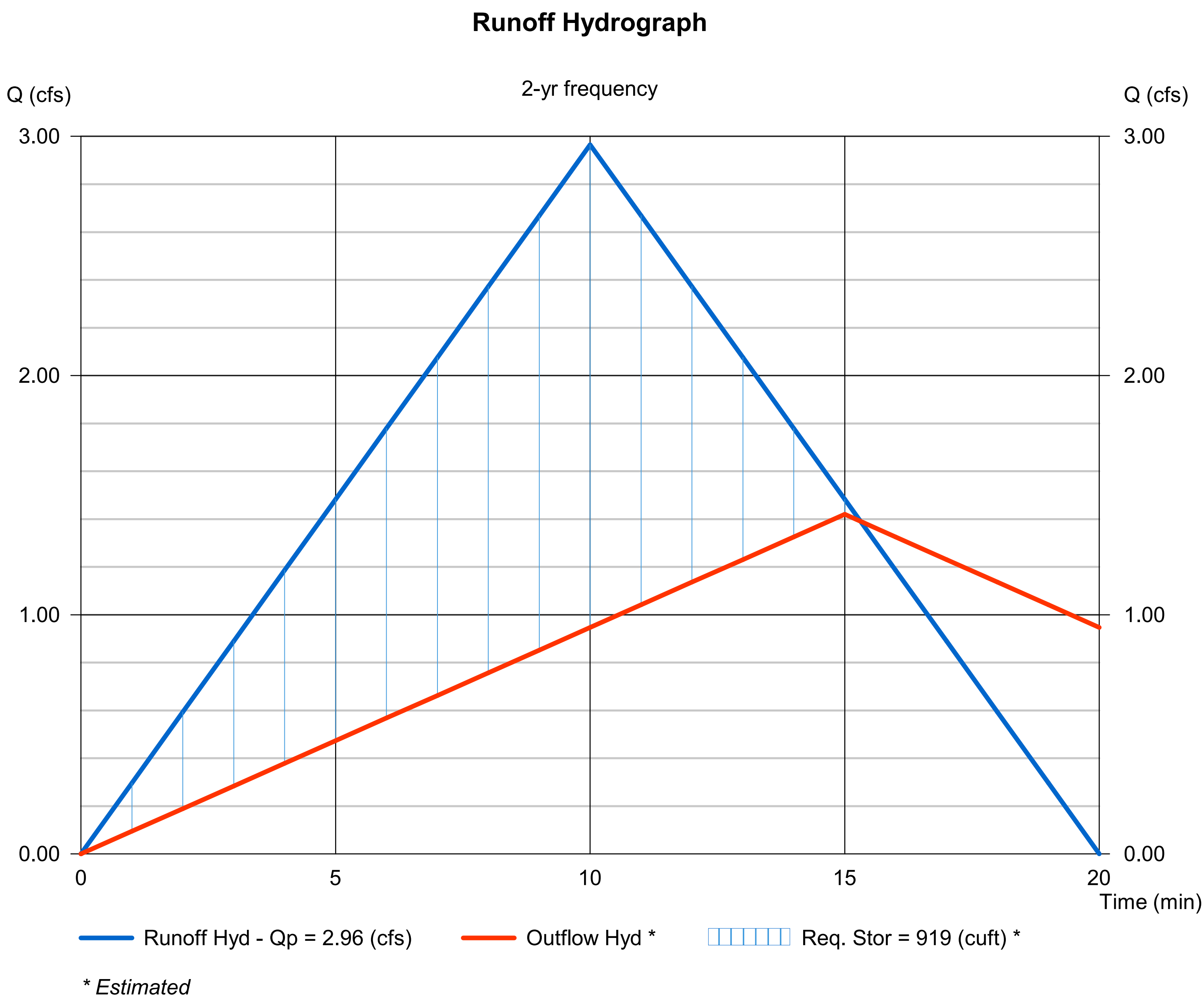


Hydrology Report

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 2.965
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 3.200	Runoff coeff. (C)	= 0.69
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 1,779 (cuft); 0.041 (acft)



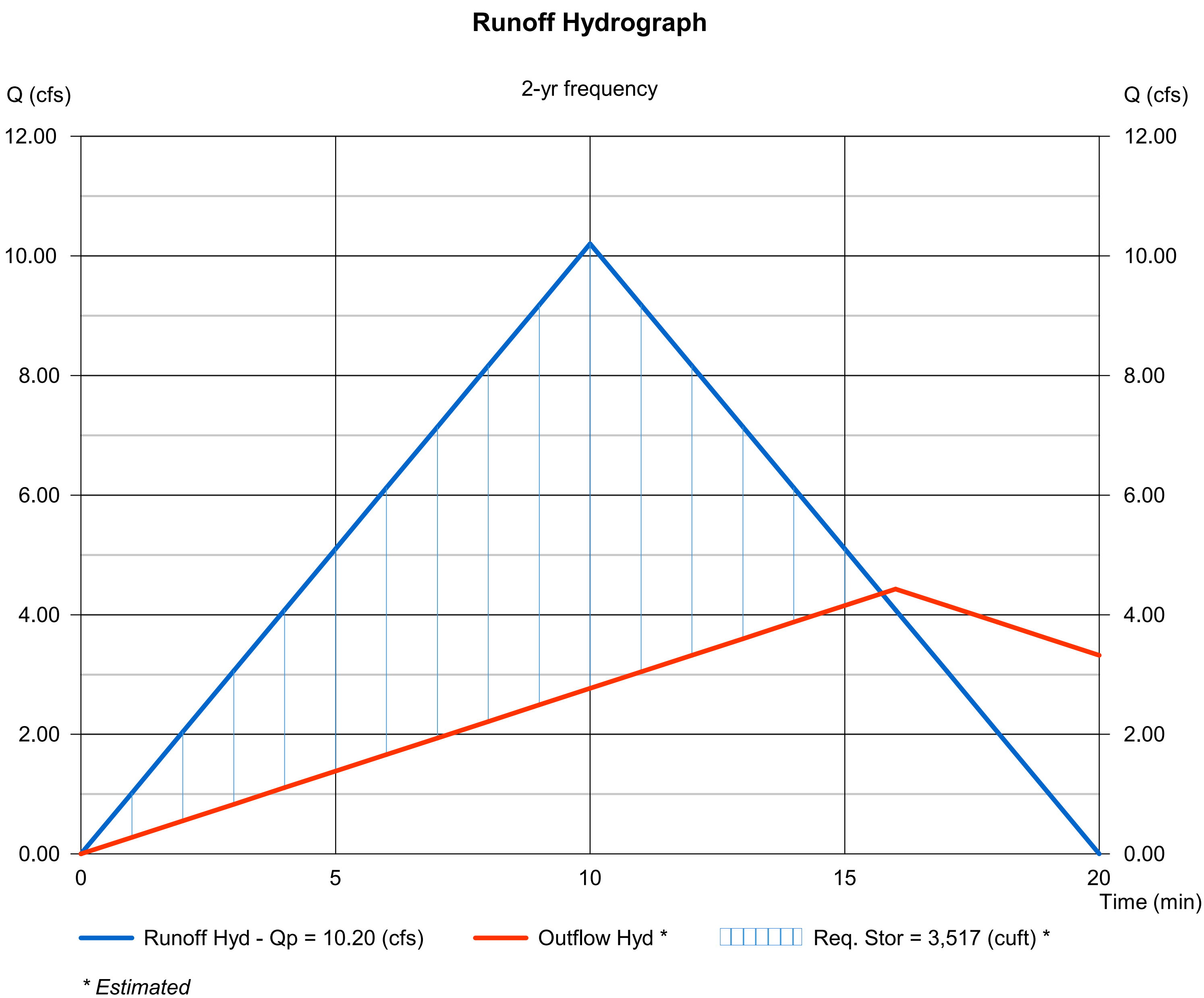
Hydrology Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 31 2020

<Name>

Hydrograph type	= Rational	Peak discharge (cfs)	= 10.20
Storm frequency (yrs)	= 2	Time interval (min)	= 1
Drainage area (ac)	= 10.000	Runoff coeff. (C)	= 0.76
Rainfall Inten (in/hr)	= 1.343	Tc by User (min)	= 10
IDF Curve	= CR IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 6,123 (cuft); 0.141 (acft)



ATTACHMENT 4

Dana Reserve TTM Drainage Analysis

SLO County Rainfall Intensity (in/hr) (Std H-4 Table 2 Annual Rainfall 14" to 17")		NOAA Atlas 14 Rainfall Intensity Data	
Recurrence Interval (Years)	10-min Duration (in/hr)	10-min Duration (in/hr)	
2	1.30	1.42	
5	1.90	1.75	
10	2.30	2.00	
25	2.60	2.33	
50	3.00	2.59	
100	3.20	2.83	

Assumed Runoff Coefficient (c) Value Summary		
Using SLOCO Std H-3 and H-3a		
Existing Pre-developed Conditions		
Open Space	0.31	(undeveloped areas)
Developed	0.35	(developed areas north and south of project)
Proposed Post-developed Conditions		
Open Space	0.31	(undeveloped open space areas)
Developed	0.95	Impervious area
	0.75	Commercial

Notes:

1) PCR 95TH PERCENTILE 24-HR STORM RETENTION VOLUME REQUIRED ASSUMES i = 0.8 (80% IMPERVIOUS)

2) SAN LUIS OBISPO COUNTY DETENTION VOLUME IS 50-YEAR POST-DEVELOPED RUNOFF VOLUME METERED OUT AT PRE-DEVELOPED 2-YEAR PEAK FLOW RATE. IDF CURVE DATA IS FROM THE NOAA ATLAS 14 RAINFALL INTENSITY DATA

3) ASSUMES ADS STORMTECH MC-3500 SUBSURFACE CHAMBERS WITH 12" ROCK

Pre-developed and Post-developed Peak Flows, Q (cfs) = c i A

Pre-developed DMA	Area (sf)	Area (ac)	Weighted Coeff (c)	2-yr (in/hr) 1.30	5-yr (in/hr) 1.90	10-yr (in/hr) 2.30	25-yr (in/hr) 2.60	50-yr (in/hr) 3.00	100-yr (in/hr) 3.20	Q2 (cfs) 2-yr
1	60,944.5	1.4	0.34	0.6	0.9	1.1	1.2	1.4	1.5	0.64
2	25,873.2	0.6	0.34	0.3	0.4	0.5	0.5	0.6	0.7	0.27
3	91,848.8	2.1	0.34	0.9	1.4	1.7	1.9	2.2	2.3	0.96
4	32,355.1	0.7	0.34	0.3	0.5	0.6	0.7	0.8	0.8	0.32
5	61,559.2	1.4	0.34	0.6	0.9	1.1	1.3	1.4	1.5	0.64
6	142,055.3	3.3	0.34	1.4	2.1	2.6	2.9	3.3	3.6	1.51
7	116,472.6	2.7	0.34	1.2	1.7	2.1	2.4	2.7	2.9	1.23
8	40,644.3	0.9	0.34	0.4	0.6	0.7	0.8	1.0	1.0	0.41
9	52,726.5	1.2	0.34	0.5	0.8	1.0	1.1	1.2	1.3	0.55
10	237,971.8	5.5	0.34	2.4	3.5	4.3	4.9	5.6	6.0	2.51
11	79,101.2	1.8	0.34	0.8	1.2	1.4	1.6	1.9	2.0	0.82
12	552,000.3	12.7	0.33	5.5	8.0	9.7	11.0	12.7	13.5	5.63
13	1,412,908.5	32.4	0.31	13.1	19.1	23.1	26.1	30.2	32.2	13.49
14	1,640,527.9	37.7	0.31	15.2	22.2	26.9	30.4	35.0	37.4	15.69
15	912,144.3	20.9	0.31	8.4	12.3	14.9	16.9	19.5	20.8	8.70
16	581,230.7	13.3	0.31	5.4	7.9	9.5	10.8	12.4	13.2	5.54
17	1,410,592.9	32.4	0.31	13.1	19.1	23.1	26.1	30.1	32.1	13.49
18	1,070,543.0	24.6	0.33	10.7	15.6	18.9	21.3	24.6	26.3	10.90
19	1,879,384.1	43.1	0.33	18.7	27.4	33.1	37.5	43.2	46.1	19.10
20	1,566,740.4	36.0	0.33	15.6	22.8	27.6	31.2	36.0	38.4	15.95
21	139,217.5	3.2	0.33	1.4	2.0	2.5	2.8	3.2	3.4	1.42
22	434,656.5	10.0	0.33	4.3	6.3	7.7	8.7	10.0	10.7	4.43
Total	12,541,498.7	287.9	0.37	136.9	200.1	242.2	273.8	315.9	336.9	143.03

Post-developed DMA	Area (sf)	Area (ac)	Weighted Coeff (c)	2-yr (in/hr) 1.30	5-yr (in/hr) 1.90	10-yr (in/hr) 2.30	25-yr (in/hr) 2.60	50-yr (in/hr) 3.00	100-yr (in/hr) 3.20	VOLUME REQUIREMENTS (CF) PCR RETENTION[1]	SLOCO DETENTION[2]	TOTAL
1	60,944.5	1.4	0.53	1.0	1.4	1.7	1.9	2.2	2.4	4,567	223	4,790
2	25,873.2	0.6	0.82	0.6	0.9	1.1	1.3	1.5	1.6	1,939	235	2,174
3	91,848.8	2.1	0.82	2.3	3.3	4.0	4.5	5.2	5.5	6,882	817	7,699
4	32,355.1	0.7	0.82	0.8	1.2	1.4	1.6	1.8	2.0	2,424	272	2,696
5	61,559.2	1.4	0.82	1.5	2.2	2.7	3.0	3.5	3.7	4,613	544	5,157
6	142,055.3	3.3	0.82	3.5	5.1	6.2	7.0	8.0	8.6	10,644	1,282	11,926
7	116,472.6	2.7	0.82	2.9	4.2	5.1	5.7	6.6	7.0	8,727	1,052	9,779
8	40,644.3	0.9	0.82	1.0	1.5	1.8	2.0	2.3	2.5	3,046	351	3,397
9	52,726.5	1.2	0.82	1.3	1.9	2.3	2.6	3.0	3.2	3,951	466	4,417
10	237,971.8	5.5	0.53	3.8	5.5	6.7	7.5	8.7	9.3	17,832	876	18,708
11	79,101.2	1.8	0.53	1.3	1.8	2.2	2.5	2.9	3.1	5,927	287	6,214
12	552,000.3	12.7	0.76	12.5	18.3	22.1	25.0	28.8	30.7	41,362	4,465	45,827
13	1,412,908.5	32.4	0.76	32.0	46.7	56.5	63.9	73.8	78.7	105,871	11,783	117,654
14	1,640,527.9	37.7	0.76	37.1	54.2	65.7	74.2	85.6	91.4	122,927	13,714	136,641
15	912,144.3	20.9	0.76	20.6	30.2	36.5	41.3	47.6	50.8	68,348	7,602	75,950
16	581,230.7	13.3	0.76	13.1	19.2	23.3	26.3	30.3	32.4	43,552	4,836	48,388
17	1,410,592.9	32.4	0.76	31.9	46.6	56.5	63.8	73.6	78.5	105,697	11,783	117,480
18	1,070,543.0	24.6	0.76	24.2	35.4	42.8	48.4	55.9	59.6	80,217	8,650	88,867
19	1,879,384.1	43.1	0.76	42.5	62.1	75.2	85.0	98.1	104.7	140,825	15,155	155,980
20	1,566,740.4	36.0	0.76	35.4	51.8	62.7	70.9	81.8	87.2	117,398	12,660	130,058
21	139,217.5	3.2	0.69	2.9	4.2	5.1	5.8	6.7	7.1	10,432	919	11,351
22	434,656.5	10.0	0.76	9.8	14.4	17.4	19.7	22.7	24.2	32,569	3,517	36,086
Total	12,541,498.7	287.9	0.82	307.5	449.4	544.0	614.9	709.5	756.8	939,750	101,489	1,041,239

Dana Reserve

Post-construction Stormwater Requirements

Retention Volume = (c) * Rainfall Depth * Area
i = percent impervious $c = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

WMZ	1		
PCRs Req'd	1,2,3,4	(in)	(ft)
85th Percentile 24-hr Storm Depth (in)		0.9	0.075
95th Percentile 24-hr Storm Depth (in)		1.5	0.125

i	c
0.60	0.41
0.70	0.49
0.80	0.60
0.90	0.73
1.00	0.89

95th Percentile Retention Volume (CF) = (c) * Rainfall Depth * Area

DMA	Area (sf)	i = 0.60	i = 0.70	i = 0.80	i = 0.90	i = 1.00
1	60,944.5	3,116	3,763	4,567	5,565	6,798
2	25,873.2	1,323	1,598	1,939	2,363	2,886
3	91,848.8	4,696	5,672	6,882	8,387	10,245
4	32,355.1	1,654	1,998	2,424	2,954	3,609
5	61,559.2	3,147	3,801	4,613	5,621	6,866
6	142,055.3	7,262	8,772	10,644	12,971	15,844
7	116,472.6	5,955	7,192	8,727	10,635	12,991
8	40,644.3	2,078	2,510	3,046	3,711	4,533
9	52,726.5	2,696	3,256	3,951	4,815	5,881
10	237,971.8	12,166	14,695	17,832	21,730	26,543
11	79,101.2	4,044	4,884	5,927	7,223	8,823
12	552,000.3	28,221	34,086	41,362	50,405	61,569
13	1,412,908.5	72,234	87,247	105,871	129,016	157,592
14	1,640,527.9	83,871	101,302	122,927	149,801	182,980
15	912,144.3	46,633	56,325	68,348	83,290	101,738
16	581,230.7	29,715	35,891	43,552	53,074	64,829
17	1,410,592.9	72,115	87,104	105,697	128,805	157,334
18	1,070,543.0	54,731	66,106	80,217	97,754	119,406
19	1,879,384.1	96,082	116,051	140,825	171,611	209,622
20	1,566,740.4	80,098	96,746	117,398	143,063	174,750
21	139,217.5	7,117	8,597	10,432	12,712	15,528
22	434,656.5	22,221	26,840	32,569	39,690	48,481
Total	12,541,498.7	641,173	774,433	939,750	1,145,197	1,398,847

Ponded Area Needed for Shallow 2-ft basin = 95th Percentile Retention Volume (CF) / 2-ft

DMA	Area (sf)	i = 0.60	i = 0.70	i = 0.80	i = 0.90	i = 1.00
1	60,944.5	1,558	1,882	2,283	2,783	3,399
2	25,873.2	661	799	969	1,181	1,443
3	91,848.8	2,348	2,836	3,441	4,193	5,122
4	32,355.1	827	999	1,212	1,477	1,804
5	61,559.2	1,574	1,901	2,306	2,811	3,433
6	142,055.3	3,631	4,386	5,322	6,486	7,922
7	116,472.6	2,977	3,596	4,364	5,318	6,496
8	40,644.3	1,039	1,255	1,523	1,856	2,267
9	52,726.5	1,348	1,628	1,975	2,407	2,940
10	237,971.8	6,083	7,347	8,916	10,865	13,271
11	79,101.2	2,022	2,442	2,964	3,611	4,411
12	552,000.3	14,110	17,043	20,681	25,202	30,784
13	1,412,908.5	36,117	43,623	52,935	64,508	78,796
14	1,640,527.9	41,935	50,651	61,463	74,900	91,490
15	912,144.3	23,316	28,162	34,174	41,645	50,869
16	581,230.7	14,857	17,945	21,776	26,537	32,415
17	1,410,592.9	36,058	43,552	52,849	64,402	78,667
18	1,070,543.0	27,365	33,053	40,109	48,877	59,703
19	1,879,384.1	48,041	58,026	70,412	85,806	104,811
20	1,566,740.4	40,049	48,373	58,699	71,532	87,375
21	139,217.5	3,559	4,298	5,216	6,356	7,764
22	434,656.5	11,111	13,420	16,285	19,845	24,240
Total	12,541,498.7	320,586	387,216	469,875	572,598	699,424

Ponded Area Needed for Deep 8-ft basin = 95th Percentile Retention Volume (CF) / 8-ft

DMA	Area (sf)	i = 0.60	i = 0.70	i = 0.80	i = 0.90	i = 1.00
1	60,944.5	389	470	571	696	850
2	25,873.2	165	200	242	295	361
3	91,848.8	587	709	860	1,048	1,281
4	32,355.1	207	250	303	369	451
5	61,559.2	393	475	577	703	858
6	142,055.3	908	1,096	1,331	1,621	1,981
7	116,472.6	744	899	1,091	1,329	1,624
8	40,644.3	260	314	381	464	567
9	52,726.5	337	407	494	602	735
10	237,971.8	1,521	1,837	2,229	2,716	3,318
11	79,101.2	505	611	741	903	1,103
12	552,000.3	3,528	4,261	5,170	6,301	7,696
13	1,412,908.5	9,029	10,906	13,234	16,127	19,699
14	1,640,527.9	10,484	12,663	15,366	18,725	22,873
15	912,144.3	5,829	7,041	8,544	10,411	12,717
16	581,230.7	3,714	4,486	5,444	6,634	8,104
17	1,410,592.9	9,014	10,888	13,212	16,101	19,667
18	1,070,543.0	6,841	8,263	10,027	12,219	14,926
19	1,879,384.1	12,010	14,506	17,603	21,451	26,203
20	1,566,740.4	10,012	12,093	14,675	17,883	21,844
21	139,217.5	890	1,075	1,304	1,589	1,941
22	434,656.5	2,778	3,355	4,071	4,961	6,060
Total	12,541,498.7	80,147	96,804	117,469	143,150	174,856

Dana Reserve
Water Supply Assessment

DANA RESERVE

WATER SUPPLY ASSESSMENT

Prepared by Rick G Sweet and RRM Design Group
Date: 6-23-2020 (Revised 12-14-2021)
Prepared for N.K.T. Nipomo Properties L.L.C.

ENGINEER OF RECORD:

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. CAMACHO
No. 76597
CIVIL
STATE OF CALIFORNIA

Robert Camacho

DATE: 12/14/2021

Contents

<u>Appendices</u>

I. INTRODUCTION

This Water Supply Assessment (W.S.A.) was prepared for the proposed Dana Reserve Specific Plan (D.R.S.P.) project (hereinafter referred to as The Project), which is located within the County of San Luis Obispo, pursuant to the requirements of Section 10910 et al.. of the State Water Code, as amended by Senate Bill No. 610, Chapter 643 (2001). The Nipomo Community Service District (N.C.S.D.) is the local water purveyor and is the proposed water supplier. This Water Supply Assessment (W.S.A.) analyzes the N.C.S.D.'s ability to serve The Project.

1.1 Background

Senate Bill No. 610, effective January 1, 2002, requires a city or county, which determines that a project (as defined in Water Code§ 10912) is subject to the California Environmental Quality Act (C.E.Q.A.), to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified water supply assessment.

The assessment is required to include an identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts. The assessment must be approved by the governing body of the public water system supplying water to the project. If the projected water demand associated with the project was included as part of the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in the water supply assessment.

The Project property is within the N.C.S.D. Urban Water Management Plan area and within the Sphere of Influence (S.O.I.) as determined by the San Luis Obispo Local Agency Formation Commission (LAFCo). Reference latest LAFCo Municipal Service Review (M.S.R.).

The bill requires the city or county, if it is not able to identify any public water system that may supply water for the project, to prepare the water supply assessment after a prescribed consultation. If the public water system concludes that water supplies are, or will be, insufficient, plans for acquiring additional water supplies are required to be submitted to the city or county. The city or county must include the water supply assessment in any environmental document prepared for the project pursuant to the act. It also requires the city or county to determine whether project water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.
The project will be reviewed by an Environmental Impact Report.

As defined under Section 10912 of the Water Code, a "project" includes the following:

a. A proposed residential development of more than 500 dwelling units.
b. A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
c. A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
d. A proposed hotel or motel, or both, having more than 500 rooms.

e. A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
f. A mixed-use project that includes one or more of the projects specified in this subdivision.
g. A project that would demand an amount of water equivalent to, or greater than the amount of water required by a 500-dwelling unit project.

The Project is a master-planned neighborhood development comprised of a mix of uses and meets the definition of a "project" under Section 10912 of the Water Code.

2. PROJECT LOCATION AND DESCRIPTION

The proposed Dana Reserve Specific Plan is in the southern portion of San Luis Obispo County, California. This property is located immediately north of the Urban Reserve Line of the Nipomo Community Service District, and within the District's LAFCo Approved Sphere of Influence. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west, and U.S. Highway 101 to the east. The property is less than a mile north of Tefft Street, a primary commercial corridor servicing the community, and just south of the new Willow Road interchange. Nipomo Regional Park is within 1,500 feet of the property's southwest corner.

The Project encompasses three parcels totaling approximately 288+/- acres and is undeveloped. It includes the +/- 275-acre western portion of the property, formerly referred to as Cañada Ranch, as well as two additional +/- 6.5-acre properties to the north that will provide access to Willow Road.

The development areas are listed in Table 2-1.

TABLE 2.1
DANA RESERVE LAND USE

HOUSING DEVELOPMENT NEIGHBORHOOD TOTALS ON GROSS SITE

LAND USE TOTALS

NBD	PRODUCT TYPE	LAND USE	LAND USE ACRES	% OF GROSS SITE	UNIT COUNT
1	MULTI-FAMILY	DR-MF	8.7	3.0%	173
2	MULTI-FAMILY	DR-MF	10.5	3.6%	210
3	CLUSTER	DR-SF2	16.9	5.9%	124
4	4,000,5000 SF LOT	DR-SF1	11.4	4.0%	72
5	4,000-5,000 SF LOT	DR-SF1	17.2	6.0%	104
6	4,000-5,000 SF LOT	DR-SF1	18.6	6.5%	114
7	4,500-8,700 SF LOT	DR-SF1	28.9	10.0%	157
8	5,000-8,600 SF LOT	DR-SF1	16.8	5.8%	62
9	4,500 SF - 10,000 SF LOT	DR-SF1	39.7	13.8%	198
SUBTOTAL:	-		168.7	58.6%	1,214
10	AFFORDABLE (6% MIN. REQ'D)	DR-MF	4.3	1.4%	75 MIN (72.84 REQ'D)
N/A	INTERNAL NEIGHBORHOOD ROADS[1]	-	-	-	-
N/A	POCKET PARKS (PARK)[1]	-	-	-	
N/A	PUBLIC RECREATION	DR-REC	11	3.8%	-
N/A	PRIMARY ROADS	-	21.9	7.6%	-
N/A	PARK AND RIDE[2]	-	-	-	-
N/A	RESIDENTIAL RURAL[3]	RR	10	3.5%	-
	TOTAL:		215.9	75%	1,289

*** ALL STATISTICS ARE APPROXIMATE**

COMMERCIAL TOTALS ON GROSS SITE

LAND USE TOTALS

	LAND USE	LAND USE ACRES	% OF GROSS SITE
FLEX COMMERCIAL	DR-FC	17.9	6.2%
VILLAGE COMMERCIAL	DR-VC	4.4	1.5%
TOTAL:		22.3	7.7%

OPEN SPACE ON GROSS SITE

LAND USE TOTALS

	LAND USE	LAND USE ACRES	% OF GROSS SITE
OPEN SPACE	DR-OS	49.8	17.3%
TOTAL:		49.8	17.3%

GROSS TOTAL ACREAGE OF SITE = 288 ACRES

* ALL STATISTICS ARE APPROXIMATE

3. URBAN WATER MANAGEMENT PLAN APPLICABILITY

Water Code Section 10910(c)(1) requires a determination of whether a project was included as part of the most recently adopted Urban Water Management Plan (U.W.M.P.). The N.C.S.D.'s most recently adopted U.W.M.P. was adopted on December 8, 2021, and provides a description of the service area, demographics, multi-source water supply, treatment, and conveyance/distribution facilities. The U.W.M.P. also includes historical and future water demand to serve the buildout of N.C.S.D. service areas and is generally consistent with the Future service areas / General plan buildout, which includes The Project. See Appendix 2, which shows the Project is within the District's LAFCo approved S.O.I. The U.W.M.P. identifies the project area known as "Dana Reserve" as "Annexations Under Review" and includes service to the Dana Reserve within Table 4-2 entitled, "Retail: Demands for Potable and Raw Water-Projected." Water service to the Dana Reserve is included in the evaluation of all water supply scenarios included within the U.W.M.P.

The Nipomo Community Services District 2020 Urban Water Management Plan (U.W.M.P.) includes policies related to present water demand and overall projected water demand. The U.W.M.P. also addresses water conservation, water resource availability, multi-source water supply, and recycled water.

The City of Santa Maria 2020 U.W.M.P. is referenced in section 5.2.1. of this report to illustrate the substantial water resources available to the City of Santa Maria to fulfill the terms of the agreement in support of the Nipomo Supplemental Water Project (N.W.S.P.).

4. WATER SUPPLY

Water Code Section 10910(b) requires the identification of the public water system that may serve the Project. The Nipomo Community Services District, formed in 1965, provides sewer, water, solid waste, and some street lighting, drainage, and landscape maintenance services and is the proposed water supplier for The Project.

4.1 Nipomo Supplemental Water Project

Before July 2015, groundwater was the sole source of water supply to the Nipomo Mesa. In 1999 a lawsuit was filed, which resulted in adjudication of the groundwater basin. All urban water purveyors and many landowners entered into a ***Stipulated Agreement*** to create a physical solution to sustain the groundwater basin. The Stipulated Agreement created the "Nipomo Mesa Management Area" (N.M.M.A.), which is an administrative management sub-area of the Santa Maria Groundwater Basin, to comply with the terms of the Stipulated Agreement.

The terms required preparation of a monitoring plan, preparation of an annual report on the conditions of the groundwater within the N.M.M.A., and the construction of a Supplemental Water Project by the N.C.S.D. to import water from the City of Santa Maria. The work consisted of a 24-inch diameter interconnect with the City of Santa Maria Water Distribution system under the Santa Maria River, a flow meter and flow control station, a pump station with a water storage tank, chloramination system, and related power, back-up power, controls and instrumentation systems, a pressure reducing station, and chloramination systems at five (5) existing N.C.S.D. production wells.

In July 2015, the first water was delivered to the N.C.S.D. via the purchase agreement between the N.C.S.D. and the City of Santa Maria, which is governed by the "Wholesale Water Supply Agreement" dated May 7, 2013. The agreement contains a minimum annual delivery volume of 2,500 acre-feet (A.F.Y.).

Water from the Nipomo Supplemental Water Project (N.S.W.P.) is distributed to water purveyors within the N.M.M.A per the "Supplemental Water Management and Groundwater Replenishment Agreement". The Stipulated Agreement requires a minimum import of 2,500 acre-feet/year (A.F.Y.) from the City of Santa Maria. In addition, the N.C.S.D. reserved an additional 500 AFY of supply water for infill development within the N.C.S.D. boundaries. The Wholesale Water Supply Agreement also contains a provision that allows the District to request an additional 3200 AFY of water for development.

The N.C.S.D. 2020 U.W.M.P. states**, "Based on the existing infrastructure of the N.S.W.P. and contractual obligations, between the District and the City, this water supply source is considered 100% reliable and is available during normal, single, and multiple dry year conditions."** Under an agreed to minimum delivery schedule**,** the N.C.S.D. is presently required to take deliveries of N.W.S.P. Beginning in the 2025-26 fiscal year, and throughout the remainder of the agreement with the City of Santa Maria, the N.C.S.D. is required to import a minimum of 2,500 AFY. A portion of the 2,500 AFY is distributed to other water purveyors within the N.M.M.A. The table below illustrates the quantity of the 2,500 AFY of N.W.S.P. water available to each water purveyor in the N.M.M.A. in the 2025-26 F.Y.

Table 4.1
NIPOMO SUPPLEMENTAL WATER PROJECT
TOTAL WATER AVAILABLE
PER PURVEYOR (2025-2026)

Purveyor	Contracted Delivery (A.F.Y.)	Additional Capacity (A.F.Y.)	Total (A.F.Y.)
NCSD	**1,668**	**500**	**2,168**
GSWC	208		208
Rural Water (G.S.W.C.)	208		208
Woodlands Mutual	416		416
Total	2,500	500	3,000

Note: This document only evaluates supply and demand for the N.C.S.D. and does not evaluate supply and demand for other water purveyors within the N.M.M.A.

4.2 Recycled Water Supply:

Currently N.C.S.D. operates two wastewater treatment facilities (W.W.T.F.) within the water service area. Southland W.W.T.F. collects and treats wastewater from much of the Nipomo Community Services District and discharges treated effluent back into the Santa Maria Groundwater Basin via percolation ponds. The percolation rates into the groundwater from these ponds are discussed in section 4.3 below.

The Blacklake W.W.T.F. is planned to be decommissioned in 2024. Once this plant is decommissioned, sewer from the Blacklake Sewer Service Area will be pumped to the Southland W.W.T.F. for treatment and disposal. Currently, the Blacklake W.W.T.F. treats wastewater through secondary treatment methods and discharges wastewater to the water hazards at Blacklake Golf Course. Water is extracted from the water hazards as necessary to irrigate the rough areas of 3 holes of the golf course adjacent to the W.W.T.F. Blacklake W.W.T.F. operates under Reclamation Orders from Regional Water Quality Control Board. N.C.S.D. does not provide recycled water to any other users.

Proposed recycled water line: As part of the future development, there have been discussions about using recycled water for irrigation of the parks and streetscapes within The Project. To accomplish this option, and in cooperation with N.C.S.D., a new **recycled water line** would be installed. The recycled waterline could also provide recycled water for irrigation to the Nipomo High School sports fields and the Nipomo Regional Park.

The proposed alignment of the recycled waterline is preliminarily planned from the Southland W.W.T.F. crossing under U.S. Highway 101 at Southland Street, traveling northerly (2.5 miles) under Oakglen Avenue, and then crossing underneath State Route 101 immediately north of Nipomo High School to serve The Project.

The Project would contribute funding to this future recycled waterline project except for any pumping, additional wastewater treatment at the Southland W.W.T.F., and the crossings under 101. Utilizing existing water use for landscaping at Nipomo High School, the Nipomo Regional Park, and projected recycled water use for The Project, see Table 7-1, produces the following recycled water quantities that would offset current and future water use:

TABLE 4.2
RECYCLED WATER QUANTITIES

Location	Recycle Water (A.F.Y.)
Nipomo High School	43
Nipomo Regional Park	92
The Project (Public and Commercial Landscaping)	37.8
Total	**172.8 AFY**

If the District determines that the Recycled Waterline is not cost-effective, the District may utilize the funds provided by the Project to enhance the N.S.W.P.

4.3 Return Flows

Wastewater recharged into the underlying groundwater basin is referred to as "return flows." The N.M.M.A. 11th Annual Report identifies present Wastewater Discharge and Reuse quantities in the N.M.M.A. The Annual Report identifies 2018 wastewater flows to the Southland W.W.T.F. at 585.66 AFY. Accounting for losses due to solids removal and evaporation from the settling ponds, the amount identified for infiltration back into the groundwater basin was 512 AFY. The 512 AFY represents a thirteen percent (13%) loss from the original influent value of 585.66 AFY. Wastewater flows from The

Project will be conveyed to the Southland W.W.T.F. and consist of the following projected quantities:

TABLE 4.3
WASTEWATER FLOWS FROM THE DANA RESERVE

Residential	197.5AFY
Commercial	37.4 A.F.Y.
Park	5.5 A.F.Y.
Total	**240.50 AFY**

Adding the 240.5+/- AFY flow to the existing flow to the Southland WWTF 585.66 AFY results in projected total inflow to the Southland W.W.T.F. of 826.2 AFY. Reducing this total inflow number by the thirteen percent (13%) in losses results in **projecting total inflow to the basin (return flows) for a recharge of approximately 719 AFY.**

4.4 Water Use Reduction:

As required in the Stipulated Agreement, the N.C.S.D. has dramatically reduced overall water demand and significantly reduced its reliance on groundwater through the importation of N.S.W.P. water. The Stage IV water severity condition that the N.M.M.A. is presently in requires that groundwater deliveries be reduced by fifty percent from average production in 2009 through 2013 of 2,533.4 AFY or 1,266.7 AFY.

The Water Production Summary Table (shown below) shows that from 2009 to 2019, the N.C.S.D. reduced its pumping demand on the groundwater basin from **2,560 AFY to 901 AFY**, a sixty-five percent (65%) reduction in groundwater production. The 901 AFY of groundwater production is significantly lower than the requested 1,266.7 AFY production level requested under the Stage IV water severity condition. The Water Production Summary, table below, illustrates both the reduction in total water demand and the reduction in groundwater production since 2009.

TABLE 4.4
NIPOMO COMMUNITY SERVICES DISTRICT
WATER PRODUCTION SUMMARY

Production Values from NMMA Annual Report	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Groundwater (AF/Y)	2560	2370	2488	2572	2646	2224	1626	1078	999	1,003	901
Supplemental Water (AF/Y)	0	0	0	0	0	0	321	759	941	959	967
Total Water Produced AF/Y)	2560	2370	2488	2572	2646	2224	1947	1837	1940	1,962	1868
Number of accounts (Mgr's Report)							4325	4368	4402	4434	4441
Annual Use per Account (Acre-Foot per Account)							0.45	0.42	0.44	0.44	0.42
Avg Use per Account 2015-19 (AF per Account)											0.43

From the “Water Production Summary Table” above, the average annual water use per meter for the last five years is 0.43 AFY per meter. The N.C.S.D. assigns projected meter use for each water meter based on average water use for the period from 2009 through 2013. The N.C.S.D. Monthly Manager’s Reports cite this average use per water meter as 0.53 AFY as established by District Resolution 2015-

1372. The amount of water determined to meet the water demands of infill development (500 AFY) was established in the March 2009 EIR for the N.S.W.P.

The table below summarizes the use per water meter values and clearly illustrates the reduced use per water meter that the N.C.S.D. has achieved.

TABLE 4.5
NIPOMO COMMUNITY SERVICES DISTRICT
WATER USE PER METER

Period	Water Use Per Meter (A.F.Y.)
Average 2009 through 2013	0.53
Average for years 2015 through 2019	0.43

4.5 Total Water Supply

To maintain the operation of N.C.S.D.'s well field, a minimum of 600 AFY should be pumped from the groundwater basin. The Stage IV water severity condition that the N.M.M.A. is presently in requests that groundwater deliveries be reduced by fifty percent from average production in 2009 through 2013 of 2,533.4 AFY or 1,266.7 AFY.

The groundwater available combined with the N.S.W.P. water available, Table 4.1, identifies the total N.S.W.P. water available to the N.C.S.D. The table below specifies the total water production given N.S.W.P. water and a range in groundwater production given minimum groundwater production (600 AFY) and the fifty percent reduction (1,267 AFY).

TABLE 4.6
NIPOMO COMMUNITY SERVICE DISTRICT
TOTAL WATER SUPPLY

Water Source	Min. Groundwater	Fifty Percent G.W.
Supplemental Water Project	2,168 AFY	2,168 AFY
Groundwater	600 AFY	1,267 AFY
Total	**2,768 AFY**	**3,435 AFY**

5 WATER RESOURCE AVAILABILITY AND RELIABILITY

5.1 Water Resource Availability

The January 2020 District Manager's Report indicates that there are 403.7 acre-feet of the 500 AF to be allocated. Table 4.4 above illustrates the reduction in water use per water meter. Comparison of these values, as noted in the calculations below, are utilized to project the total N.C.S.D. water demand, including infill.

Projected Water Required to Supply Water for Complete Infill of District Boundaries

Present Water Use + (Remaining water from 500 AF) x (present use/adopted use) =

1,900 AF + (403.7 AF) x (0.43 AF per account/0.53 AF per account) = 2,227.5 AFY or approximately 2,230 AFY

Total Unallocated Water

The difference between the amount of water available and the amount of water required to service total "infill" within the District boundaries is water presently unallocated and available to the N.C.S.D. for allocation to projects outside of present N.C.S.D. boundaries. Since there is a range in potential demand numbers and potential water available, there is a range of values for unallocated water.

The highest amount of unallocated water is a result of the difference between the highest available water and the lowest water demand. The smallest amount of unallocated water is the difference between the lowest water available value and the highest infill water demand value. This range is represented below:

TABLE 5.1
UNALLOCATED WATER
RANGE OF VALUES

	Lowest Water Available (AF/Y)	Highest Water Available (AF/Y)
Water Available	2,768	3,435
Water Demand Including Infill	2,230	2,230
Water Available to Serve Project	538	1,205

5.2 Water Reliability

The N.C.S.D. relies on N.S.W.P. water and groundwater as its two primary water sources. The N.C.S.D. 2020 U.W.M.P. identifies water demand of the "The Project" as the original baseline water requirements, without updated demands for projected Accessory Dwelling Units's (ADU's) of 21.4 AFY, as 352 AFY. Table 7.4 from the U.W.M.P. illustrates the most severe water supply scenario of multiple dry years. The table illustrates that in the year 2045 and in the fifth successive year of drought, the water supply exceeds the water demand by 440 AF.

5.2.1 Nipomo Supplemental Water Project

The N.C.S.D. 2020 U.W.M.P. states, "Based on the existing infrastructure of the N.S.W.P. and contractual obligations, between the District and the City, this water supply source is considered 100% reliable and is available during normal, single, and multiple dry year conditions."

Table 5.2 below, Table 7.5 of the City of Santa Maria 2020 U.W.M.P., identifies the amount of water available in 2045 under the most extreme water supply condition as 25,180 AF. The water demand identified in this table, inclusive of water sales to the N.C.S.D., is 18,716 AF. Table 5.2, see below, is Table 7.5 from the City of Santa Maria U.W.M.P., and identifies water demand and water supply for multiple dry years. **This table clearly illustrates that the water supply available to the City of Santa Maria, under the worst-case scenario, exceeds the projected water demand by 6464 AF or thirty-five percent.**

TABLE 5.2
CITY OF SANTA MARIA PROJECTED
DEMAND AND SUPPLY IN MULTIPLE DRY YEARS
(WORST CASE SCENARIO)

Table 7-5: Comparison of Projected Supply and Demand for Multiple-Dry Years

		2020	2025	2030	2035	2040	2045
First year	Supply totals	28,715	29,189	29,662	30,136	30,610	31,084
	Demand totals	13,244	15,026	17,247	17,869	18,490	18,716
Second year	Supply totals	30,220	29,605	28,989	28,374	27,758	27,143
	Demand totals	13,244	15,026	17,247	17,869	18,490	18,716
Third year	Supply totals	27,921	27,169	26,417	25,665	24,913	24,161
	Demand totals	13,244	15,026	17,247	17,869	18,490	18,716
Fourth year	Supply totals	30,131	30,126	30,121	30,116	30,111	30,106
	Demand totals	13,244	15,026	17,247	17,869	18,490	18,716
Fifth year	Supply totals	25,180	25,180	25,180	25,180	25,180	25,180
	Demand totals	13,244	15,026	17,247	17,869	18,490	18,716
	NOTES: Units of volume in acre-feet Revisions to fifth year demand values per email with City of S.M., Director of Utilities						

5.2.2 Groundwater Reliability

As referenced in prior sections of this report, the Stipulated Agreement established physical solutions to ensure the viability of the groundwater basin. The physical solution is addressed more fully in various sections of the report. A significant factor in the physical solution is the N.W.S.P. which replaces groundwater with imported water. Portions of the N.W.S.P. are completed and approximately 900 AFY is presently being delivered to the N.C.S.D. The N.W.S.P. will be improved to deliver the 2,500 AFY by 2025-26 FY as required by contract between the City of Santa Maria and the N.C.S.D.

Additional basin management measures include:

1. Development of a groundwater monitoring plan. The N.M.M.A. technical group has adopted and implemented a groundwater monitoring program

2. Preparation of an annual report by the Technical Group of the N.M.M.A. That shall include the following:

   a. Summarize the results of the groundwater monitoring program.
   b. Changes in groundwater supplies.
   c. Identify threats to groundwater supplies.
   d. Tabulation of management area water use as identified below:
      i. Imported water availability and use
      ii. Return flow availability and use
      iii. Groundwater availability and use

   In April of 2021, the N.M.M.A. filed the latest annual report entitled," Nipomo Mesa Management Area, 13th Annual Report, Calendar Year 2020."

3. Severe Water Shortage Response Plan - Technical Group has developed a Severe Water Shortage Response plan that establishes criteria to define potentially severe and severe water conditions. The stipulating parties are coordinating efforts to implement voluntary conservation measures and adopt programs to increase the supply of Nipomo Supplemental Water. As noted throughout this report, the N.C.S.D. has significantly reduced its use of groundwater to 900 AFY in 2018.

4. New Urban Water Uses – New urban uses within the sphere of influence or service area are required to attempt to obtain water service from the local water supplier. The local public water supplier shall provide service on a reasonable and non-discriminatory basis. The N.C.S.D. has implemented an N.S.W.P. fee to be paid by each new water meter connection.

6. WATER USAGE

Current water use provided by N.C.S.D. includes single-family, multi-family, commercial (including institutional and industrial), landscape and irrigation customers. As reported in the 2020 Urban Water Management Plan, the total water demand for the N.C.S.D. in 2020 was 2050(+/-) A.F.

6.1 Water Conservation Program:

Section 4.4 of this report entitled "Water Use Reduction" provides considerable data illustrating the reduction in water use by the District. For the 2019 Calendar Year, the District pumped 901 AF of groundwater. As described earlier, the 901 AFY of groundwater production is a 64.4 percent reduction in pumping from the 2,533.4 AFY baseline groundwater production value. This significant reduction in groundwater pumping was accomplished by the implementation of water conservation strategies and the importation of N.S.W.P. water.

In 2009, Senate Bill X7-7 was passed requiring water agencies to reduce per capita water use by 25% by the year 2020. N.C.S.D. has complied with the Memorandum of Understanding (M.O.U.) regarding Urban Water Conservation, which was a negotiated agreement between water purveyors statewide and environmental organizations on how best to utilize the State's water resources by incorporating conservation into their water management practices. The N.C.S.D. has actively pursued the implementation of the water efficiency best management practices (B.M.P.s) prescribed in the Memorandum of Understanding M.O.U. The B.M.P.s have been developed *over* the years by water purveyors, environmental groups, and industry stakeholders.

These B.M.P.'s are identified in the District's 2020 Urban Water Management Plan as Demand Management Measures and include:

- A plumbing retrofit program requiring the installation of low flow fixtures before the sale of property
- Other - Customers must repair leaks, breaks, and malfunctions in a timely manner
- Landscape - Restrict or prohibit runoff from landscape irrigation
- Landscape - Limit landscape irrigation to specific times
- Pools and Spas - Require covers for pools and spas
- Prohibit use of potable water for washing hard surfaces
- Prohibit use of potable water for construction and dust control
- Conservation Pricing

Further reduction in groundwater pumping is reliant on the District's ability to import more N.S.W.P. water and demand reduction through continued conservation efforts. Increasing the amount of N.S.W.P. the District can deliver is dependent on two items:

- Completion of the infrastructure for the N.S.W.P. to deliver more than 1,000 AFY
- Revenues of substantial value to pay the City of Santa Maria for the wholesale water supply

7. ENTITLEMENTS/REGULATORY APPROVALS

Water Code Section 10910(d)(2) requires the identification of existing water supply entitlements, water rights, or water service contracts, federal, state, and local permits for construction of necessary infrastructure, and any regulatory approvals required to be able to deliver the water supply. The entitlements for N.C.S.D. are described above in the section describing water supply and water usage.

8. DANA RESERVE SPECIFIC PLAN PROJECT

The Dana Reserve Specific Plan is a master-planned neighborhood development comprised of a mix of uses. Table 8-1 was developed to project Dana Reserve Specific Plan's water demand using the water use factors from the U.W.M.P., City of Santa Barbara and/or San Luis Obispo County if there was not a direct water usage factor listed in the 2015 U.W.M.P. Using these water demand factors shows that the total estimated water use for the Dana Reserve Specific Plan would be 387 (+/-) A.F.Y.

It should be noted that the County of San Luis Obispo County has projected an estimated **153** Accessory Dwelling Units (A.D.U.) have the potential to be built with the development of this project. The calculated water demand as shown in table 8.1 estimates the water demand for the project to be 387 +/- A.F.Y. which includes a 10% contingency or 35.2 A.F.Y. This contingency will cover the projected water demand for 153 A.D.U.s assuming a conservative 0.14 ac-ft/year-unit water demand factor which is the same for a townhome.

153 units * 0.14 ac-ft/year-unit = 21.42 ac-ft

21.42 ac-ft < 35.2 ac-ft = ok

TABLE 8.1
DANA RESERVE SPECIFIC PLAN
WATER DEMAND

Type of Usage	Units	gal/unit-day	Acreage	Demand (A.F.Y.)
Residential				
Condominiums	173	114		22.14
Townhomes	210	129		30.24
Small Lot SFR (Lot size< 5,000 sq. ft.)	571	186		118.77
Medium Lot SFR (Lot size > 5,000 and < 7,000	260	300		87.36
Multifamily	75	129		10.84
Total Residential				**269.35**
Commercial + Daycare				
Commercial Bldg (1/3 parking, 1/3 bldg, 1/3 landscaping) source S.B. City Planning		0.136 AF per 1000 sq ft	7.65	45.36
Commercial Landscaping (1AF/Acre)		1 A.F./Acre	7.65	7.66
Parking		0	7.65	0
Total Commercial			**22.95**	**53.02**
Public		A.F./Acre		
Public Park		1	11	11
Neighborhood Parks		1	12	12
Streetscape/Parkways		1	6.5	6.5
Total Public				**29.5**
Grand Subtotal				
Residential				269.35
Commercial				53.02
Public				29.50
Subtotal				351.87
10% Contingency				35.18
Total				**387.01**

** Water usage factors used in the table above are derived from the following sources: 2020 N.C.S.D. Urban Water Management Plan (U.W.M.P.), The City of Santa Barbara and the County of S.L.O. were used if there wasn't a direct water usage factor listed in the 2015 U.W.M.P. for each land use designation. The water demand usage factors have been reduced by the mandated 20% as described in the 2020 U.W.M.P.*

Table 8-1 shows a summary of the project water demands under each land use area of the proposed site.

9. CONCLUSION

The annual water demand for The Project is approximately 387 AFY, see Table 8-1. It should be noted that available water to serve development outside of the present District boundaries ranges from 538 AFY to 1205 AFY, see Table 5.1. Assuming the unallocated water to serve areas outside the present N.C.S.D. boundary is **the very conservative value of 538 AFY per year**, then there is more than sufficient water available to meet or exceed the needs of The Project.

This conclusion does not include credits for return flows from this Project, potential development of recycled water as discussed in this document or future implementation of new state law requirements to reduce water use.

This conclusion was determined based on this Water Supply Assessment and supporting information in the N.C.S.D. records.

10. REFERENCES

Nipomo Community Services District 2020 Urban Water Management Plan. Final December 2021, prepared by MKN & Associates

City of Santa Maria 2020 U.W.M.P. Final June 2021, prepared by Provost and Pritchard

Nipomo Mesa Management Area, 13th annual report, calendar year 2020, prepared by N.M.M.A. Technical Group.

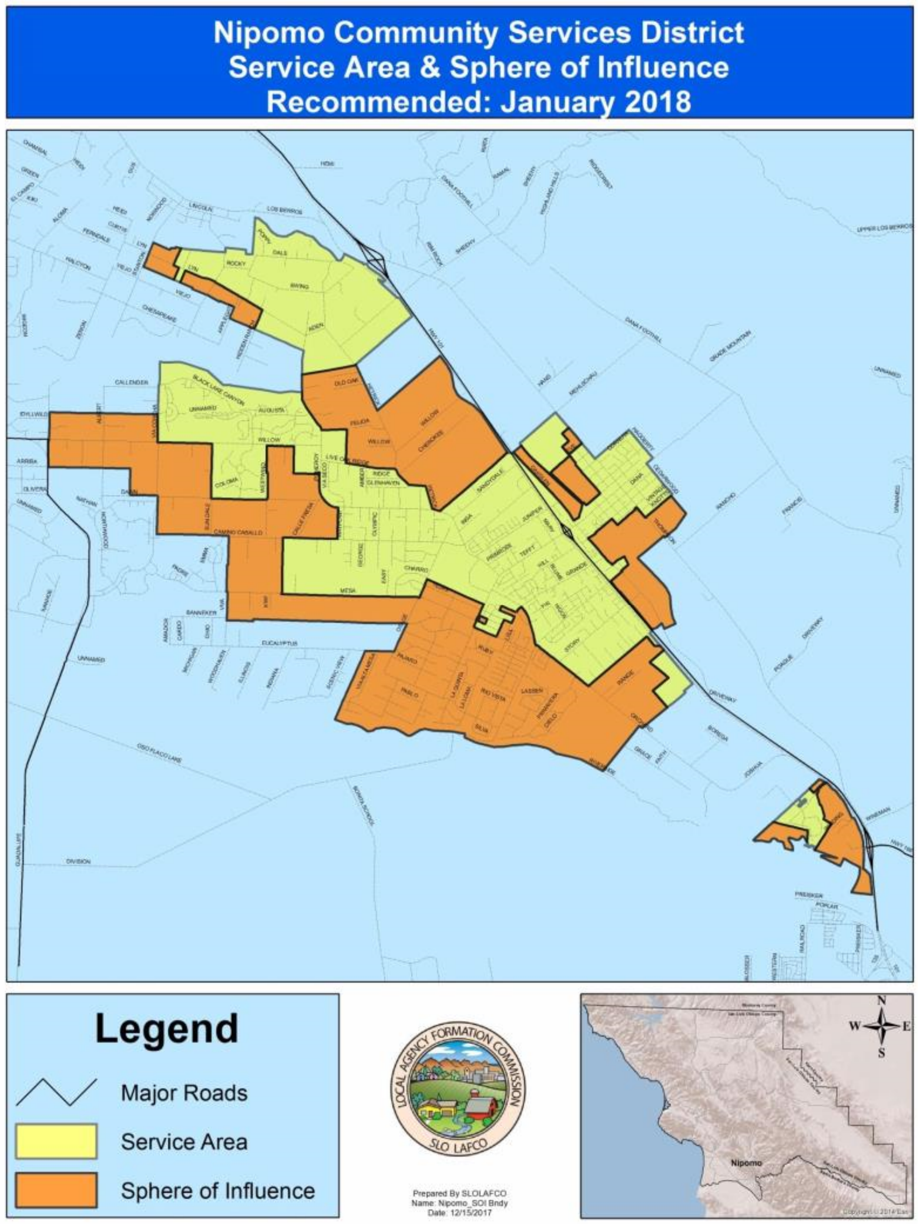
Nipomo Community Services District Resolution No, 2015-1372

Nipomo Mesa Management Area T.G. Well Management Plan

District Managers Report, N.C.S.D. meeting minutes

Appendix 1: N.C.S.D. Service Area and Sphere of Influence

Figure 1-1 – Recommended Sphere of Influence



Appendix 2: Dana Reserve Land Use Plan

DANA RESERVE

LAND USE & PUBLIC ROADS

GROSS LAND USE TOTALS

COLOR	LAND USE	ACRES	%
	RESIDENTIAL MULTI-FAMILY (DR-MF)	23.5	8.2%
	RESIDENTIAL SINGLE FAMILY- TRADITIONAL (DR-SF1)	132.6	46.0%
	RESIDENTIAL SINGLE FAMILY (DR-SF2)	16.9	5.9%
	RECREATION (DR-REC)	11.0	3.8%
	PRIMARY ROADS	21.9	7.6%
	RURAL RESIDENTIAL (RR) - EXISTING	10	3.5%
	RESIDENTIAL SUBTOTAL:	215.9	75%
	FLEX COMMERCIAL (DR-FC)	17.9	6.2%
	VILLAGE COMMERCIAL (DR-VC)	4.4	1.5%
	COMMERCIAL SUBTOTAL:	22.3	7.7%
	OPEN SPACE (DR-OS)	49.8	17.3%
	TOTAL:	288	100%

GROSS TOTAL ACREAGE OF SITE = 288 ACRES

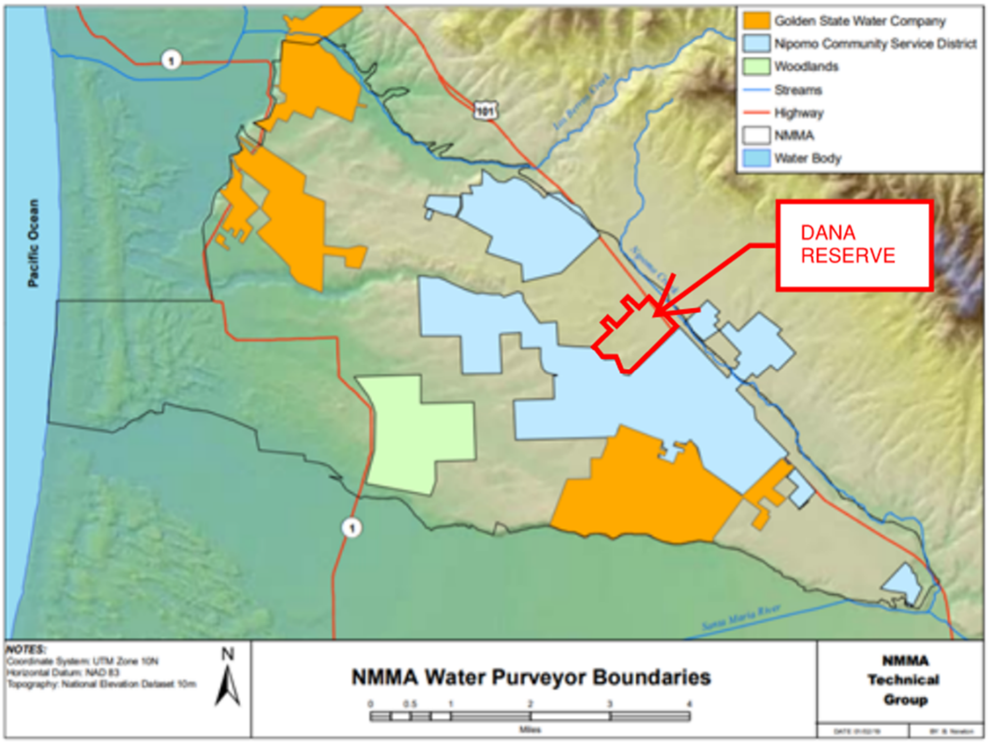
* ALL STATISTICS ARE APPROXIMATE

N

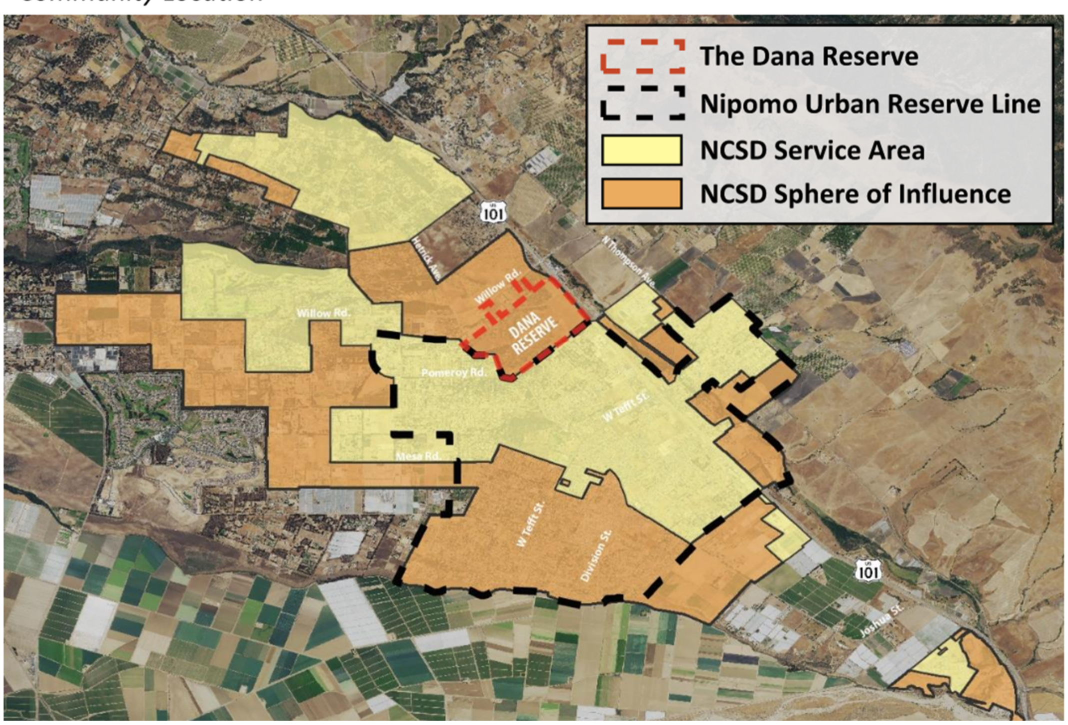
rrm design group

V.30 - October 7, 2021

Appendix 3: Dana Reserve location relative to N.C.S.D. Service Area and other local water suppliers



Community Location



APPENDIX I

Noise Background Information

Noise Impact Assessment for Dana Reserve Specific Plan

NOISE IMPACT ASSESSMENT

FOR

DANA RESERVE SPECIFIC PLAN

NIPOMO, CA

FEBRUARY 2022

PREPARED FOR:

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A. Ambient Noise Monitoring Surveys
B. Noise Modeling & Supportive Documentation

INTRODUCTION

This report discusses the existing noise setting and identifies potential noise impacts associated with the implementation of the proposed Dana Reserve Specific Plan Project (project). Noise mitigation measures are recommended where the predicted noise levels would exceed applicable noise standards.

PROJECT OVERVIEW

The proposed Dana Reserve Specific Plan will provide a combination of land uses that include residential uses, flex commercial uses, open space, trails, and a public neighborhood park within an approximately 300-acre specific plan area. The plan will include 1,291 residential dwelling units (comprised of 833 single-family units and 458 multi-family units), between 110,000-203,00 square feet of commercial space, and 49.8 acres of open space for recreation. The project site is located in the southern portion of San Luis Obispo County, this property is immediately north of the Urban Reserve Line of the Nipomo community. It is bounded by Willow Road and Cherokee Place to the north, existing residential ranchettes to the south and west and U.S. Highway 101 to the east. The proposed Dana Reserve Specific Plan is depicted in Figure 1.

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration.

Amplitude

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. For example, a 65 dB source of a sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person.

Frequency

Frequency is the number of fluctuations in the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to the sound of different frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, the environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA. Common community noise sources and noise levels are depicted in Figure 2.

Addition of Decibels

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces a sound level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

Figure 1. Proposed Dana Reserve Specific Plan & Nearby Land Uses

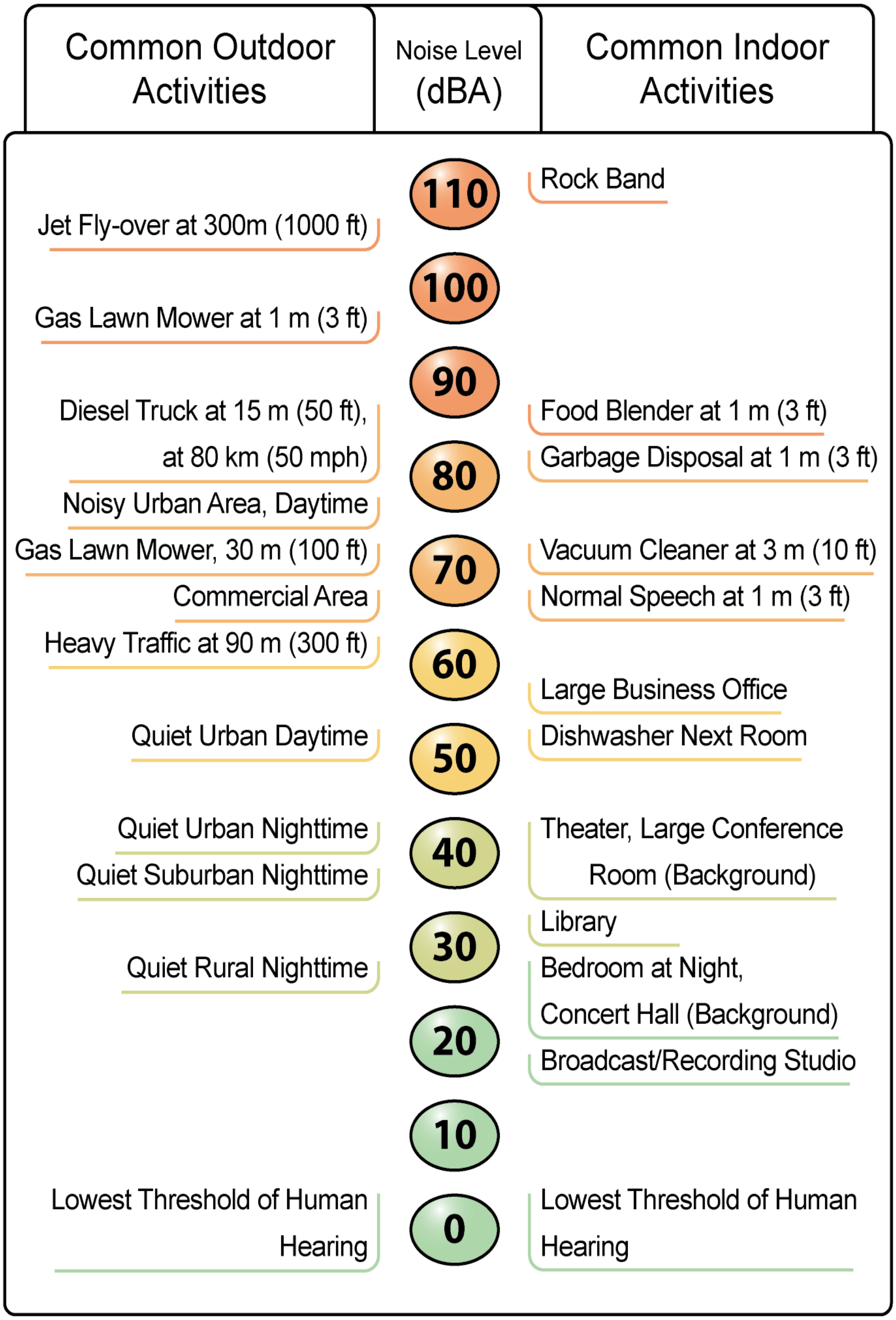
Not to Scale.

Sound Propagation & Attenuation

Geometric Spreading

The sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level decreases (attenuates) at a rate of approximately 6 decibels for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 decibels for each doubling of distance from a line source, depending on ground surface characteristics. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between a line source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation for soft surfaces results in an overall attenuation rate of 4.5 decibels per doubling of distance from a line source.

Figure 2. Common Noise Levels



Source: Caltrans 2012

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in an approximate 5 dB of noise reduction. Taller barriers provide increased noise reduction.

Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the sound-pressure level in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, which is referred to as the "A-weighted" sound level (expressed in units of dBA). The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted noise scale. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are typically used. For the evaluation of environmental noise, the most commonly used descriptors are L_{eq}, L_{dn}, and CNEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA "penalty" added for nighttime noise (10 p.m. to 7 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7 p.m. to 10 p.m.) Common noise descriptors are summarized in Table 1.

Table 1. Common Acoustical Terms and Descriptors

Descriptor	Definition
Decibel (dB)	A unit-less measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to referenced sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Energy Equivalent Noise Level (L_{eq})	The energy means (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value (in dBA) is calculated.
Minimum Noise Level (L_{min})	The minimum instantaneous noise level during a specific period of time.
Maximum Noise Level (L_{max})	The maximum instantaneous noise level during a specific period of time.
Day-Night Average Noise Level (DNL or L_{dn})	The 24-hour L_{eq} with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours to account for increased sensitivity to noise during these hours.
Community Noise Equivalent Level (CNEL)	The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated Ldn.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted: the so-called "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. Regarding increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans;
- Outside of the laboratory, a 3-dB change is considered a just-perceivable difference;
- A change in the level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial;
- A 10-dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Speech Communication

For most noise-sensitive land uses, an interior noise level of 45 dB L_{eq} is typically identified for the protection of speech communication in order to provide for 100-percent intelligibility of speech sounds. Assuming an average 20-dB reduction in sound level between outdoors and indoors (which is an average amount of sound attenuation that assumes windows are closed), this interior noise level would equate to an exterior noise level of 65 dBA L_{eq}. For outdoor voice communication, an exterior noise level of 60 dBA L_{eq} allows normal conversation at distances up to 2 meters with 95 percent sentence intelligibility (U.S. EPA 1974.) Based on this information, speech interference begins to become a problem when steady noise levels reach approximately 60 to 65 dBA. Within more noise-sensitive interior environments, such as educational facilities and places of worship, an average-hourly background noise level of 45 dBA L_{eq} is typically recommended.

Annoyance & Sleep Disruption

With regard to potential increases in annoyance, activity interference, and sleep disruption, land use compatibility determinations are typically based on the use of the cumulative noise exposure metrics (i.e., CNEL or L_{dn}). Perhaps the most comprehensive and widely accepted evaluation of the relationship between noise exposure and the extent of annoyance was one originally developed by Theodore J. Schultz in 1978. In 1978 the research findings of Theodore J. Schultz provided support for L_{dn} as the descriptor for environmental noise. Research conducted by Schultz identified a correlation between the cumulative noise exposure metric and individuals who were highly annoyed by transportation noise. The Schultz curve, expressing this correlation, became a basis for noise standards. When expressed graphically, this relationship is typically referred to as the Schultz curve. The Schultz curve indicates that approximately 13 percent of the population is highly annoyed at a noise level of 65 dBA L_{dn}. It also indicates that the percentage of people describing themselves as being highly annoyed accelerates smoothly between 55 and 70 dBA L_{dn}. A noise level of 65 dBA L_{dn} is a commonly referenced dividing point between lower and higher rates of people describing themselves as being highly annoyed.

The Schultz curve and associated research became the basis for many of the noise criteria subsequently established for federal, state, and local entities. Most federal and state of California regulations and policies related to transportation noise sources establish a noise level of 65 dBA CNEL/L_{dn} as the basic limit of acceptable noise exposure for residential and other noise-sensitive land uses. For instance, with respect to aircraft noise, both the Federal Aviation Administration (FAA) and the State of California have identified a noise level of 65 dBA L_{dn} as the dividing point between normally compatible and normally incompatible residential land use generally applied for the determination of land use compatibility. For noise-sensitive land uses exposed to aircraft noise, noise levels in excess of 65 dBA CNEL/L_{dn} are typically considered to result in a potentially significant increase in levels of annoyance.

Allowing for an average exterior-to-interior noise reduction of 20 dB, an exterior noise level of 65 dBA CNEL/L_{dn} would equate to an interior noise level of 45 dBA CNEL/L_{dn}. An interior noise level of 45 dB CNEL/L_{dn} is generally considered sufficient to protect against long-term sleep interference (U.S. EPA, 1974.) Within California, the California Building Code establishes a noise level of 45 dBA CNEL as the maximum acceptable interior noise level for residential uses (other than detached single family dwellings). Use of the 45 dBA CNEL threshold is further supported by recommendations provided in the State of California Office of Planning and Research's *General Plan Guidelines*, which recommend an interior noise level of 45 dB CNEL/L_{dn} as the maximum allowable interior noise level sufficient to permit "normal residential activity" (OPR 2017).

The cumulative noise exposure metric is currently the only noise metric for which there is a substantial body of research data and regulatory guidance defining the relationship between noise exposure, people's reactions, and land use compatibility. However, when evaluating environmental noise impacts involving intermittent noise events, such as aircraft overflights and train pass by, the use of cumulative noise metrics may not provide a thorough understanding of the resultant impact. The general public often finds it difficult to understand the relationship between intermittent noise events and cumulative noise exposure metrics. In such instances, supplemental use of other noise metrics, such as the L_{eq} or L_{max} descriptor, are sometimes used as a means of increasing public understanding regarding the relationship between these metrics and the extent of the resultant noise impact.

EXISTING SETTING

Noise-Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Noise-sensitive land uses in the project vicinity consist predominantly of residential land uses. The nearest residential land uses are located adjacent to the western, southern, and northern project site boundary. Nearby residential land uses are depicted in Figure 1.

Ambient Noise Environment

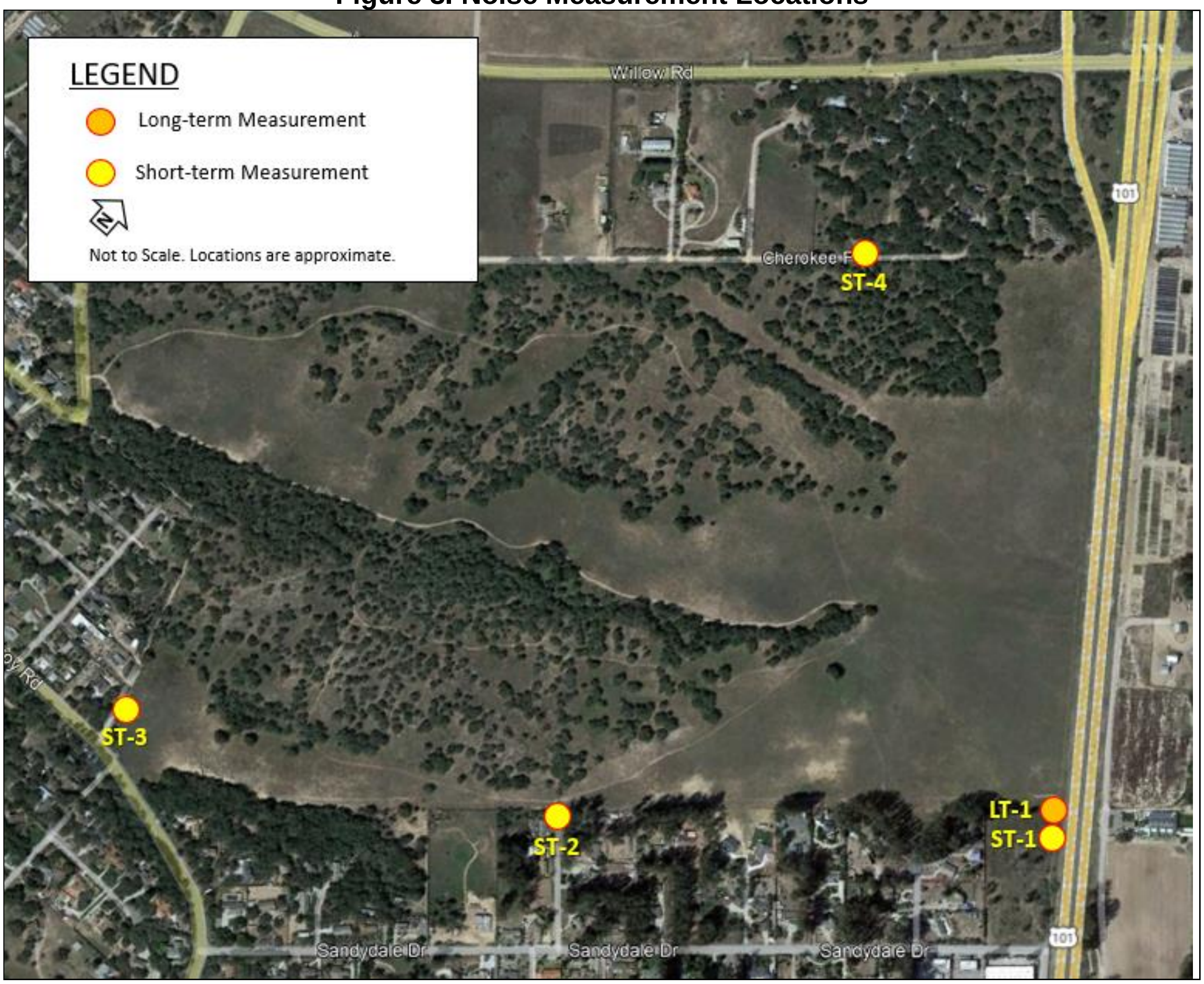
To document the existing noise environment in the project vicinity, four short-term (i.e., 10-minutes) noise measurements and one continuous long-term (i.e., 21 hour) noise measurements were conducted. Ambient noise measurement surveys were conducted on November 15 - 16, 2021, using a Larson Davis LxT Type I sound-level meter. Measured short-term noise measurements are summarized in Table 2. As noted in Table 2, measured short-term daytime average-hourly noise levels in the project area generally range from approximately 41.3 dBA L_{eq} to approximately 70.3 dBA L_{eq}. Measured ambient noise levels in the vicinity of the project site were predominantly influenced by vehicle traffic on U.S. Highway 101 and area roadways.

Table 2. Summary of Measured Short-Term Ambient Noise Levels

Monitoring Location	Monitoring Period	Monitoring Location	Noise Level (dBA)	
			L_{eq}	L_{max}
ST-1	10/16/2021 14:14-13:14	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	65.5	84.3
ST-1	10/15/2021 11:13-11:23	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	70.3	77.4
ST-2	10/15/2021 11:40-11:50	Southern boundary of project site on Cory Way, approximately 212 yards north of Sandydale Dr.	41.3	57.9
ST-3	10/15/2021 11:56-12:06	West side of project, on Hetrick Ave., approximately 56 yards north of Pomeroy Rd.	56.6	66.6
ST-4	10/15/2021 12:24-12:34	North side of project, on Cherokee Pl., approximately 306 yards south of Willow Rd.	44.3	65.4

Noise measurement surveys were conducted on November 15th and November 16st, 2021 using a Larson Davis Laboratories, Type I, Model 820 integrating sound-level meter positioned at a height of approximately 5 feet above ground level. Refer to Figure 3 for noise measurement locations.
Refer to Figure 3 for measurement locations.

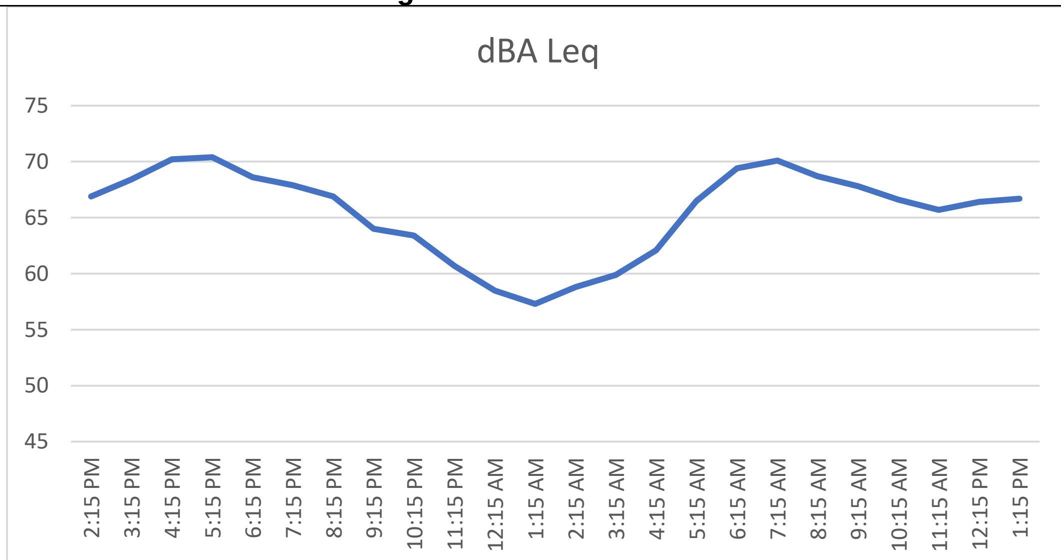
Figure 3. Noise Measurement Locations



Refer to Table 2 for noise measurement data.

In addition to the short-term noise measurement surveys, a long-term (24-hour) noise measurement was conducted near the southeastern boundary of the project site, approximately 33 yards from the median of U.S. Highway 101. Noise levels at this location were primarily affected by vehicle traffic on U.S. Highway 101. Measured long-term noise levels are summarized in Table 3. As noted in Table 3, measured average-hourly noise levels ranged from approximately 57.3 dBA L_{eq} during the nighttime hours to approximately 70.4 dBA L_{eq} during the daytime hours. Measured nighttime noise levels were approximately 13 dBA lower than the highest measured daytime noise level.

Table 3. Long-Term Noise Measurement Data



Hour Beginning	Average (dBA L_{eq}[h])	Difference from Loudest Hour (dB)
14:15	66.9	-3.5
15:15	68.4	-2
16:15	70.2	-0.2
17:15	**70.4**	0
18:15	68.6	-1.8
19:15	67.9	-2.5
20:15	66.9	-3.5
21:15	64.0	-6.4
22:15	63.4	-7
23:15	60.7	-9.7
0:15	58.5	-11.9
1:15	57.3	-13.1
2:15	58.8	-11.6
3:15	59.9	-10.5
4:15	62.1	-8.3
5:15	66.5	-3.9
6:15	69.4	-1
7:15	70.1	-0.3
8:15	68.7	-1.7
9:15	67.8	-2.6
10:15	66.6	-3.8
11:15	65.7	-4.7
12:15	66.4	-4
13:15	66.7	-3.7

Note: Highest hourly noise level is bolded.
Noise measurements were conducted on November 15-16, 2021 using a Larson Davis LxT Type I sound-level meter.
Refer to Figure 3 for measurement locations.

Existing Traffic Noise Levels

As noted above, vehicle traffic on area roadways is the primary source of noise in the project area. Calculated existing traffic noise levels at 50 feet from the near-travel-lane centerline and distances to existing noise contours for area roadways are summarized in Table 4. As shown in Table 4, existing traffic noise levels along nearby roadways range from approximately 61.8 to 66.9 dBA CNEL/L_{dn} at 50 feet from the near-travel-lane centerline.

Table 4. Predicted Existing Traffic Noise Levels

Roadway Segment	Noise Level (dBA CNEL)				
	at 50 Feet from Near-Travel-Lane Centerline	Distance (Feet) to CNEL/L_{dn} Contours From Roadway Centerline			
		70	65	60	55
Willow Rd., State Route 1 to Pomeroy Rd.	68.0	WR	88.8	191	411.2
Willow Rd., Pomeroy Rd.to Hetrick Ave.	67.6	WR	83.5	179.4	386.3
Willow Rd., Hetrick Ave. to U.S. Highway 101 SB Ramp	68.9	WR	101.6	218.5	470.6
Willow Rd., U.S. Highway 101 SB Ramp to NB Ramp	65.2	WR	70.3	147.4	315.6
Pomeroy Rd., Willow Rd. to SW Project Entry	63.4	WR	WR	93.3	200.6
Pomeroy Rd., SW Project Enter to Tefft St.	64.5	WR	51.8	111	238.8
Tefft St., Pomeroy Rd. to Mary Ave.	66.9	WR	96.4	202.8	434.5
Tefft St., Mary Ave. to U.S. Highway 101 SB Ramp	65.6	WR	79.2	164.8	352.1
Tefft St., U.S. Highway 101 SB Ramp to NB Ramp	65.3	WR	83.9	170.9	363.3
Mary Ave., Tefft St. to Juniper St.	61.8	WR	WR	77.9	166.8
N. Thompson Ave., South of Willow Rd.	66.4	WR	69.4	149	320.7
Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared for this project. WR = Within Road Right-of-Way					

Groundborne Vibration

No major existing sources of groundborne vibration were identified in the project area. Vehicle traffic on area roadways, particularly heavy-duty trucks, can result in increased groundborne vibration. However, groundborne vibration levels associated with vehicle traffic is typically considered minor and would not exceed applicable criteria at the project site boundaries.

REGULATORY FRAMEWORK

Noise

Noise Control Act of 1972

The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act also serves to (1) establish a means for effective coordination of Federal research and activities in noise control; (2) authorize the establishment of Federal noise emission standards for products distributed in commerce; and (3) provide information to the public respecting the noise emission and noise reduction characteristics of such products.

Department of Housing and Urban Development (HUD)

HUD guidelines for the acceptability of residential land use are set forth in the Code of Federal Regulations Title 24, Part 51, "Environmental Criteria and Standards." These guidelines parallel those suggested in the FICUN report: noise exposure of 65 dBA CNEL/L_{dn}, or less, is acceptable and between 65 and 75 dBA CNEL/L_{dn} noise exposure is considered normally acceptable provided appropriate sound-reduction measures are provided. Above 75 dBA CNEL/L_{dn} noise exposure is generally considered unacceptable. The guidelines also identify the recommended interior noise levels of 45 dBA CNEL/L_{dn}. These guidelines apply only to new construction supported by HUD grants and are not binding upon local communities.

California Code of Regulations, Title 24

Title 24 of the California Code of Regulations contains standards for allowable interior noise levels associated with exterior noise sources (California Building Code, 1998 edition, Volume 1, Appendix Chapter 12, Section 1208A). The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single family residences. The standards state that the interior noise level attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room. Proposed residential structures to be located where the CNEL exceeds 60 dBA are required to prepare an acoustical analysis showing that the proposed building design would achieve the prescribed allowable interior noise standard. Worst-case noise levels, either existing or future, shall be used as the basis for determining compliance with these standards.

California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The "State of California General Plan Guidelines" (OPR 2017), published by the Governor's Office of Planning and Research, also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

2010 California Green Building Standards

The *2010 California Green Building Standards* (California Code of Regulations Title 24, Part 11, Section 5.507) requires that the wall and roof-ceiling assemblies making up a building envelope to have a minimum Sound Transmissions Class (STC) of 50, and exterior windows to have a minimum STC of 30 for any of the following building locations:

- Within 1,000 feet of freeways
- Within 5 miles of airports serving more than 10,000 commercial jets per year;
- Where the sound levels at the property line regularly exceed 65 decibels, other than occasional sound due to church bells, train horns, emergency vehicles, and public warning systems.

The above standards do not apply to buildings with few or no occupants or where occupants are not likely to be affected by exterior noise (as determined by the enforcement authority), such as factories, stadiums, storage, enclosed parking structures, and utility buildings. This section also identifies a minimum STC of 40 for interior walls and floor-ceiling assemblies that separate tenant spaces and public spaces (CBSC 2010).

County of San Luis Obispo

The County of San Luis Obispo's noise standards for non-transportation noise sources are summarized in Table 5. As depicted, the maximum allowable noise exposure standards vary depending on the duration of exposure and time of day. During the daytime hours of 7:00 a.m. to 10:00 p.m., average-hourly noise levels are limited to 50 dBA L_{eq} at the property line of the receiving noise-sensitive land use. Daytime maximum instantaneous noise levels associated with non-transportation noise sources are limited to 70 dBA L_{max} and impulsive noise levels are limited to 65 dBA L_{max} at the property line of noise-sensitive land uses. These daytime noise standards are reduced by 5 dBA for events occurring during the more noise-sensitive nighttime hours (10:00 p.m. to 7:00 a.m.) (San Luis Obispo County 1992).

The County's noises standards for transportation sources are summarized in Table 6. As depicted L_{dn}/CNEL noise levels for outdoor activity areas range from 60 to 70 dB. Interior spaces have an L_{dn}/CNEL standard of 45 dB for residences, hotels, motels, hospitals, and nursing facilities. Interior spaces for public assembly and entertainment type land uses have a 35 L_{eq} dB standard and office, places of worship, and school type land uses have a 45 L_{eq} dB standard (San Luis Obispo County 1992).

Table 5. County of San Luis Obispo Maximum Allowable Noise-Exposure Standards for Stationary Noise Sources

Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	50	45
Maximum level, dB	70	65
Maximum level, dB-Impulsive Noise	65	60

As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property line noise mitigation measures. Applies only where the receiving land use operates or is occupied during nighttime hours.

Table 6. County of San Luis Obispo Maximum Allowable Noise-Exposure Standards for Transportation Noise Sources

Land Use	Outdoor Activity Areas[1]	Interior Spaces	
	L_{dn}/CNEL, dB	L_{dn}/CNEL, dB	L_{eq} dB[2]
Residential (except temporary dwellings and residential accessory uses)	60[3]	45	--
Bed and Breakfast Facilities, Hotels and Motels	60[3]	45	--
Hospitals, Nursing and Personal Care	60[3]	45	--
Public Assembly and Entertainment (except Meeting Halls)	--	--	35
Offices	60[3]	--	45
Churches, Meeting Halls	--	--	45
Schools-Preschool to Secondary, College and University, Specialized Education and Training Libraries and Museums	--	--	45
Outdoor Sports and Recreation	70	--	--

1. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
2. As determined for a typical worst-case hour during periods of use.
3. For other than residential uses, where an outdoor activity area is not proposed, the standard shall not apply. Where it is not possible to reduce noise in outdoor activity areas to 60 dB LDN/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

Groundborne Vibration

There are no federal, state, or local regulatory standards for ground-borne vibration. However, Caltrans has developed vibration criteria based on potential structural damage risks and human annoyance. Caltrans-recommended criteria for the evaluation of groundborne vibration levels, with regard to structural damage and human annoyance, are summarized in Table 7. The criteria apply to continuous vibration sources, which include vehicle traffic, train, and most construction vibrations, with the exception of transient or intermittent construction activities, such as pile driving. All damage criteria for buildings are in terms of ground motion at the buildings' foundations. No allowance is included for the amplifying effects of structural components (Caltrans 2013).

As shown in Table 7, the threshold for architectural damage commonly applied to construction activities is a peak particle velocity (ppv) of 0.3 inches per second (in/sec) for fragile structures and 0.5 in/sec ppv for newer structures. Levels above 0.2 in/sec ppv may result in increased levels of annoyance for people in buildings (Caltrans 2013).

Table 7. Summary of Groundborne Vibration Levels and Potential Effects

Vibration Level (in/sec ppv)	Human Reaction	Effect on Buildings
0.006-0.019	Threshold of perception; possibility of intrusion.	Vibrations unlikely to cause damage of any type.
0.08	Vibrations readily perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
0.10	Level at which continuous vibrations begin to annoy people.	Virtually no risk of "architectural" damage to normal buildings.
0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relatively short periods of vibrations).	Threshold at which there is a risk of "architectural" damage to fragile buildings.
0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Potential risk of "architectural" damage may occur at levels above 0.3 in/sec ppv for older residential structures and above 0.5 in/sec ppv for newer structures.

The vibration levels are based on peak particle velocity in the vertical direction for continuous vibration sources, which includes most construction activities, with the exception of transient or intermittent construction activities, such as pile driving. For pile driving, the minimum criterion level is typically considered to be 0.2 in/sec ppv.
Source: Caltrans 2020

IMPACTS AND MITIGATION MEASURES

Significance Criteria

Criteria for determining the significance of noise impacts were developed based on information contained in the California Environmental Quality Act Guidelines (CEQA Guidelines, Appendix G). According to the guidelines, a project may have a significant effect on the environment if it would result in the following conditions:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b) Generation of excessive groundborne vibration or groundborne noise levels.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

Short-Term Construction Noise Impacts

The County has not adopted noise standards that apply to short-term construction activities. However, based on screening noise criteria commonly recommended by federal agencies, construction activities would generally be considered to have a potentially significant impact if average daytime noise levels would exceed 90 dBA L_{eq} when averaged over a 1-hour period ($L_{eq}^{(1)}$), or 80 dBA L_{eq} when averaged over an 8-hour period ($L_{eq}^{(8)}$) (FTA 2018). Because some activities may not occur over a full 8-hour day and to be conservative, construction-generated noise levels would be considered to have a potentially significant impact if predicted noise levels at noise-sensitive land uses would exceed 80 dBA L_{eq} when averaged over a 1-hour period.

Long-Term Operational Noise Impacts

The *CEQA Guidelines* do not define the levels at which increases in ambient noise would be considered "substantial." As discussed previously in this section, a noise level increase of 3 dBA is barely perceptible to most people, a 5 dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a doubling of loudness. For purposes of this analysis, a substantial increase in ambient noise levels would be defined as an increase of 3 dBA, or greater. Substantial increases in ambient noise levels that would exceed applicable noise standards for existing land uses would be considered to have a potentially significant impact. The compatibility of the future planned land uses were evaluated based on predicted future on-site noise conditions and in comparison to the County's noise exposure standards for determination of impact significance (refer to Table 6). Exposure to non-transportation noise sources would be considered potentially significant if noise levels would exceed the County's noise exposure standards for non-transportation noise sources (refer to Table 5).

Groundborne Vibration Impacts

Groundborne vibration levels would be considered potentially significant if predicted short-term construction or long-term operational groundborne vibration levels attributable to the proposed project would exceed normally applied groundborne vibration criteria at nearby structures (Table 7). No existing historic or fragile structures were identified in the project area. For purposes of this analysis, groundborne vibration levels would be considered to have a potentially significant impact if predicted levels would exceed 0.2 in/sec ppv with regard to human annoyance or 0.5 in/sec ppv for structural damage.

Methodology

Short-Term Construction Noise

Short-term noise impacts associated with construction activities were analyzed based on typical construction equipment noise levels derived from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* and the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual*. Typical equipment use for various phases of construction were based on default assumptions identified in the *California Emissions Estimator Model* (CAPCOA 2018) for representative development projects. Predicted average-hourly construction noise levels (in dBA L_{eq}) were calculated assuming the two loudest pieces of construction equipment operating simultaneously at 50 feet from source center (FTA 2018). Noise levels were predicted based on an average noise-attenuation rate of 6 dB per doubling of distance from the source.

Long-term Operational Noise

Traffic noise levels were calculated using the Federal Highway Administration (FHWA) roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Additional input data included day/night percentages of autos, medium and heavy trucks, vehicle speeds, ground attenuation factors, and roadway widths. The project's contribution to traffic noise levels along area roadways was determined by comparing the predicted noise levels with and without project-generated traffic. Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the *U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report* (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data available for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's *2017 Traffic Volumes for all Vehicles on CA State Highways*. Predicted traffic noise modeling assumptions and results are included in Appendix B.

Impact Discussions and Mitigation Measures

IMPACT A.	**Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**

Long-Term Exposure to Traffic Noise

Increases in Traffic Noise Levels

Implementation of the proposed project would result in increased traffic volumes on area roadways. The increase in traffic volumes resulting from implementation of the proposed project would, therefore, contribute to increases in traffic noise levels.

Predicted increases in traffic noise levels, with and without implementation of the proposed project, are depicted in Table 8. As depicted in Table 8, increases in existing traffic noise levels along area roadways attributable to the proposed project would range from less than 0.1 to 2.9 dBA CNEL/L_{dn}. Implementation of the proposed project would not result in a substantial increase (i.e., 3 dBA, or greater) in existing traffic noise levels along area roadways. As a result, this impact is considered ***less than significant***.

Compatibility of Proposed Land Uses with Traffic Noise Levels

The proposed project includes a mix of residential, hotel, educational, commercial, open space, and outdoor recreational uses. As noted in Table 6, the County's noise standards for exposure to transportation noise sources are 60 dBA CNEL/L_{dn} for residential, commercial office, and hotel uses, and 70 dBA CNEL/L_{dn} for outdoor sports and recreation uses. Noise exposure standards for other land uses considered to be potentially sensitive to noise, such as educational use facilities are based on an interior noise exposure level of 45 dBA CNEL/L_{dn}.

Table 8. Predicted Increases in Traffic Noise Levels

Roadway Segment	Noise Level (dBA CNEL/L_{dn}) at 50 Feet From Near-Travel-Lane Centerline			Significant Impact?[1]
	Existing without Project	Existing with Project	Change	
Willow Rd., State Route 1 to Pomeroy Rd.	68.0	68.5	0.5	No
Willow Rd., Pomeroy Rd.to Hetrick Ave.	67.6	68.1	0.5	No
Willow Rd., Hetrick Ave. to U.S. Highway 101 SB Ramp	68.9	71.6	2.7	No
Willow Rd., U.S. Highway 101 SB Ramp to NB Ramp	65.2	68.1	2.9	No
Pomeroy Rd., Willow Rd. to SW Project Entry	63.4	64.4	1.0	No
Pomeroy Rd., SW Project Enter to Tefft St.	64.5	66.0	1.5	No
Tefft St., Pomeroy Rd. to Mary Ave.	66.9	66.9	0.0	No
Tefft St., Mary Ave. to U.S. Highway 101 SB Ramp	65.6	65.5	-0.1	No
Tefft St., U.S. Highway 101 SB Ramp to NB Ramp	65.3	65.3	0.0	No
Mary Ave., Tefft St. to Juniper St.	61.8	61.6	-0.2	No
N. Thompson Ave., South of Willow Rd.	66.4	67.3	0.9	No

Note: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared for this project.
1. A significant impact is defined as a substantial increase (i.e., 3 dB, or greater) in traffic noise levels.

As previously discussed, ambient noise levels at the project site are primarily influenced by vehicle traffic on U.S. Highway 101, which extends in a general north-to-south direction along the eastern boundary of the project site. Based on the traffic noise modeling conducted for future year 2032 conditions, the predicted 70, 65, and 60 dBA CNEL noise contours would extend to approximately 220 feet, 468 feet, and 1,005 feet from the centerline of U.S. Highway 101, respectively. Predicted distances to future year 2032 onsite traffic noise contours for U.S. Highway are depicted in Figure 4. As depicted, predicted traffic noise levels at proposed multi-family land uses located within the eastern-most portions of the project site would be projected to exceed the County's exterior noise standard of 60 dBA CNEL/L_{dn}. Other land uses, such as the proposed offices or the junior college campus, could potentially exceed the County's interior noise standard of 45 dBA CNEL/L_{dn}. Predicted traffic noise levels at other future planned land uses located along Collector B and Collector C, including proposed residential land uses and the daycare facility, would be approximately 60 dBA CNE/L_{dn}, or less, and would not exceed applicable County noise standards. Because predicted traffic noise levels at planned land uses would exceed applicable County noise standards, this impact is considered ***potentially significant***.

Figure 4. Predicted Future On-Site Traffic Noise Levels (dBA CNEL) – U.S. Highway 101

Long-Term Exposure to Non-Transportation Noise

The proposed project includes the development of residential, commercial, community park/open space, and educational land uses. These land uses would result in non-transportation (stationary) noise sources that could potentially exceed the County's applicable noise standards at nearby noise-sensitive land uses. Noise levels typically associated with these land uses and associated noise impacts are discussed as follows:

Residential Uses

Noise associated with proposed residential dwellings would expose other nearby residences (both existing and project related) to minor increases in ambient noise levels. Noise typically associated with such development includes lawn and garden equipment, voices, air conditioning equipment, and amplified music. Noise generated by these land uses would result in only minor increases in ambient noise levels, primarily during the day and evening hours and less frequently at night. Residential use air conditioning units typically generate noise levels of approximately 60 dBA L_{eq} at 3 feet when operating. Typical operational cycles for residential units occur for periods of approximately 10 minute in 20 to 30 minute intervals. When averaged over an approximate 1-hour period and assuming a setback distance of 5 feet, predicted average-hourly noise levels at nearby residential land uses would not be anticipated to exceed the County's noise standards. As a result, increased noise levels associated with proposed residential land uses would be ***less than significant***.

Parking Lots

The proposed project would include multiple parking lots dispersed throughout the project site, primarily associated with proposed commercial uses and multi-family land uses located within the eastern-most portion of the project site. Noise levels associated with parking lots typically includes vehicle operations, the opening and closing of vehicle doors, and the operation of vehicle sound systems. Parking areas associated with commercial uses, as well as multi-family land uses, would be separated from nearby residential land uses by proposed on-site roadways. Resultant noise levels at the nearest residential land uses would not be projected to exceed the County's noise standards and would be largely masked by vehicular traffic on area roadways, including U.S. Highway 101. This impact would be considered ***less than significant***.

Outdoor Recreational & Special Event Uses

Noise typically associated with neighborhood parks, small playgrounds, trails, and open space areas are typically limited to the voices of adults and children and the occasional opening and closing of vehicle doors. Noise events are typically sporadic and limited primarily to the daytime hours of operation. Parks and open space areas/corridors are typically considered to be an accepted land use within residential developments and generally do not result in noise events that are uncharacteristic of typical residential noise environments. However, some outdoor uses, such as outdoor athletic and temporary event facilities, may incorporate the use of an amplified public address (PA) sound system. Depending on the location of the PA system and speaker orientation, the use of amplified public address systems can generate noise levels of approximately 75 dBA L_{eq} at 100 feet. Based on this noise level, predicted operational noise levels within approximately 1,050 feet and 3,300 feet could potentially exceed the County's daytime and nighttime noise standards of 50 and 45 dBA L_{eq}, respectively. Depending on operational characteristics and location, predicted noise levels at nearby noise-sensitive land uses could potentially exceed the County's noise standards. For this reason, noise-generated by the proposed land uses that involve the use of exterior amplified PA systems would be considered to have a ***potential significant impact***.

Commercial, Hotel, and Retail Uses

Noise sources commonly associated with commercial, hotel, and retail uses include building mechanical systems (e.g., HVAC systems), back-up power generators, vehicle activity within parking lots, and loading dock activities. Noise levels associated with building mechanical systems, such as larger air conditioning units, can range from 60 to 79 dBA L_{eq} at 5 feet. Back-up power generators can generate noise levels of approximately 79 dBA L_{eq} at 50 feet (FTA 2018. FHWA 2008). Assuming a maximum noise level of 79 dBA L_{eq} at 50 feet, predicted operational noise levels associated with back-up power generators could potentially exceed 50 dBA L_{eq} at approximately 1,500 feet and approximately 45 dBA L_{eq} at 2,700 feet. Based on measurements conducted at various commercial uses, noise levels associated with loading dock operations and material handling activities can generate noise levels of approximately 65 dBA L_{eq} at 50 feet. Predicted operational noise levels associated with loading dock operations could potentially exceed 50 dBA L_{eq} at approximately 150 feet and approximately 45 dBA L_{eq} at 265 feet. Other outdoor equipment, such as commercial-use air conditioning condensers and trash compactors, and material handling activities may also result in intermittent increases in operational noise levels.

Depending on the specific uses proposed, site design, and hours of operation predicted noise levels associated with proposed commercial land uses could potentially exceed the County's stationary noise source standards at nearby noise-sensitive land uses (refer to Table 5). Areas where commercial and residential development would occur in close proximity, such as planned mixed-use development, would be of particular concern. As a result, noise generated by planned commercial uses would be considered a ***potentially significant impact.***

Educational Land Uses

Noise generated by the proposed satellite junior college campus and childcare center would be predominantly generated by elevated children's voices, adult voices, building mechanical equipment, parking lots, and exterior PA system speakers. Based on measurement data obtained from similar land uses, noise levels associated with small playgrounds and recreation areas can generate intermittent noise levels of approximately 55-60 dBA L_{eq} at 50 feet. Noise levels associated with outdoor playgrounds would not be anticipated to exceed the County's noise standards at nearby land uses and would be largely masked by traffic noise emanating from area roadways, including U.S. Highway 101. Building mechanical equipment is typically located within the structure, enclosed, or placed on rooftop areas away from direct public exposure. Noise generated by onsite noise sources would be predominantly limited to the daytime hours of operations. However, as discussed above, outdoor equipment such as back-up power generators, trash compactors, and exterior amplified P.A. sound systems may result in increases in ambient noise levels at nearby noise-sensitive land uses in excess of the County's noise standards. As a result, noise generated by the proposed satellite junior college campus would be considered a ***potentially significant impact***.

Mitigation Measures

Noise-1: The following mitigation measures shall be implemented to reduce long-term exposure to transportation and non-transportation noise:

a. The County shall require acoustical assessments to be prepared as part of the environmental review process for future noise-sensitive land uses located within the projected 60 dBA CNEL noise contour of U.S. Highway 101 (i.e., within 1,005 feet from the centerline of U.S. Highway 101, Refer to Figure 4 of this report). The acoustical assessments shall address compatibility with the County's noise standards for transportation noise sources. Where the acoustical assessments determine that transportation noise levels would exceed applicable County noise standards, noise-reduction measures shall be incorporated sufficient to reduce operational noise levels to below applicable noise standards. Such measure may include but are not limited to, the incorporation of setbacks, sound barriers, or berms. The emphasis of such measures shall be placed upon site planning and project design. (Refer to Table 6 of this report for noise-sensitive land uses and corresponding noise standards.)

b. The County shall require acoustical assessments to be prepared as part of the environmental review process for future commercial land uses involving the proposed installation of exterior noise-generating equipment, including, but not limited to, back-up power generators, trash compactors, amplified public address systems, and commercial-use air conditioning condensers. The acoustical assessments shall evaluate potential noise impacts attributable to the proposed project in comparison to applicable County noise standards for stationary noise sources (refer to Table 5). The acoustical assessment shall evaluate impacts to nearby existing off-site, as well as future planned on-site noise-sensitive land uses. Where the acoustical analysis determines that stationary-source noise levels would exceed applicable County noise standards, noise-reduction measures shall be incorporated sufficient to reduce operational noise levels to below applicable noise standards. Such measure may include but are not limited to, the incorporation of setbacks, sound barriers, berms, hourly limitations, or equipment enclosures. The emphasis of such measures shall be placed upon site planning and project design. (Refer to Table 5 of this report for applicable County noise standards.)

Significance After Mitigation

In accordance with Mitigation Measure Noise-1, acoustical assessments would be required for purposes of ensuring compatibility of planned future on-site land uses with the County's noise standards for transportation noise sources. Acoustical assessments would also be required for planned future land uses that would involve the installation of noise-generating non-transportation (stationary) equipment for consistency with applicable County noise standards. Noise-reduction measures, such as the incorporation of setbacks, sound barriers, berms, hourly limitations, or equipment enclosures, would be required sufficient to demonstrate compliance with applicable County noise standards. With mitigation, this impact would be considered ***less than significant.***

Short-Term Exposure to Construction Noise

Construction noise typically occurs intermittently and varies depending upon the nature or phase of construction (e.g., land clearing, grading, excavation, and paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Although noise ranges are generally similar for all construction phases, the initial site preparation phase tends to involve the most heavy-duty equipment having a higher noise-generation potential. Noise levels associated with individual construction equipment are summarized in Table 9.

As depicted in Table 9, maximum noise levels generated by individual pieces of construction equipment typically range from approximately 77 dBA to 90 dBA L_{max} at 50 feet (FTA 2018). Average-hourly noise levels for individual construction equipment generally range from approximately 72 to 82 dBA L_{eq}. Based on these equipment noise levels, equipment commonly associated with community development projects, and assuming the two loudest pieces of equipment operating simultaneously in close proximity, predicted average-hourly noise levels occurring during the loudest phases of construction generally range from approximately 78 to 84 dBA L_{eq} at 50 feet (refer to Table 10). Other construction activities (e.g., painting, landscaping) typically generate lower noise levels (FTA 2018). Short-term increases in vehicle traffic, including worker commute trips and haul truck trips may also result in temporary increases in ambient noise levels at nearby receptors.

Table 9. Construction Equipment Noise Levels

Equipment	Noise Level (dBA at 50 feet)	
	L_{max}	L_{eq}
Backhoes	78	74
Bulldozers	82	78
Compressors	78	74
Cranes	81	73
Concrete Pump Truck	81	74
Drill Rigs	79	72
Dump Trucks	77	73
Excavator	81	77
Generator	81	78
Gradall	83	79
Grader	85	81
Hydraulic Break Rams	90	80
Front End Loaders	79	75
Pneumatic Tools	85	82
Pumps	81	78
Rollers	80	73
Scrapers	84	80
Tractor	84	80

Based on measured instantaneous noise levels (L_{max}), average equipment usage rates, and calculated average-hourly (Leq) noise levels derived from the FHWA Road Construction Noise Model (FHWA 2008)

Table 10. Typical Construction Phase Equipment & Noise Levels

Construction Phase	Typical Equipment	Noise Level (dBA L_{eq}) at 50 feet from Source Center
Demolition	Concrete Saws, Excavators, Dozers	81
Site Preparation	Dozers, Tractors, Loaders, Backhoes	83
Grading	Dozers, Tractors, Loaders, Backhoes, Graders, Scrapers, Excavators	84
Building Construction/Architectural Coating	Cranes, Forklifts, Tractors, Loaders, Backhoes, Generators, Welders	83
Paving	Pavers, Rollers, Paving Equipment (e.g., Compactors)	78

1. Represents equipment typically associated with community development projects derived from the California Emissions Estimator Model.
2. Based on equipment noise levels identified in Table 11. Assumes the two loudest pieces of equipment operating simultaneously.
Sources: FTA 2018, FHWA 2008, CAPCOA 2016

Depending on the location and types of activities conducted (e.g., demolition, site preparation, grading), predicted noise levels at the nearest residences, which are located adjacent to the project site, could potentially exceed 80 dBA L_{eq}, particularly when activities occur within approximately 50 feet of the nearest site boundaries. Furthermore, with regard to residential land uses, activities occurring during the more noise-sensitive evening and nighttime hours could result in increased levels of annoyance and potential sleep disruption. For these reasons, noise-generating construction activities would be considered to have a **potentially significant** short-term noise impact.

Mitigation Measures

Noise-2: The following mitigation measures shall be implemented to reduce exposure to short-term construction noise.

a. Unless otherwise provided for in a validly issued permit or approval, noise-generating construction activities should be limited to the hours of 7:00 a.m. and 7:00 p.m. Noise-generating construction activities should not occur on Sundays or legal holidays.

b. Construction equipment should be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment-engine shrouds should be closed during equipment operation.

c. Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

d. Construction haul truck routes shall be routed away from nearby noise-sensitive land uses, to the extent possible.

e. Staging and queuing areas shall be located at the furthest distance possible from nearby noise-sensitive land use identified in the project area at the time of construction.

f. Stationary equipment (e.g., generators, compressors) shall be located at the furthest distance possible from nearby noise-sensitive land use identified in the project area at the time of construction.

g. A public liaison shall be appointed for project construction and shall be responsible for addressing public concerns related to construction-generated noise, including excessive noise. As needed, the liaison shall determine the cause of the concern (e.g., starting too early, bad muffler) and implement measures to address the concern. Where necessary, additional measures, such as equipment repairs, equipment enclosures, or temporary barriers, shall be implemented to address local concerns.

h. Signage shall be placed at the project site construction entrance(s) to advise the public of anticipated dates of construction. The signage shall include the phone number of the public liaison appointed to address construction-related noise concerns.

Significance After Mitigation

With the implementation of Mitigation Measure Noise-2, construction activities would be limited to the less noise-sensitive daytime hours. The proper maintenance of construction equipment and use of manufacturer-recommended mufflers and engine shrouds would reduce equipment noise levels by approximately 10 dB. The installation of temporary noise barriers, where required, would decrease noise level by approximately 5 to 8 dB. With mitigation, average-hourly construction noise levels would be reduced to less than 80 dBA L_{eq} at nearby noise-sensitive land uses. With mitigation, this impact would be considered **less than significant**.

IMPACT B. Generation of excessive groundborne vibration or groundborne noise levels.

Increases in groundborne vibration levels attributable to the proposed project would be primarily associated with short-term construction-related activities. Construction activities associated with the proposed project would likely require the use of various off-road equipment, such as tractors, concrete mixers, and haul trucks.

Groundborne vibration levels associated with representative construction equipment are summarized in Table 11. Based on the vibration levels presented, ground vibration generated by construction equipment would not exceed approximately 0.09 inches per second ppv at 25 feet. Predicted vibration levels at the nearest offsite structures would not be anticipated to exceed the minimum recommended criteria for structural damage or human annoyance (0.5 and 0.2 in/sec ppv, respectively) at nearby land uses.

In addition, haul trucks traveling along project area roadways may result in perceptible increases in vibration levels. However, these vibration levels would be transient and instantaneous events, which would be typical of existing vibrations along the roadway network. Based on measurements conducted by Caltrans, on-road heavy-duty trucks would not generate substantial increases in groundborne vibration that would be expected to exceed commonly applied criteria for structural damage or annoyance (Caltrans 2020). As a result, this impact would be considered **less than significant**.

Table 11. Representative Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity at 25 Feet (In/Sec)
Large Bulldozers	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozers	0.003
Source: FTA 2018, Caltrans 2020	

IMPACT C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The project site is not located within two miles of a public airport or private airstrip. The nearest airports include the Santa Maria Airport, which is located approximately nine miles south of the project site, and the Oceano County Airport, which is located approximately seven miles northwest of the project site. The project site is not located within the airport land use planning areas or the projected 65 dBA CNEL contours of these airports (SLOALUC 2007, SBCAG 2019). As a result, the project site is not subject to high levels of aircraft noise. This impact is considered **less than significant**.

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APPENDIX A
Ambient Noise Monitoring Surveys

NOISE MEASUREMENT SURVEY FORM

SHEET 1 OF 2

DATE:	11/15-16/2021
PROJECT:	DANA RESERVE
LOCATION:	SAN LUIS OBISPO COUNTY
MONITORING STAFF:	KURT LEGLEITER, TREVOR BURMESTER

LOCATION MAP: (Include a map of noise measurement locations AND photographs for measurement locations on attached worksheet. Include additional sheets as necessary. Where possible include GPS coordinates.)

NOISE MEASUREMENT CONDITIONS & EQUIPMENT

MET CONDITIONS & MONITORING EQUIPMENT:	TEMP: 70-75 F. | HUMIDITY: 30 % | WIND SPEED: 0-2 MPH | SKY: 2, 3 | GROUND: DRY			
	CLOUD COVER BY CLASS (OC=OVERCAST):	2	(1. HEAVY OC, 2. LIGHT OC, 3. SUNNY, 4. CLEAR NIGHT, 5. OC NIGHT)	
	MET. METER:	KESTREL 5500		
NOISE MONITORING EQUIPMENT:	LARSON DAVIS SLM MODEL:	820		
	CALIBRATOR:	CAL200		
NOISE MONITORING SETUP:	WITHIN 10 FT OF REFLECTIVE SURFACE?:	NO	MICROPHONE HEIGHT AGL (FT):	5
	CALIBRATED PRIOR TO AND UPON COMPLETION OF MEASUREMENTS:	YES	METER SETTINGS: A-WHT	SLOW

NOISE & TRAFFIC MEASUREMENTS

MEASUREMENT LOCATION	MEASUREMENT DATE/TIME	DURATION (Minutes)	MEASUREMENT LOCATION	PRIMARY NOISE SOURCES NOTED	MEASURED NOISE LEVELS LEQ	LMAX		
ST-1	10/16/2021 14:14-13:14	10	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	Traffic	65.5	94.3		
ST-1	10/15/2021 11:13-11:23	10	Southeast corner of Project site, approximately 33 yards from the median of U.S. Highway 101.	Traffic	70.3	77.4		
ST-2	10/15/2021 11:40-11:50	10	Southern boundary of project site on Cory Way, approximately 212 yards north of Sandydale Dr.	Traffic	41.3	57.9		
ST-3	10/15/2021 11:56-12:06	10	West side of project, on Hetrick Ave., approximately 56 yards north of Pomeroy Rd.	Traffic	56.6	66.6		
ST-4	10/15/2021 12:24-12:34	10	North side of project, on Cherokee Pl., approximately 306 yards south of Willow Rd.	Traffic	44.3	65.4		

NOISE MEASUREMENT SURVEY FORM

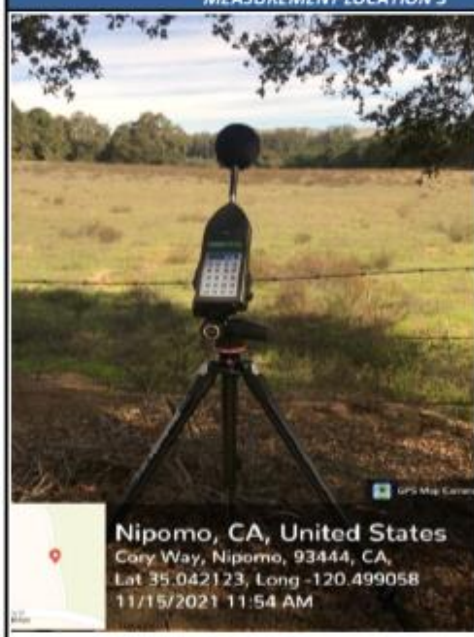
		SHEET	2	OF	2
DATE:	11/15-16/2021				
PROJECT:	DANA RESERVE				
LOCATION:	SAN LUIS OBISPO COUNTY				
MONITORING STAFF:	KURT LEGLEITER, TREVOR BURMESTER				

SITE PHOTO(S): (Refer to data sheets for noise measurement locations)

MEASUREMENT LOCATION 1

MEASUREMENT LOCATION 2

MEASUREMENT LOCATION 3



MEASUREMENT LOCATION 4

APPENDIX B
Noise Modeling & Supportive Documentation

PREDICTED FUTURE YEAR TRAFFIC VOLUMES FOR HIGHWAY 101

HIGHWAY SEGMENT	YR 2010 VOLUMES	FUTURE YR 2035 VOLUME	CHANGE	PERCENT INCREASE
US 101, SOUTH OF SAN LUIS BAY DRIVE	71355	80447	9092	12.74%
US 101, AT SAN LUIS BAY DRIVE	70760	79911	9151	12.93%
US 101, NORTH OF SAN LUIS BAY DRIVE	77204	86751	9547	12.37%
US 101, NORTH OF HIGUERA	68226	78618	10392	15.23%

Source: County of San Luis Obispo. October 2019. US 101/San Luis Bay Drive Intersection Control Evaluation (ICE), Step 1, Final Report. Website url: https://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Transportation/Previous-Traffic-Studies/San-Luis-Bay-Drive-Interchange-Analysis-Future-I.pdf.

HIGHWAY SEGMENT	YEAR 2017 VOLUMES	PERCENT INCREASE	FUTURE YR 2032 VOLUME
US 101, Tefft St	66000	15.23%	76052.94169

Year 2017 traffic volumes derived from Caltrans. 2017 Traffic Volumes, For All Vehicles on CA State Highways. Website url: https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes.

To be conservative, future year traffic volumes assume an increase of 15.23%, based on data obtained from the ICE report.

Predicted Traffic Noise Levels - Weekdays									
	Existing Noise Level - dBA CNEL/Ldn								
					at 50ft	Distance to Contours			
Roadways	Avg Lanes	Avg Speeds	PM Vol	ADT	NTLCL	55 CNEL	60 CNEL	65 CNEL	70 CNEL
Willow Rd (SR 1 to Pomeroy)	2	55	784	7840	68.03	411.2	191	88.8	0
Willow Rd (Pomeroy to Hetrick)	2	55	714	7140	67.62	386.3	179.4	83.5	0
Willow Rd (Hetrick to US 101 SB ramp)	2	55	960	9600	68.91	470.6	218.5	101.6	0
Willow Rd (US 101 SB Ramp to NB ramp)	4	55	527	5270	65.23	315.6	147.4	70.3	0
Pomeroy Rd (Willow to SW Project Entry)	2	45	443	4430	63.35	200.6	93.3	0	0
Pomeroy Rd (SW Project Enter to Tefft)	2	45	576	5760	64.49	238.8	111	51.8	0
Tefft St (Pomeroy to Mary)	5	45	1,415	14150	66.94	434.5	202.8	96.4	0
Tefft St (Mary to US 101 SB Ramp)	5	35	1,916	19160	65.56	352.1	164.8	79.2	0
Tefft St (US 101 SB ramp to NB ramp)	6	35	2,006	20060	65.29	363.3	170.9	83.9	0
Mary St (Tefft to Juniper)	3	35	624	6240	61.84	166.8	77.9	0	0
N Thompson Ave (South of Willow)	2	55	540	5400	66.41	320.7	149	69.4	0
W Project Entry	2	35							
N Frontag Road	2	35							
SW Project Entry	2	35							
SR 101 (Willow to Tefft)	4	60	5600	67000	75.94	1987.1	923.1	429.9	202.5
SR 101 (Willow to Tefft) - Year 2032	4	60		76052	76.49	2162.2	1004.4	467.5	219.8

NTLCL=Near Travel Lane Centerline

ADT calculated based on pk-hr volumes and a k-factor of 0.10.

Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's 2017 Traffic Volumes for all Vehicles on CA State Highways.

Roadways	Avg Lanes	Avg Speeds	PM Vol	ADT	at 50ft NTLCL	Distance to Contours			
	Predicted Traffic Noise Levels - Weekdays								
	Existing Plus Project - dBA CNEL/Ldn								
						55	60	65	70
Willow Rd (SR 1 to Pomeroy)	2	55	867	8670	68.47	439.7	204.2	94.9	0
Willow Rd (Pomeroy to Hetrick)	2	55	797	7970	68.1	415.7	193.1	89.8	0
Willow Rd (Hetrick to US 101 SB ramp)	2	55	1,769	17690	71.56	707.1	328.3	152.5	71
Willow Rd (US 101 SB Ramp to NB ramp)	4	55	1008	10080	68.05	485.8	226.1	106.2	0
Pomeroy Rd (Willow to SW Project Entry)	2	45	558	5580	64.35	233.8	108.7	50.7	0
Pomeroy Rd (SW Project Enter to Tefft)	2	45	820	8200	66.02	302.2	140.4	65.4	0
Tefft St (Pomeroy to Mary)	5	45	1,415	14150	66.94	434.5	202.8	96.4	0
Tefft St (Mary to US 101 SB Ramp)	5	35	1,866	18660	65.45	346	161.9	78	0
Tefft St (US 101 SB ramp to NB ramp)	5	35	2,026	20260	65.33	365.7	172	84.3	0
Mary St (Tefft to Juniper)	3	35	588	5880	61.58	160.4	74.9	0	0
N Thompson Ave (South of Willow)	2	55	664	6640	67.31	368.1	171	79.5	0
W Project Entry *NEW*	2	35	395	3950	60.16	123	57.4	0	0
N Frontag Road *NEW*	2	35	715	7150	62.74	182.6	84.9	0	0
SW Project Entry *NEW*	2	35	463	4630	60.85	136.7	63.7	0	0

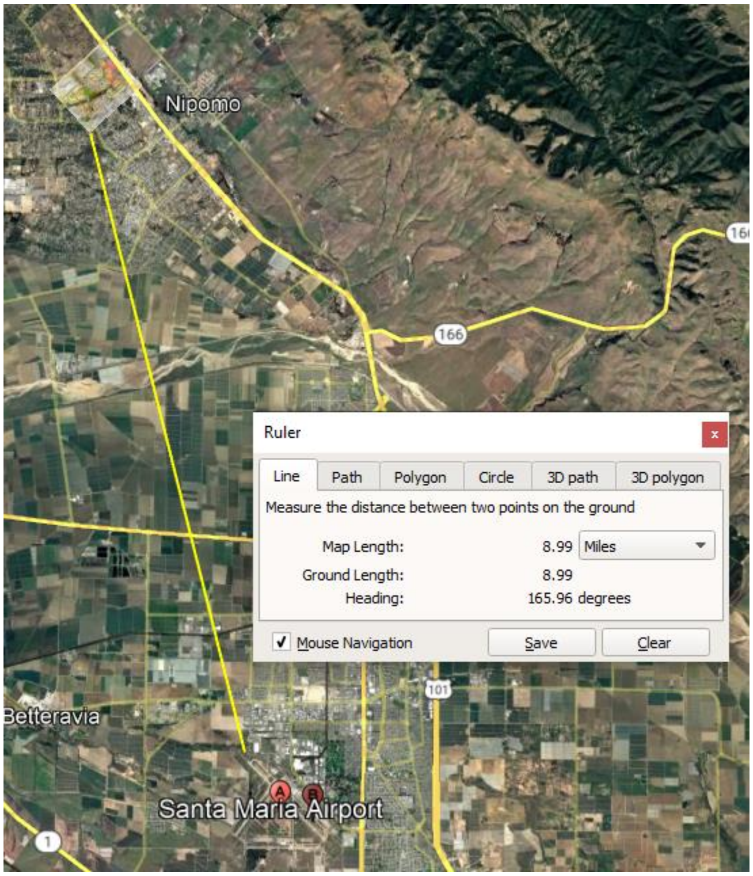
NTLCL=Near Travel Lane Centerline

ADT calculated based on pk-hr volumes and a k-factor of 0.10.

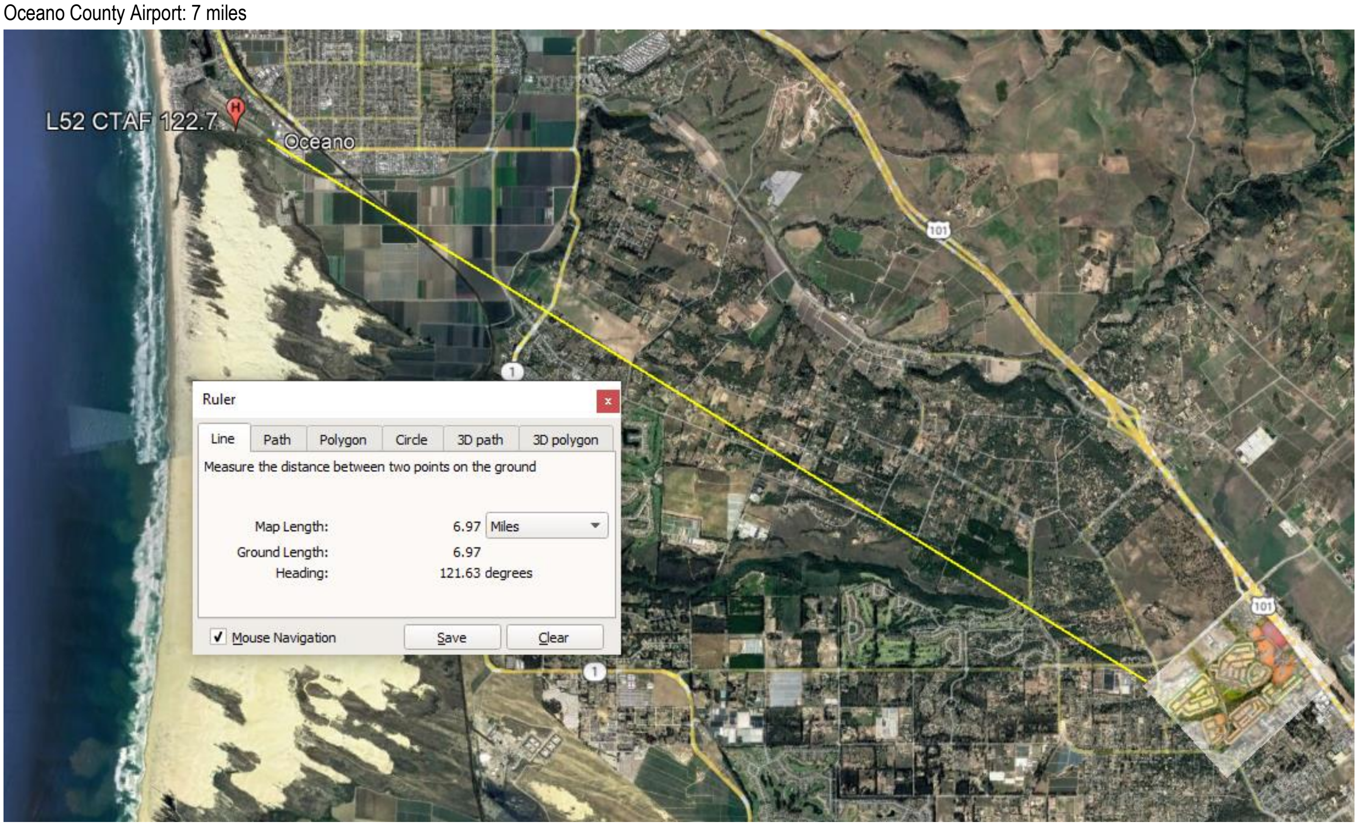
Predicted future traffic noise levels for U.S. Highway 101 were calculated based on a maximum predicted increase of 15.23 percent in traffic volumes over an estimated 15-year period, derived from the U.S. 101/San Luis Bay Drive Intersection Control Evaluation, Step 1, Final Report (San Luis Obispo County 2019). The estimated percent increase in traffic volumes was applied to the most current traffic volume data for the adjacent segment of U.S Highway 101, derived from the California Department of Transportation's 2017 Traffic Volumes for all Vehicles on CA State Highways.

DISTANCES TO NEARBY AIRPORTS

Santa Maria Airport: 9 miles

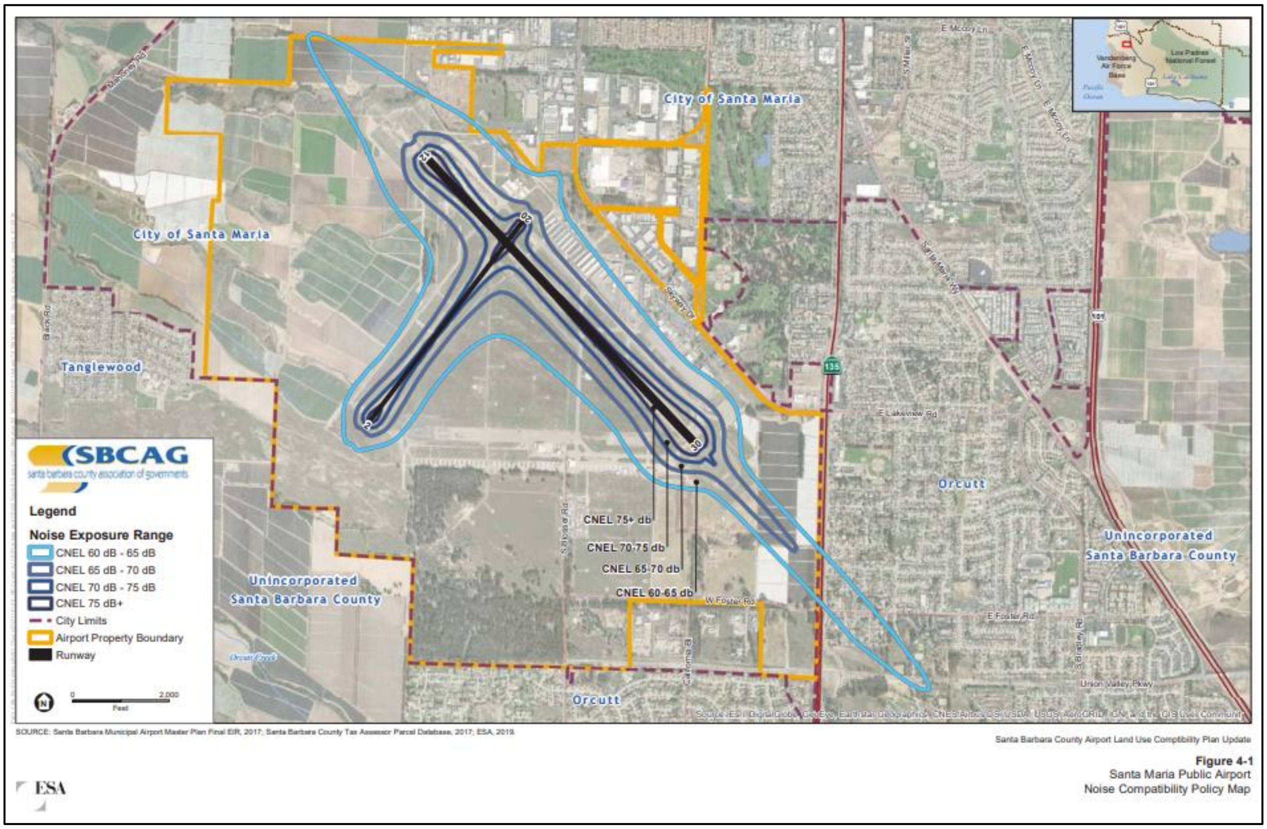


Oceano County Airport: 7 miles

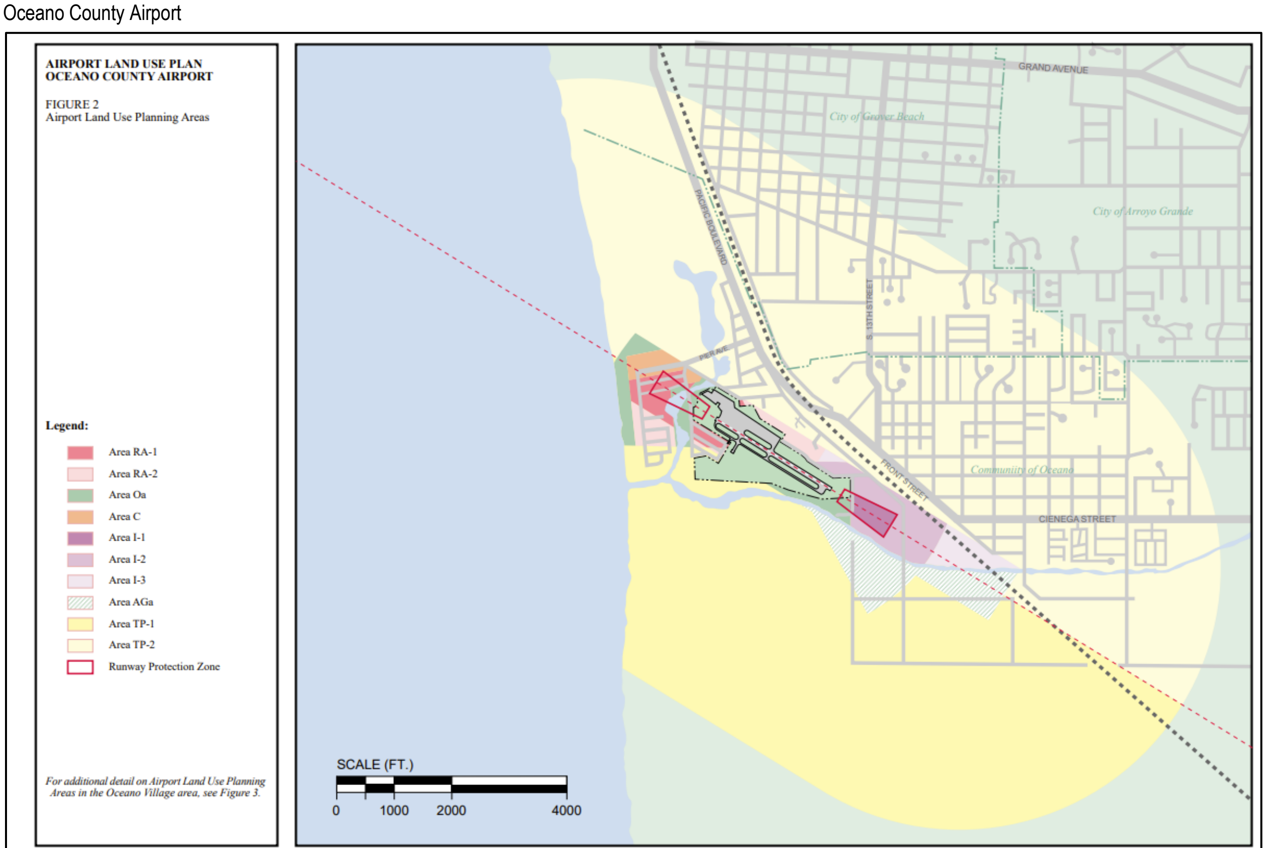


AIRPORT LAND USE COMPATIBILITY PLANNING AREAS

Santa Maria Airport



Oceano County Airport



APPENDIX J

Transportation Background Information

Dana Reserve Nipomo
Transportation Impact Study

Dana Reserve Nipomo

Transportation Impact Study

Prepared For: NKT Nipomo Properties, LLC

Central Coast Transportation Consulting

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July 2021

Central Coast Transportation Consulting

Traffic Engineering & Transportation Planning

0.0 Executive Summary

This study evaluates the potential transportation impacts of the Dana Reserve development located outside of the Nipomo Community Plan Area in unincorporated San Luis Obispo County. The project consists of 833 single family residential units, 610 multi-family dwelling units (including 152 ADUs), 113,000 square feet of various commercial uses, a 110-room hotel, and 30,000 square feet for education. The project is expected to generate 17,892 net new daily trips, 1,156 net new AM peak hour trips, 1,379 net new PM peak hour trips, 12,930 net new Sunday daily trips, and 1,201 net new Sunday midday peak hour trips.

The following summarizes the key findings of the Transportation Impact Study (TIS):

0.1 KEY FINDINGS

1. The proposed frontage road extension would complete a necessary circulation connection between Sandydale Drive and Willow Road. This improvement will divert existing traffic away from Tefft Street and will benefit daily commuter operations as well as Swap Meet circulation on Sundays. In addition to the frontage road connection, the project will construct an additional north-south connector roadway between Willow Road and Pomeroy Road improving circulation.
2. The US 101 northbound and southbound ramp intersections on Willow Road operate unacceptably with project traffic. Signalization is warranted at both intersections and would result in acceptable operations with existing lane configurations under Plus Project conditions. Signalization at these intersections is consistent with the South County Circulation Study.
3. The project entry at Willow Road/North Frontage Road meets peak hour signal warrants and was assumed to be signalized under Plus Project conditions. The intersection operates acceptably with a traffic signal, a dedicated eastbound right turn lane and westbound left turn lane on Willow Road, and left and right turn lanes on the project approach.
4. The Willow Road/West Project Entry operates acceptably with side-street-stop control, a dedicated eastbound right turn lane and westbound left turn lane on Willow Road, and left and right turn lanes on the project approach.
5. The Pomeroy Road/Southwest Project Entry operates acceptably with side street stop control, a dedicated eastbound left and westbound right turn lane on Pomeroy Road, and left and right turn lanes on the project approach.
6. Portions of the Tefft Street corridor near US 101 would operate unacceptably during at least one peak hour under all studied scenarios. The improvements currently under construction would result in acceptable operations under Existing Plus Project conditions but not under Cumulative conditions.
7. Per the South County Circulation Study a new Southland interchange is required under Cumulative conditions reflecting buildout of the Nipomo area.
8. All freeway segments operate unacceptably during at least one peak hour in all scenarios. No capacity enhancements are currently programmed on the studied freeway segments.
9. Collectors A, B, and C operate acceptably as two-lane collectors and Local Road D operates acceptably as a two-lane local road. A center turn lane is recommended and required on Collector A per County Standard A-2d.
10. An additional multi-use trail connection to Willow Road is recommended for consistency with the Parks and Recreation Element.
11. The project will have a significant and unavoidable impact to VMT.

Contents

1.0 Introduction

This study evaluates the potential transportation impacts of the Dana Reserve development to become a part of the Nipomo Community Plan Area in unincorporated San Luis Obispo County. The project consists of 833 single family residential units of varying lot sizes, 458 multi-family dwelling units, 152 accessory dwelling units (ADUs), 113,000 square feet (s.f) of various commercial uses, a 110-room hotel, and a 30,000 s.f. education facility.

This TIS scope of work was developed in consultation with County staff and the draft TIS was revised following peer review by the County and other consultants. Refer to **Appendix F** for comments and responses.

The project's location and study intersections are shown on **Figure 1**, while **Figure 2** shows the project site plan. Study intersections were identified in consultation with County staff. The following intersections were analyzed during the weekday morning (7-9 AM) and evening (4-6 PM) time periods:

1. Willow Road/State Route 1
2. Willow Road/Pomeroy Road
3. Willow Road/Hetrick Avenue
4. Willow Road/West Project Entry (future intersection)
5. Willow Road/North Frontage Road (future intersection)
6. Willow Road/US 101 SB Ramps
7. Willow Road/US 101 NB Ramps
8. Willow Road/Thompson Avenue
9. Southwest Project Entry/Pomeroy Road (future intersection)
10. West Tefft Street/Pomeroy Road
11. West Tefft Street/Mary Avenue
12. West Tefft Street/US 101 SB Ramps/South Frontage Road
13. West Tefft Street/US 101 NB Ramps

The following intersections were analyzed during the Sunday midday peak hour while the Nipomo Swap Meet and Flea Market was underway:

1. West Tefft Street/Pomeroy Road
2. West Tefft Street/Mary Avenue
3. West Tefft Street/US 101 SB Ramps/South Frontage Road
4. West Tefft Street/US 101 NB Ramps
5. Mary Avenue/Juniper Street
6. Willow Road/North Frontage Road (future intersection)

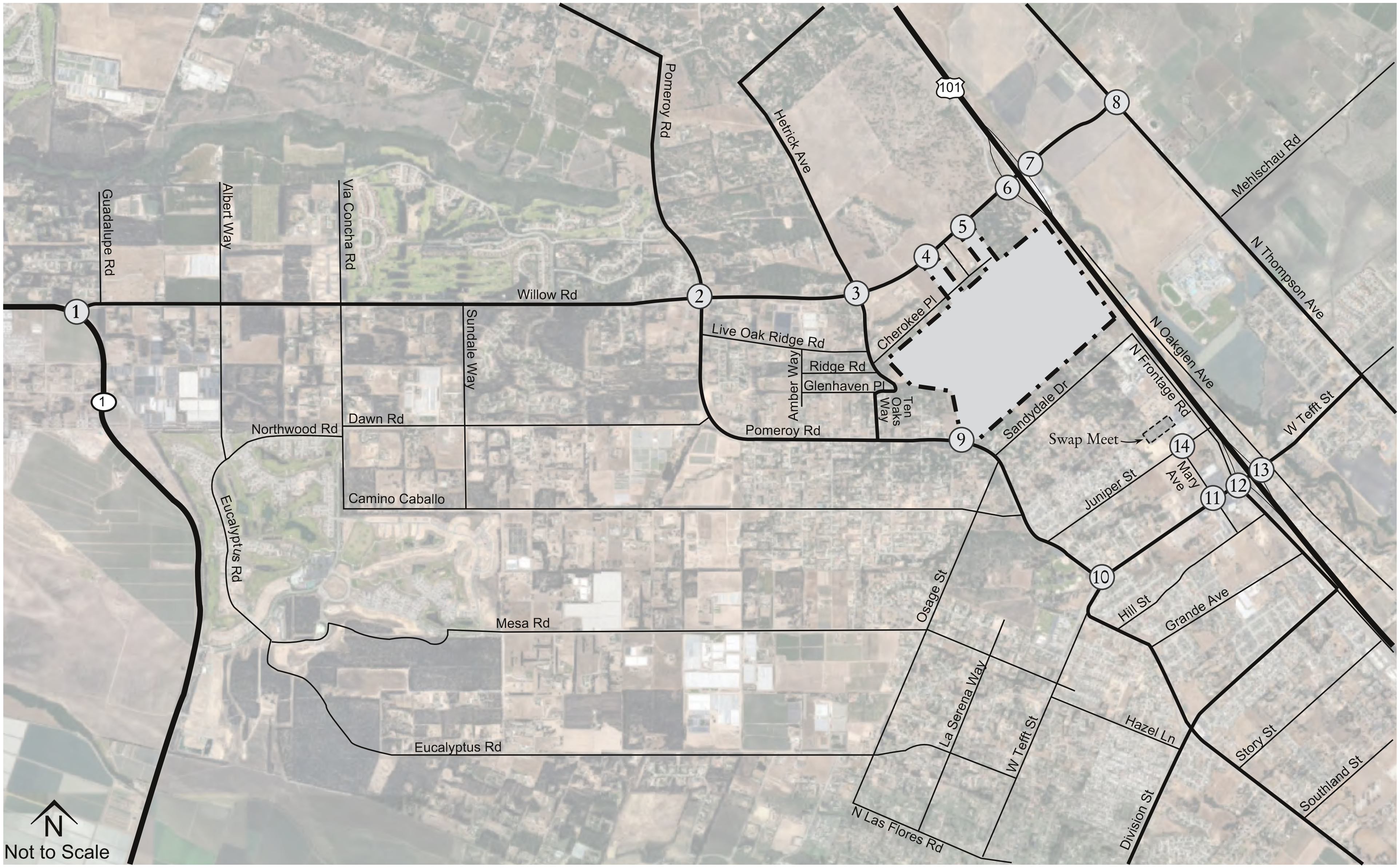
US 101 was analyzed during the weekday AM and PM peak hours near the Willow Road interchange.

The study locations were evaluated under the following scenarios:

1. **Existing Conditions** reflects recent traffic counts and the existing transportation network.
2. **Existing Plus Project Conditions** adds Project-generated traffic to existing volumes.
3. **Cumulative Conditions** represents future traffic conditions reflective of the General Plan buildout of land uses in the area, not including the proposed Project.
4. **Cumulative Plus Project Conditions** represents future traffic conditions reflective of the buildout of land uses in the area, including the proposed Project.

Each scenario is described in more detail in the corresponding chapter.

Figure 1: Project and Study Locations



Legend:
- Project Site
17 - Study Intersection

July 2021

Dana Reserve

Figure 2: Project Site Plan

Source: RRM Design Group

Central Coast Transportation Consulting
Traffic Engineering & Transportation Planning

2.0 Analysis Methods

2.1 LEVEL OF SERVICE THRESHOLDS AND POLICIES

The analysis approach was developed based on the Highway Capacity Manual (HCM), County of San Luis Obispo, and Caltrans standards.

2.1.1 Intersection Level of Service Thresholds

The level of service (LOS) thresholds for intersections are based on the 6th Edition of the HCM and are presented in **Table 1**.

Table 1: Intersection Level of Service Thresholds

Level of Service Thresholds			
Signalized Intersections[1]		Stop Controlled Intersections[2]	
Control Delay[3]	LOS	Control Delay[3]	LOS
≤ 10	A	≤ 10	A
> 10 - 20	B	> 10 - 15	B
> 20 - 35	C	> 15 - 25	C
> 35 - 55	D	> 25 - 35	D
> 55 - 80	E	> 35 - 50	E
> 80	F	> 50 or v/c > 1	F

1. Source: Exhibit 19-8 of the 6th Edition Highway Capacity Manual.
2. Source: Exhibits 20-2 and 21-8 of the 6th Edition Highway Capacity Manual.
3. Control delay is seconds per vehicle.

The study intersections were analyzed with the Synchro 10 software package applying the HCM 6 methods except as noted below.

The latest available signal timing was obtained from Caltrans and the County. Due to the signal phasing, the intersections of West Tefft Street/Pomeroy Road (#10) and West Tefft Street/US 101 SB Ramps/South Frontage Road (#12) were analyzed using the 2000 HCM methodology as the HCM 6 methodology does not support the intersection phasing.

2.1.2 Freeway Level of Service Thresholds

The LOS thresholds for freeway facilities are also based on the 6th Edition of the HCM and are presented in **Table 2**. The mainline, merge, and diverge segments of US 101 were evaluated using the HCS 7 software package with a vehicle density calculation consistent with the HCM 6 methodology.

Table 2: Freeway Level of Service Thresholds

Freeway Level of Service Thresholds			
Basic Freeway & Multilane Highway Segments[1]		Freeway Merge/Diverge Segments[2]	
Density[3]	LOS	Density[3]	LOS
≤ 11	A	≤ 10	A
> 11 - 18	B	> 10 - 20	B
> 18 - 26	C	> 20 - 28	C
> 26 - 35	D	> 28 - 35	D
> 35 - 45	E	> 35	E
> 45 (Demand>Capacity)	F	v/c > 1	F

1. Source: Exhibit 12-15 of the 6th Edition Highway Capacity Manual.
2. Source: Exhibit 14-3 of the 6th Edition Highway Capacity Manual.
3. Density is passenger cars per vehicle per lane.

2.1.3 County of San Luis Obispo Facilities

The County of San Luis Obispo has adopted the following LOS standard for roadways and intersections:

- Rural areas (outside the Urban Reserve Line): LOS C is acceptable; LOS D is not.
- Urban areas (within the Urban Reserve Line): LOS D is acceptable; LOS E is not.

Willow Road and a portion of Pomeroy Road are currently outside the Urban Reserve Line (URL). However, approval of the project would modify the URL and the LOS D standard was used for all study locations.

2.2 VEHICLE MILES TRAVELED THRESHOLDS

2.2.1 County of San Luis Obispo Facilities

The County of San Luis Obispo's Transportation Impact Analysis Guidelines (October, 2020) provide the following thresholds of significance for VMT impacts:

- Residential Projects: 27.2 VMT per capita.
- Work Projects: 25.7 VMT per employee.
- Retail and other projects: no net increase in overall VMT.

The County developed a quick-response tool for use in calculating VMT which is applied in this study.

2.2.2 Caltrans Facilities

Caltrans has eliminated LOS consistent with SB 743 and now relies on VMT and safety to evaluate transportation impacts. Caltrans recently issued a series of policy documents related to transportation impacts and CEQA determinations, briefly summarized below.

Caltrans published a VMT Focused TIS Guide in May 2020 which replaced the prior guide reliant on LOS. The TIS Guide notes that lead agencies have the discretion to choose VMT thresholds and methods, and generally conforms to OPR guidance.

Caltrans issued Traffic Safety Bulletin 20-02-R1 in December 2020 providing guidance for intergovernmental review for potential safety impacts of land use projects and plans affecting the State Highway System. The Bulletin describes the procedure for Caltrans staff to review potential safety impacts and develop mitigation measures as appropriate.

3.0 Existing Conditions

This section describes the existing transportation system and operating conditions in the study area.

3.1 EXISTING ROADWAY NETWORK

US Highway 101 is a major north-south interstate facility connecting Los Angeles to San Francisco. Near the project it is has four lanes with full access interchanges at Willow Road and Tefft Street.

State Route 1 (SR 1) is a north-south state highway facility connecting the South County area to the Five Cities area to the north. SR 1 branches off US 101 in Pismo Beach, running parallel to US 101 throughout South County as a conventional two-lane highway.

Willow Road is an undivided, two-lane arterial running east-west with a speed limit of 50 to 55 mph connecting SR 1 to US 101 with a full access interchange. There are two project entries planned along Willow Road between Hetrick Avenue and the US 101 ramps.

Hetrick Avenue is a two-lane residential collector road with no posted speed limit. Hetrick Avenue links residential neighborhoods to Willow Road, providing regional access via SR 1 and US 101.

North Frontage Road is a north-south commercial collector road connecting Juniper Street to Sandydale Drive with no posted speed limit. It would be extended to Willow Road as a part of the project, providing access to two of the four project entries.

Thompson Avenue is a two-lane, undivided arterial running north-south with posted speed limits ranging from 35 to 55 mph. Thompson Avenue links the residential areas east of US 101 to commercial services via Tefft Street, as well as providing regional access via full access interchanges with US 101 at Willow Road and Los Berros Road.

Pomeroy Road is a two-lane, north-south undivided facility considered an arterial south of Willow Road and a collector north of Willow Road with a speed limit ranging from 45 to 55 mph. There is one project entry planned along Pomeroy Road between Calimex Place and Sandydale Drive.

Tefft Street is a four-lane, major east-west arterial with speed limits ranging from 25 to 45 mph. Tefft Street connects Thompson Avenue and Pomeroy Road to a variety of commercial and retail services, as well as to a full access interchange with US 101.

Mary Avenue is a north-south, two-lane undivided commercial collector with a continuous center left turn lane. Mary Avenue connects the residential areas along Juniper Street to the commercial services along Tefft Street.

Juniper Street is an east-west, two-lane undivided residential collector with a speed limit of 35 mph. Juniper Street connects the residential properties to the commercial areas to the east via Mary Avenue, or to Pomeroy Road to the west.

3.2 EXISTING PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals at all signalized intersections. The signalized intersection of Willow Road and Pomeroy Road does not have sidewalks but has crosswalks and pedestrian signals, except on the east leg. The signalized intersection of Tefft Street and Pomeroy Road has crosswalks on the north and east legs and the south leg has a sidewalk. The signalized intersection of Tefft Street and Mary Avenue has crosswalks on each leg. The all-way stop controlled intersection of Mary Avenue and Juniper Street has partial sidewalk coverage on the south leg and discontinuous sidewalk coverage on the north leg; this intersection has no marked crosswalks. The signalized intersections of Tefft Street and the US 101 northbound and southbound ramps have crosswalks on each leg except the west and east legs, respectively. All other remaining intersections do not have pedestrian facilities.

Bicycle facilities in the study area consist of Class II and III bikeways. A Class II bike lane provides a striped lane for one-way bicycle travel on the side of the street adjacent to vehicle traffic. Class III bike routes consist of a roadway that is shared between bicycle and vehicle traffic with supplemental bike signage. The bikeways in the project vicinity are described below.

- *Willow Road:* existing Class II bike lanes between SR 1 and Thompson Avenue.
- *Thompson Avenue:* existing Class II bike lanes between Knotts Street to Nipomo High School.
- *Pomeroy Road:* existing Class II bike lanes between Tefft Street and Willow Road.
- *Tefft Street:* existing Class II bike lanes between Las Flores Drive and the Nipomo Creek Bridge and Class III bike route between Nipomo Creek Bridge and Thompson Avenue.
- *Mary Avenue:* existing Class II bike lanes between Juniper Street and Hill Street.
- *Juniper Street:* existing Class III bike route.

3.3 EXISTING TRANSIT SERVICE

San Luis Obispo Regional Transit Authority (SLORTA) serves Nipomo via Routes 10 and 10 Express (10X). The Route 10 stops within Nipomo are all located outside the study area, specifically along Thompson Avenue near the high school and along Tefft Street east of the US 101 ramps. Nipomo Dial-A-Ride provides curb-to-curb transportation within the local Nipomo area. It operates Monday through Friday from 7:00 AM to 6:30 PM and can provide connections to Route 10, as well as to the two Old Towne Nipomo bus stops on Tefft Street.

3.4 EXISTING TRANSPORTATION CONDITIONS

This section is divided into the following analysis subsections: 1) weekday intersection operations, 2) Sunday midday intersection operations, and 3) freeway segment operations.

The ramp widening and signal modification improvements at the Tefft Street interchange, currently in construction, were assumed to be in place under Existing conditions. However, analysis results for 2018 conditions without the improvements are also shown where applicable.

3.4.1 Weekday Intersection Operations

Traffic counts were collected for weekday AM and PM peak hour conditions at the study intersections in May 2018 when local schools were in session. Traffic count sheets are provided in **Appendix A**.

Figure 3 shows the existing peak hour traffic volumes. **Table 3** and

Table 4 summarize the existing LOS and key queues exceeding storage for the study intersections during the weekday peak hours with detailed calculation sheets included in **Appendix B** and warrant analysis sheets in **Appendix D**.

Table 3: Existing Weekday Intersection LOS

Existing Weekday Intersection Auto Levels of Service			
Intersection	**Peak Hour**	**Delay[1] (sec/veh)**	**LOS**
1. Willow Rd/SR 1	AM	4.9 (12.4)	- (B)
	PM	4.4 (13.4)	- (B)
2. Willow Rd/Pomeroy Rd	AM	20.8	C
	PM	21.2	C
3. Willow Rd/Hetrick Ave	AM	4.2 (31.2)	- (D)
	PM	1.8 (17.7)	- (C)
4. Willow Rd/W Project Entry	AM	*Future Intersection*	
	PM		
5. Willow Rd/N Frontage Rd	AM	*Future Intersection*	
	PM		
6. Willow Rd/US 101 SB Ramps	AM	2.2 (12.8)	- (B)
	PM	4.5 (12.7)	- (B)
7. Willow Rd/US 101 NB Ramps	AM	**32.1 (181.0)**	**- (F)**
	PM	8.6 (18.9)	- (C)
8. Willow Rd/Thompson Ave	AM	5.4 (15.3)	- (C)
	PM	3.6 (11.0)	- (B)
9. SW Project Entry/Pomeroy Rd	AM	*Future Intersection*	
	PM		
10. W Tefft St/Pomeroy Rd	AM	15.0	B
	PM	15.8	B
11. W Tefft St/Mary Ave[2]	AM	38.9/34.7	D/C
	PM	47.1/36.8	D/D
12. W Tefft St/US 101 SB Ramps/S Frontage Rd[2]	AM	**59.3**/26.3	**E**/C
	PM	**42.0**/22.0	**D**/C
13. W Tefft St/US 101 NB Ramps[2]	AM	23.5/19.5	C/B
	PM	**39.7**/19.1	**D**/B

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction.

Note: Unacceptable operations shown in **bold** text.

Table 4: Existing Weekday Intersection Queues

Existing Intersection Queues				
Intersection	**Movement**	**Storage Length (ft)**	**Peak Hour**	**95th Percentile Queue (ft)[1]**
2. Pomeroy Rd. & Willow Rd.	NBR	25	AM	**35**
			PM	0
3. Hetrick Ave. & Willow Rd.	NBR	25	AM	**55**
			PM	5
11. Tefft St. & Mary Ave.[2]	NBL	120	AM	62
			PM	**137**/117
	SBL	120	AM	**137**/110
			PM	**236/161**
13. 101 NB Ramps & Tefft St.[2]	NBL	125/200	AM	**227**/131
			PM	**371**/182

1. Queue length that would not be exceeded 95 percent of the time.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction.

# indicates 95th percentile volume exceeds capacity, queue may be longer.
Bold indicates queue length longer than storage length.
Detailed queues provided in Appendix B.

All County intersections operate acceptably at LOS D or better during both weekday peak hours. However, the following queue lengths are exceeded:

- Pomeroy Road/Willow Rd (#2): the northbound right exceeds the small storage length provided within the shoulder during the AM peak hour. However, the queue would not block the through movement during the signal phase.
- Hetrick Avenue/Willow Rd (#3): the northbound right exceeds the small storage length provided with a flared approach during the AM peak hour. There is a small number of northbound through vehicles and the northbound queue would be less than three vehicles without a northbound right turn lane.
- Tefft Street/Mary Avenue (#11): the southbound left turn lane exceeds storage during the PM peak hour with the ramp widening improvements. However, additional storage is available in the approach and the queue would not block the through movement during the signal phase.

The following Caltrans intersections operate below the LOS C threshold or queues exceed storage:

- Willow Road/US 101 NB Ramps (#7): the northbound approach operates at LOS F during the AM peak hour due to long delays resulting from side street stop control, low peak hour factor due to High School traffic, and the high volumes along Willow Road. However, the peak hour traffic signal warrant is not met under Existing conditions.
- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS E and LOS D during the AM and PM peak hour, respectively, due to high volumes on all approaches. The intersection will operate acceptably with the ramp widening improvements currently under construction.
- West Tefft Street/US 101 NB Ramps (#13): operates at LOS D during the PM peak hour and the northbound left turn lane exceeds storage during the AM and PM peak hours. The intersection will operate acceptably with the ramp widening improvements currently under construction.

3.4.2 *Sunday Midday Intersection Operations*

Figure 4 shows the existing Sunday midday peak hour volumes at key intersections affected by the Swap Meet. Sunday traffic counts were collected in 2017 and 2018 while the Swap Meet was underway. Traffic count sheets are provided in **Appendix A**.

Table 5 and **Table 6** summarize the existing LOS and key queues for the study intersections during the Sunday midday peak with detailed calculation sheets included in **Appendix B**.

Table 5: Existing Sunday Intersection LOS

Existing Sunday Intersection Auto Levels of Service		
Intersection	**Delay[1] (sec/veh)**	**LOS**
5. Willow Rd/N Frontage Rd	*Future Intersection*	
10. W Tefft St/Pomeroy Rd	18.5	B
11. W Tefft St/Mary Ave[2]	47.1/38.5	D/D
12. W Tefft St/US 101 SB Ramps/S Frontage Rd[2]	**36.8**/24.2	**D**/C
13. W Tefft St/US 101 NB Ramps[2]	31.0/23.1	C/C
14. Mary Avenue/Juniper Street	18.8	C

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction.

Note: Unacceptable operations shown in **bold** text.

Table 6: Existing Sunday Intersection Queues

Existing Sunday Intersection Queues			
Intersection	**Movement**	**Storage Length (ft)**	**95th Percentile Queue (ft)[1]**
11. Tefft St. & Mary Ave.[2]	EBL	120	**149/134**
	SBL	120	**312/255**
13. 101 NB Ramps & Tefft St.[2]	NBL	125/200	**344/229**

1. Queue length that would not be exceeded 95 percent of the time.
2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction.
# indicates 95th percentile volume exceeds capacity, queue may be longer.
Bold indicates queue length longer than storage length.
Detailed queues provided in Appendix B.

All County intersections operate acceptably at LOS D or better during the Sunday midday peak hour. However, the following queue lengths exceed storage capacity:

- Tefft Street/Mary Avenue (#11): the eastbound and southbound left turn lanes exceed storage during the Sunday midday peak hour with the ramp widening improvements.

The following Caltrans intersections operate below the LOS C threshold or queues exceed storage:

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS D during the AM peak hour due to high volumes on all approaches. Ramp widening improvements at this location are currently in construction and would improve operations to LOS C.
- West Tefft Street/US 101 NB Ramps (#13): the northbound left turn lane exceeds storage during the Sunday midday peak hour with the ramp widening improvements.

3.4.3 Freeway Segment Operations

Table 7 summarizes the existing LOS at the freeway mainline and ramp locations during the weekday peak hours. Mainline peak hour volumes were obtained using September 2019 traffic counts and ramp volumes were derived from the ramp terminal intersection counts. The mainline truck percentage was obtained from Caltrans data. Detailed calculation sheets are included in **Appendix C**.

Table 7: Existing Freeway LOS

Existing Freeway Operations					
Direction	**Location**	**Segment Type**	**Peak Hour**	**Density (pc/mi/ln)[1]**	**LOS**
US 101 NB	South of Willow Rd	Mainline	AM	**27.1**	**D**
			PM	22.5	C
	Willow Rd Off Ramp	Diverge	AM	**32.3**	**D**
			PM	**28.5**	**D**
	Willow Rd On Ramp	Merge	AM	**30.1**	**D**
			PM	24.5	C
	North of Willow Rd	Mainline	AM	**30.5**	**D**
			PM	22.2	C
US 101 SB	North of Willow Rd	Mainline	AM	21.9	C
			PM	**37.3**	**E**
	Willow Rd Off Ramp	Diverge	AM	27.9	C
			PM	**38.1**	**E**
	Willow Rd On Ramp	Merge	AM	24.8	C
			PM	**32.7**	**D**
	South of Willow Rd	Mainline	AM	22.4	C
			PM	**34.4**	**D**

1. HCM 6th density (passenger car per mile per lane).
Note: Unacceptable operations shown in **bold** text.

The following Caltrans freeway segments operate below the LOS C threshold:

- US 101 Mainline south of Willow Road operates at LOS D northbound during the AM peak hour and southbound during the PM peak hour.
- US 101 Mainline north of Willow Road operates at LOS D northbound during the AM peak hour and LOS E southbound during the PM peak hour.

- Willow Road northbound off ramp operates at LOS D during the AM and PM peak hours.
- Willow Road northbound on ramp operates at LOS D during the AM peak hour.
- Willow Road southbound off ramp operates at LOS E during the PM peak hour.
- Willow Road southbound on ramp operates at LOS D during the PM peak hour.

Figure 3: Existing Weekday Peak Hour Volumes with Lane Configurations

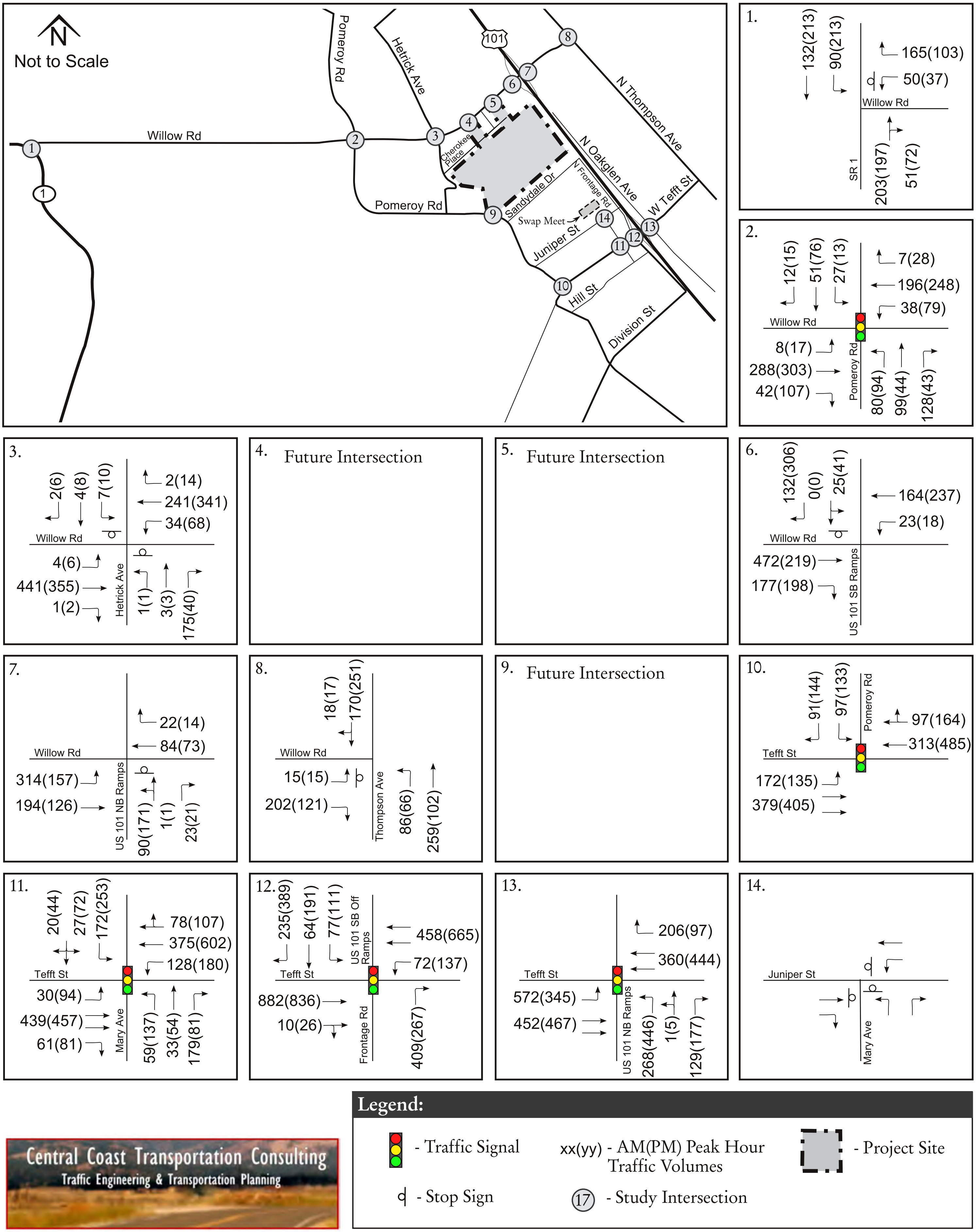


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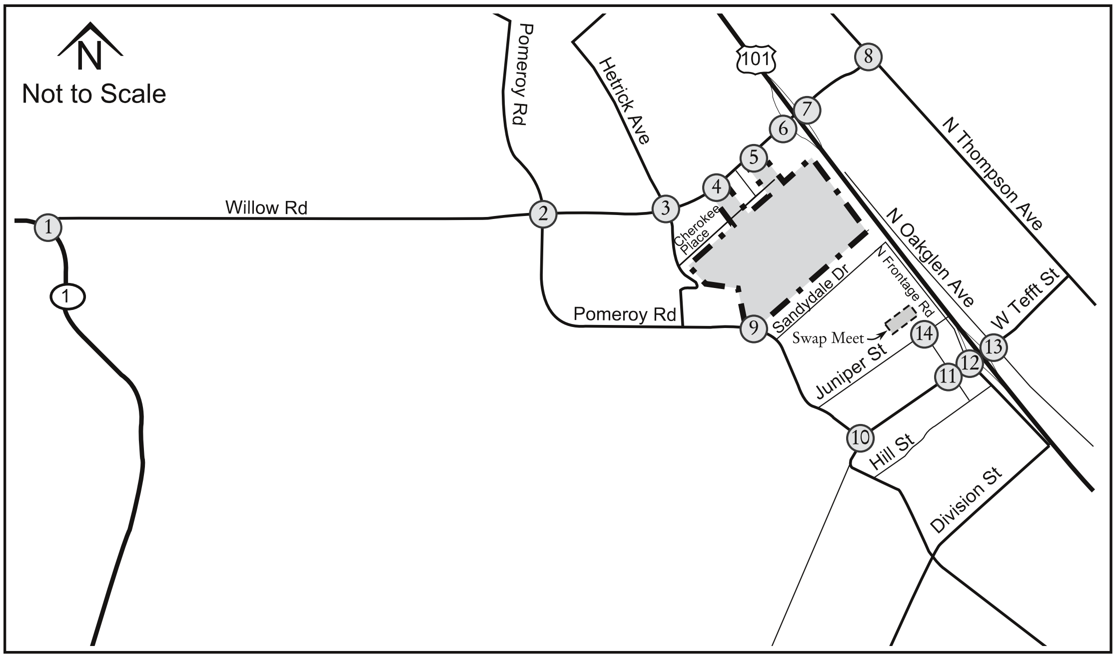
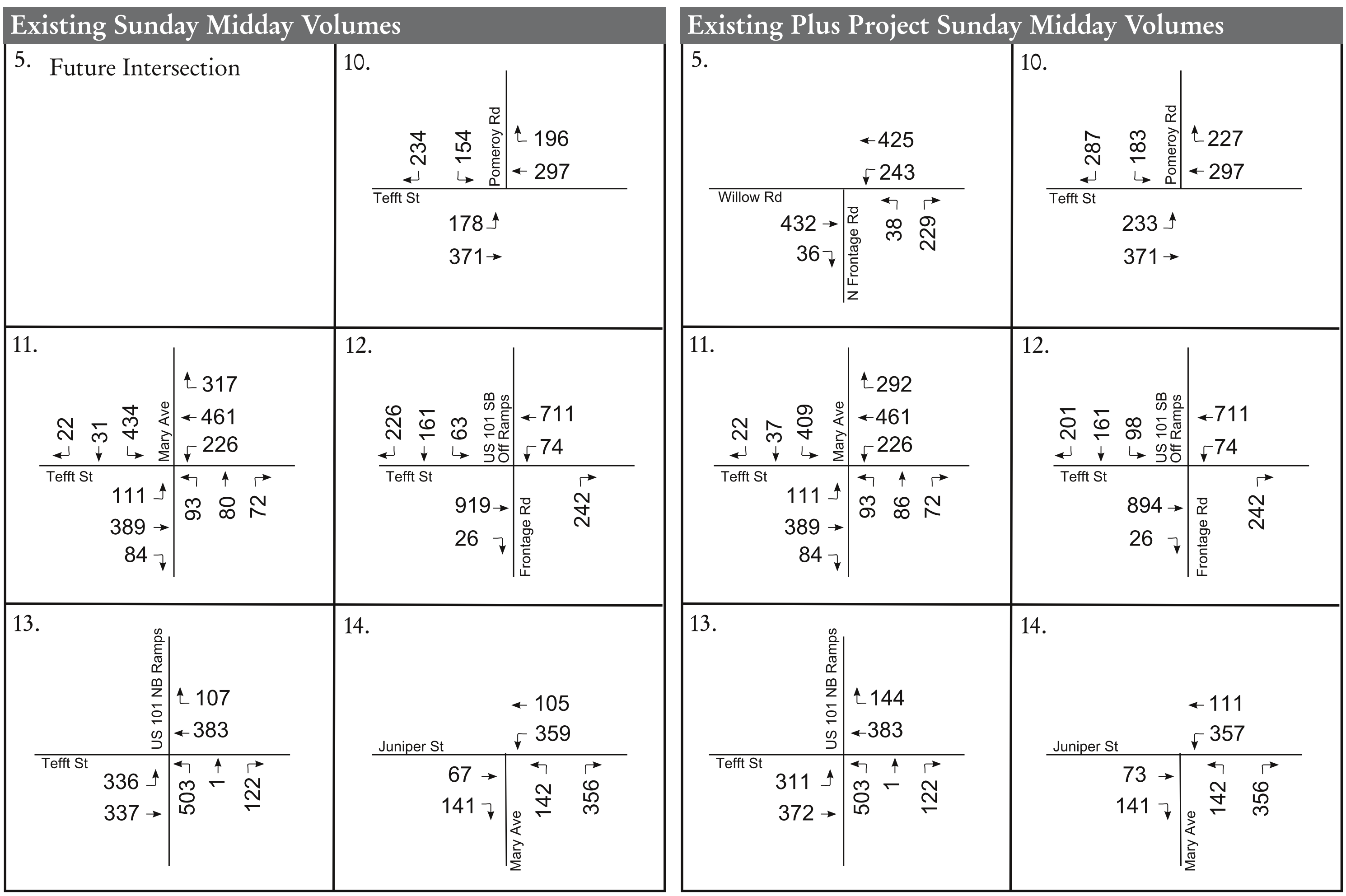
Figure 4: Existing and Existing Plus Project Sunday Midday Volumes





Legend:

xx - Sunday Midday Traffic Volumes

- Project Site

17 - Study Intersection

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4.0 Existing Plus Project Conditions

This section evaluates the impacts of the proposed project on the surrounding transportation network.

4.1 PROJECT TRAFFIC ESTIMATES

The amount of project traffic affecting the study locations is estimated in three steps: trip generation, trip distribution, and trip assignment. Trip generation refers to the total number of trips generated by the site. Trip distribution identifies the general origins and destination of these trips, and trip assignment specifies the routes taken to reach these origins and destinations.

4.1.1 Trip Generation

The Institute of Transportation Engineers (ITE) *Trip Generation Manual* 10th Edition was used to estimate project trip generation. **Table 8** summarizes the estimated trip generation from the proposed project.

Table 8: Project Trip Generation

Weekday and Sunday Vehicle Trip Generation														
			Weekday	AM Peak Hour			PM Peak Hour			Sunday	Sunday MID[6]		
Land Use	**Size**	**Unit**	**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**Daily**	**In**	**Out**	**Total**
Single Family Residential[1]	833	DU	7,310	149	447	596	490	287	777	7,324	355	314	669
Multi Family Residential[2]	610	DU	4,571	61	205	266	186	109	295	3,831	205	204	409
Commercial Services[3]	113,000	SF	6,533	129	79	208	286	309	595	2,384	154	161	315
Education[4]	30,000	SF	608	48	14	62	28	28	56	36	3	3	6
Hotel[5]	110	Rooms	920	31	21	52	34	32	66	655	29	33	62
Gross Trips			19,942	418	766	1,184	1,024	765	1,789	14,230	746	715	1,461
Internal Trips[7]			*1,240*	*14*	*14*	*28*	*124*	*124*	*248*	*1,020*	*102*	*102*	*204*
Pass-by Trips[8]			*810*	*0*	*0*	*0*	*81*	*81*	*162*	*280*	*28*	*28*	*56*
Net New Trips			**17,892**	**404**	**752**	**1,156**	**819**	**560**	**1,379**	**12,930**	**616**	**585**	**1,201**

DU=Dwelling Unit; SF= Square Feet

1) ITE Land Use Code #210, Single-Family Detached Housing. Fitted curve equations used for weekday and Sunday.

2) ITE Land Use Code #220, Multifamily Housing (Low-Rise). Fitted curve equation used for weekday; Average rate used for Sunday.

3) ITE Land Use Code #820, Shopping Center. Fitted curve equation used for weekday; Average rate used for Sunday.

4) ITE Land Use Code #540, Junior/Community College. Average rates used for weekday and Sunday.

5) ITE Land Use Code #310, Hotel. Average rate used for weekday and Sunday.

6) Sunday, Peak Hour of Generator rates and equations used for midday.

7) Internal trips calculated using *TripGen 10* software. Sunday mid-day internal capture assumed same as weekday PM. PM and mid-day internal trips multiplied by factor of 5 to determine daily internal trips.

8) Pass-by rates from ITE *Trip Generation Handbook*, 3rd Edition. PM peak hour and Sunday Mid-day volumes both multiplied by a factor of 5 to determine weekday and Sunday daily pass-by trips, respectively. Saturday Mid-day pass-by rates used for Sunday Mid-day.

Source: ITE *Trip Generation Manual*, 10th Edition; CCTC, 2021.

The project is expected to generate a total of 17,892 net new daily trips, 1,156 net new AM peak hour trips, 1,379 net new PM peak hour trips, 12,930 net new Sunday daily trips, and 1,201 net new Sunday midday peak hour trips. Net new trips were found by subtracting internal capture trips and pass-by trips from the gross trip generation. The trip generation assumes up 1,443 residential units including 458 multi-family units and 152 accessory dwelling units (ADUs).

ITE Land Use #820 for shopping center includes a variety of uses: office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities. The fitted curve equations were used for the weekday trip generation estimates. Use of the average trip rates would reduce the AM and PM peak hour trips by approximately 49% and 28%, respectively. Use of the average trip rate plus one standard deviation would result in fewer AM peak hour trips and 11% more PM peak hours trip compared to the fitted curve equations. Although the trip generation will be affected by the tenants and can vary greatly, use of the shopping center fitted curve is appropriate for the analysis.

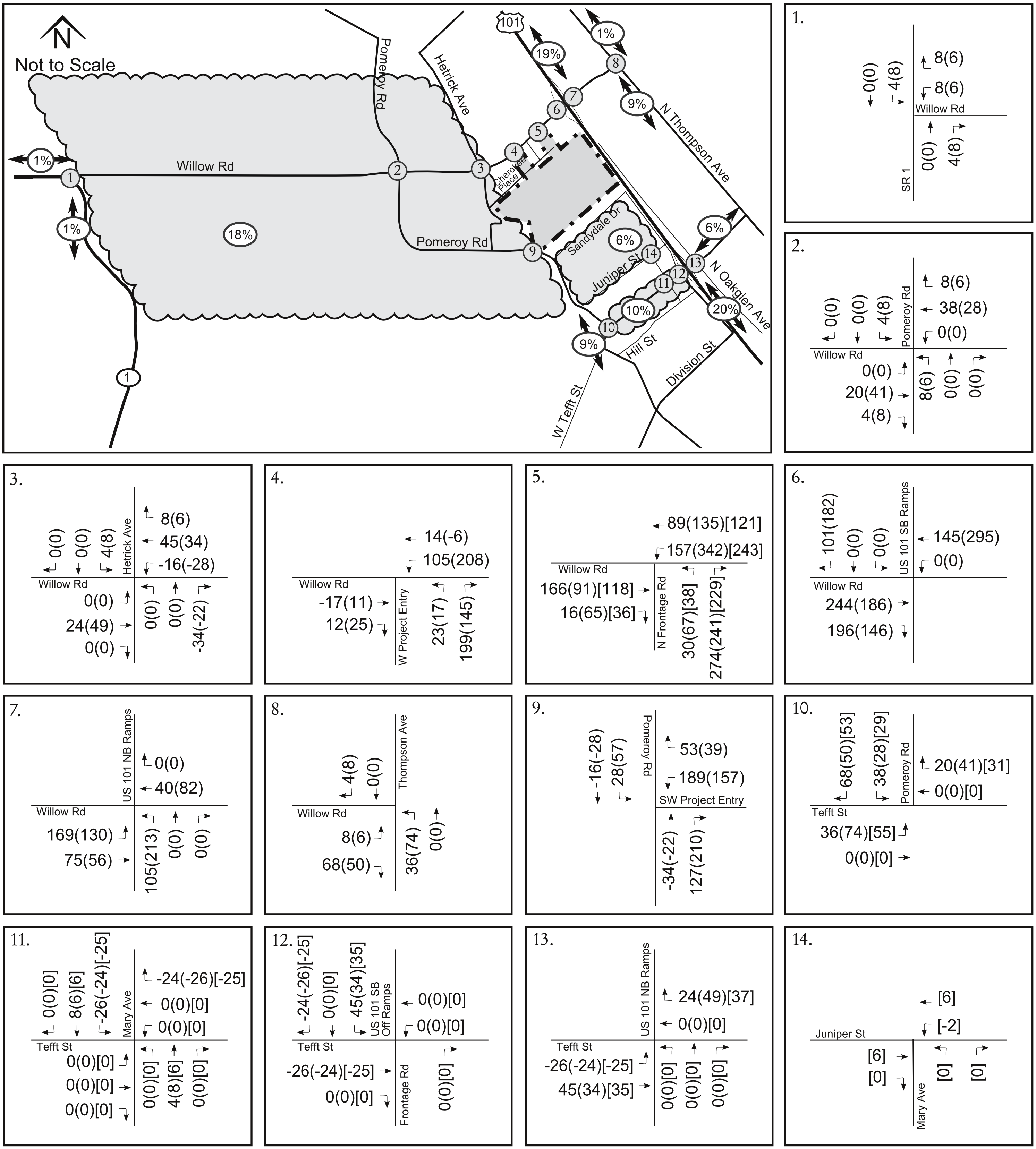
Pass-by trips were only applied on Willow Road at Willow Rd/North Frontage Rd (#5). ITE internal capture trip data was also applied. This site is 288 acres within the applicable range of ITE data.

Trips could be also diverted from US 101. However, per ITE it is common for a traffic impact assessment of site development to treat diverted trips as additional trips. This conservative approach is applied in this TIS.

4.1.2 Trip Distribution and Assignment

Project trip distribution and assignment were derived using a select zone procedure in the SLOCOG Travel Demand Model (TDM). Existing Plus Project conditions volumes were redistributed based on the North Frontage Road extension and the additional north-south connector. **Figure 5** shows the trip distribution percentages and project trip assignment including pass-by trips and redistributed trips. Project trip assignment volumes were balanced between intersections to account for the effects of rounding.

Figure 5: Project Trip Distribution and Assignment



Legend:

xx(yy)[zz] - AM(PM) Peak Hour [Sunday] Midday Traffic Volumes

- Project Site

x% - Project Trip Distribution

17 - Study Intersection

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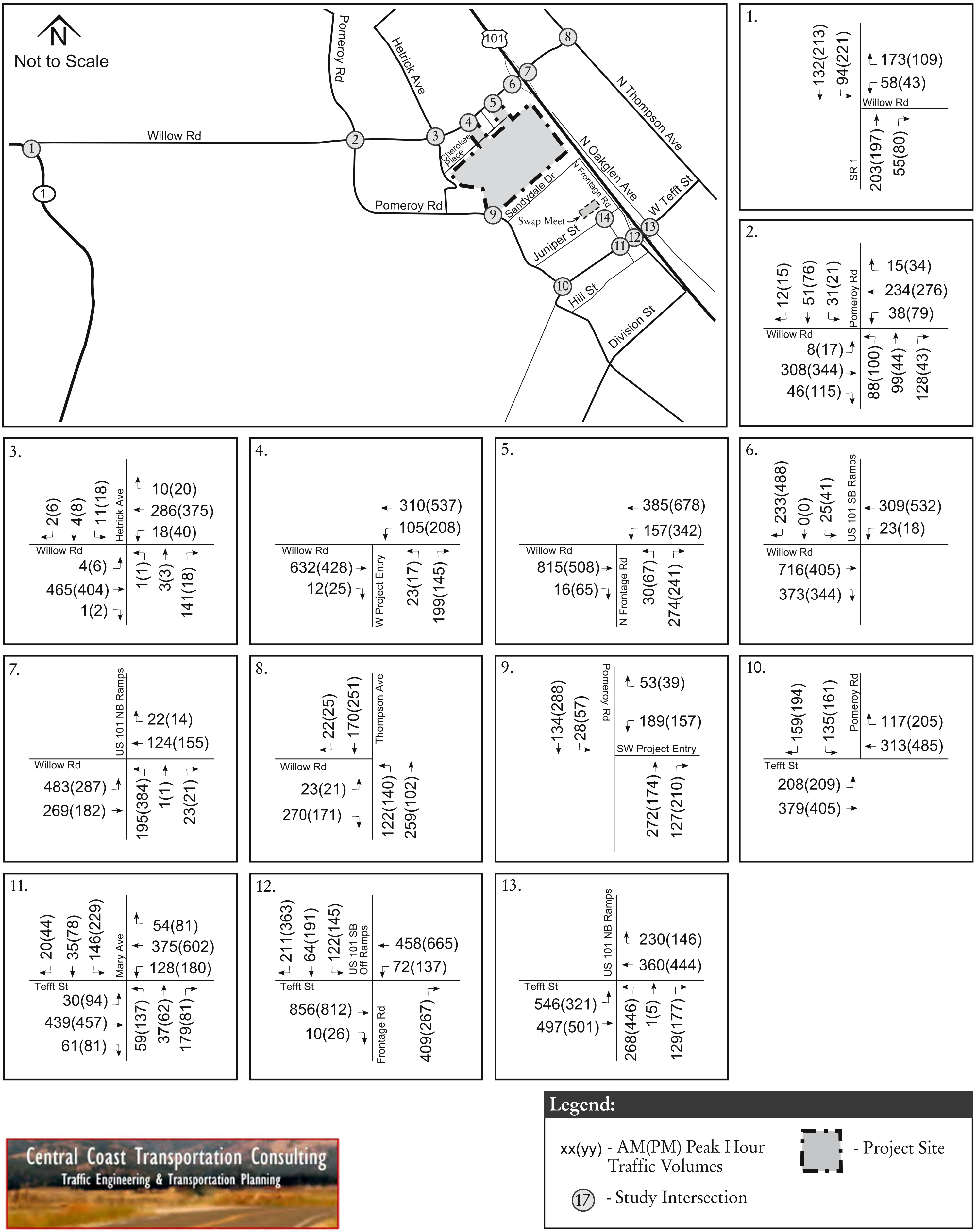
Figure 6: Existing Plus Project Weekday Peak Hour Volumes



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4.2 EXISTING PLUS PROJECT IMPACT ANALYSIS

This section is divided into the following analysis subsections: 1) weekday intersection operations, 2) Sunday midday intersection operations, and 3) freeway segment operations. The Tefft Street improvements that are currently under construction have been assumed to be complete under Existing Plus Project conditions.

4.2.1 Weekday Intersection Operations

Figure 6 shows the LOS for the study intersections during the weekday peak hours under Existing Plus Project conditions, with detailed calculation sheets included in **Appendix B** and warrant analysis sheets in **Appendix D**.

Table 9 and **Table 10** summarize the LOS and key queues for the study intersections during the weekday peak hours under Existing and Existing Plus Project conditions.

Table 9: Weekday Existing Plus Project LOS

Existing and Existing Plus Project Intersection Auto Levels of Service					
		Existing		Existing + Project	
Intersection	Peak Hour	Delay[1] (sec/veh)	LOS	Delay[1] (sec/veh)	LOS
1. Willow Rd/SR 1	AM	4.9 (12.4)	- (B)	5.1 (12.6)	- (B)
	PM	4.4 (13.4)	- (B)	4.6 (14.1)	- (B)
2. Willow Rd/Pomeroy Rd	AM	20.8	C	21.3	C
	PM	21.2	C	22.1	C
3. Willow Rd/Hetrick Ave	AM	4.2 (31.2)	- (D)	3.3 (33.0)	- (D)
	PM	1.8 (17.7)	- (C)	1.4 (18.7)	- (C)
4. Willow Rd/W Project Entry	AM	*Future Intersection*		4.5 (21.4)	- (C)
	PM			3.4 (16.6)	- (C)
5. Willow Rd/N Frontage Rd	AM	*Future Intersection*		24.8	C
	PM			15.4	B
6. Willow Rd/US 101 SB Ramps	AM	2.2 (12.8)	- (B)	3.6 (22.4)	- (C)
	PM	4.5 (12.7)	- (B)	**14.8 (50.9)**	**- (F)**
7. Willow Rd/US 101 NB Ramps	AM	**32.1 (181.0)**	**- (F)**	**>200 (>200)**	**- (F)**
	PM	8.6 (18.9)	- (C)	**199.1 (>200)**	**- (F)**
8. Willow Rd/Thompson Ave	AM	5.4 (15.3)	- (C)	8.0 (20.2)	- (C)
	PM	3.6 (11.0)	- (B)	4.9 (12.0)	- (B)
9. SW Project Entry/Pomeroy Rd	AM	*Future Intersection*		4.9 (15.2)	- (C)
	PM			4.2 (17.2)	- (C)
10. W Tefft St/Pomeroy Rd	AM	15.0	B	18.1	B
	PM	15.8	B	19.5	B
11. W Tefft St/Mary Ave[2]	AM	38.9/34.7	D/C	34.4	C
	PM	47.1/36.8	D/D	36.2	D
12. W Tefft St/US 101 SB Ramps/S Frontage Rd[2]	AM	**59.3**/26.3	**E**/C	31.3	C
	PM	**42.0**/22.0	**D**/C	23.0	C
13. W Tefft St/US 101 NB Ramps[2]	AM	23.5/19.5	C/B	20.5	C
	PM	**39.7**/19.1	**D**/B	19.3	B

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction. EX+P results assume construction is complete.

Note: Unacceptable operations shown in **bold** text.

Table 10: Weekday Existing Plus Project Queues

Existing and Existing Plus Project Intersection Queues					
Intersection	Movement	Storage Length (ft)	Peak Hour	EX 95th Percentile Queue (ft)[1]	EX+ P
2. Pomeroy Rd. & Willow Rd.	NBR	25	AM	**35**	**35**
			PM	0	**0**
3. Hetrick Ave. & Willow Rd.	NBR	25	AM	**55**	**40**
			PM	5	3
11. Tefft St. & Mary Ave.[2]	NBL	120	AM	62	62
			PM	**137**/117	117
	SBL	120	AM	**137**/110	102
			PM	**236/161**	**155**
13. 101 NB Ramps & Tefft St.[2]	NBL	125/200	AM	**227**/131	131
			PM	**371**/182	182

1. Queue length that would not be exceeded 95 percent of the time.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction. EX+P results assume construction is complete.

# indicates 95th percentile volume exceeds capacity, queue may be longer.

Bold indicates queue length longer than storage length.

Detailed queues provided in Appendix B.

All County intersections operate at LOS D or better under Existing and Existing Plus Project conditions. However, the following queue lengths are exceeded:

- Pomeroy Road/Willow Rd (#2): the northbound right exceeds the small storage length provided within the shoulder during the AM peak hour. However, the queue would not block the through movement during the signal phase and the project does not exacerbate the queue.

  Recommendation: None.

- Hetrick Avenue/Willow Rd (#3): the northbound right exceeds the small storage length provided with a flared approach during the AM peak hour. There is a small number of northbound through vehicles and the northbound queue would be less than two vehicles without a northbound right turn lane. The project reduced the queue length on this approach. Refer to section 4.4.2 for additional discussion of Hetrick Avenue.

  Recommendation: None.

- Tefft Street/Mary Avenue (#11): the southbound left turn lane exceeds storage during the PM peak hour with the ramp widening improvements. However, additional storage is available in the approach and the queue would not block the through movement during the signal phase.

  Recommendation: None, acceptable queues will result from the improvements under construction.

Although the Mary Avenue/Juniper Street (#14) intersection was only evaluated under Sunday Conditions, the intersection would operate acceptably during the weekday peak hours with the addition of project traffic.

The following Caltrans intersections operate below the LOS C threshold:

- Willow Road/US 101 SB Ramps (#6): the southbound approach operates at LOS F during the PM peak hour with project traffic due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive phasing on the westbound Willow Road approach and the existing lane configurations would result in

LOS C or better during both peak hours. This improvement is included in the South County Road Improvement Fee Program and the peak hour signal warrant is met under the Existing Plus Project conditions.

Recommendation: Install traffic signal.

- Willow Road/US 101 NB Ramps (#7): the northbound approach operates at LOS F during both peak hours due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive on the eastbound Willow Road approach and the existing lane configurations would result in LOS C or better during both peak hours. This improvement is included in the South County Road Improvement Fee Program and the peak hour signal warrant is met under the Existing Plus Project conditions.

  Recommendation: Install traffic signal.

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS E and LOS D during the AM and PM peak hours, respectively. Installation of the improvements under construction, including an additional turn lane on the northbound and southbound off-ramps and restricting northbound left turns on Frontage Road would result in LOS C or better during both peak hours. The improvement will also reduce queuing on Tefft Street near the Mary Avenue intersection.

  Recommendation: None, acceptable operations will result from the improvements under construction.

- West Tefft Street/US 101 NB Ramps (#13): operates at LOS D during the PM peak hours. Installation of the ramp improvements currently under construction would result in LOS C or better during both peak hours.

  Recommendation: None, acceptable operations will result from the improvements under construction.

The Frontage Road connection to Willow Road will shift traffic away from the Tefft Street corridor and improve operations, reducing delay.

4.2.2 Sunday Midday Intersection Operations

Figure 4 shows the Existing and Existing Plus Project Sunday midday volumes.

Table 11 and **Table 12** summarize the LOS and key queues for the study intersections during the Sunday midday peak hour under Existing and Existing Plus Project conditions with detailed calculation sheets included in **Appendix B**.

Table 11: Sunday Existing Plus Project Intersection LOS

Existing and Existing Plus Project Sunday Intersection Auto Levels of Service				
Intersection	Sunday Existing Delay[1]	Sunday Existing LOS	Sun Existing + Project Delay[1]	Sun Existing + Project LOS
5. Willow Rd/N Frontage Rd	*Future Intersection*		13.6	B
10. W Tefft St/Pomeroy Rd	18.5	B	20.6	C
11. W Tefft St/Mary Ave[2]	47.1/38.5	D/D	37.9	D
12. W Tefft St/US 101 SB Ramps/S Frontage Rd[2]	**36.8**/24.2	**D**/C	24.4	C
13. W Tefft St/US 101 NB Ramps[2]	31.0/23.1	C/C	23.1	C
14. Mary Avenue/Juniper Street	18.8	C	18.8	C

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction. EX+P results assume construction is complete.

Note: Unacceptable operations shown in **bold** text.

Table 12: Sunday Existing Plus Project Intersection Queues

Existing and Existing Plus Project Sunday Intersection Queues				
Intersection	Movement	Storage Length (ft)	Sun EX 95th Percentile Queue (ft)[1]	Sun EX+ P 95th Percentile Queue (ft)[1]
11. Tefft St. & Mary Ave.[2]	EBL	120	**149/134**	**134**
	SBL	120	**312/255**	**244**
13. 101 NB Ramps & Tefft St.[2]	NBL	125/200	**344/229**	**229**

1. Queue length that would not be exceeded 95 percent of the time.
2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction. EX+P results assume construction is complete.
# indicates 95th percentile volume exceeds capacity, queue may be longer.
Bold indicates queue length longer than storage length.
Detailed queues provided in Appendix B.

All County intersections operate at LOS D or better under the Sunday conditions. However, the following queue lengths are exceeded:

- Tefft Street/Mary Avenue (#11): the eastbound and southbound left turn lanes exceed storage during the Sunday midday peak hour with the ramp widening improvements. This is a temporary condition associated with the Swap Meet and no improvements are recommended.

  Recommendation: None.

The following Caltrans intersections operates below the LOS C threshold:

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS D during the Sunday midday peak hour due to high volumes on all approaches. Installation of the intersection improvements currently under construction would result in acceptable LOS during the Sunday midday peak hour.

  Recommendation: None, acceptable operations will result from improvements under construction.

- West Tefft Street/US 101 NB Ramps (#13): the northbound left turn lane exceeds storage during the Sunday midday peak hour with the ramp widening improvements. The queues will be shorter than the current condition without the project. This is a temporary condition associated with the Swap Meet and no improvements are recommended.

  Recommendation: None.

The Frontage Road connection to Willow Road will shift traffic away from the Tefft Street corridor and improve operations, reducing delay.

4.2.3 Freeway Segment Operations

Table 13 summarizes the LOS at the freeway mainline and ramp locations under Existing and Existing Plus Project conditions. Detailed calculation sheets are included in **Appendix C**.

Table 13: Freeway Existing Plus Project LOS

Existing and Existing Plus Project Freeway Operations							
				Existing		Existing Plus Project	
Direction	Location	Segment Type	Peak Hour	Density (pc/mi/ln)[1]	LOS	Density (pc/mi/ln)[1]	LOS
US 101 NB	South of Willow Rd	Mainline	AM	**27.1**	**D**	**28.6**	**D**
			PM	22.5	C	25.0	C
	Willow Rd Off Ramp	Diverge	AM	**32.3**	**D**	**33.4**	**D**
			PM	**28.5**	**D**	**30.7**	**D**
	Willow Rd On Ramp	Merge	AM	**30.1**	**D**	**31.5**	**D**
			PM	24.5	C	25.6	C
	North of Willow Rd	Mainline	AM	**30.5**	**D**	**33.5**	**D**
			PM	22.2	C	23.8	C
US 101 SB	North of Willow Rd	Mainline	AM	21.9	C	23.2	C
			PM	**37.3**	**E**	**41.8**	**E**
	Willow Rd Off Ramp	Diverge	AM	27.9	C	**29.0**	**D**
			PM	**38.1**	**E**	**40.1**	**E**
	Willow Rd On Ramp	Merge	AM	24.8	C	26.9	C
			PM	**32.7**	**D**	**34.4**	**D**
	South of Willow Rd	Mainline	AM	22.4	C	25.1	C
			PM	**34.4**	**D**	**37.5**	**E**

1. HCM 6th density (passenger car per mile per lane).
Note: Unacceptable operations shown in **bold** text.

All freeway segments operate below the LOS C threshold during at least one peak hour under both Existing and Existing Plus Project conditions.

The 2014 US 101 Transportation Concept Report supports Tefft Street interchange improvements, parallel routes, enhanced transit, transportation demand management (TDM), and transportation system management (TSM) strategies in the project vicinity. The project would contribute to these goals by providing multi-modal facilities, construction of the Frontage Road as a parallel route, and impact fee contributions supporting future infrastructure improvements.

Auxiliary lanes and high occupancy vehicle (HOV) lanes, which would improve operations, are not currently planned on US 101 in the project vicinity.

4.3 SITE ACCESS AND ON-SITE CIRCULATION

This section discusses issues related to site access and on-site circulation. On-site circulation deficiencies would occur if the project designs fail to meet appropriate standards, fail to provide adequate truck access, or would result in hazardous conditions.

Roadways within the development will be designed consistent with the San Luis Obispo County Public Improvement Standards. We recommend truck turning templates be applied to all Public Improvements and site designs as the project design plans develop.

4.3.1 Project Entries

The project entries with Willow Road and Pomeroy Road were analyzed under the weekday intersection operations section and all operate at LOS C or better under the Existing and Cumulative Conditions with the addition of project traffic as summarized below:

- Willow Road/West Project Entry (Collector B) (#4): operates at LOS C or better with side street stop control, a dedicated eastbound right turn lane and westbound left turn lane on Willow Road, and left and right turn lanes on the project approach.
- Willow Road/North Frontage Road (Collector A) (#5): operates at LOS C or better with a traffic signal, a dedicated eastbound right turn lane and westbound left turn lane on Willow Road, and left and right turn lanes on the project approach. The intersection meets the peak hour signal warrant in both the AM and PM peak hours under Existing Plus Project conditions. To minimize eastbound through and westbound left turn queues on Willow Road, we recommend coordination with the US 101 ramp traffic signals as well as westbound protective/permissive left turn phasing and northbound right turn overlap phasing.
- Southwest Project Entry (Collector B)/Pomeroy Road (#9): operates at LOS C or better with side street stop control, dedicated left and right turn lanes on Pomeroy Road, and left and right turn lanes on the project approach.

All turn lane storage lengths at the project entries are adequate as proposed and can accommodate 95th percentile queues.

4.3.2 Internal Streets

The project access along the three proposed collectors and local road were also analyzed under Existing and Cumulative Conditions. Consistent with County Circulation Studies, the ADT would need to exceed 10,500 on a two-lane collector and 4,000 on a local road for unacceptable LOS E operations. Operations on the internal roadways are summarized below:

- Collector A (North Frontage Road): Collector A is anticipated to carry between 6,000 and 10,500 vehicles per day under Cumulative Conditions and would operate acceptably. Twelve-foot travel lanes, with turn lanes at intersections, eight-foot bike lanes, and five-to-six-foot detached sidewalks comply with County Standard A-2d. We recommend a left-turn lane be provided at intersections on Collector A.

- Collector B (West/Southwest Project Entry): Collector B is anticipated to carry less than 6,000 vehicles per day under Cumulative Conditions and would operate acceptably. Two travel lanes with eight-foot bike lanes, and five-to-six-foot detached sidewalks as proposed complies with County Standard A-2c. Where turn lanes are proposed, the travel lane is reduced to 11 feet which may require a design exception.
- Collector C (East-West connection from Collector A to B): Collector C is anticipated to carry less than 6,000 vehicles per day under Cumulative Conditions and would operate acceptably. Twelve-foot travel lanes, eight-foot bike lanes, and five foot or greater sidewalks as proposed complies with County Standard A-2c.
- Local Road D: Local Road D is anticipated to carry less than 4,000 vehicles per day under Cumulative Conditions and would operate acceptably. Twelve-foot travel lanes, eight-foot parking lanes, and five-foot detached sidewalks as proposed complies with County Standard A-2c.

Driveways accessing the Village Commercial as well as all driveways on Collectors A, B, and C shall be located no closer than 200 feet to the adjacent intersection(s) consistent with County Standards. In addition, the distance between driveways shall not be less than 200 feet.

Two roundabouts are proposed within the project where Collector C intersects Collector A and Collector B. The single lane roundabouts operate acceptably as proposed. All other intersections on Collectors A, B, and C would operate acceptably with two-way stop control.

4.3.3 Emergency Access

The project will provide two connections to Willow Road, one to North Frontage Road/Sandydale Drive, and one to Pomeroy Road as well as emergency access to Hetrick Avenue and Cory Way. All neighborhoods have two access points to Collectors A, B, C, or Local Road D, except for Neighborhood Three which has additional access through Neighborhood One and emergency access to Neighborhood Seven.

Cal Fire in Nipomo is located on North Oakglen Avenue north of Tefft Street approximately two miles from the project site via Tefft Street and three miles via Thompson Avenue which typically does not experience congestion. As neighborhoods develop, Cal Fire approval will be required for access as well as other proposed improvements.

4.4 NEIGHBORHOOD CIRCULATION

4.4.1 Cherokee Place

Cherokee Place is an unimproved non-County maintained road parallel to and south of Willow Road along the project frontage. Although the road will not provide the fastest or most convenient route to most destinations, a small amount of project traffic may use the route to access neighborhoods off Hetrick Avenue. Any increase in traffic could deteriorate the roadway and the County has recommended a maintenance agreement.

4.4.2 Hetrick Avenue

Prior to the Willow Road extension and interchange project completed in 2012, vehicles used Los Berros Road, North Frontage Road, Summit Station Road, Hetrick Avenue, Glenhaven Place, and Ten Oaks Way to access Pomeroy Road as an alternative to the Tefft Street interchange. The Willow Road extension and interchange project created a faster less circuitous route to both Willow Road and Pomeroy Road. Although the traffic volumes decreased following the completion of the Willow Road extension and interchange project, area residents are still concerned with cut through traffic, speeds, horizontal alignment, and the condition of the roadway along the Hetrick Avenue, Glenhaven Place, and Ten Oaks Way corridor.

To address the residents' concerns the project is proposing the following:

- Terminate Glenhaven Place with a cul-de-sac at Hetrick Avenue.
- Terminate Hetrick Avenue at Ridge Road and improve intersection.
- Allow emergency access only on Hetrick Avenue between Ridge Road and Glenhaven Place.

In addition, the existing Hetrick Road intersection with Pomeroy Road will be removed and residences on Hetrick Road would access Collector B.

Restricting access on Hetrick Avenue would result in additional vehicles using Collector B (West/Southwest Project Entry). The Willow Road/Hetrick Ave (#3), Willow Road/West Project Entry (Collector B) (#4), and Southwest Project Entry (Collector B)/Pomeroy Road (#9) intersections would operate acceptably at LOS D or better during both peak hours under Cumulative Conditions with the redistribution of traffic.

4.5 PLAN CONSISTENCY

Planning documents with transportation improvements in the Nipomo Area include the South County Circulation Study, Nipomo Community Plan, Parks and Recreation Element, and Bikeways Plan, as summarized in the following section. In summary, the proposed transportation facilities are consistent with these planning documents.

4.5.1 South County Circulation Study

The South County Circulation Study and Road Improvement Fee (RIF) Update analyzed the existing and cumulative capacity of area intersections and roadways based on the existing General Plan land uses. The project will construct the following facilities consistent with the 2015 South County Circulation Study:

- Frontage Road extension from Willow Road to Sandydale Drive. We recommend that the project be conditioned to complete Frontage Road extension just north of Sandydale Drive if not completed by adjacent development prior to project occupancy.
- Installation of a traffic signal at Willow Road/US 101 SB Ramps (#6).
- Installation of a traffic signal at Willow Road/US 101 NB Ramps (#7).
- Construction of additional north-south collector is functionally equivalent to the Hetrick Road extension. (Note: Hetrick Road extension is not included in RIF funding).

4.5.2 Nipomo Community Plan

The Nipomo Community Plan was adopted in 2014 with content last updated in 1994. The plan included the areas within the URL. The plan recommends the following consistent with the project:

- Improve North Frontage Road to urban collector standards from Sandydale Drive to the proposed interchange at the Willow Road extension.
- Class II bike lanes should be developed on all urban collector and arterial streets within the Nipomo urban area.

We recommend improvements on North Frontage Road/Collector A be consistent with County Standard A-2d. Class II bike lanes are proposed on all project collector roadways.

4.5.3 County Bikeways Plan

The County Bikeways Plan identifies existing Class II bike lanes on Pomeroy Road and Willow Road. Per the Bike Plan goals, all new roadways shall be evaluated for multi-modal improvements. Class II bike lanes are proposed on Collectors A, B and C, with two connections to Willow Road and one connection to Pomeroy Road. All proposed bike lanes are eight feet wide. Sidewalks will also be constructed on Collectors A, B and C, as well as Local Road D.

4.5.4 Parks and Recreation Element

The San Luis Obispo County Parks and Recreation Element identifies future multi-use trails on Sandydale Drive, Pomeroy Road, Hetrick Avenue, and Willow Road near the project as well as a north-south connection from Sandydale Drive to Willow Road.

The project would construct a network of multi-use trails including two east-west trails and two north-south trails connecting to Pomeroy Road, Hetrick Avenue, and Cory Way north of Sandydale Drive. An additional multi-use trail connection to Willow Road is recommended for consistency with the Parks and Recreation Element.

A network of pedestrian trails are proposed in addition to the sidewalks and multi-use trails. The pedestrian trails provide access within and between neighborhoods and connect to the public recreation facilities.

4.6 VEHICLE MILES TRAVELED (VMT)

The project's potential impacts to VMT were evaluated under a few scenarios (residential only, no residential, and mixed use as proposed) using the County's SB743 Sketch VMT Tool as shown in **Table 14**. The additional scenarios were evaluated to determine if specific components of the project would have different VMT impacts.

Table 14: SLO County SB743 Sketch VMT Tool Summary

SLO County SB743 Sketch VMT Tool Summary					
Scenario		**Overall VMT**	**Miles Per Trip**	**VMT Per Employee**	**VMT Per Capita**
	Threshold	*N/A*	*N/A*	*25.7*	*27.2*
	Current	*9,812,738*	*11.26*	***27.0***	***29.8***
Residential Only	w/Project	-	-	-	**30.1**
Mixed Use (as proposed)	w/Project	**9,839,599**	11.21	**26.9**	**30.0**
Mixed Use (No Residential)	w/Project	**9,842,931**	11.21	**26.9**	-

Source: CCTC, 2021, County of SLO Quick Response Tool Version 6.6.
Project APN 091-301-073 shown. Bold indicates higher than threshold.

Currently, the project site's VMT per Employee and VMT per Capita exceed the County's thresholds without the addition of project traffic. The project would generate 26.9 VMT per capita and 30.0 VMT per employee, which are 4.8 and 9.5 percent above the threshold, respectively. The overall regional VMT would increase by 26,861 miles, which exceeds the threshold for retail project components. The addition of mixed-use components lowers the residential VMT per capita and overall VMT when compared to the residential only scenario.

Table 15 summarizes the California Air Pollution Control Officers Association (CAPCOA) mitigation measure strategies and percent VMT reductions for land use and site design strategies.

Table 15: CAPCOA VMT Reductions

#	Strategy	VMT Reduction	Notes
CAPCOA VMT Reductions			
Land Use/Location VMT Reduction Strategies			
LUT-4	Increase Destination Accessibility	1.7%	Reductions for distance to downtown job center
LUT-6	Integrate Affordable & Below Market Rate Housing	0.2%	Reduction for percentage of low income housing
LUT-8	Locate Project near Bike Path/Bike Lane	0.625%	Reduction for bike path/lane
LUT-9	Improve Design of Development	25.0%	Reduction for intersections per square mile
	Total (Land Use/Location) Reductions	*10.0%*	*Max Reduction for Suburban Land Use/Location Strategies (LUT-2)*
Neighborhood/Site Design Reduction Strategies			
SDT-1	Provide Pedestrian Network Improvements	1.0%	Reduction for pedestrian network within urban/suburban project site.
SDT-5	Incorporate Bike Lane Street Design (on-site)	0.9%	Reduction for each mile of bikeway per 100,000 residents
	Total (Land Use/Location) Reductions	*1.9%*	
	TOTAL VMT Mitigation Reductions	**11.9%**	

Source: CAPCOA Quantifying Greenhouse Gas Mitigation Measures (2010).
Parking Policy/Pricing, Commute Trip Reduction, and Transit System Improvement Management Strategies not included.

The maximum VMT reduction allowed for suburban land uses is 11.9 percent. The project site design incorporates most of these VMT reduction strategies. However, the effectiveness of these design features in reducing VMT to the extent needed is not certain and the project increases overall VMT. Therefore, we recommend a finding of a significant and unavoidable impact to VMT.

4.6.1 Induced Demand

Transportation projects such as roadway widenings or new roads have the potential to increase VMT. This is called induced demand- new capacity lowers the cost (e.g. time) of travel and more people travel as a result. Research has shown that increasing roadway capacity generally increases demand for travel.

The County's TIA Guidelines list a number of transportation projects that can be presumed to have a less-than-significant impact. These include the addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and transit if applicable. They also include the installation of turn lanes at intersections.

The project would construct new local and collector roads with extensive facilities for pedestrians and cyclists. Therefore the project's transportation improvements would have a less-than-significant impact to VMT as it relates to induced demand.

5.0 Cumulative Conditions

Cumulative conditions represent build-out of the land uses in the region consistent with the General Plan. This section evaluates the Cumulative conditions of the study area and the impacts of the proposed project on the surrounding transportation network.

5.1 CUMULATIVE VOLUME FORECASTS

Cumulative intersection and ramp traffic volume forecasts were obtained from the 2015 South County Circulation Study and Traffic Impact Fee Update. Freeway volumes were derived using the traffic counts, SLOCOG Travel Demand Model, and the US 101 Corridor Mobility Study.

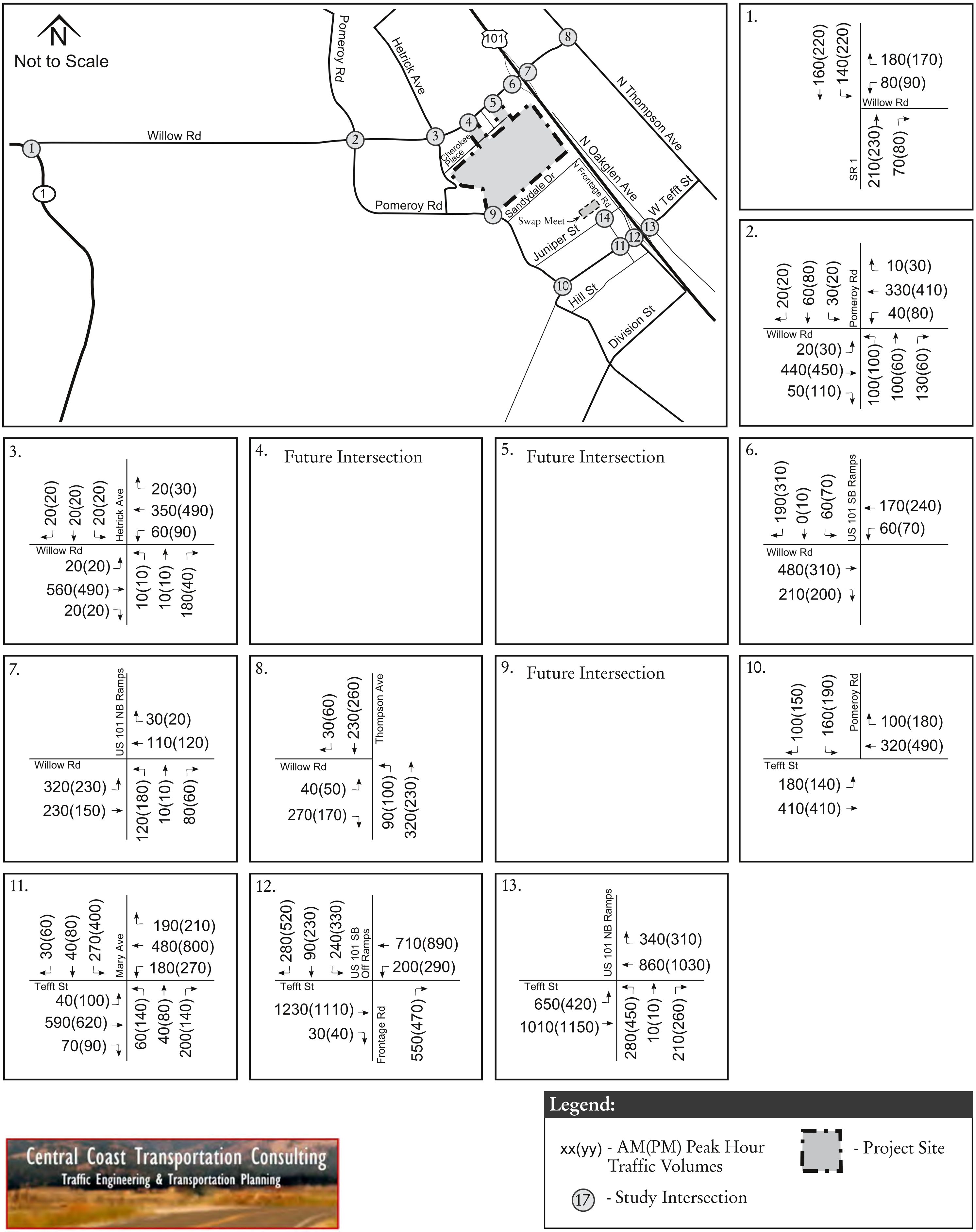
Intersection and ramp volumes for Cumulative conditions were obtained from the 2035 Base Buildout volumes of the Circulation Study which does not include any identified capital improvements projects for the region including the North Frontage Road extension. Volumes were rounded up from the study if the existing volumes were higher.

The Cumulative conditions base network assumed the ramp widening improvements at the Tefft Street interchange. The Cumulative Plus Project conditions network included the project roadway network and the North Frontage Road extension in addition to the Tefft Street Interchange improvements under construction.

Cumulative Plus Project conditions volumes were redistributed based on the North Frontage Road extension and the additional north-south connector.

Figure 7 and **Figure 8** show the Cumulative and Cumulative Plus Project traffic volumes, respectively.

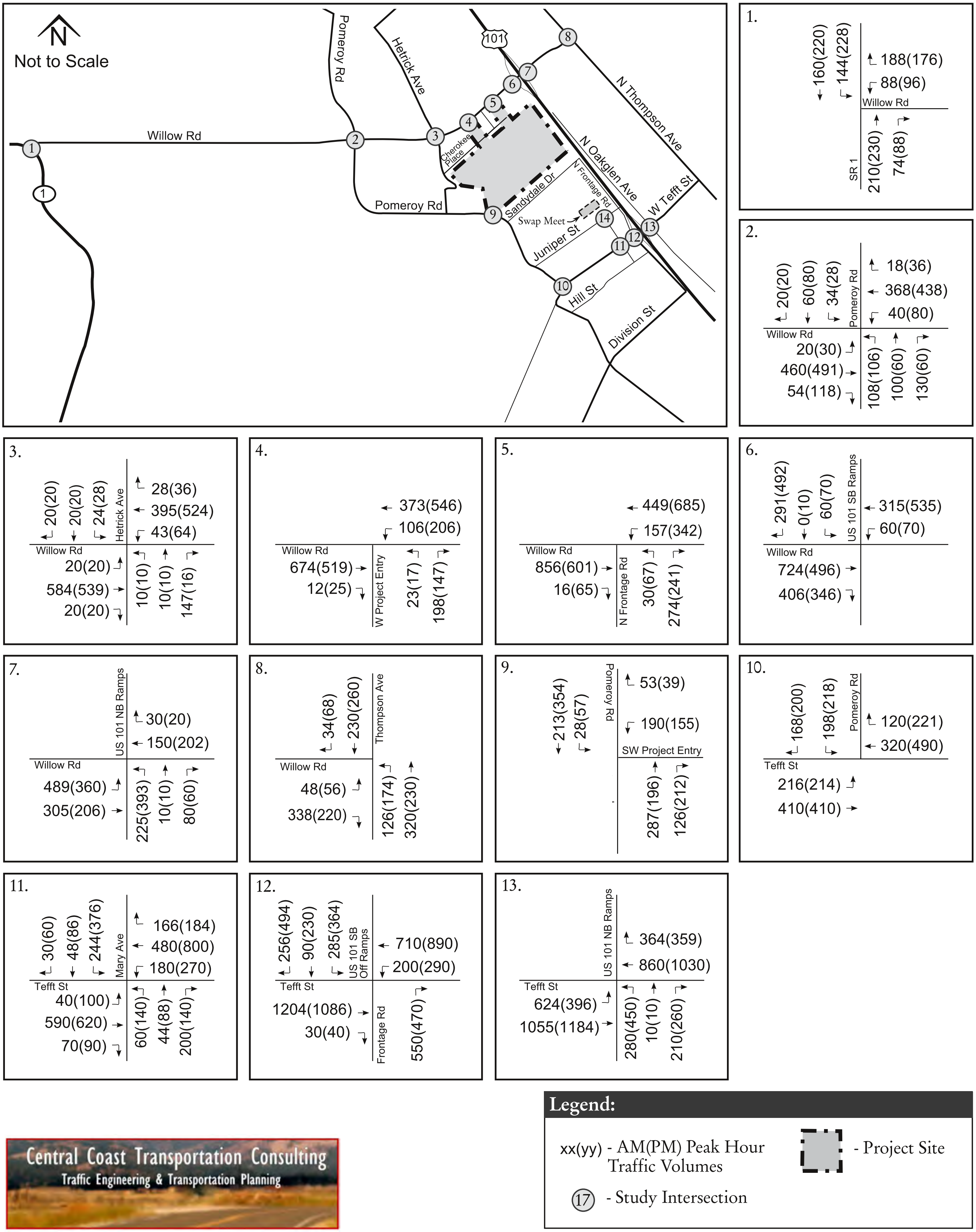
Figure 7: Cumulative Weekday Peak Hour Volumes



July 2021

Dana Reserve

Figure 8: Cumulative Plus Project Weekday Peak Hour Volumes



5.2 CUMULATIVE TRANSPORTATION CONDITIONS

This section is divided into the following analysis subsections for Cumulative and Cumulative Plus Project conditions: 1) weekday intersection operations and 2) freeway segment operations.

5.2.1 Intersection Operations

Table 16 and **Table 17** summarize the LOS and key queues at the study intersections during the weekday peak hours under Cumulative and Cumulative Plus Project conditions, with detailed calculation sheets included in **Appendix B** and warrant analysis sheets in **Appendix D**.

Table 16: Cumulative and Cumulative Plus Project Intersection LOS

Cumulative and Cumulative Plus Project Intersection Auto Levels of Service					
		Cumulative		Cumulative + Project	
Intersection	Hour	Delay[1]	LOS	Delay[1]	LOS
1. Willow Rd/SR 1	AM	5.7 (14.0)	- (B)	6.0 (14.5)	- (B)
	PM	6.7 (18.6)	- (C)	7.1 (20.0)	- (C)
2. Willow Rd/Pomeroy Rd	AM	22.0	C	22.4	C
	PM	22.3	C	22.8	C
3. Willow Rd/Hetrick Ave	AM	**5.2 (37.1)**	**- (E)**	**4.6 (38.8)**	**- (E)**
	PM	3.1 (29.0)	- (D)	2.9 (31.7)	- (D)
4. Willow Rd/W Project Entry	AM	*Future Intersection*		4.5 (23.7)	- (C)
	PM			3.5 (19.0)	- (C)
5. Willow Rd/N Frontage Rd	AM	*Future Intersection*		26.2	C
	PM			17.7	B
6. Willow Rd/US 101 SB Ramps	AM	3.4 (13.6)	- (B)	4.8 (23.3)	- (C)
	PM	5.1 (14.1)	- (B)	**16.3 (56.3)**	**- (F)**
7. Willow Rd/US 101 NB Ramps	AM	**14.5 (49.4)**	**- (E)**	**>200 (>200)**	**- (F)**
	PM	**13.8 (35.2)**	**- (E)**	**>200 (>200)**	**- (F)**
8. Willow Rd/Thompson Ave	AM	4.9 (13.2)	- (B)	6.1 (14.8)	- (B)
	PM	4.3 (13.2)	- (B)	5.6 (15.0)	- (C)
9. SW Project Entry/Pomeroy Rd	AM	*Future Intersection*		5.1 (17.7)	- (C)
	PM			4.3 (19.8)	- (C)
10. W Tefft St/Pomeroy Rd	AM	17.2	B	19.7	B
	PM	18.3	B	21.0	C
11. W Tefft St/Mary Ave	AM	40.3	D	39.9	D
	PM	44.0	D	43.9	D
12. W Tefft St/US 101 SB Ramps/S Frontage Rd	AM	**96.6**	**F**	**101.7**	**F**
	PM	**87.1**	**F**	**89.0**	**F**
13. W Tefft St/US 101 NB Ramps	AM	30.3	C	33.5	C
	PM	28.9	C	28.9	C

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

Note: Unacceptable operations shown in **bold** text.

Table 17: Cumulative and Cumulative Plus Project Intersection Queues

Intersection	Movement	Storage Length (ft)	Peak Hour	CM 95th Percentile Queue (ft)[1]	CM +P 95th Percentile Queue (ft)[1]
2. Pomeroy Rd. & Willow Rd.	NBR	25	AM	**51**	**51**
			PM	0	0
3. Hetrick Ave. & Willow Rd.	NBR	25	AM	**48**	**38**
			PM	5	3
10. Tefft St. & Pomeroy Rd.	EBL	95	AM	63	77
			PM	69	**105**
11. Tefft St. & Mary Ave.	EBL	125	AM	59	59
			PM	**137**	**137**
	NBL	120	AM	82	82
			PM	**172**	**172**
	SBL	120	AM	**205**	**194**
			PM	**311**	**302**
12. Frontage Road/101 SB Off Ramp & Tefft St.	SBL	250	AM	**382**	**465**
			PM	**505**	**569**
13. 101 NB Ramps & Tefft St.	NBL	200	AM	174	173
			PM	**273**	**273**
	NBR	200	AM	140	149
			PM	**204**	**211**

1. Queue length that would not be exceeded 95 percent of the time.
# indicates 95th percentile volume exceeds capacity, queue may be longer.
Bold indicates queue length longer than storage length.
Detailed queues provided in Appendix B.

The project entries with Willow Road and Pomeroy Road all operate at LOS D or better under Cumulative Plus Project conditions with the same intersection control and geometry as under the Existing Plus Project conditions.

Although the Mary Avenue/Juniper Street (#14) intersection was only evaluated under Sunday Existing Conditions, the intersection would operate acceptably during the weekday peak hours under Cumulative Conditions with the addition of project traffic.

The following County intersections operates below the LOS D threshold or queue lengths exceed storage:

- Pomeroy Road/Willow Rd (#2): the northbound right exceeds the small storage length provided within the shoulder during the AM peak hour. However, the queue would not block the through movement during the signal phase and the project does not exacerbate the queue.

  Recommendation: None.

- Willow Road/Hetrick Avenue (#3): the southbound approach operates at LOS E during the AM peak hour under Cumulative and Cumulative Plus Project conditions due to long delays resulting from side street stop control and the high volumes along Willow Road. The proposed project improves operations at this location by providing two new parallel routes to Hetrick Avenue. Although the intersection operates below the LOS threshold, the peak hour traffic signal warrant is not met due to low side street volumes. The maximum vehicle queue under Cumulative Plus Project conditions is less than two vehicles and no capital improvements are warranted at this location. Construction of the proposed project including the North Frontage Road and the additional north-south connector road will provide alternative routes with improved traffic control, benefiting this intersection.

Recommendation: None, traffic signal warrant not met.

- Tefft Street/Pomeroy Road (#10): the eastbound left turn lane exceeds the storage length during the PM peak hour. However, additional storage is available in the bay taper.

  Recommendation: None.

- Tefft Street/Mary Avenue (#11): the eastbound, northbound, and southbound left turn lane exceeds storage during one or more peak hours under Cumulative Conditions. A ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street would be required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program. The additional interchange will also benefit Tefft Street/Mary Avenue.

  Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements.

The following Caltrans intersections operate below the LOS C threshold or queue lengths exceed storage:

- Willow Road/US 101 SB Ramps (#6): the southbound approach operates at LOS F in the PM peak hour under Cumulative Plus Project conditions due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive on the westbound Willow Road approach and the existing lane configurations would result in LOS C during both peak hours. This improvement is consistent with the South County Road Improvement Fee Program and the traffic signal warrant is met.

  Recommendation: Install traffic signal.

- Willow Road/US 101 NB Ramps (#7): the northbound approach operates at LOS F during both peak hours under Cumulative conditions and LOS F during both peak hours under Cumulative Plus Project conditions due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive on the eastbound Willow Road approach and the existing lane configurations would result in LOS C or better during both peak hours. This improvement is consistent with the South County Road Improvement Fee Program and the traffic signal warrant is met.

  Recommendation: Install traffic signal.

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS F during both peak hours under Cumulative and Cumulative Plus Project conditions due to high volumes on all approaches. The Tefft Street corridor is geometrically constrained. A ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street is required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program.

  Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements.

- West Tefft Street/US 101 NB Ramps (#13): the northbound left and right turn lanes exceed storage during the PM peak hour under Cumulative Conditions. The Tefft Street corridor is geometrically constrained. A ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street is required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program.

  Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements.

The Frontage Road connection to Willow Road will shift traffic away from the Tefft Street corridor and improve operations, reducing delay.

5.2.2 Freeway Segment Operations

Table 18 summarizes the LOS at the freeway mainline and ramp locations under Cumulative and Cumulative Plus Project conditions. Detailed calculation sheets are included in **Appendix C**.

Table 18: Cumulative and Cumulative Plus Project Freeway LOS

Cumulative and Cumulative Plus Project Freeway Operations							
				Cumulative		CM + P	
Direction	Location	Segment Type	Peak Hour	Density (pc/mi/ln)[1]	LOS	Density (pc/mi/ln)[1]	LOS
US 101 NB	South of Willow Rd	Mainline	AM	**32.4**	**D**	**34.3**	**D**
			PM	**28.4**	**D**	**31.9**	**D**
	Willow Rd Off Ramp	Diverge	AM	**35.7**	**E**	**36.8**	**E**
			PM	**33.2**	**D**	**35.4**	**E**
	Willow Rd On Ramp	Merge	AM	**32.3**	**D**	**33.7**	**D**
			PM	**29.0**	**D**	**30.0**	**D**
	North of Willow Rd	Mainline	AM	**35.2**	**E**	**38.9**	**E**
			PM	**28.6**	**D**	**30.6**	**D**
US 101 SB	North of Willow Rd	Mainline	AM	23.0	C	24.2	C
			PM	**v/c > 1**	**F**	**v/c > 1**	**F**
	Willow Rd Off Ramp	Diverge	AM	**28.9**	**D**	**29.9**	**D**
			PM	**v/c > 1**	**F**	**v/c > 1**	**F**
	Willow Rd On Ramp	Merge	AM	25.3	C	27.0	C
			PM	**v/c > 1**	**F**	**v/c > 1**	**F**
	South of Willow Rd	Mainline	AM	23.3	C	25.7	C
			PM	**v/c > 1**	**F**	**v/c > 1**	**F**

1. HCM 6th density (passenger car per mile per lane).
Note: Unacceptable operations shown in **bold** text.

All freeway segments operate below the LOS C threshold during at least one peak hour under both Cumulative and Cumulative Plus Project conditions. The 2014 US 101 Transportation Concept Report supports Tefft Street interchange improvements, parallel routes, enhanced transit, transportation demand management (TDM), and transportation system management (TSM) strategies in the project vicinity. The South County Road Improvement Fee Program includes Tefft Street interchange improvements and construction of an additional interchange south of Tefft Street. Auxiliary lanes and high occupancy vehicle (HOV) lanes, which would improve operations, are not currently planned on US 101 in the project vicinity.

6.0 References

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Appendix A: Traffic Counts

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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION Willow Rd @ SR 1 **LATITUDE** 35.0467

COUNTY San Luis Obispo **LONGITUDE** -120.5698

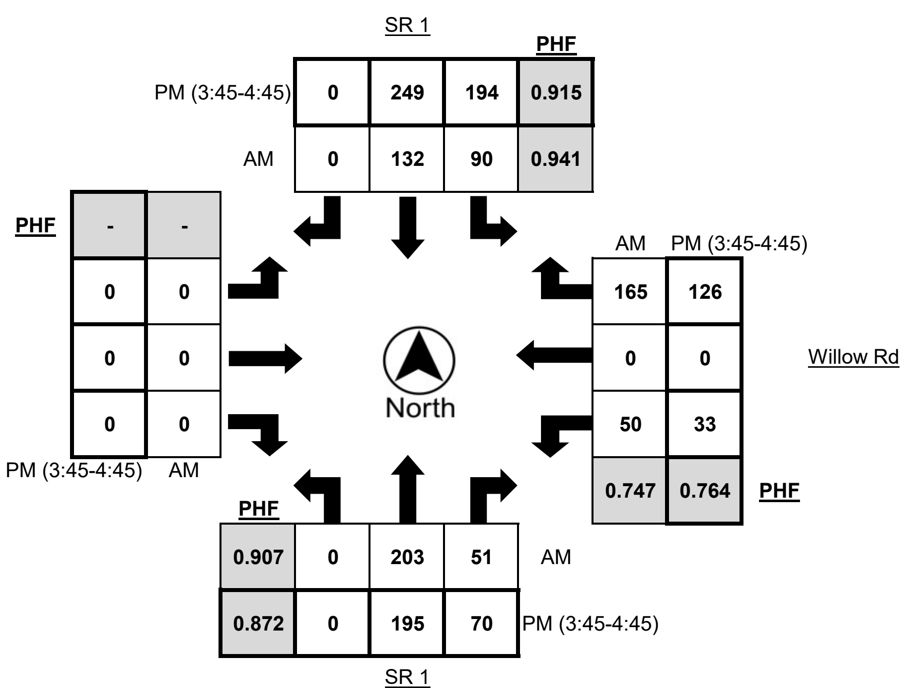
COLLECTION DATE Tuesday, May 22, 2018 **WEATHER** Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	0	23	10	0	13	38	0	3	0	0	0	0	9	0	24	4
7:15 AM - 7:30 AM	0	58	12	4	22	29	0	7	0	0	0	0	14	0	35	7
7:30 AM - 7:45 AM	0	42	17	4	24	29	0	2	0	0	0	0	10	0	45	6
7:45 AM - 8:00 AM	0	57	12	6	20	39	0	3	0	0	0	0	16	0	56	4
8:00 AM - 8:15 AM	0	46	10	9	24	35	0	3	0	0	0	0	10	0	29	0
8:15 AM - 8:30 AM	0	34	10	3	20	33	0	7	0	0	0	0	6	0	25	0
8:30 AM - 8:45 AM	0	38	14	3	24	25	0	3	0	0	0	0	4	0	24	1
8:45 AM - 9:00 AM	0	42	9	4	18	33	0	7	0	0	0	0	9	0	31	3
TOTAL	**0**	**340**	**94**	**33**	**165**	**261**	**0**	**35**	**0**	**0**	**0**	**0**	**78**	**0**	**269**	**25**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
2:00 PM - 2:15 PM	0	30	4	0	29	31	0	2	0	0	0	0	11	0	38	3
2:15 PM - 2:30 PM	0	38	13	3	48	33	0	3	0	0	0	0	8	0	25	2
2:30 PM - 2:45 PM	0	29	15	2	37	44	0	0	0	0	0	0	7	0	26	6
2:45 PM - 3:00 PM	0	31	9	6	40	39	0	4	0	0	0	0	8	0	21	2
3:00 PM - 3:15 PM	0	40	10	1	37	49	0	8	0	0	0	0	10	0	31	3
3:15 PM - 3:30 PM	0	32	11	2	52	41	0	4	0	0	0	0	14	0	28	4
3:30 PM - 3:45 PM	0	42	7	6	51	49	0	5	0	0	0	0	10	0	31	1
3:45 PM - 4:00 PM	0	49	12	3	48	68	0	6	0	0	0	0	11	0	31	4
4:00 PM - 4:15 PM	0	42	20	9	38	69	0	3	0	0	0	0	7	0	45	1
4:15 PM - 4:30 PM	0	46	20	4	46	53	0	2	0	0	0	0	10	0	32	1
4:30 PM - 4:45 PM	0	58	18	3	62	59	0	2	0	0	0	0	5	0	18	0
4:45 PM - 5:00 PM	0	38	17	3	39	56	0	3	0	0	0	0	10	0	25	3
5:00 PM - 5:15 PM	0	48	14	3	60	50	0	2	0	0	0	0	13	0	33	3
5:15 PM - 5:30 PM	0	53	23	2	52	48	0	0	0	0	0	0	9	0	27	0
5:30 PM - 5:45 PM	0	43	24	4	48	37	0	3	0	0	0	0	7	0	31	0
5:45 PM - 6:00 PM	0	37	7	0	32	55	0	3	0	0	0	0	14	0	32	4
TOTAL	**0**	**656**	**224**	**51**	**719**	**781**	**0**	**50**	**0**	**0**	**0**	**0**	**154**	**0**	**474**	**37**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	0	203	51	23	90	132	0	15	0	0	0	0	50	0	165	17
3:45 PM - 4:45 PM	0	195	70	19	194	249	0	13	0	0	0	0	33	0	126	6
4:30 PM - 5:30 PM	0	197	72	11	213	213	0	7	0	0	0	0	37	0	103	6

	PHF	Trucks
AM	0.864	8.0%
PM (3:45-4:45)	0.981	4.4%
PM (4:30-5:30)	0.949	2.9%



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Turning Movement Report

Prepared For:
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895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION Willow Rd @ SR 1 **LATITUDE** 35.0467

COUNTY San Luis Obispo **LONGITUDE** -120.5698

COLLECTION DATE Tuesday, May 22, 2018 **WEATHER** Clear

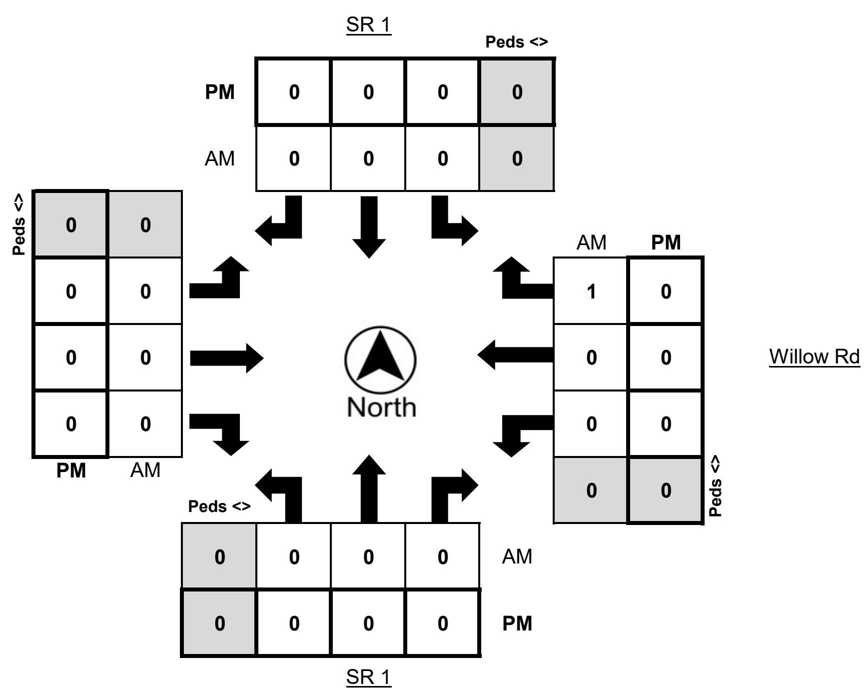
	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3:45 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Bikes	Peds
AM Peak Total	1	0
PM Peak Total (3:45-4:45 & 4:30-5:30)	0	0

0



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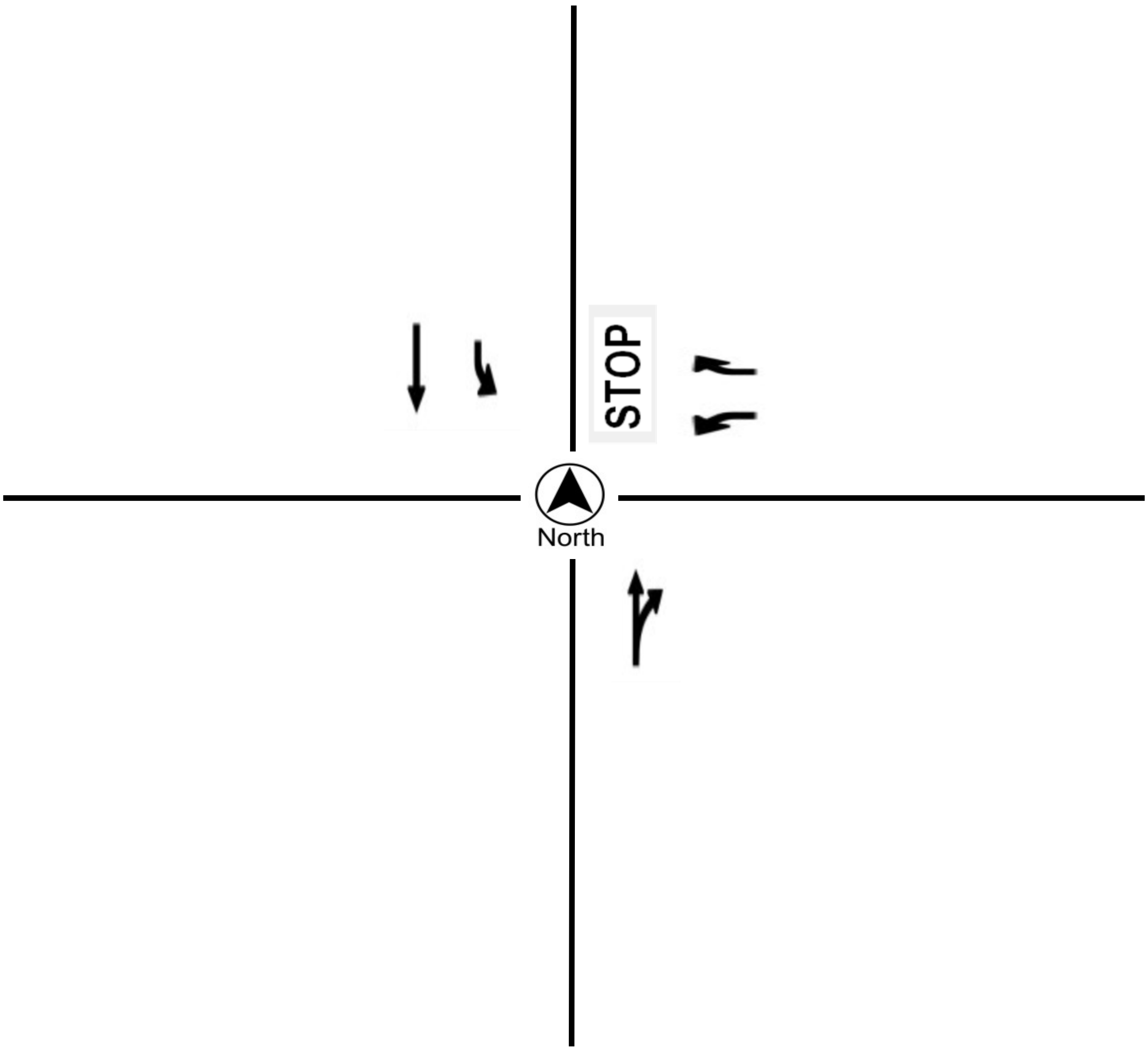
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ SR 1	**N/S STREET**	SR 1 / SR 1
COUNTY	San Luis Obispo	**E/W STREET**	Willow Rd /
COLLECTION DATE	Tuesday, May 22, 2018	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	One-Way Stop

COMMENTS



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Morro Bay, CA 93442

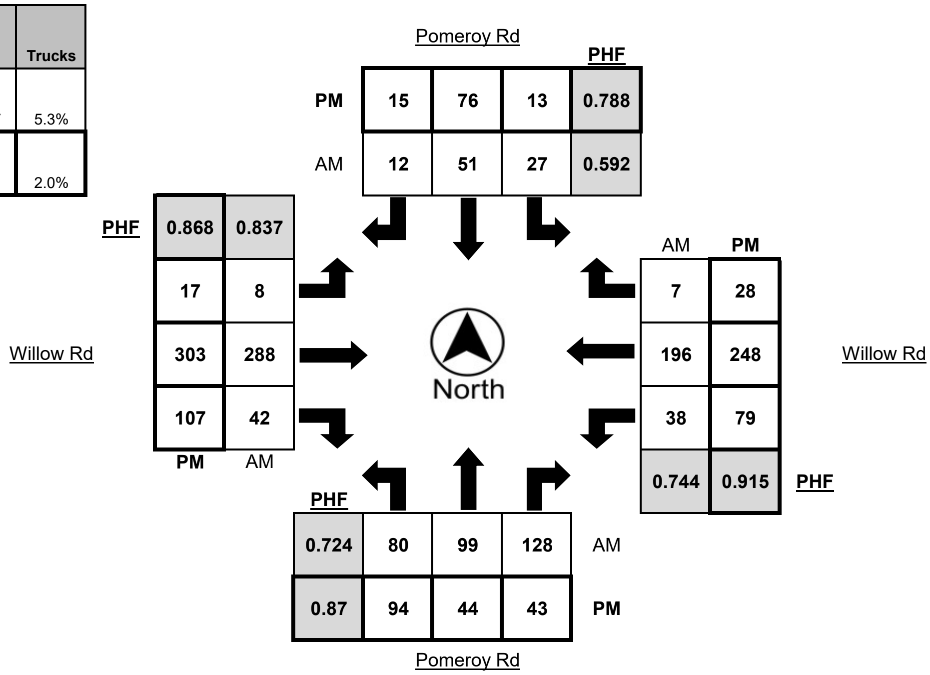
LOCATION	Willow Rd @ Pomeroy Rd	**LATITUDE**	35.0478
COUNTY	San Luis Obispo	**LONGITUDE**	-120.5243
COLLECTION DATE	Tuesday, May 22, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	9	8	14	0	4	5	3	0	1	48	8	4	3	34	4	5
7:15 AM - 7:30 AM	24	27	32	2	3	4	5	1	4	64	6	7	7	31	1	7
7:30 AM - 7:45 AM	23	46	37	3	11	7	4	1	1	93	7	2	6	58	2	8
7:45 AM - 8:00 AM	20	18	32	1	10	27	1	0	3	71	17	3	14	66	1	4
8:00 AM - 8:15 AM	13	8	27	3	3	13	2	0	0	60	12	8	11	41	3	2
8:15 AM - 8:30 AM	18	5	27	2	2	6	1	0	6	61	18	5	3	38	3	2
8:30 AM - 8:45 AM	18	6	17	1	3	8	2	1	1	68	23	7	4	45	3	3
8:45 AM - 9:00 AM	16	12	29	1	3	5	1	0	1	59	9	6	10	38	3	6
TOTAL	**141**	**130**	**215**	**13**	**39**	**75**	**19**	**3**	**17**	**524**	**100**	**42**	**58**	**351**	**20**	**37**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
2:00 PM - 2:15 PM	25	13	12	0	1	9	1	0	2	40	17	3	9	57	5	5
2:15 PM - 2:30 PM	17	10	7	2	2	23	2	1	3	53	31	4	11	51	3	4
2:30 PM - 2:45 PM	17	12	21	1	3	17	3	2	6	57	28	1	13	64	4	6
2:45 PM - 3:00 PM	14	15	19	1	10	4	3	1	5	63	18	4	18	56	4	2
3:00 PM - 3:15 PM	16	7	13	0	2	11	5	0	2	63	17	7	25	63	9	5
3:15 PM - 3:30 PM	28	8	17	1	5	13	5	0	3	68	32	1	17	83	6	3
3:30 PM - 3:45 PM	24	10	13	0	1	6	1	0	2	57	22	4	18	62	0	5
3:45 PM - 4:00 PM	22	17	10	2	1	10	4	0	2	71	35	6	15	59	6	3
4:00 PM - 4:15 PM	26	13	16	3	11	11	4	0	0	57	20	3	15	54	8	1
4:15 PM - 4:30 PM	26	12	12	0	4	19	5	0	8	79	34	5	22	63	12	1
4:30 PM - 4:45 PM	18	5	10	1	3	29	1	0	3	72	20	3	20	58	3	0
4:45 PM - 5:00 PM	22	15	9	0	4	12	6	0	1	65	22	1	19	62	7	4
5:00 PM - 5:15 PM	28	12	12	0	2	16	3	0	5	87	31	3	18	65	6	3
5:15 PM - 5:30 PM	30	11	22	1	3	12	2	0	2	59	35	3	17	49	7	0
5:30 PM - 5:45 PM	20	16	17	0	1	11	2	0	5	66	23	3	14	45	2	0
5:45 PM - 6:00 PM	28	13	14	2	6	15	4	1	1	54	15	0	11	58	9	5
TOTAL	**361**	**189**	**224**	**14**	**59**	**218**	**51**	**5**	**50**	**1011**	**400**	**51**	**262**	**949**	**91**	**47**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:15 AM - 8:15 AM	80	99	128	9	27	51	12	2	8	288	42	20	38	196	7	21
4:15 PM - 5:15 PM	94	44	43	1	13	76	15	0	17	303	107	12	79	248	28	8

	PHF	Trucks
AM	0.827	5.3%
PM	0.901	2.0%



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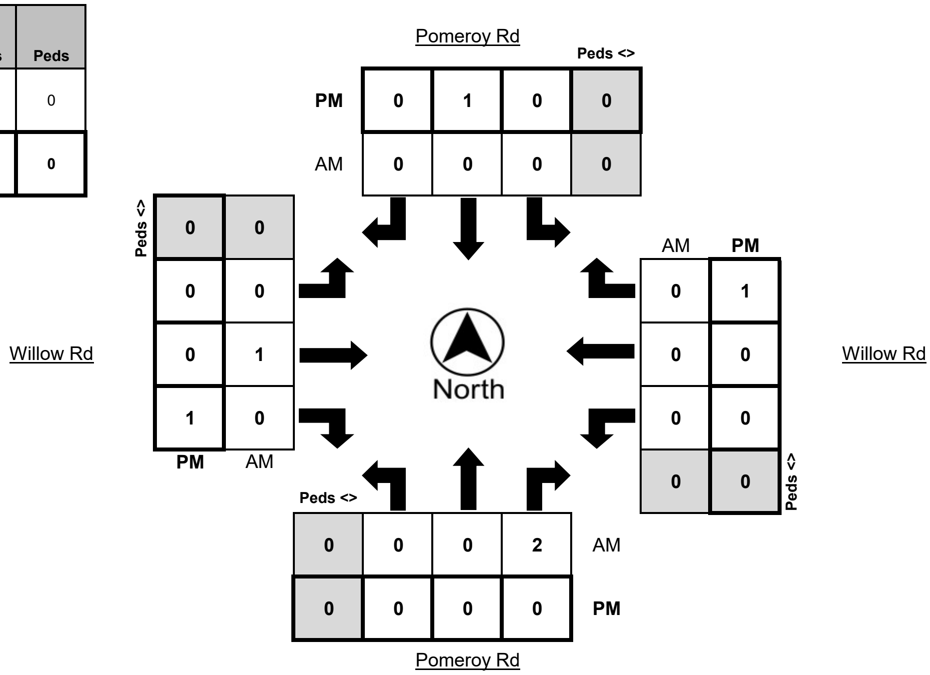
LATITUDE 35.0478
COUNTY San Luis Obispo
LONGITUDE -120.5243
COLLECTION DATE Tuesday, May 22, 2018
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0
4:15 PM - 5:15 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0

	Bikes	Peds
AM Peak Total	3	0
PM Peak Total	**3**	**0**



Metro Traffic Data Inc.

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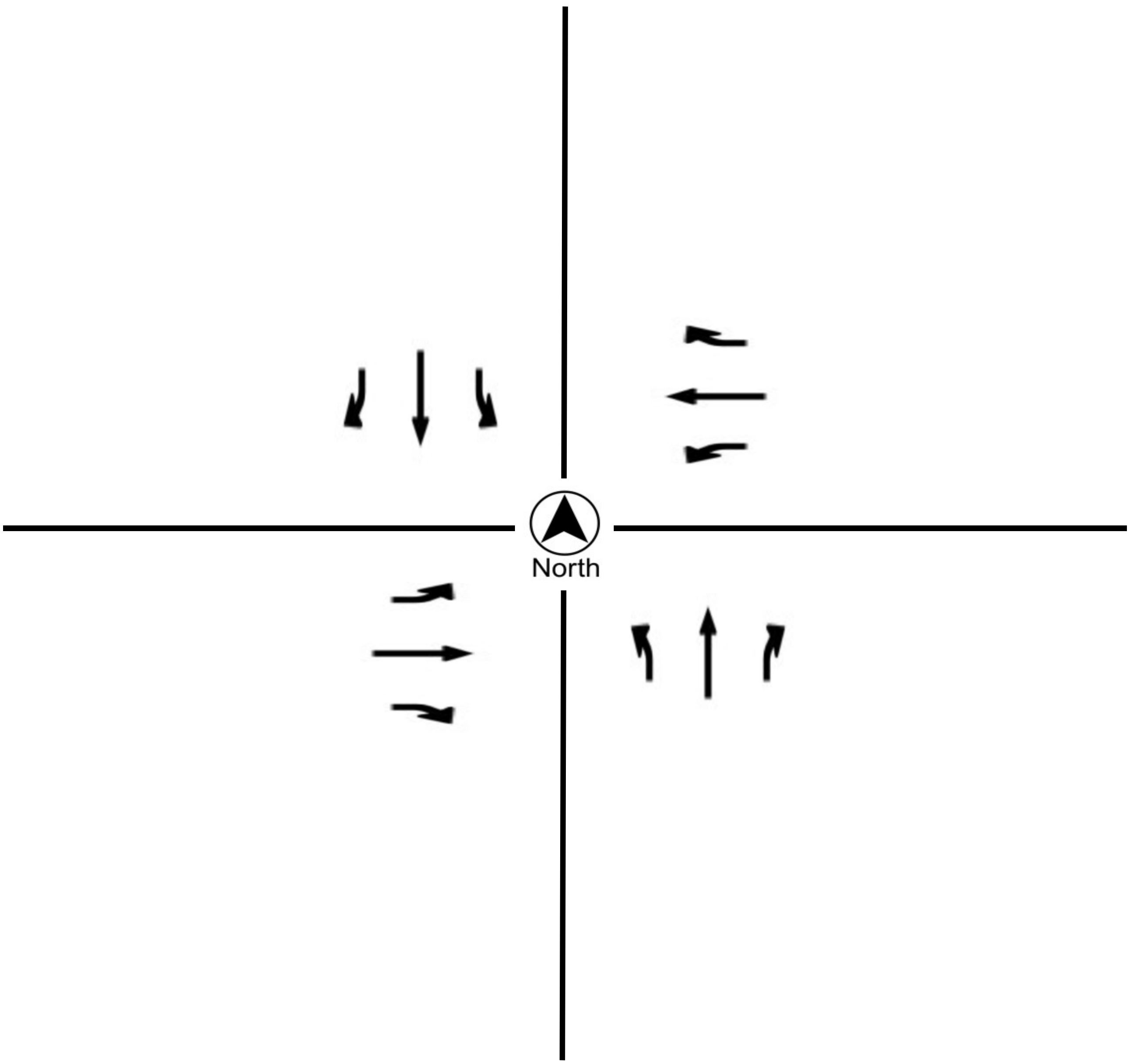
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ Pomeroy Rd	**N/S STREET**	Pomeroy Rd / Pomeroy Rd
COUNTY	San Luis Obispo	**E/W STREET**	Willow Rd / Willow Rd
COLLECTION DATE	Tuesday, May 22, 2018	**WEATHER**	Clear
CYCLE TIME	93 Seconds	**CONTROL TYPE**	Signal

COMMENTS All approaches have protected left turns.



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Prepared For:
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Morro Bay, CA 93442

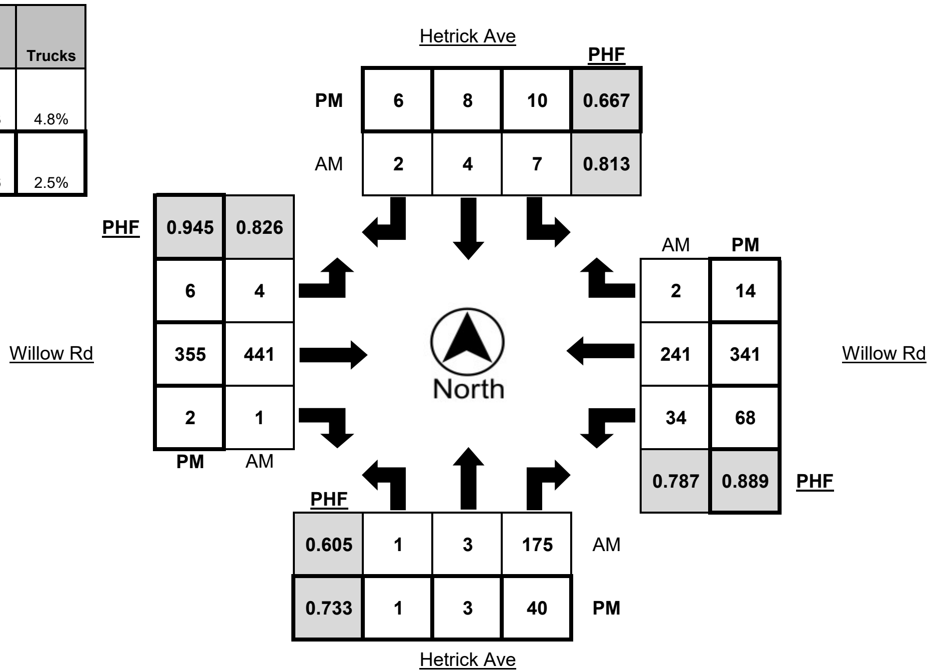
LOCATION	Willow Rd @ Hetrick Ave	**LATITUDE**	35.0480
COUNTY	San Luis Obispo	**LONGITUDE**	-120.5128
COLLECTION DATE	Tuesday, May 22, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	0	0	21	0	1	1	0	0	0	67	0	5	4	39	1	5
7:15 AM - 7:30 AM	0	2	52	0	2	2	0	0	2	99	0	7	4	39	0	7
7:30 AM - 7:45 AM	0	1	73	0	2	0	1	1	2	133	0	2	11	69	0	8
7:45 AM - 8:00 AM	1	0	27	0	1	1	1	1	0	116	0	0	8	79	1	6
8:00 AM - 8:15 AM	0	0	23	0	2	1	0	1	0	93	1	7	11	54	1	4
8:15 AM - 8:30 AM	0	0	16	0	5	2	0	0	0	95	0	6	4	43	0	3
8:30 AM - 8:45 AM	1	0	21	0	1	1	0	0	1	79	0	6	6	51	1	4
8:45 AM - 9:00 AM	0	1	16	1	1	1	1	0	0	97	0	7	3	50	2	6
TOTAL	**2**	**4**	**249**	**1**	**15**	**9**	**3**	**3**	**5**	**779**	**1**	**40**	**51**	**424**	**6**	**43**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
2:00 PM - 2:15 PM	0	2	8	0	1	2	1	0	1	51	2	2	13	67	4	5
2:15 PM - 2:30 PM	1	0	5	0	3	1	1	0	0	63	0	4	13	66	3	4
2:30 PM - 2:45 PM	1	1	8	0	2	1	1	0	2	78	1	0	8	76	1	6
2:45 PM - 3:00 PM	0	3	16	0	2	1	3	0	1	94	0	0	11	80	5	2
3:00 PM - 3:15 PM	1	2	11	0	3	0	0	0	0	75	1	5	18	95	0	7
3:15 PM - 3:30 PM	1	0	9	0	0	0	2	0	1	82	1	2	16	105	3	5
3:30 PM - 3:45 PM	1	0	24	0	2	1	2	0	0	83	0	3	16	77	4	7
3:45 PM - 4:00 PM	0	1	7	0	1	2	2	1	2	71	0	3	10	76	3	1
4:00 PM - 4:15 PM	1	3	8	0	0	0	2	0	1	87	2	5	17	73	0	3
4:15 PM - 4:30 PM	0	2	7	0	1	1	1	0	1	95	0	4	12	94	2	1
4:30 PM - 4:45 PM	1	0	9	0	1	2	2	0	3	88	0	3	12	73	6	0
4:45 PM - 5:00 PM	0	1	14	0	4	2	1	0	0	79	1	2	24	91	4	4
5:00 PM - 5:15 PM	0	0	10	0	4	3	2	0	2	93	1	3	20	83	2	4
5:15 PM - 5:30 PM	0	1	18	0	2	2	1	0	0	84	0	2	15	76	2	0
5:30 PM - 5:45 PM	0	1	13	0	2	3	0	0	0	86	0	4	15	68	1	1
5:45 PM - 6:00 PM	0	2	17	1	2	4	1	1	2	70	1	0	12	73	3	4
TOTAL	**7**	**19**	**184**	**1**	**30**	**25**	**22**	**2**	**16**	**1279**	**10**	**42**	**232**	**1273**	**43**	**54**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:15 AM - 8:15 AM	1	3	175	0	7	4	2	3	4	441	1	16	34	241	2	25
4:15 PM - 5:15 PM	1	3	40	0	10	8	6	0	6	355	2	12	68	341	14	9

	PHF	**Trucks**
AM	0.783	4.8%
PM	0.966	2.5%



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

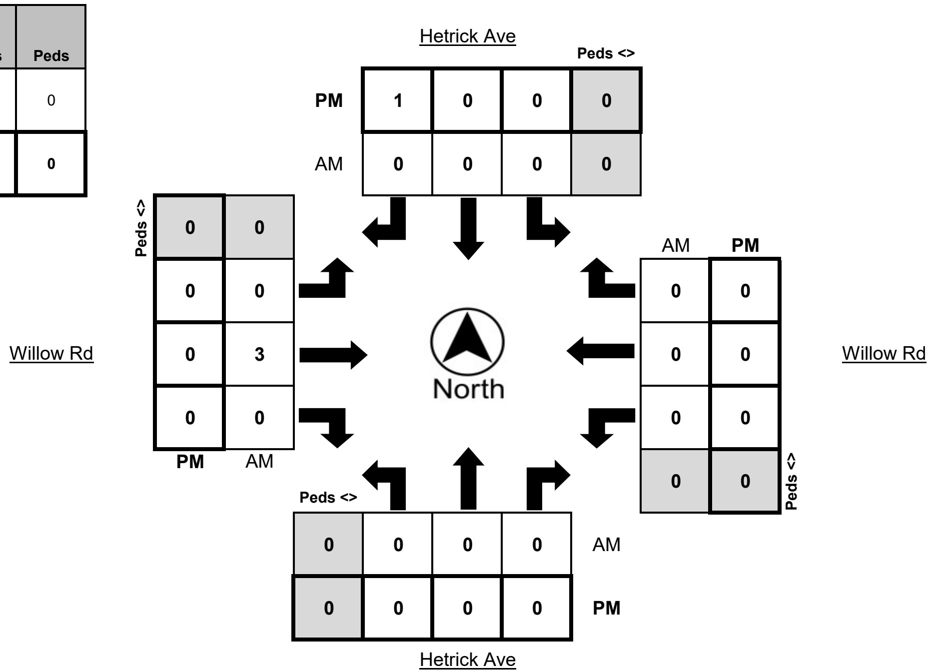
LOCATION Willow Rd @ Hetrick Ave
COUNTY San Luis Obispo
COLLECTION DATE Tuesday, May 22, 2018
LATITUDE 35.0480
LONGITUDE -120.5128
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
4:15 PM - 5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

	Bikes	Peds
AM Peak Total	3	0
PM Peak Total	**1**	**0**



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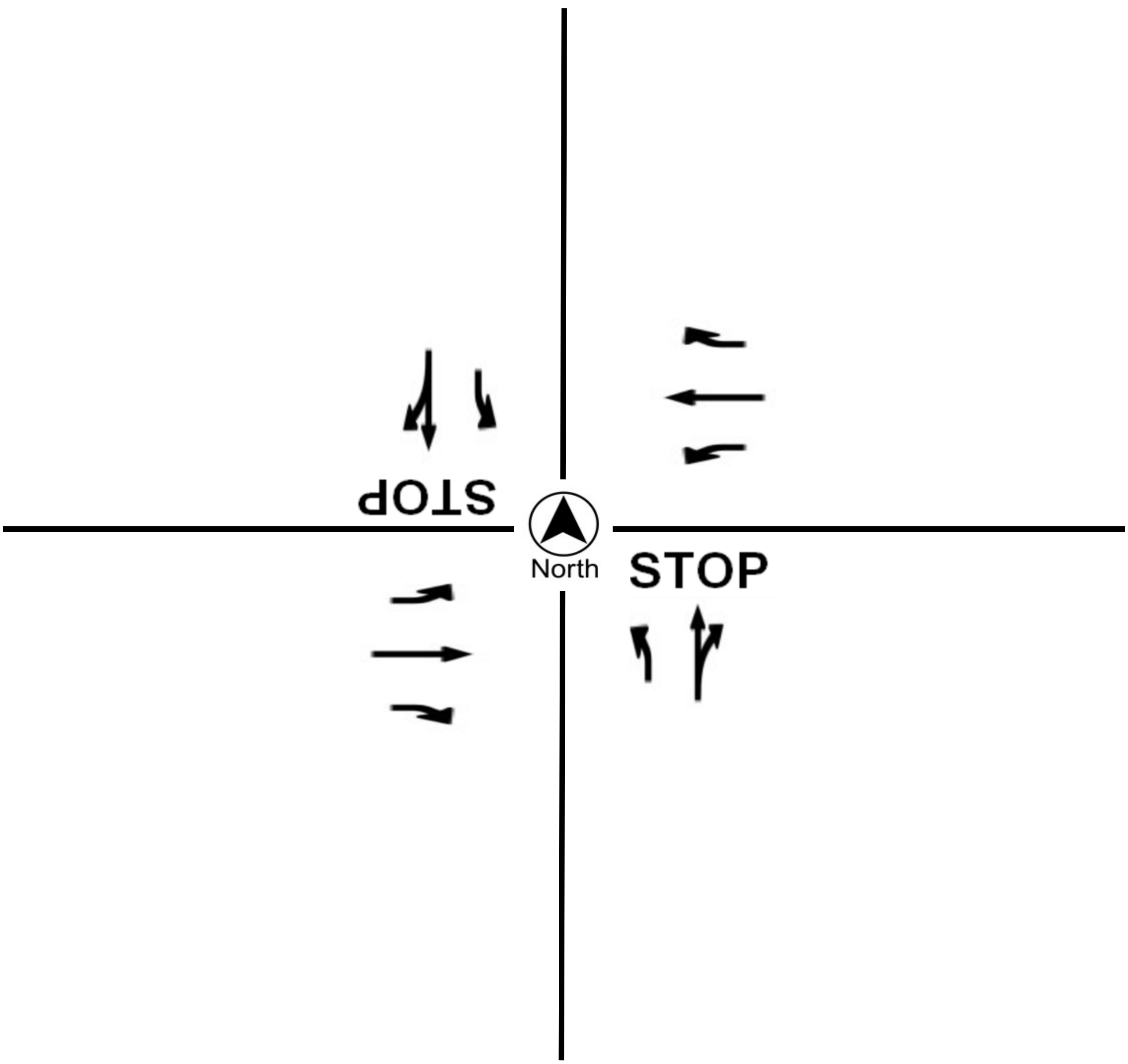
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ Hetrick Ave	**N/S STREET**	Hetrick Ave / Hetrick Ave
COUNTY	San Luis Obispo	**E/W STREET**	Willow Rd / Willow Rd
COLLECTION DATE	Tuesday, May 22, 2018	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	Two-Way Stop

COMMENTS



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

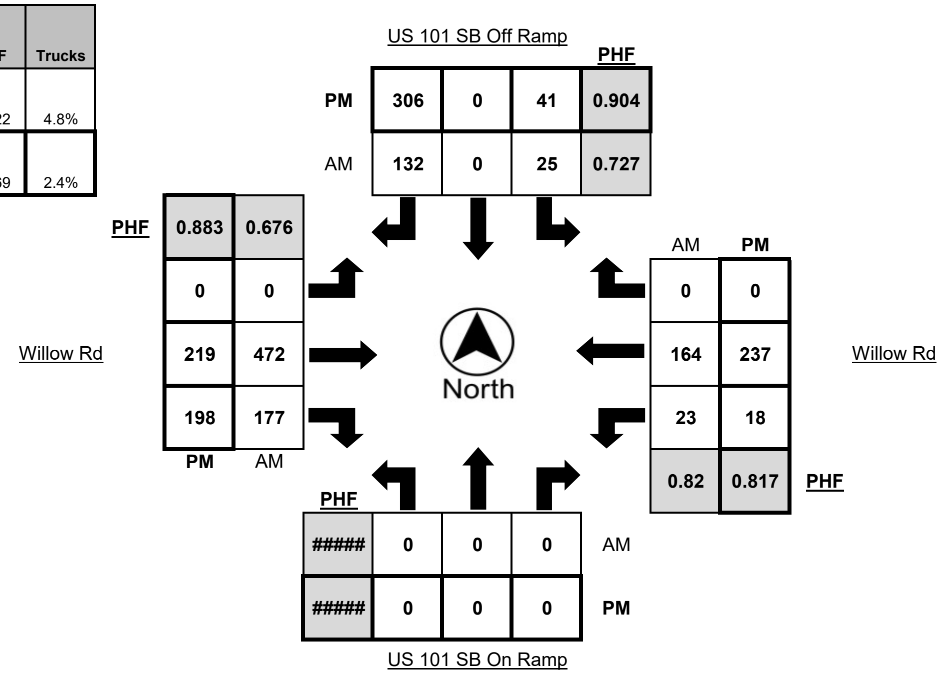
LOCATION Willow Rd @ US 101 SB Ramps
LATITUDE 35.0546
COUNTY San Luis Obispo
LONGITUDE -120.5021
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	0	0	0	0	4	0	13	4	0	53	29	0	7	26	0	1
7:15 AM - 7:30 AM	0	0	0	0	11	0	17	6	0	96	30	2	2	24	0	2
7:30 AM - 7:45 AM	0	0	0	0	16	0	31	6	0	182	58	7	9	48	0	1
7:45 AM - 8:00 AM	0	0	0	0	2	0	52	6	0	114	40	1	5	52	0	1
8:00 AM - 8:15 AM	0	0	0	0	2	0	25	4	0	83	42	7	4	28	0	1
8:15 AM - 8:30 AM	0	0	0	0	5	0	24	2	0	93	37	12	5	36	0	0
8:30 AM - 8:45 AM	0	0	0	0	9	0	25	6	0	81	39	9	6	36	0	7
8:45 AM - 9:00 AM	0	0	0	0	3	0	30	4	0	81	22	5	4	40	0	3
TOTAL	**0**	**0**	**0**	**0**	**52**	**0**	**217**	**38**	**0**	**783**	**297**	**43**	**42**	**290**	**0**	**16**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
2:00 PM - 2:15 PM	0	0	0	0	1	0	37	1	0	40	29	2	1	31	0	1
2:15 PM - 2:30 PM	0	0	0	0	5	0	45	8	0	53	30	7	4	32	0	1
2:30 PM - 2:45 PM	0	0	0	0	9	0	43	1	0	48	28	5	6	40	0	5
2:45 PM - 3:00 PM	0	0	0	0	7	0	49	4	0	55	30	5	3	65	0	3
3:00 PM - 3:15 PM	0	0	0	0	12	0	59	7	0	66	32	6	1	71	0	2
3:15 PM - 3:30 PM	0	0	0	0	8	0	53	5	0	64	36	7	2	52	0	2
3:30 PM - 3:45 PM	0	0	0	0	11	0	46	3	0	56	40	5	8	49	0	4
3:45 PM - 4:00 PM	0	0	0	0	10	0	38	5	0	51	43	2	4	51	0	4
4:00 PM - 4:15 PM	0	0	0	0	8	0	49	1	0	55	46	6	4	57	0	3
4:15 PM - 4:30 PM	0	0	0	0	6	0	79	1	0	51	67	5	4	56	0	3
4:30 PM - 4:45 PM	0	0	0	0	14	0	74	1	0	50	58	4	5	54	0	2
4:45 PM - 5:00 PM	0	0	0	0	9	0	87	2	0	56	33	1	2	56	0	2
5:00 PM - 5:15 PM	0	0	0	0	12	0	66	0	0	62	40	2	7	71	0	1
5:15 PM - 5:30 PM	0	0	0	0	15	0	71	2	0	59	46	4	4	49	0	1
5:30 PM - 5:45 PM	0	0	0	0	17	0	44	0	0	55	79	2	8	49	0	1
5:45 PM - 6:00 PM	0	0	0	0	5	0	55	0	0	36	35	1	3	45	0	0
TOTAL	**0**	**0**	**0**	**0**	**149**	**0**	**895**	**41**	**0**	**857**	**672**	**64**	**66**	**828**	**0**	**35**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:30 AM - 8:30 AM	0	0	0	0	25	0	132	18	0	472	177	27	23	164	0	3
4:15 PM - 5:15 PM	0	0	0	0	41	0	306	4	0	219	198	12	18	237	0	8

	PHF	Trucks
AM	0.722	4.8%
PM	0.969	2.4%



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Prepared For:
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Morro Bay, CA 93442

LOCATION Willow Rd @ US 101 SB Ramps **LATITUDE** 35.0546

COUNTY San Luis Obispo **LONGITUDE** -120.5021

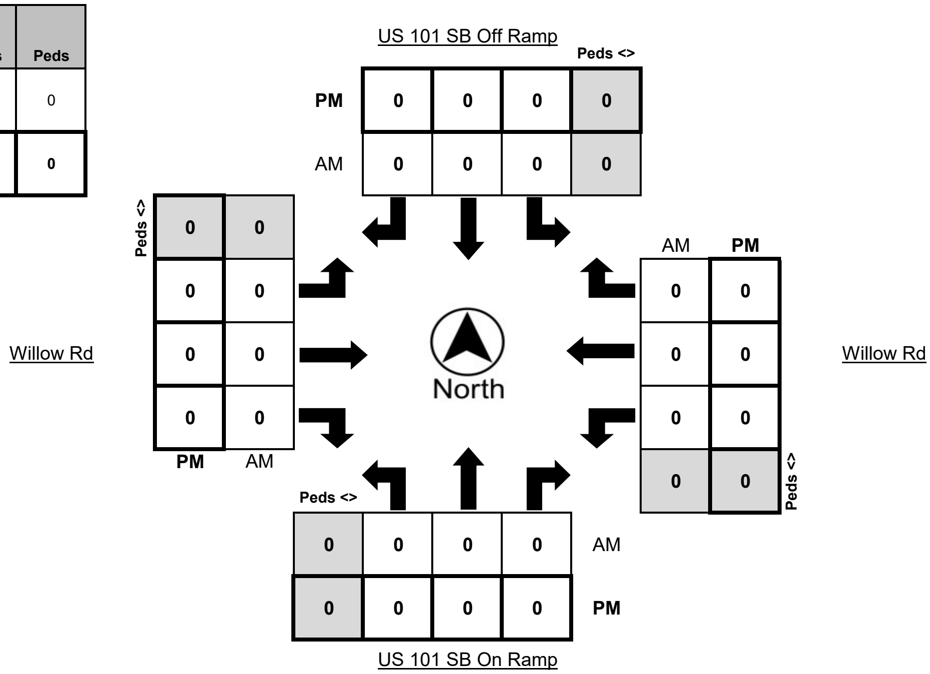
COLLECTION DATE Wednesday, May 23, 2018 **WEATHER** Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:30 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Bikes	Peds
AM Peak Total	0	0
PM Peak Total	**0**	**0**



Metro Traffic Data Inc.
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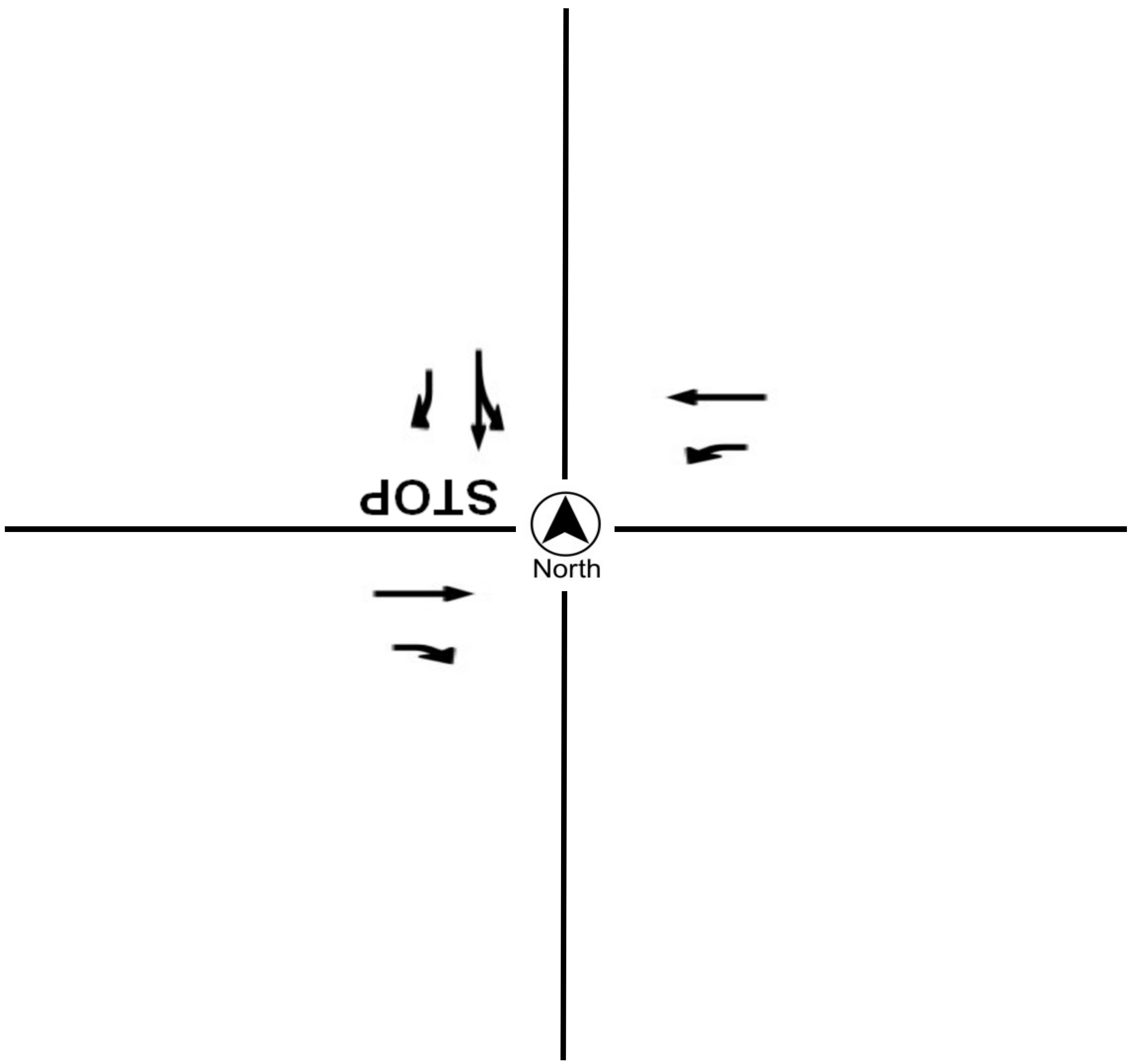
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ US 101 SB Ramps	**N/S STREET**	US 101 SB Off Ramp / US 101 SB On Ramp
COUNTY	San Luis Obispo	**E/W STREET**	Willow Rd / Willow Rd
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	One-Way Stop

COMMENTS



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Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

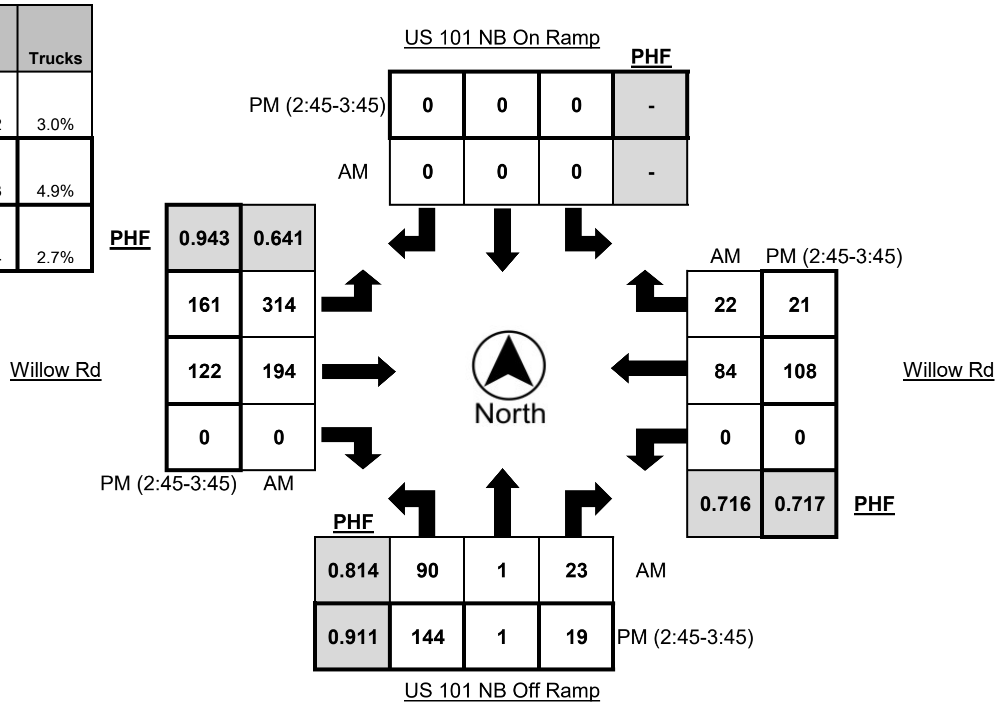
LOCATION Willow Rd @ US 101 NB Ramps
COUNTY San Luis Obispo
COLLECTION DATE Wednesday, May 23, 2018
LATITUDE 35.0555
LONGITUDE -120.5009
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	24	0	5	1	0	0	0	0	47	7	0	4	0	10	1	0
7:15 AM - 7:30 AM	13	0	6	1	0	0	0	0	62	44	0	4	0	14	6	1
7:30 AM - 7:45 AM	25	0	7	1	0	0	0	0	91	107	0	5	0	28	9	1
7:45 AM - 8:00 AM	31	1	3	2	0	0	0	0	87	35	0	1	0	30	6	0
8:00 AM - 8:15 AM	21	0	7	1	0	0	0	0	74	8	0	5	0	12	1	0
8:15 AM - 8:30 AM	29	1	3	0	0	0	0	0	80	19	0	9	0	11	0	0
8:30 AM - 8:45 AM	26	0	2	6	0	0	0	0	69	24	0	6	0	16	2	1
8:45 AM - 9:00 AM	29	1	6	4	0	0	0	0	59	20	0	5	0	14	3	0
TOTAL	**198**	**3**	**39**	**16**	**0**	**0**	**0**	**0**	**569**	**264**	**0**	**39**	**0**	**135**	**28**	**3**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
2:00 PM - 2:15 PM	30	0	4	1	0	0	0	0	31	5	0	1	0	5	2	0
2:15 PM - 2:30 PM	22	1	2	2	0	0	0	0	46	11	0	6	0	12	2	0
2:30 PM - 2:45 PM	35	1	3	3	0	0	0	0	37	25	0	7	0	10	3	3
2:45 PM - 3:00 PM	30	0	4	4	0	0	0	0	24	37	0	4	0	38	3	0
3:00 PM - 3:15 PM	39	0	6	2	0	0	0	0	39	36	0	3	0	36	9	0
3:15 PM - 3:30 PM	37	0	5	2	0	0	0	0	53	22	0	5	0	16	3	0
3:30 PM - 3:45 PM	38	1	4	2	0	0	0	0	45	27	0	4	0	18	6	2
3:45 PM - 4:00 PM	38	1	4	5	0	0	0	0	39	21	0	0	0	17	6	2
4:00 PM - 4:15 PM	43	0	5	3	0	0	0	0	40	24	0	1	0	18	6	0
4:15 PM - 4:30 PM	47	1	6	3	0	0	0	0	42	14	0	4	0	14	2	0
4:30 PM - 4:45 PM	42	0	3	1	0	0	0	0	35	30	0	2	0	16	2	2
4:45 PM - 5:00 PM	40	1	3	2	0	0	0	0	38	22	0	1	0	18	5	0
5:00 PM - 5:15 PM	47	0	4	2	0	0	0	0	46	28	0	1	0	27	2	0
5:15 PM - 5:30 PM	46	0	7	1	0	0	0	0	33	40	0	4	0	12	3	0
5:30 PM - 5:45 PM	38	0	7	0	0	0	0	0	40	36	0	2	0	16	4	2
5:45 PM - 6:00 PM	37	0	5	0	0	0	0	0	34	9	0	0	0	10	1	0
TOTAL	**609**	**6**	**72**	**33**	**0**	**0**	**0**	**0**	**622**	**387**	**0**	**45**	**0**	**283**	**59**	**11**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	90	1	23	5	0	0	0	0	314	194	0	15	0	84	22	2
2:45 PM - 3:45 PM	144	1	19	10	0	0	0	0	161	122	0	16	0	108	21	2
4:45 PM - 5:45 PM	171	1	21	5	0	0	0	0	157	126	0	8	0	73	14	2

	PHF	Trucks
AM	0.682	3.0%
PM (2:45-3:45)	0.873	4.9%
PM (4:30-5:30)	0.914	2.7%



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

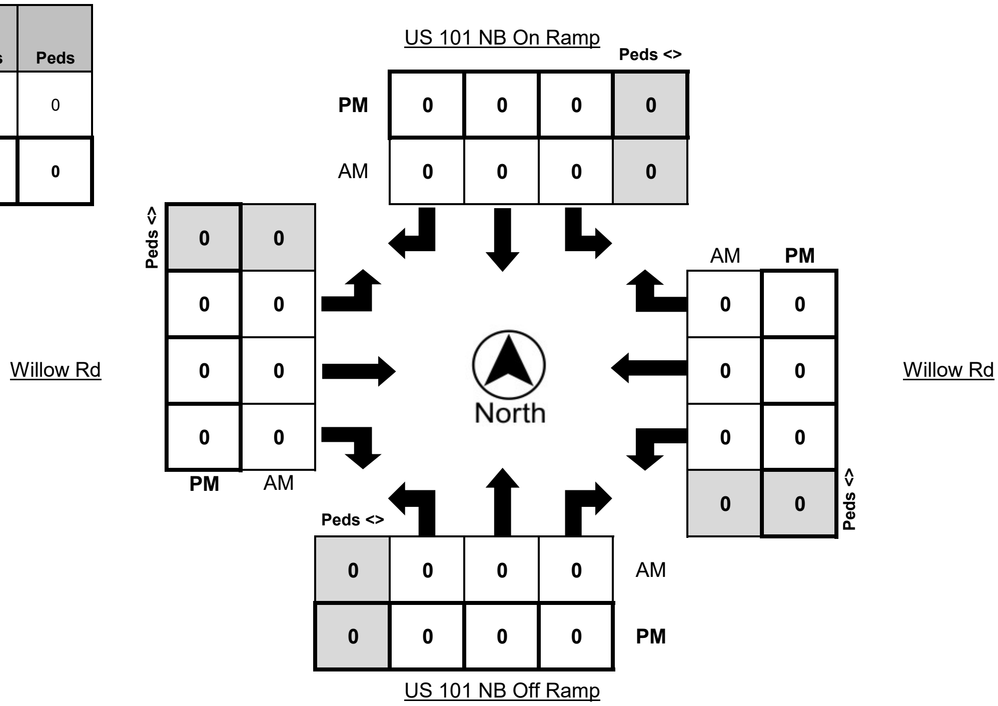
LOCATION	Willow Rd @ US 101 NB Ramps	**LATITUDE**	35.0555
COUNTY	San Luis Obispo	**LONGITUDE**	-120.5009
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Bikes	Peds
AM Peak Total	0	0
PM Peak Total (All)	0	0



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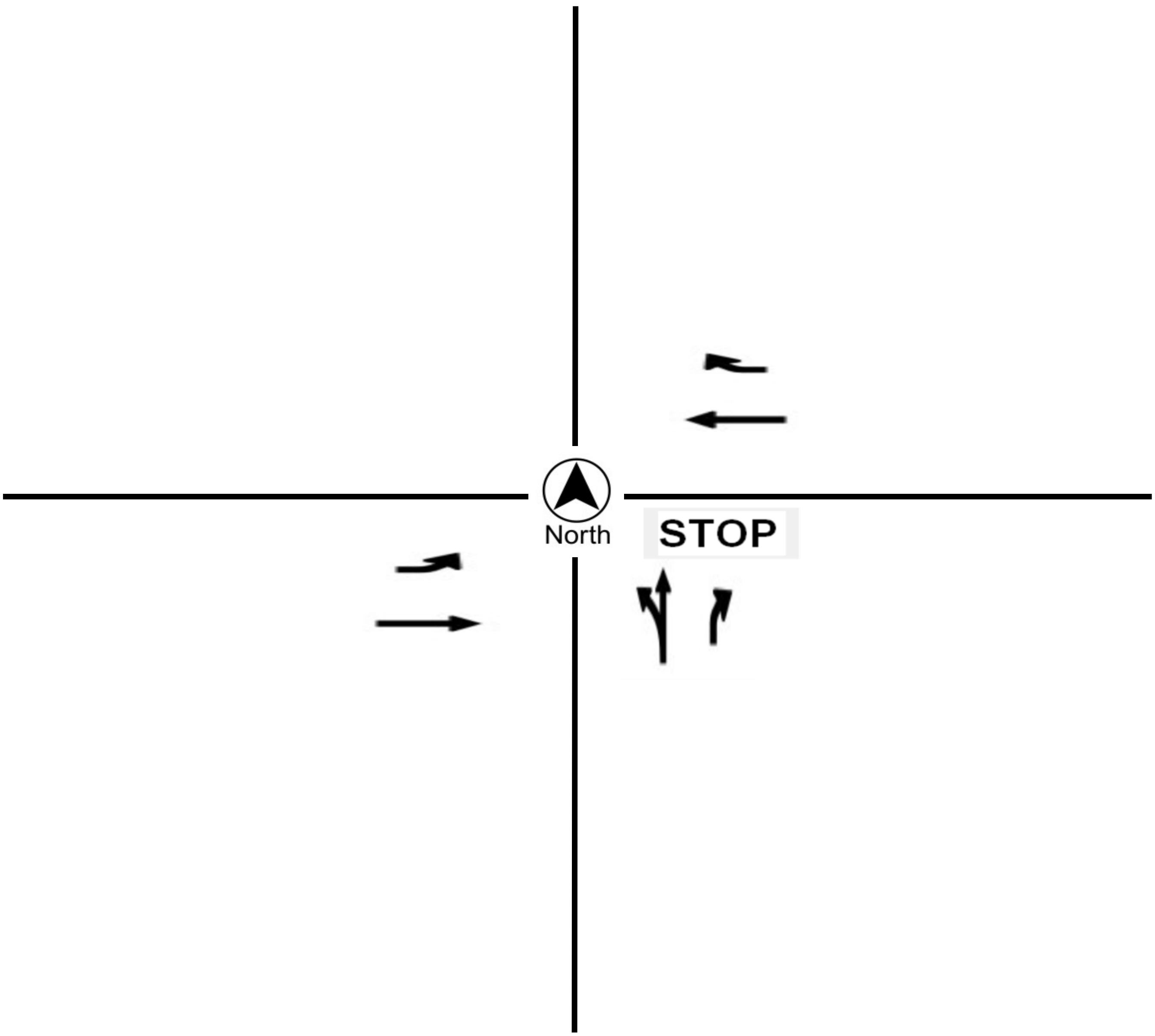
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ US 101 NB Ramps	**N/S STREET**	US 101 NB On Ramp / US 101 NB Off Ramp
COUNTY	San Luis Obispo	**E/W STREET**	Willow Rd / Willow Rd
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	One-Way Stop

COMMENTS



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

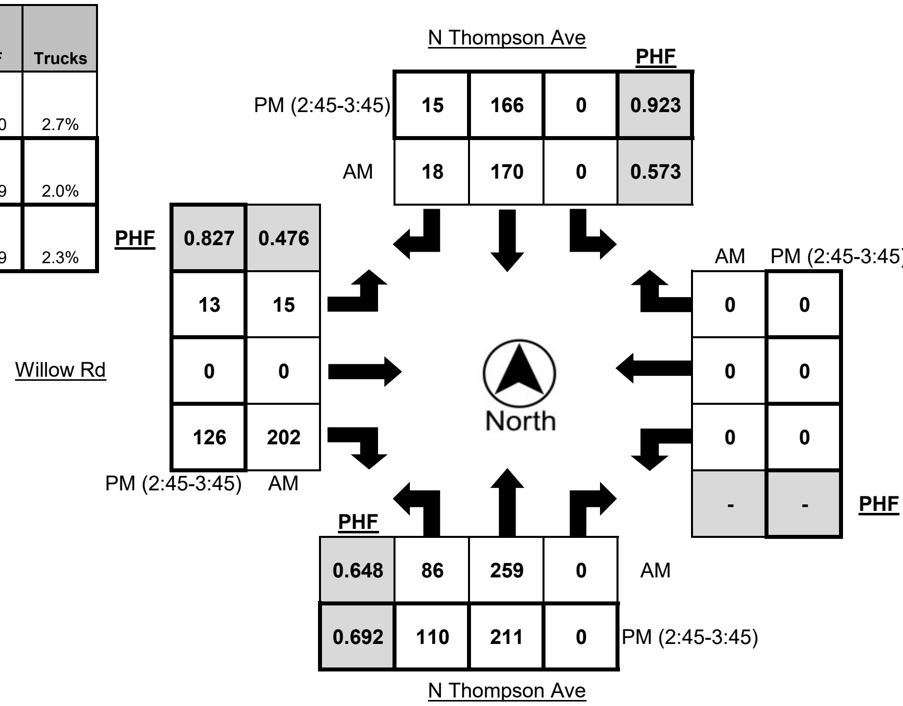
LOCATION Willow Rd @ Thompson Ave
LATITUDE 35.0594
COUNTY San Luis Obispo
LONGITUDE -120.4941
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	5	43	0	0	0	24	4	3	2	0	8	0	0	0	0	0
7:15 AM - 7:30 AM	16	59	0	7	0	44	4	2	3	0	48	2	0	0	0	0
7:30 AM - 7:45 AM	41	92	0	2	0	80	2	0	4	0	110	0	0	0	0	0
7:45 AM - 8:00 AM	24	66	0	4	0	27	5	2	4	0	33	0	0	0	0	0
8:00 AM - 8:15 AM	5	42	0	1	0	19	7	0	4	0	11	0	0	0	0	0
8:15 AM - 8:30 AM	7	33	0	0	0	28	4	1	4	0	17	1	0	0	0	0
8:30 AM - 8:45 AM	12	26	0	3	0	21	5	0	5	0	22	2	0	0	0	0
8:45 AM - 9:00 AM	14	36	0	2	0	22	5	0	4	0	21	1	0	0	0	0
TOTAL	**124**	**397**	**0**	**19**	**0**	**265**	**36**	**8**	**30**	**0**	**270**	**6**	**0**	**0**	**0**	**0**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
2:00 PM - 2:15 PM	6	38	0	1	0	20	2	0	3	0	4	0	0	0	0	0
2:15 PM - 2:30 PM	9	31	0	1	0	36	4	3	2	0	11	1	0	0	0	0
2:30 PM - 2:45 PM	9	20	0	2	0	31	6	4	3	0	25	2	0	0	0	0
2:45 PM - 3:00 PM	37	66	0	0	0	38	1	1	2	0	38	2	0	0	0	0
3:00 PM - 3:15 PM	39	77	0	1	0	42	3	1	3	0	39	1	0	0	0	0
3:15 PM - 3:30 PM	17	36	0	0	0	45	3	1	4	0	24	1	0	0	0	0
3:30 PM - 3:45 PM	17	32	0	3	0	41	8	1	4	0	25	1	0	0	0	0
3:45 PM - 4:00 PM	14	33	0	1	0	37	6	1	3	0	22	1	0	0	0	0
4:00 PM - 4:15 PM	20	42	0	0	0	47	5	2	3	0	26	0	0	0	0	0
4:15 PM - 4:30 PM	12	30	0	0	0	50	5	0	5	0	15	1	0	0	0	0
4:30 PM - 4:45 PM	13	30	0	3	0	53	5	0	3	0	30	0	0	0	0	0
4:45 PM - 5:00 PM	17	29	0	0	0	67	4	3	1	0	23	0	0	0	0	0
5:00 PM - 5:15 PM	27	25	0	1	0	51	3	2	3	0	29	1	0	0	0	0
5:15 PM - 5:30 PM	9	18	0	0	0	80	5	1	8	0	39	2	0	0	0	0
5:30 PM - 5:45 PM	14	22	0	2	0	45	6	2	3	0	40	1	0	0	0	0
5:45 PM - 6:00 PM	11	23	0	2	0	49	2	2	6	0	8	0	0	0	0	0
TOTAL	**271**	**552**	**0**	**17**	**0**	**732**	**68**	**24**	**56**	**0**	**398**	**14**	**0**	**0**	**0**	**0**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	86	259	0	14	0	170	18	4	15	0	202	2	0	0	0	0
2:45 PM - 3:45 PM	110	211	0	4	0	166	15	4	13	0	126	5	0	0	0	0
4:30 PM - 5:30 PM	66	102	0	4	0	251	17	6	15	0	121	3	0	0	0	0

	PHF	Trucks
AM	0.570	2.7%
PM (2:45-3:45)	0.789	2.0%
PM (4:30-5:30)	0.899	2.3%



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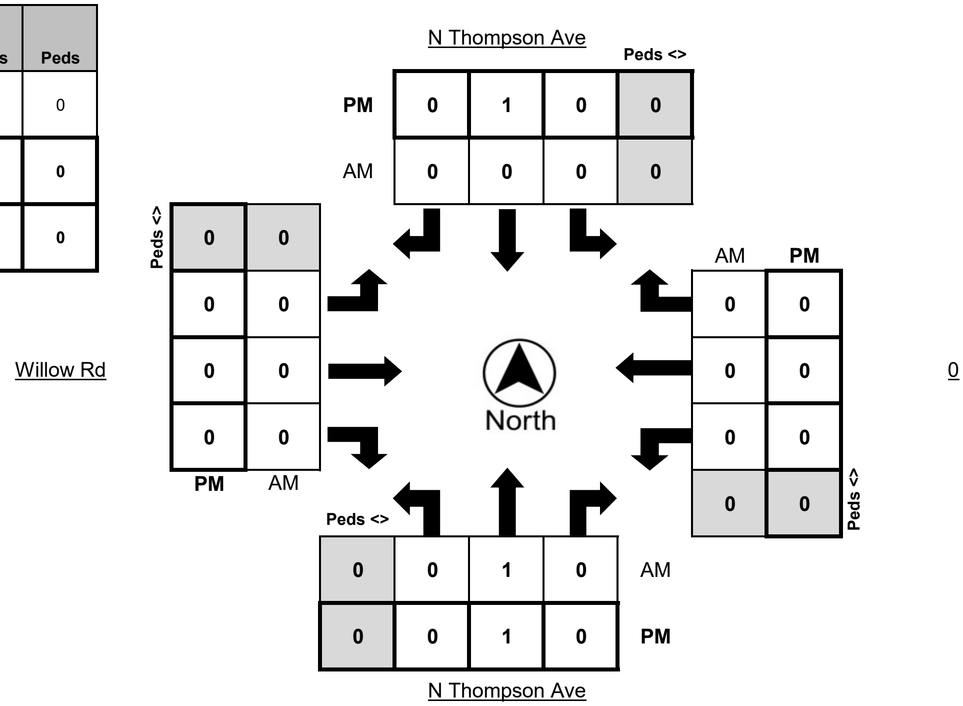
LOCATION	Willow Rd @ Thompson Ave	**LATITUDE**	35.0594
COUNTY	San Luis Obispo	**LONGITUDE**	-120.4941
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:45 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4:30 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Bikes	Peds
AM Peak Total	1	0
PM Peak Total (2:45-3:45)	**2**	**0**
PM Peak Total (4:30-5:30)	**0**	**0**



Metro Traffic Data Inc.
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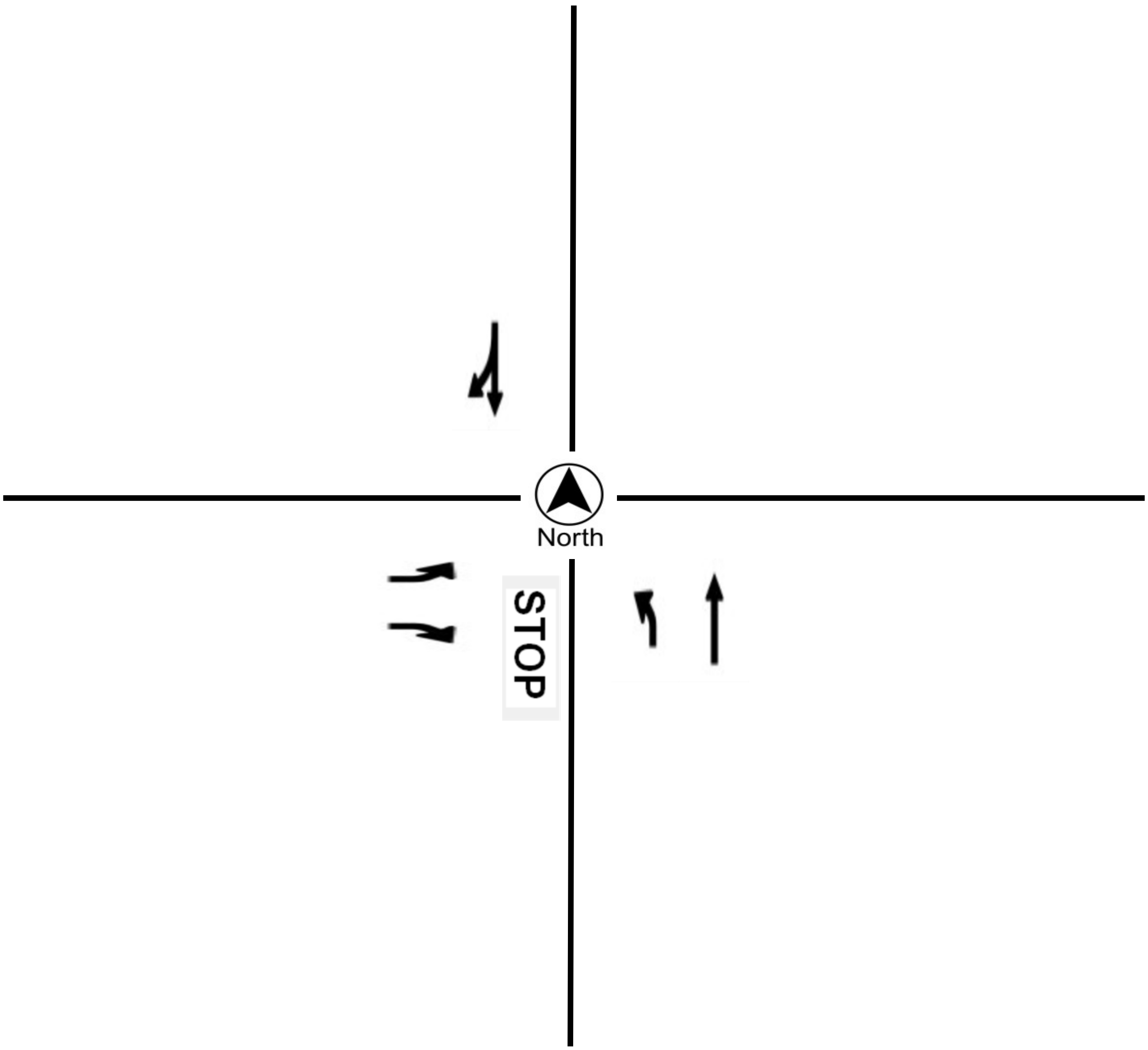
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Willow Rd @ Thompson Ave	**N/S STREET**	N Thompson Ave / N Thompson Ave
COUNTY	San Luis Obispo	**E/W STREET**	/ Willow Rd
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	One-Way Stop

COMMENTS



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

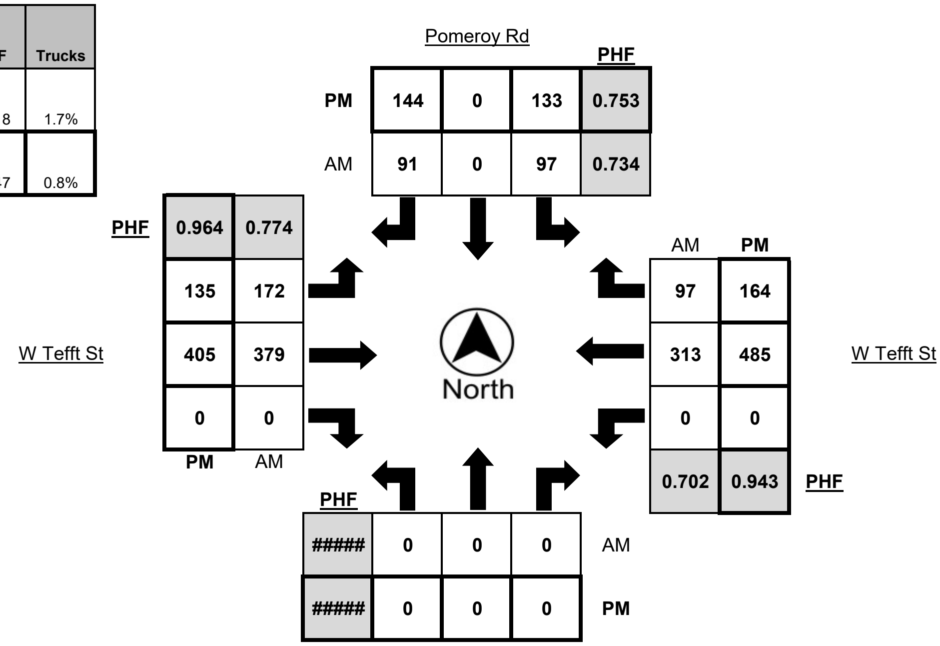
LOCATION W Tefft St @ Pomeroy Rd
LATITUDE 35.0308
COUNTY San Luis Obispo
LONGITUDE -120.4951
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	0	0	0	0	29	0	15	1	19	74	0	2	0	52	7	2
7:15 AM - 7:30 AM	0	0	0	0	16	0	13	1	60	118	0	3	0	58	25	2
7:30 AM - 7:45 AM	0	0	0	0	27	0	15	0	63	107	0	3	0	73	13	3
7:45 AM - 8:00 AM	0	0	0	0	30	0	34	0	28	75	0	1	0	109	37	1
8:00 AM - 8:15 AM	0	0	0	0	24	0	29	1	21	79	0	3	0	73	22	1
8:15 AM - 8:30 AM	0	0	0	0	29	0	11	0	15	76	0	1	0	62	20	3
8:30 AM - 8:45 AM	0	0	0	0	33	0	27	0	26	98	0	4	0	76	30	1
8:45 AM - 9:00 AM	0	0	0	0	51	0	15	0	23	141	0	1	0	82	28	4
TOTAL	**0**	**0**	**0**	**0**	**239**	**0**	**159**	**3**	**255**	**768**	**0**	**18**	**0**	**585**	**182**	**17**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
2:00 PM - 2:15 PM	0	0	0	0	30	0	13	3	16	78	0	2	0	75	27	5
2:15 PM - 2:30 PM	0	0	0	0	31	0	21	1	16	75	0	2	0	82	36	2
2:30 PM - 2:45 PM	0	0	0	0	30	0	27	3	24	88	0	0	0	85	36	2
2:45 PM - 3:00 PM	0	0	0	0	28	0	27	2	9	97	0	2	0	111	34	3
3:00 PM - 3:15 PM	0	0	0	0	39	0	27	5	12	83	0	2	0	159	42	4
3:15 PM - 3:30 PM	0	0	0	0	43	0	34	1	23	91	0	6	0	105	54	4
3:30 PM - 3:45 PM	0	0	0	0	42	0	26	2	16	114	0	6	0	112	41	2
3:45 PM - 4:00 PM	0	0	0	0	32	0	27	0	30	90	0	0	0	112	55	1
4:00 PM - 4:15 PM	0	0	0	0	37	0	33	0	38	101	0	0	0	112	44	2
4:15 PM - 4:30 PM	0	0	0	0	35	0	27	0	24	98	0	1	0	115	43	0
4:30 PM - 4:45 PM	0	0	0	0	36	0	33	3	36	112	0	1	0	102	42	2
4:45 PM - 5:00 PM	0	0	0	0	36	0	39	1	33	107	0	1	0	115	57	2
5:00 PM - 5:15 PM	0	0	0	0	24	0	31	0	39	101	0	1	0	128	36	0
5:15 PM - 5:30 PM	0	0	0	0	22	0	33	1	33	97	0	0	0	118	42	1
5:30 PM - 5:45 PM	0	0	0	0	51	0	41	2	30	100	0	0	0	124	29	2
5:45 PM - 6:00 PM	0	0	0	0	53	0	27	0	26	69	0	2	0	115	42	1
TOTAL	**0**	**0**	**0**	**0**	**569**	**0**	**466**	**24**	**405**	**1501**	**0**	**26**	**0**	**1770**	**660**	**33**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	0	0	0	0	97	0	91	2	172	379	0	10	0	313	97	7
4:45 PM - 5:45 PM	0	0	0	0	133	0	144	4	135	405	0	2	0	485	164	5

	PHF	Trucks
AM	0.918	1.7%
PM	0.947	0.8%



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

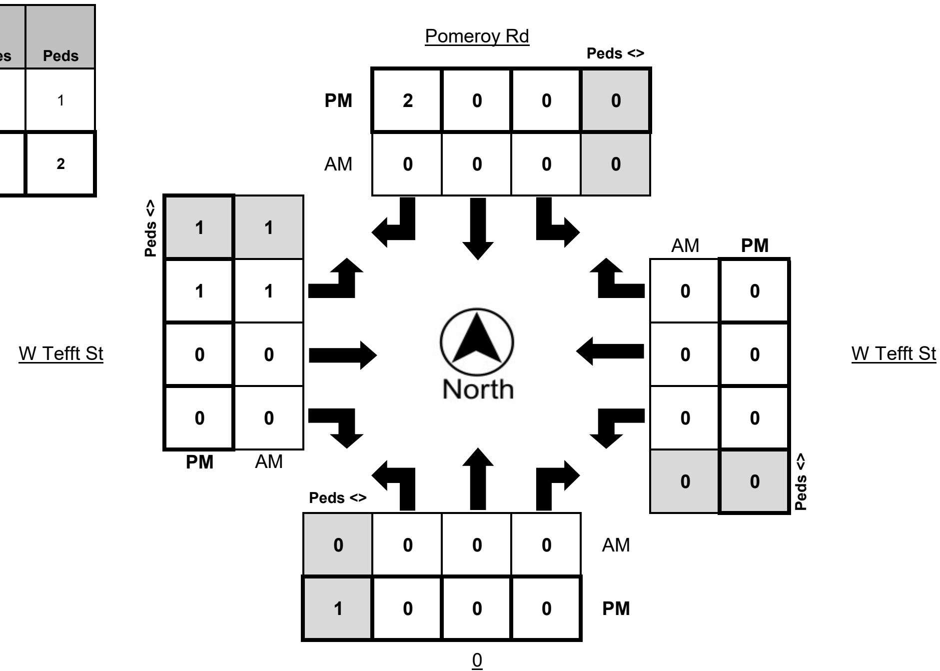
LOCATION W Tefft St @ Pomeroy Rd
LATITUDE 35.0308
COUNTY San Luis Obispo
LONGITUDE -120.4951
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
7:15 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**2**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
2:30 PM - 2:45 PM	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3:15 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM - 5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
5:30 PM - 5:45 PM	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**3**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
4:45 PM - 5:45 PM	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	1

	Bikes	Peds
AM Peak Total	1	1
PM Peak Total	**3**	**2**



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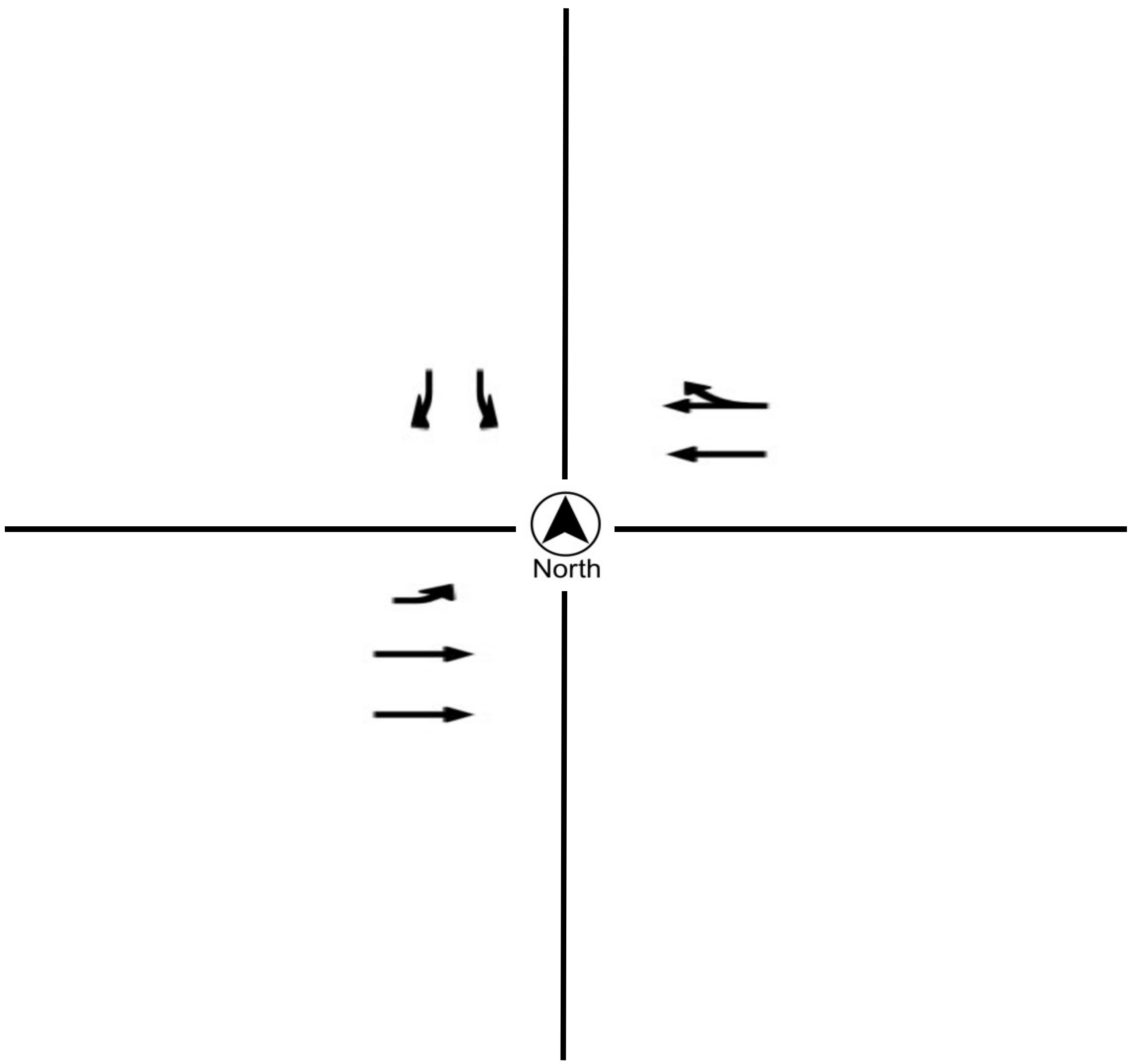
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	W Tefft St @ Pomeroy Rd	**N/S STREET**	Pomeroy Rd /
COUNTY	San Luis Obispo	**E/W STREET**	W Tefft St / W Tefft St
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear
CYCLE TIME	58 Seconds	**CONTROL TYPE**	Signal

COMMENTS Eastbound left turns are protected.



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

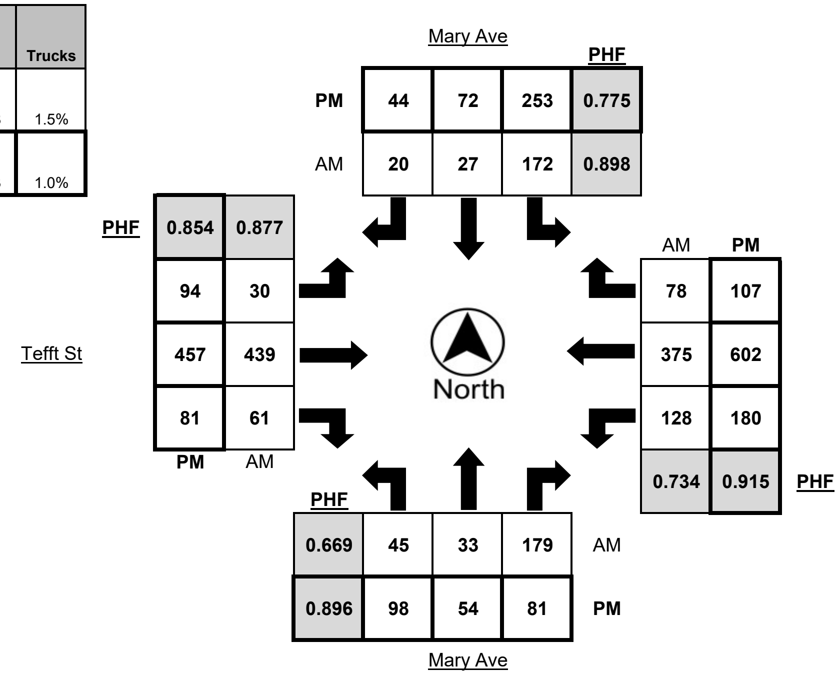
LOCATION Tefft St @ Mary Ave
LATITUDE 35.0357
COUNTY San Luis Obispo
LONGITUDE -120.4867
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	1	4	20	1	41	2	2	1	12	98	11	2	16	70	16	3
7:15 AM - 7:30 AM	7	12	52	0	46	8	2	1	5	117	13	3	26	70	14	4
7:30 AM - 7:45 AM	14	6	76	0	34	10	4	2	11	118	22	3	34	87	15	3
7:45 AM - 8:00 AM	16	8	37	1	45	8	8	0	6	114	17	1	34	134	30	2
8:00 AM - 8:15 AM	8	7	14	0	47	1	6	1	8	90	9	3	34	84	19	0
8:15 AM - 8:30 AM	7	12	20	1	30	4	2	2	8	100	14	0	24	82	27	4
8:30 AM - 8:45 AM	21	5	24	0	44	5	6	2	11	100	10	3	29	94	22	2
8:45 AM - 9:00 AM	8	4	19	0	48	9	3	1	23	164	18	1	14	119	23	6
TOTAL	**82**	**58**	**262**	**3**	**335**	**47**	**33**	**10**	**84**	**901**	**114**	**16**	**211**	**740**	**166**	**24**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
2:00 PM - 2:15 PM	18	10	14	1	46	20	5	2	15	90	14	6	26	87	17	4
2:15 PM - 2:30 PM	21	11	18	1	46	12	8	0	21	81	18	1	24	101	21	3
2:30 PM - 2:45 PM	11	6	22	0	36	6	6	0	11	91	23	1	34	115	21	5
2:45 PM - 3:00 PM	22	8	15	2	59	16	10	1	24	107	22	3	35	132	28	6
3:00 PM - 3:15 PM	24	19	13	0	45	17	12	0	10	102	21	5	46	182	22	6
3:15 PM - 3:30 PM	29	13	17	0	51	20	11	1	17	107	26	6	46	137	28	3
3:30 PM - 3:45 PM	23	17	15	0	63	14	12	2	24	113	16	4	48	141	24	5
3:45 PM - 4:00 PM	17	21	15	0	55	24	8	0	21	104	17	0	52	168	26	3
4:00 PM - 4:15 PM	26	23	13	1	63	24	8	1	17	97	23	1	52	142	31	1
4:15 PM - 4:30 PM	19	15	16	0	73	14	10	1	24	101	23	2	34	148	27	3
4:30 PM - 4:45 PM	25	16	15	1	62	14	12	3	31	135	19	1	48	128	24	2
4:45 PM - 5:00 PM	23	13	23	1	49	20	9	2	25	108	23	3	37	168	33	2
5:00 PM - 5:15 PM	23	9	21	0	84	21	14	1	21	101	21	2	45	136	27	1
5:15 PM - 5:30 PM	27	16	22	1	58	17	9	1	17	113	18	1	50	170	23	0
5:30 PM - 5:45 PM	21	12	25	0	64	24	11	2	23	114	24	4	38	124	24	2
5:45 PM - 6:00 PM	18	20	23	0	64	21	12	2	18	111	15	1	36	141	19	2
TOTAL	**347**	**229**	**287**	**8**	**918**	**284**	**157**	**19**	**319**	**1675**	**323**	**41**	**651**	**2220**	**395**	**48**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:15 AM - 8:15 AM	45	33	179	1	172	27	20	4	30	439	61	10	128	375	78	9
4:30 PM - 5:30 PM	98	54	81	3	253	72	44	7	94	457	81	7	180	602	107	5

	PHF	**Trucks**
AM	0.868	1.5%
PM	0.983	1.0%



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Turning Movement Report

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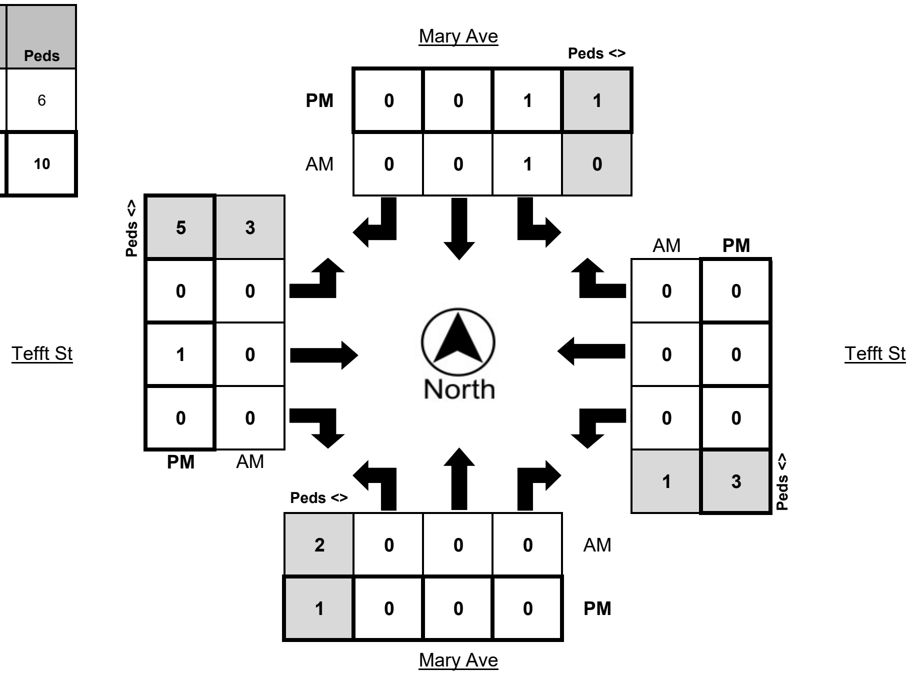
LOCATION Tefft St @ Mary Ave
LATITUDE 35.0357
COUNTY San Luis Obispo
LONGITUDE -120.4867
COLLECTION DATE Wednesday, May 23, 2018
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	0	1	0	0	2	0	0	0	1	0	0	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM - 8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM - 8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM - 8:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
8:45 AM - 9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**4**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	4	0	0	0	1	0	0	0	4	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
2:45 PM - 3:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
3:00 PM - 3:15 PM	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	2
3:15 PM - 3:30 PM	0	0	0	1	0	0	0	4	0	0	1	1	0	0	0	3
3:30 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
4:00 PM - 4:15 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2
4:15 PM - 4:30 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1
4:45 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4
5:00 PM - 5:15 PM	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
5:15 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5:30 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**1**	**0**	**11**	**1**	**0**	**0**	**9**	**0**	**2**	**1**	**12**	**0**	**1**	**1**	**19**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	0	1	0	0	2	0	0	0	1	0	0	0	3
4:30 PM - 5:30 PM	0	0	0	1	1	0	0	1	0	1	0	3	0	0	0	5

	Bikes	Peds
AM Peak Total	1	6
PM Peak Total	2	10



Metro Traffic Data Inc.
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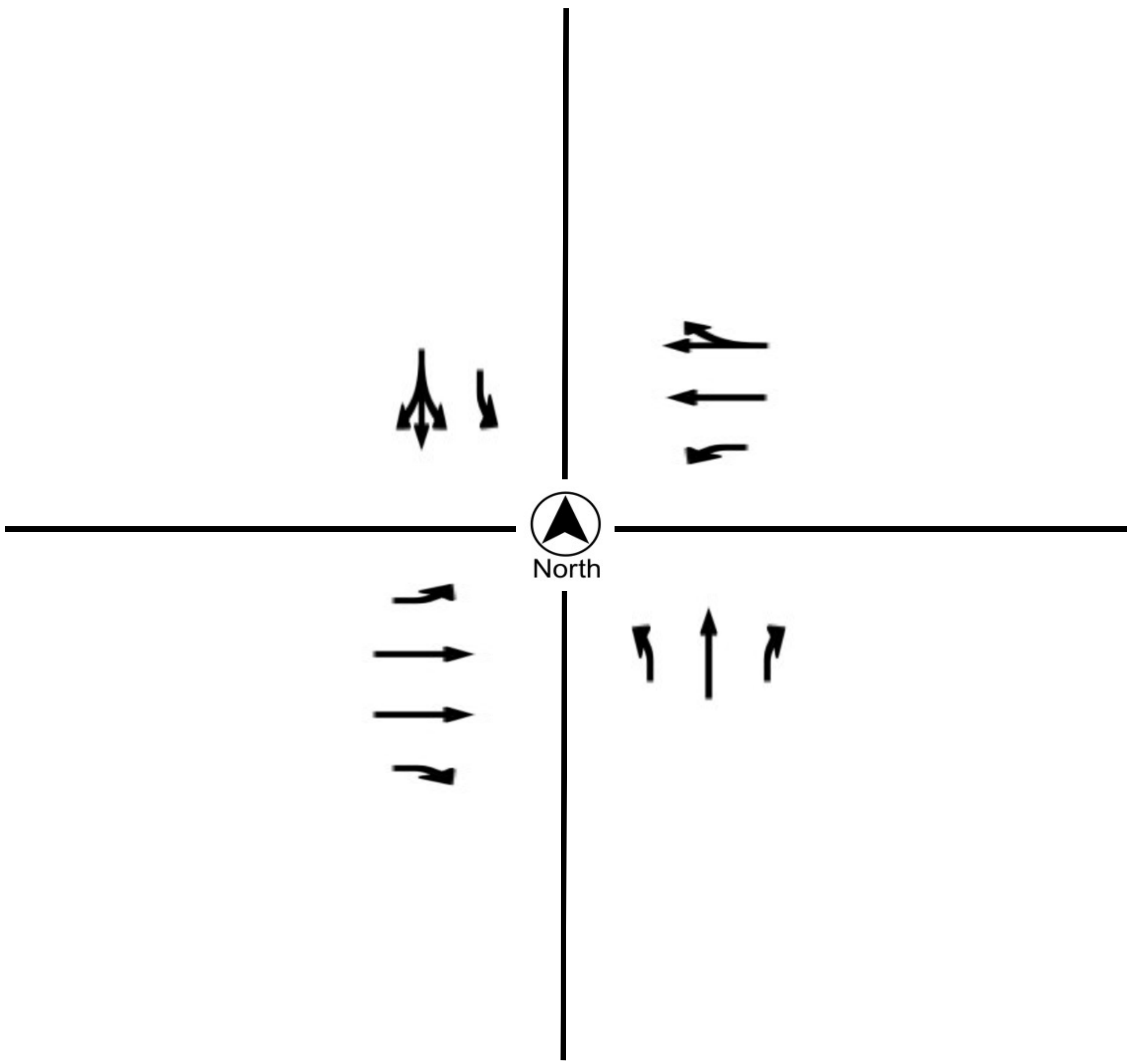
Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ Mary Ave	**N/S STREET**	Mary Ave / Mary Ave
COUNTY	San Luis Obispo	**E/W STREET**	Tefft St / Tefft St
COLLECTION DATE	Wednesday, May 23, 2018	**WEATHER**	Clear
CYCLE TIME	123 Seconds	**CONTROL TYPE**	Signal

COMMENTS All approaches have protected left turns.



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

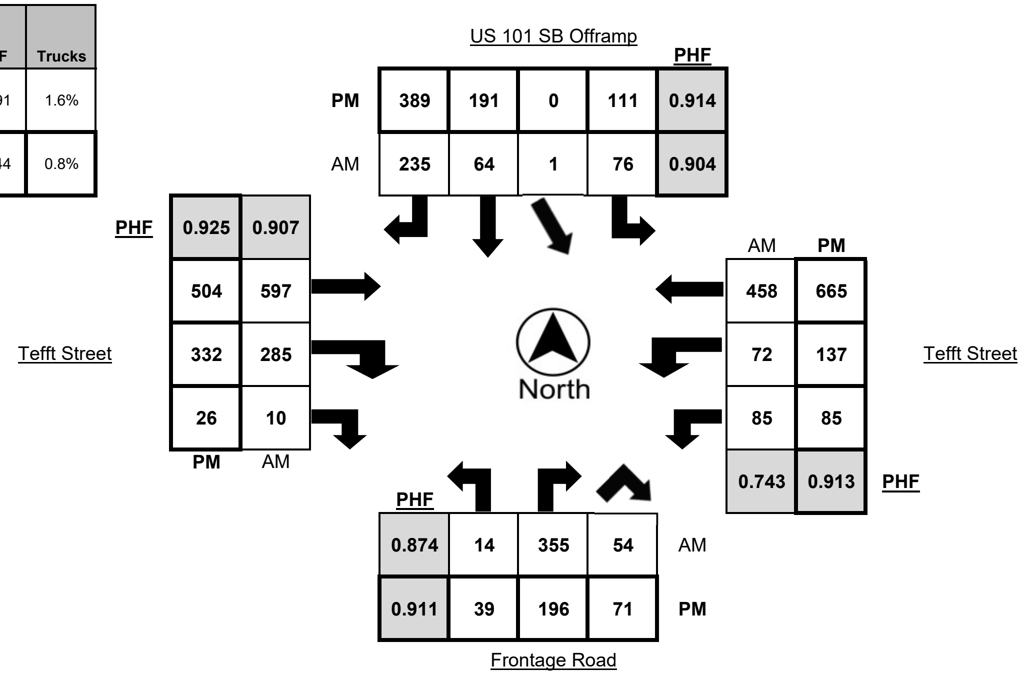
LOCATION Tefft Street @ US 101 SB Ramps
LATITUDE 35.0365
COUNTY San Luis Obispo
LONGITUDE -120.4853
COLLECTION DATE Thursday, May 24, 2018
WEATHER Clear

	Northbound				Southbound					Eastbound				Westbound			
Time	Left	R-Tefft	R-101 S	Trucks	L-Tefft	L-101 S	Thru	Right	Trucks	Thru	R-101 S	R-Front	Trucks	L-101 S	L-Front	Thru	Trucks
7:00 AM - 7:15 AM	8	56	7	2	8	0	10	44	4	114	59	1	5	18	13	90	4
7:15 AM - 7:30 AM	4	90	15	3	16	0	17	57	2	157	75	2	3	21	17	87	4
7:30 AM - 7:45 AM	0	103	18	1	21	1	17	47	2	160	68	3	2	26	20	109	1
7:45 AM - 8:00 AM	4	78	8	0	20	0	12	72	1	167	75	4	4	27	22	158	5
8:00 AM - 8:15 AM	6	84	13	0	19	0	18	59	3	113	67	1	5	11	13	104	1
8:15 AM - 8:30 AM	7	62	12	1	17	0	11	57	5	101	62	3	3	24	11	103	3
8:30 AM - 8:45 AM	7	64	10	2	11	0	15	42	2	123	66	4	0	22	14	114	5
8:45 AM - 9:00 AM	8	42	17	1	15	0	16	56	4	144	57	7	2	21	14	131	2
TOTAL	**44**	**579**	**100**	**10**	**127**	**1**	**116**	**434**	**23**	**1079**	**529**	**25**	**24**	**170**	**124**	**896**	**25**

	Northbound				Southbound					Eastbound				Westbound			
Time	Left	R-Tefft	R-101 S	Trucks	L-Tefft	L-101 S	Thru	Right	Trucks	Thru	R-101 S	R-Front	Trucks	L-101 S	L-Front	Thru	Trucks
2:00 PM - 2:15 PM	6	26	9	1	15	0	25	55	2	98	59	3	0	11	14	96	2
2:15 PM - 2:30 PM	5	44	11	2	21	0	31	68	5	85	63	6	0	13	23	126	2
2:30 PM - 2:45 PM	10	42	8	0	17	0	28	53	4	132	56	1	7	14	23	84	0
2:45 PM - 3:00 PM	9	58	9	2	13	1	27	78	3	131	50	5	0	10	27	162	4
3:00 PM - 3:15 PM	9	48	14	0	16	0	37	94	3	113	65	10	3	18	31	206	7
3:15 PM - 3:30 PM	9	31	8	2	20	0	44	108	5	122	73	10	2	21	43	157	6
3:30 PM - 3:45 PM	7	32	19	1	15	1	31	115	2	144	76	9	3	13	23	138	3
3:45 PM - 4:00 PM	8	47	15	4	25	0	47	93	4	113	80	9	2	19	22	152	3
4:00 PM - 4:15 PM	12	38	18	0	24	0	37	97	3	143	90	7	1	19	25	139	2
4:15 PM - 4:30 PM	9	53	9	0	25	0	51	78	1	118	68	11	5	25	32	148	1
4:30 PM - 4:45 PM	9	40	18	0	31	0	47	95	1	110	90	4	0	18	34	144	1
4:45 PM - 5:00 PM	8	56	13	1	26	0	41	98	3	135	80	6	6	18	34	191	2
5:00 PM - 5:15 PM	13	47	24	0	20	0	53	91	1	119	78	7	1	23	37	161	3
5:15 PM - 5:30 PM	9	53	16	1	34	0	50	105	1	140	84	9	1	26	32	169	1
5:30 PM - 5:45 PM	8	56	11	0	19	2	56	85	1	113	76	8	3	21	24	139	1
5:45 PM - 6:00 PM	9	58	15	0	18	0	48	106	0	117	83	12	0	24	30	129	1
TOTAL	**140**	**729**	**217**	**14**	**339**	**4**	**653**	**1419**	**39**	**1933**	**1171**	**117**	**34**	**293**	**454**	**2341**	**39**

	Northbound				Southbound					Eastbound				Westbound			
PEAK HOUR	Left	R-Tefft	R-101 S	Trucks	L-Tefft	L-101 S	Thru	Right	Trucks	Thru	R-101 S	R-Front	Trucks	L-101 S	L-Front	Thru	Trucks
7:15 AM - 8:15 AM	14	355	54	4	76	1	64	235	8	597	285	10	14	85	72	458	11
4:30 PM - 5:30 PM	39	196	71	2	111	0	191	389	6	504	332	26	8	85	137	665	7

	PHF	Trucks
AM	0.891	1.6%
PM	0.944	0.8%



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Turning Movement Report

Prepared For:
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895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

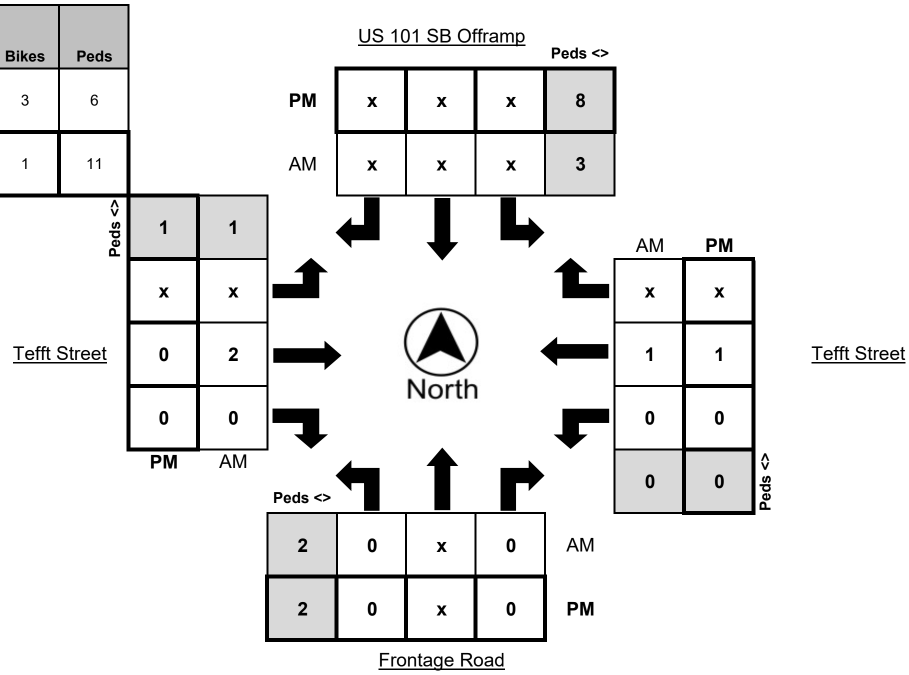
LOCATION Tefft Street @ US 101 SB Ramps
LATITUDE 35.0365
COUNTY San Luis Obispo
LONGITUDE -120.4853
COLLECTION DATE Thursday, May 24, 2018
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	x	0	0	x	x	x	2	x	0	0	0	0	1	x	0
7:15 AM - 7:30 AM	0	x	0	0	x	x	x	0	x	2	0	0	0	1	x	0
7:30 AM - 7:45 AM	0	x	0	1	x	x	x	1	x	0	0	0	0	0	x	1
7:45 AM - 8:00 AM	0	x	0	0	x	x	x	1	x	0	0	0	0	0	x	0
8:00 AM - 8:15 AM	0	x	0	2	x	x	x	0	x	0	0	0	0	0	x	0
8:15 AM - 8:30 AM	0	x	0	0	x	x	x	0	x	0	0	0	0	0	x	0
8:30 AM - 8:45 AM	0	x	0	1	x	x	x	2	x	0	0	0	0	0	x	0
8:45 AM - 9:00 AM	0	x	0	0	x	x	x	3	x	0	0	0	0	0	x	0
TOTAL	**0**	**x**	**0**	**4**	**x**	**x**	**x**	**9**	**x**	**2**	**0**	**0**	**0**	**2**	**x**	**1**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	x	0	2	x	x	x	0	x	0	0	0	0	0	x	0
2:15 PM - 2:30 PM	0	x	0	2	x	x	x	0	x	0	0	0	0	0	x	0
2:30 PM - 2:45 PM	0	x	0	0	x	x	x	1	x	0	0	0	0	0	x	2
2:45 PM - 3:00 PM	0	x	0	0	x	x	x	1	x	0	0	0	0	0	x	0
3:00 PM - 3:15 PM	0	x	0	5	x	x	x	1	x	0	0	0	0	1	x	1
3:15 PM - 3:30 PM	0	x	0	12	x	x	x	1	x	0	0	0	0	0	x	5
3:30 PM - 3:45 PM	0	x	0	12	x	x	x	2	x	0	0	0	0	0	x	1
3:45 PM - 4:00 PM	0	x	0	4	x	x	x	1	x	0	0	0	0	0	x	4
4:00 PM - 4:15 PM	0	x	0	2	x	x	x	0	x	1	0	0	0	0	x	0
4:15 PM - 4:30 PM	0	x	0	4	x	x	x	1	x	0	0	0	0	0	x	0
4:30 PM - 4:45 PM	0	x	0	6	x	x	x	0	x	0	0	0	0	0	x	0
4:45 PM - 5:00 PM	0	x	0	0	x	x	x	1	x	0	0	0	0	0	x	0
5:00 PM - 5:15 PM	0	x	0	1	x	x	x	0	x	0	0	0	0	0	x	1
5:15 PM - 5:30 PM	0	x	0	1	x	x	x	1	x	0	0	0	0	1	x	0
5:30 PM - 5:45 PM	0	x	0	0	x	x	x	1	x	0	0	0	0	0	x	1
5:45 PM - 6:00 PM	0	x	0	3	x	x	x	2	x	0	0	0	0	1	x	2
TOTAL	**0**	**x**	**0**	**54**	**x**	**x**	**x**	**13**	**x**	**1**	**0**	**0**	**0**	**3**	**x**	**17**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	x	0	3	x	x	x	2	x	2	0	0	0	1	x	1
4:30 PM - 5:30 PM	0	x	0	8	x	x	x	2	x	0	0	0	0	1	x	1

	Bikes	Peds
AM Peak Totals	3	6
PM Peak Totals	1	11



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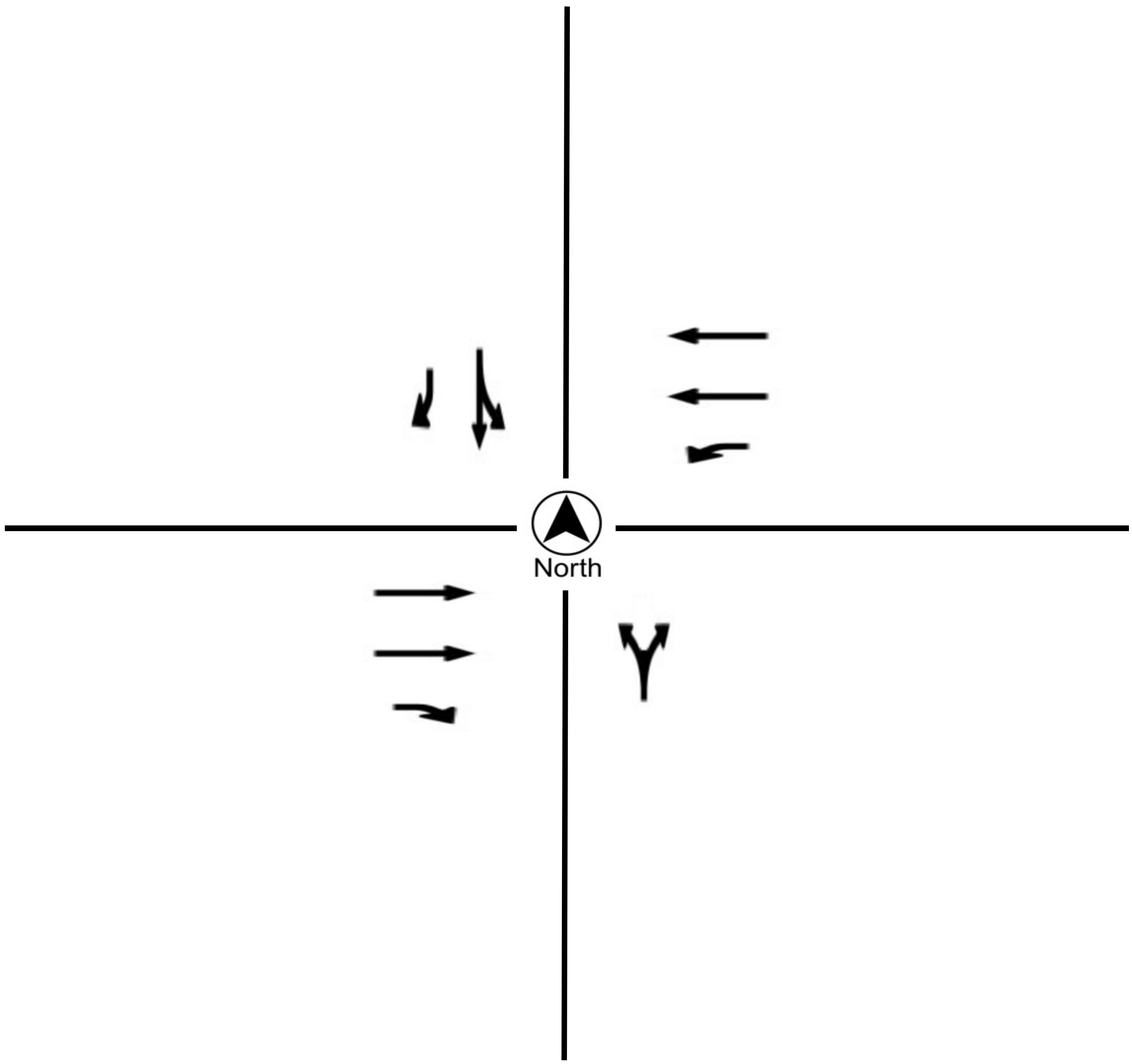
Turning Movement Report

Prepared For:

Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft Street @ US 101 SB Ramps	**N/S STREET**	US 101 SB Offramp
COUNTY	San Luis Obispo	**E/W STREET**	Tefft Street
COLLECTION DATE	Thursday, May 24, 2018	**WEATHER**	Clear
CYCLE TIME	105 Seconds	**CONTROL TYPE**	Signal

COMMENTS Northbound and southbound approaches are split.
Westbound left turns are protected.



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Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

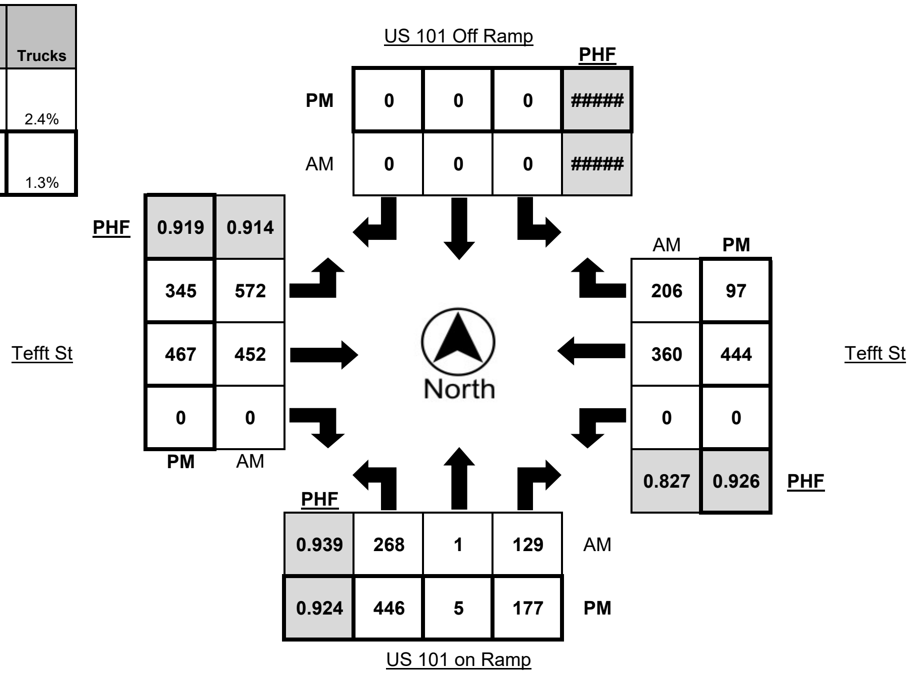
LOCATION	Tefft St @ US 101 NB Ramps	**LATITUDE**	35.0371
COUNTY	San Luis Obispo	**LONGITUDE**	-120.4842
COLLECTION DATE	Thursday, May 24, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	55	0	31	4	0	0	0	0	116	63	0	10	0	71	46	4
7:15 AM - 7:30 AM	47	0	38	1	0	0	0	0	150	127	0	8	0	68	54	5
7:30 AM - 7:45 AM	68	0	34	4	0	0	0	0	134	128	0	3	0	112	59	3
7:45 AM - 8:00 AM	74	1	31	4	0	0	0	0	157	123	0	6	0	111	52	2
8:00 AM - 8:15 AM	79	0	26	1	0	0	0	0	131	74	0	8	0	69	41	3
8:15 AM - 8:30 AM	54	0	23	3	0	0	0	0	106	77	0	5	0	69	36	3
8:30 AM - 8:45 AM	61	0	39	5	0	0	0	0	117	86	0	4	0	97	41	3
8:45 AM - 9:00 AM	75	0	33	3	0	0	0	0	89	109	0	4	0	84	35	2
TOTAL	**513**	**1**	**255**	**25**	**0**	**0**	**0**	**0**	**1000**	**787**	**0**	**48**	**0**	**681**	**364**	**25**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
2:00 PM - 2:15 PM	65	0	24	3	0	0	0	0	69	65	0	1	0	76	28	2
2:15 PM - 2:30 PM	79	0	30	2	0	0	0	0	81	73	0	5	0	75	27	3
2:30 PM - 2:45 PM	69	1	30	2	0	0	0	0	75	116	0	8	0	65	22	2
2:45 PM - 3:00 PM	75	0	28	2	0	0	0	0	91	110	0	1	0	112	22	4
3:00 PM - 3:15 PM	76	1	24	1	0	0	0	0	80	96	0	2	0	203	23	9
3:15 PM - 3:30 PM	82	0	30	5	0	0	0	0	74	100	0	5	0	111	29	5
3:30 PM - 3:45 PM	88	0	22	3	0	0	0	0	88	100	0	4	0	99	21	3
3:45 PM - 4:00 PM	82	0	34	2	0	0	0	0	73	112	0	8	0	113	23	3
4:00 PM - 4:15 PM	97	0	28	1	0	0	0	0	65	139	0	2	0	91	35	3
4:15 PM - 4:30 PM	94	0	48	1	0	0	0	0	68	134	0	4	0	103	27	4
4:30 PM - 4:45 PM	98	1	50	1	0	0	0	0	85	100	0	1	0	103	26	3
4:45 PM - 5:00 PM	122	1	41	5	0	0	0	0	81	128	0	6	0	122	24	1
5:00 PM - 5:15 PM	110	0	35	3	0	0	0	0	87	110	0	2	0	113	21	1
5:15 PM - 5:30 PM	116	3	51	0	0	0	0	0	92	129	0	1	0	106	26	2
5:30 PM - 5:45 PM	79	0	49	1	0	0	0	0	68	121	0	3	0	109	23	1
5:45 PM - 6:00 PM	71	0	37	1	0	0	0	0	73	118	0	0	0	104	35	0
TOTAL	**1403**	**7**	**561**	**33**	**0**	**0**	**0**	**0**	**1250**	**1751**	**0**	**53**	**0**	**1705**	**412**	**46**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:15 AM - 8:15 AM	268	1	129	10	0	0	0	0	572	452	0	25	0	360	206	13
4:30 PM - 5:30 PM	446	5	177	9	0	0	0	0	345	467	0	10	0	444	97	7

	PHF	Trucks
AM	0.905	2.4%
PM	0.947	1.3%



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Morro Bay, CA 93442

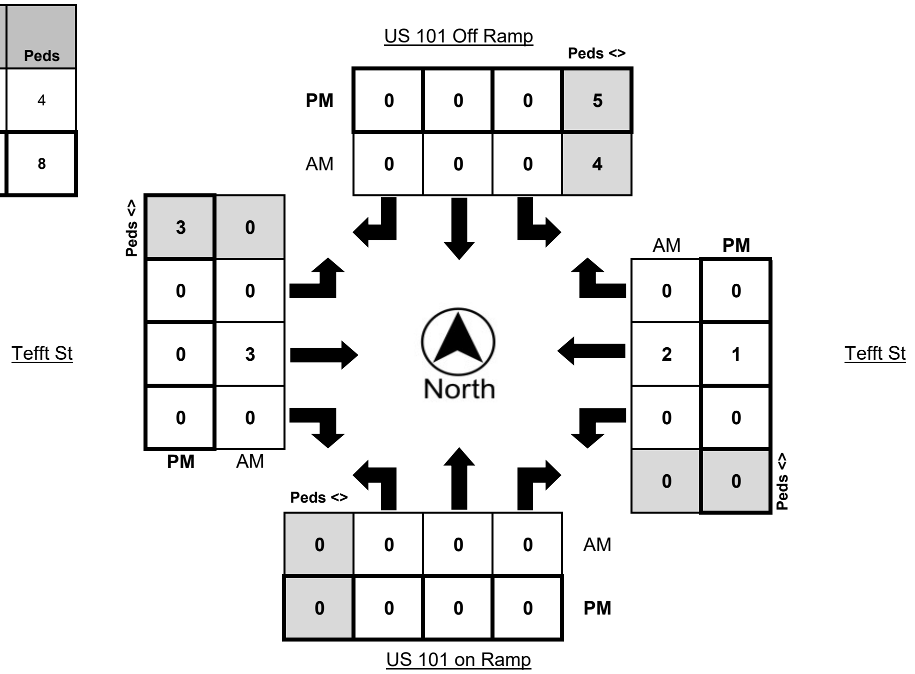
LOCATION Tefft St @ US 101 NB Ramps
LATITUDE 35.0371
COUNTY San Luis Obispo
LONGITUDE -120.4842
COLLECTION DATE Thursday, May 24, 2018
WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:00 AM - 7:15 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM - 7:30 AM	0	0	0	3	0	0	0	0	0	3	0	0	0	1	0	0
7:30 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7:45 AM - 8:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM - 8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM - 8:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2
8:30 AM - 8:45 AM	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0
8:45 AM - 9:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**4**	**0**	**2**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2:45 PM - 3:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 3:15 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1
3:15 PM - 3:30 PM	0	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0
3:30 PM - 3:45 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
4:00 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
4:15 PM - 4:30 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM - 4:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM - 5:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM - 5:30 PM	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0
5:30 PM - 5:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM - 6:00 PM	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	1
TOTAL	**0**	**0**	**0**	**17**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**5**	**0**	**5**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
7:15 AM - 8:15 AM	0	0	0	4	0	0	0	0	0	3	0	0	0	2	0	0
4:30 PM - 5:30 PM	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0	3

	Bikes	Peds
AM Peak Total	5	4
PM Peak Total	**1**	**8**



Metro Traffic Data Inc.
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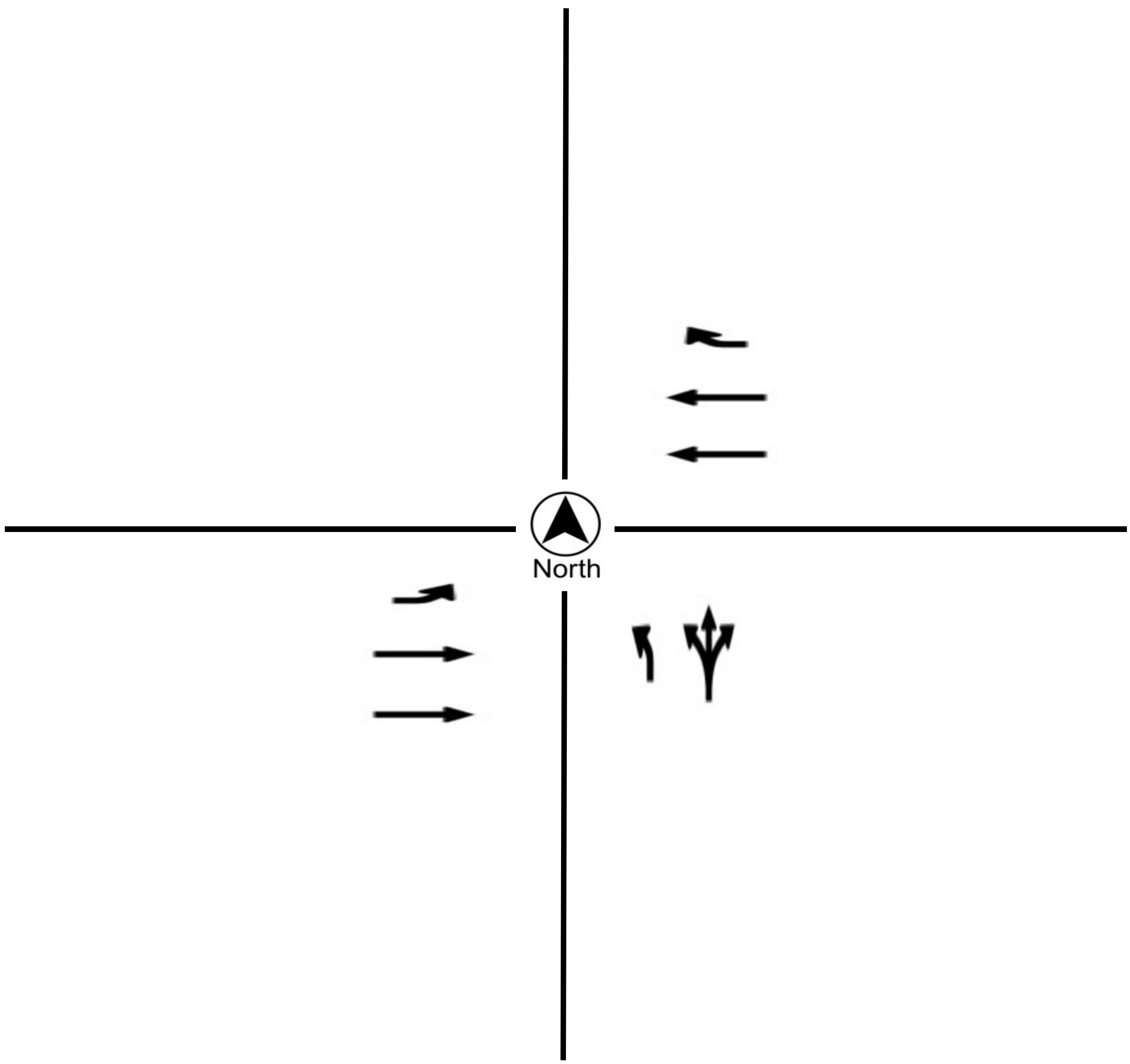
800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ US 101 NB Ramps	**N/S STREET**	US 101 Off Ramp / US 101 on Ramp
COUNTY	San Luis Obispo	**E/W STREET**	Tefft St / Tefft St
COLLECTION DATE	Thursday, May 24, 2018	**WEATHER**	Clear
CYCLE TIME	123 Seconds	**CONTROL TYPE**	Signal

COMMENTS Eastbound left turns are protected.



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Turning Movement Report

Prepared For:
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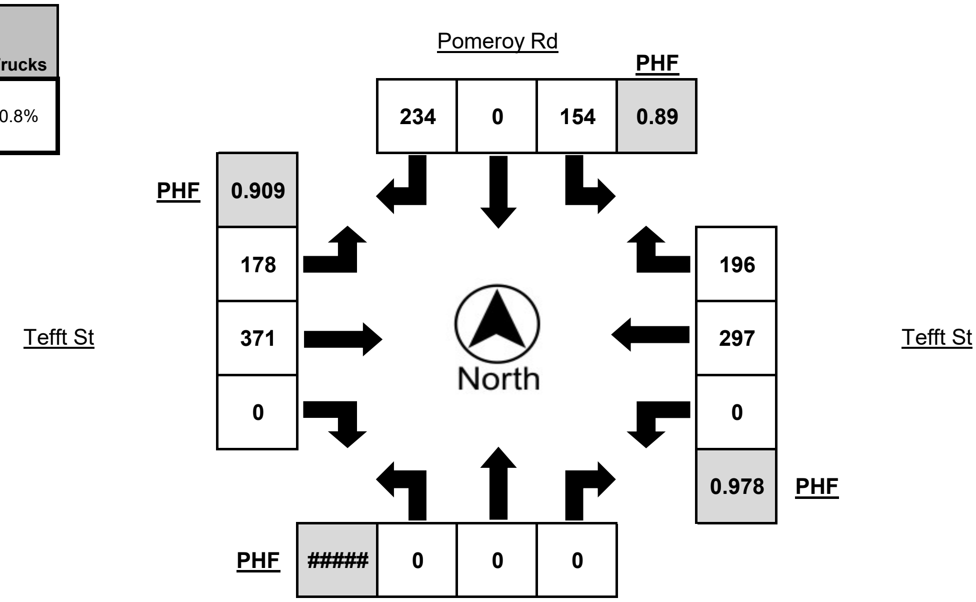
Morro Bay, CA 93442

LOCATION	Tefft St @ Pomeroy Rd	**LATITUDE**	35.030812°
COUNTY	San Luis Obispo	**LONGITUDE**	-120.495123°
COLLECTION DATE	Sunday, July 15, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
11:30 AM - 11:45 AM	0	0	0	0	36	0	21	1	29	73	0	0	0	44	33	0
11:45 AM - 12:00 PM	0	0	0	0	33	0	30	0	31	76	0	1	0	90	31	0
12:00 PM - 12:15 PM	0	0	0	0	37	0	24	1	28	74	0	1	0	60	49	0
12:15 PM - 12:30 PM	0	0	0	0	36	0	43	1	33	78	0	2	0	63	54	2
12:30 PM - 12:45 PM	0	0	0	0	43	0	47	1	36	84	0	0	0	68	57	3
12:45 PM - 1:00 PM	0	0	0	0	36	0	73	2	47	104	0	0	0	84	32	1
1:00 PM - 1:15 PM	0	0	0	0	38	0	62	2	51	96	0	1	0	77	49	0
1:15 PM - 1:30 PM	0	0	0	0	37	0	52	1	44	87	0	0	0	68	58	1
1:30 PM - 1:45 PM	0	0	0	0	34	0	48	0	41	97	0	3	0	53	42	0
1:45 PM - 2:00 PM	0	0	0	0	36	0	51	0	42	71	0	1	0	83	26	3
2:00 PM - 2:15 PM	0	0	0	0	39	0	42	2	27	64	0	0	0	68	28	1
2:15 PM - 2:30 PM	0	0	0	0	36	0	61	0	31	62	0	3	0	68	24	0
TOTAL	**0**	**0**	**0**	**0**	**441**	**0**	**554**	**11**	**440**	**966**	**0**	**12**	**0**	**826**	**483**	**11**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
12:30 PM - 1:30 PM	0	0	0	0	154	0	234	6	178	371	0	1	0	297	196	5

	PHF	**Trucks**
Peak Hour	0.951	0.8%



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Turning Movement Report

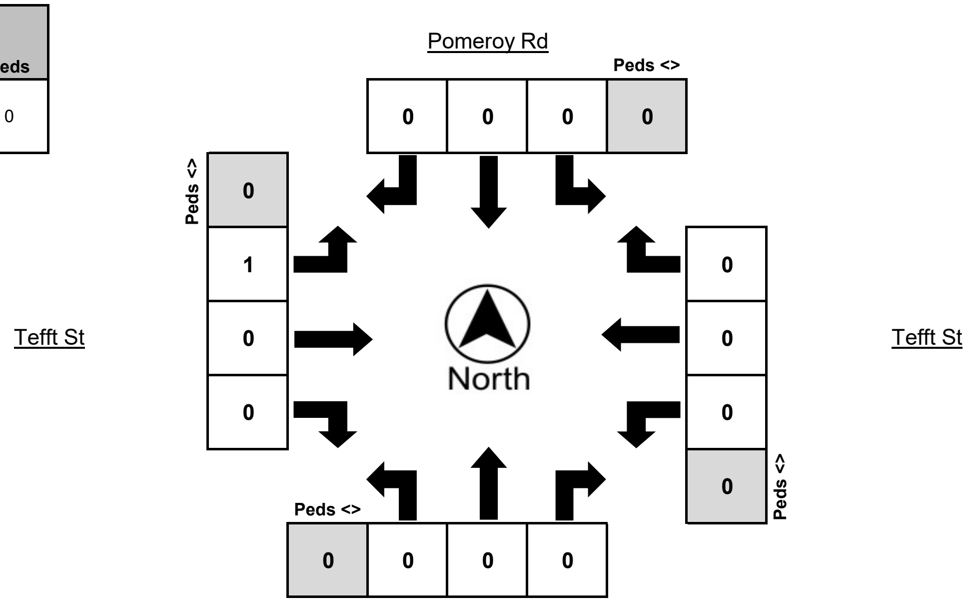
Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ Pomeroy Rd	**LATITUDE**	35.030812°
COUNTY	San Luis Obispo	**LONGITUDE**	-120.495123°
COLLECTION DATE	Sunday, July 15, 2018	**WEATHER**	Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
11:30 AM - 11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM - 12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM - 12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM - 12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM - 12:45 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
12:45 PM - 1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM - 1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM - 1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM - 1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM - 2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
12:30 PM - 1:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

	Bikes	Peds
Peak Totals	1	0



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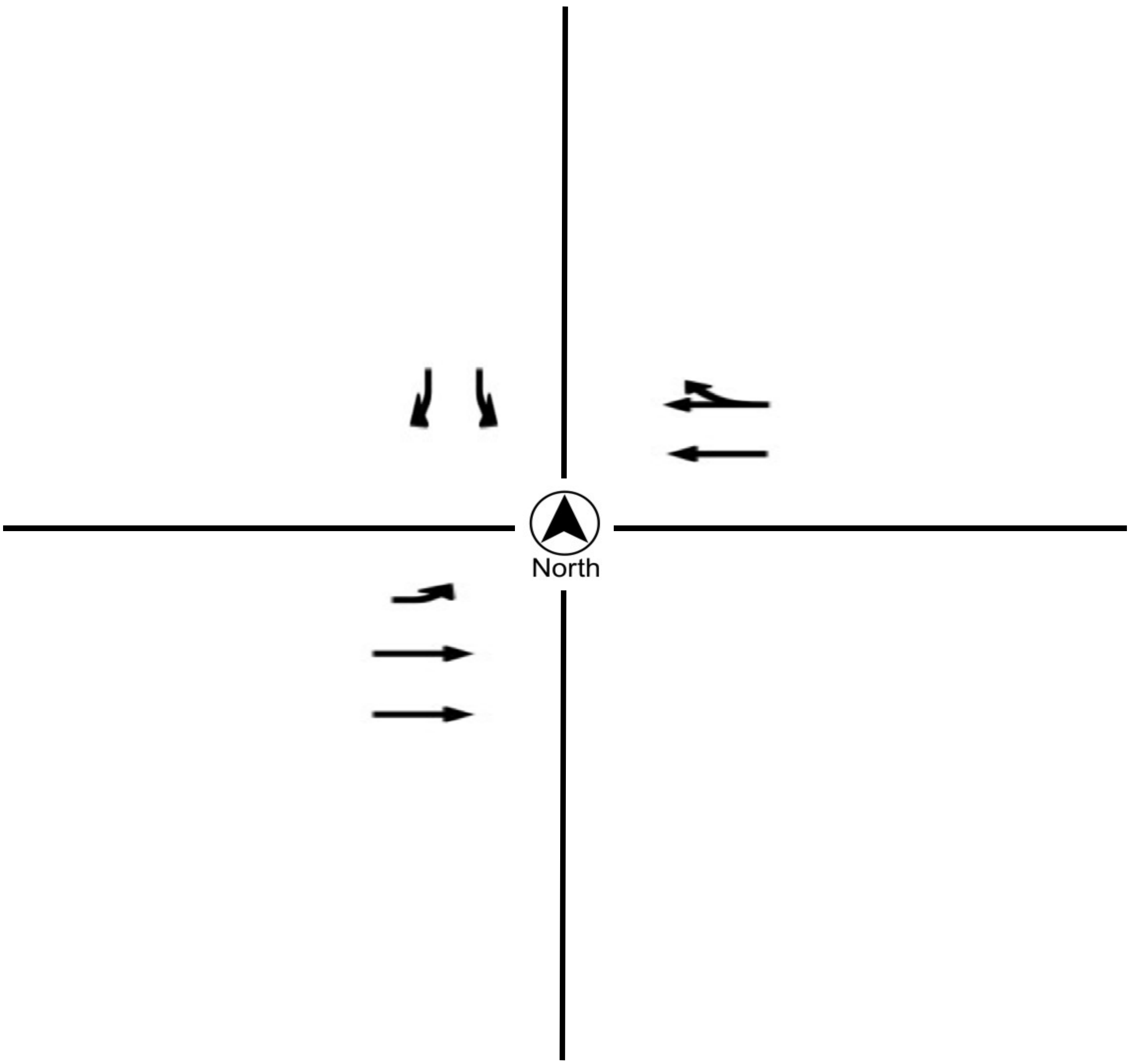
Turning Movement Report

Prepared For:

Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ Pomeroy Rd	**N/S STREET**	Pomeroy Rd
COUNTY	San Luis Obispo	**E/W STREET**	Tefft St
COLLECTION DATE	Sunday, July 15, 2018	**WEATHER**	Clear
CYCLE TIME	66 Seconds	**CONTROL TYPE**	Signal

COMMENTS Eastbound left turns are protected.



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Turning Movement Report

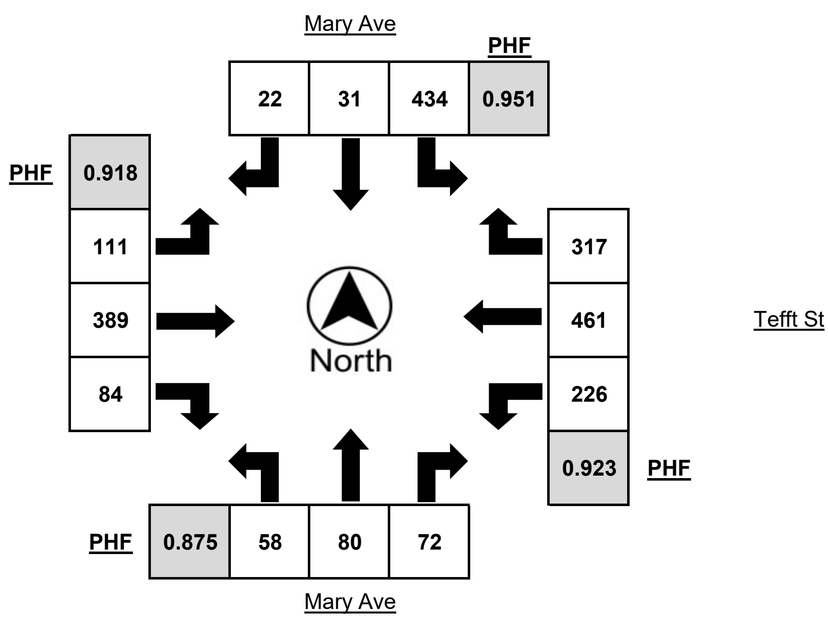
Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION Tefft St @ Mary Ave
LATITUDE 35.0357
COUNTY San Luis Obispo
LONGITUDE -120.4867
COLLECTION DATE Sunday, July 8, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
11:30 AM - 11:45 AM	13	9	21	1	107	8	1	2	22	94	4	2	45	75	74	2
11:45 AM - 12:00 PM	15	18	16	2	111	6	4	1	27	91	17	1	52	99	84	2
12:00 PM - 12:15 PM	13	28	13	0	113	7	5	2	33	89	21	0	65	119	88	4
12:15 PM - 12:30 PM	13	19	17	0	104	4	4	0	20	93	19	4	64	100	74	3
12:30 PM - 12:45 PM	17	12	18	1	113	10	5	0	32	101	26	1	59	135	75	3
12:45 PM - 1:00 PM	15	21	24	1	104	10	8	0	26	106	18	1	38	107	80	4
1:00 PM - 1:15 PM	24	17	16	0	107	13	9	2	26	86	11	4	44	109	75	9
1:15 PM - 1:30 PM	14	15	15	1	126	15	3	2	22	97	11	1	53	110	52	3
1:30 PM - 1:45 PM	17	12	21	0	106	6	14	2	28	105	18	5	52	104	53	1
1:45 PM - 2:00 PM	21	17	10	2	105	10	9	1	25	108	15	1	51	112	44	4
2:00 PM - 2:15 PM	20	13	10	1	98	4	7	2	20	76	14	1	32	84	41	5
2:15 PM - 2:30 PM	16	13	6	0	123	8	10	1	32	87	11	1	41	89	40	3
TOTAL	**198**	**194**	**187**	**9**	**1317**	**101**	**79**	**15**	**313**	**1133**	**185**	**22**	**596**	**1243**	**780**	**43**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
12:00 PM - 1:00 PM	58	80	72	2	434	31	22	2	111	389	84	6	226	461	317	14

	PHF	Trucks
Peak Hour	0.947	1.1%



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Turning Movement Report

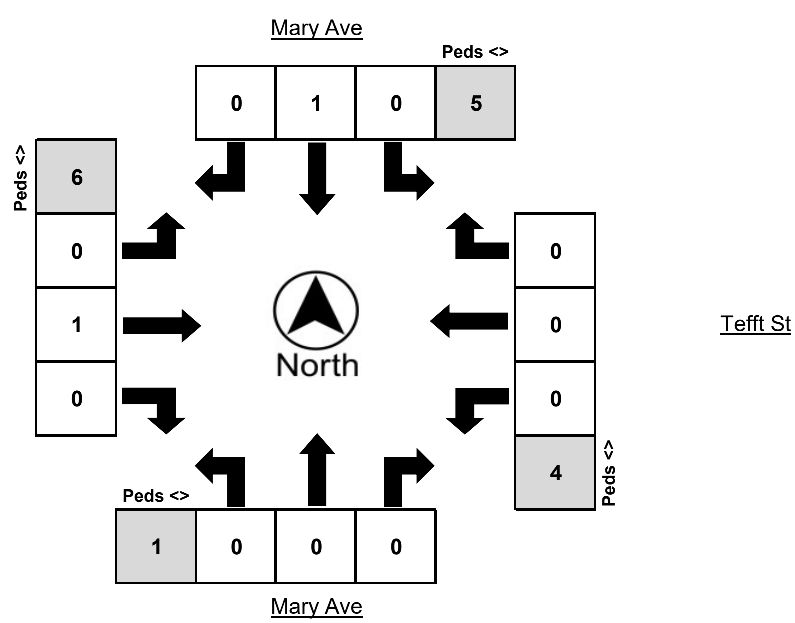
Prepared For:
Central Coast Transportation Consulting
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ Mary Ave	**LATITUDE**	35.0357
COUNTY	San Luis Obispo	**LONGITUDE**	-120.4867
COLLECTION DATE	Sunday, July 8, 2018	**WEATHER**	Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**
11:30 AM - 11:45 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
11:45 AM - 12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM - 12:15 PM	0	0	0	0	0	1	0	1	0	0	0	2	0	0	0	0
12:15 PM - 12:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1
12:30 PM - 12:45 PM	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
12:45 PM - 1:00 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
1:00 PM - 1:15 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
1:15 PM - 1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM - 1:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	3	1	1
1:45 PM - 2:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM - 2:15 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**8**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**11**	**0**	**3**	**1**	**9**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**
12:00 PM - 1:00 PM	0	0	0	5	0	1	0	1	0	1	0	4	0	0	0	6

	Bikes	Peds
Peak Totals	2	16



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Turning Movement Report

Prepared For:

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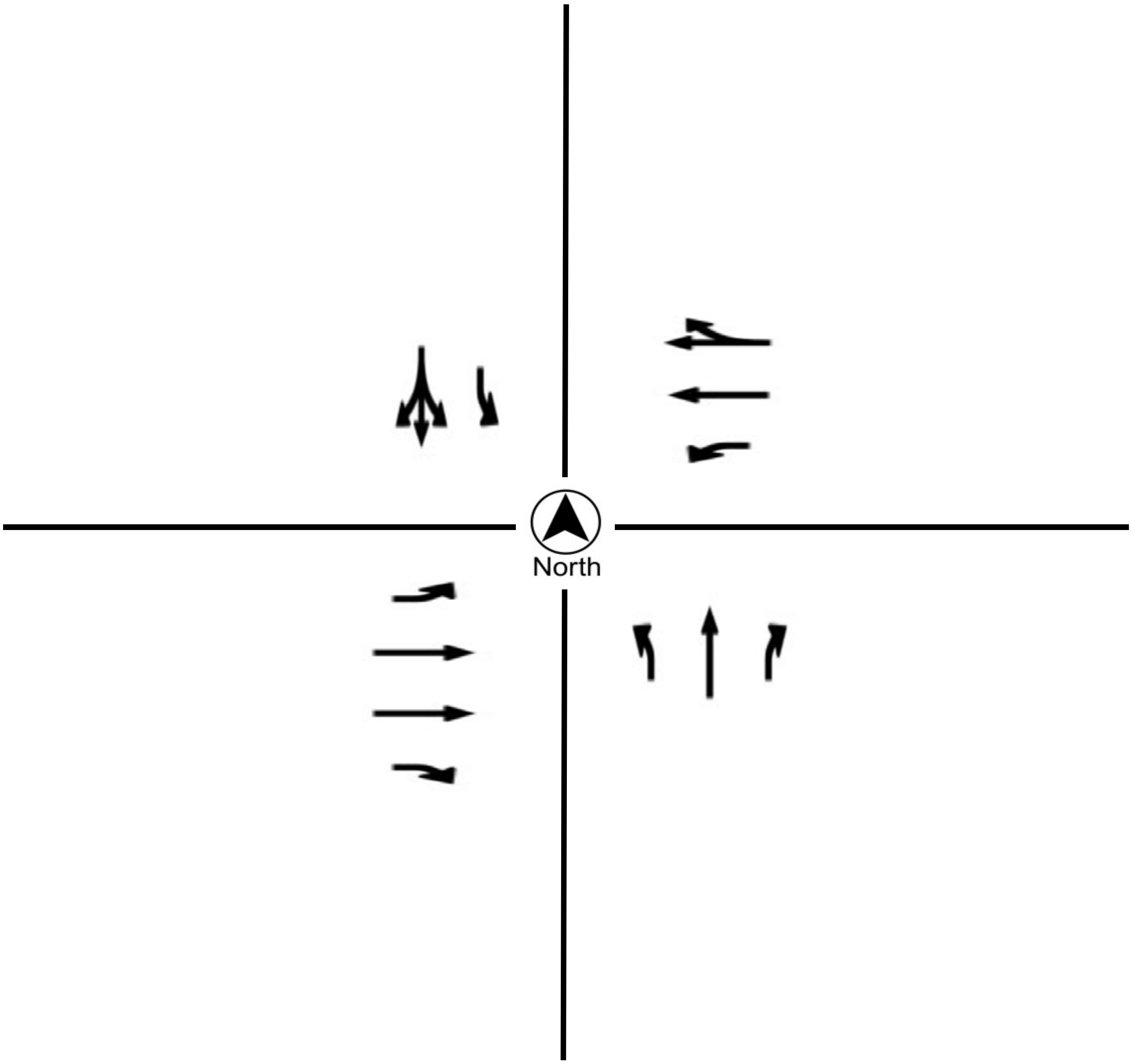
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION	Tefft St @ Mary Ave	**N/S STREET**	Mary Ave
COUNTY	San Luis Obispo	**E/W STREET**	Tefft St
COLLECTION DATE	Sunday, July 8, 2018	**WEATHER**	Clear
CYCLE TIME	119 Seconds	**CONTROL TYPE**	Signal

COMMENTS All approaches have protected left turns.



Turning Movement Report

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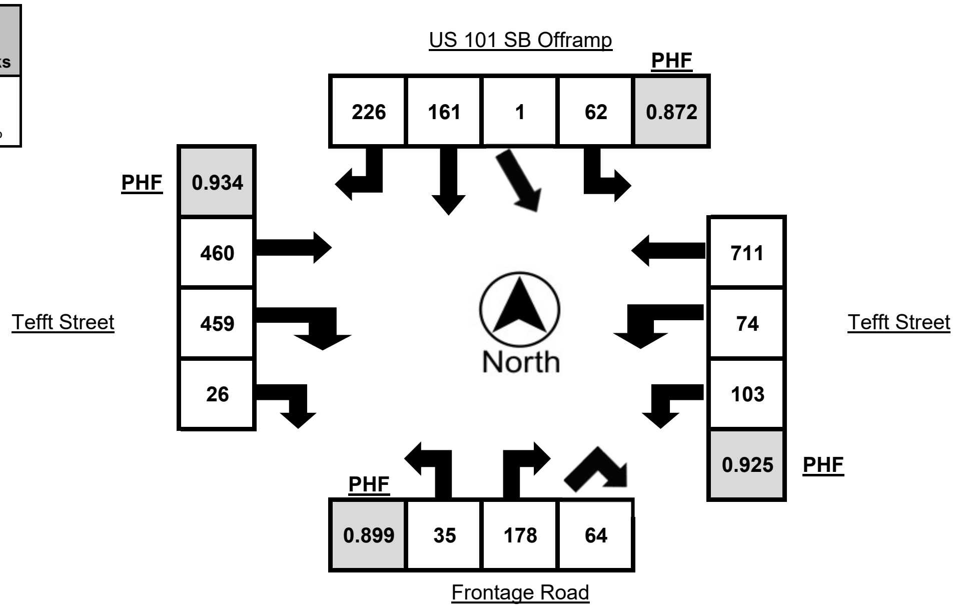
Prepared For:
County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION Tefft Street @ US 101 SB Ramps
LATITUDE 35.0365
COUNTY San Luis Obispo
LONGITUDE -120.4853
COLLECTION DATE Sunday, June 4, 2017
WEATHER Clear

	Northbound				Southbound					Eastbound				Westbound			
Time	**Left**	**R-Tefft**	**R-101 S**	**Trucks**	**L-Tefft**	**L-101 S**	**Thru**	**Right**	**Trucks**	**Thru**	**R-101 S**	**R-Front**	**Trucks**	**L-101 S**	**L-Front**	**Thru**	**Trucks**
10:30 AM - 10:45 AM	6	37	18	0	14	0	22	62	0	94	78	2	0	8	21	175	0
10:45 AM - 11:00 AM	6	53	14	1	8	0	15	60	0	116	71	2	0	20	29	198	1
11:00 AM - 11:15 AM	8	51	14	1	9	1	12	67	0	94	87	4	2	20	17	141	1
11:15 AM - 11:30 AM	7	43	16	1	16	0	29	53	0	97	92	8	1	18	12	163	0
11:30 AM - 11:45 AM	11	32	20	1	13	1	26	65	0	122	95	7	0	11	20	148	2
11:45 AM - 12:00 PM	10	52	9	1	14	0	26	57	1	98	110	2	0	18	21	168	0
12:00 PM - 12:15 PM	10	42	14	0	12	2	42	61	1	127	131	6	2	20	23	168	0
12:15 PM - 12:30 PM	5	54	18	0	18	0	41	57	1	109	102	3	2	14	23	170	1
12:30 PM - 12:45 PM	9	38	15	0	15	1	33	47	0	128	120	5	0	22	16	169	1
12:45 PM - 1:00 PM	7	41	15	0	16	0	38	42	0	108	100	6	0	28	16	196	0
1:00 PM - 1:15 PM	7	51	17	0	14	0	51	64	0	111	121	9	0	26	15	181	0
1:15 PM - 1:30 PM	12	48	17	0	17	0	39	73	0	113	118	6	0	27	27	165	2
1:30 PM - 1:45 PM	12	43	12	0	14	0	26	57	0	119	105	16	0	15	34	125	0
1:45 PM - 2:00 PM	7	48	17	0	12	0	30	74	2	113	131	5	0	20	26	138	0
2:00 PM - 2:15 PM	7	50	20	0	19	3	34	62	0	93	104	11	1	15	18	109	0
2:15 PM - 2:30 PM	12	36	14	0	11	2	29	66	1	91	132	6	0	14	20	102	2
TOTAL	**136**	**719**	**250**	**5**	**222**	**10**	**493**	**967**	**6**	**1733**	**1697**	**98**	**8**	**296**	**338**	**2516**	**10**

	Northbound				Southbound					Eastbound				Westbound			
PEAK HOUR	**Left**	**R-Tefft**	**R-101 S**	**Trucks**	**L-Tefft**	**L-101 S**	**Thru**	**Right**	**Trucks**	**Thru**	**R-101 S**	**R-Front**	**Trucks**	**L-101 S**	**L-Front**	**Thru**	**Trucks**
12:30 PM - 1:30 PM	35	178	64	0	62	1	161	226	0	460	459	26	0	103	74	711	3

	PHF	Trucks
MID	0.960	0.1%



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Turning Movement Report

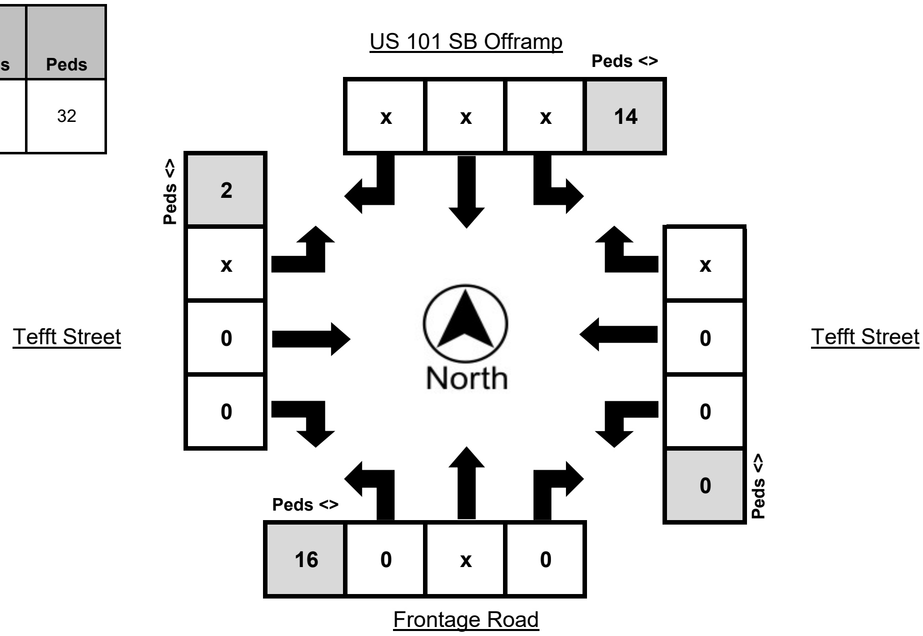
Prepared For:
County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION	Tefft Street @ US 101 SB Ramps	**LATITUDE**	35.0365
COUNTY	San Luis Obispo	**LONGITUDE**	-120.4853
COLLECTION DATE	Sunday, June 4, 2017	**WEATHER**	Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
10:30 AM - 10:45 AM	0	x	0	1	x	x	x	1	x	0	0	0	0	0	x	2
10:45 AM - 11:00 AM	0	x	0	1	x	x	x	0	x	0	0	0	0	0	x	0
11:00 AM - 11:15 AM	0	x	0	4	x	x	x	3	x	0	0	0	0	0	x	1
11:15 AM - 11:30 AM	0	x	0	0	x	x	x	2	x	1	0	0	0	0	x	0
11:30 AM - 11:45 AM	0	x	0	2	x	x	x	5	x	1	0	0	0	0	x	0
11:45 AM - 12:00 PM	0	x	0	1	x	x	x	3	x	0	0	0	0	1	x	3
12:00 PM - 12:15 PM	0	x	0	1	x	x	x	2	x	0	0	0	0	0	x	0
12:15 PM - 12:30 PM	0	x	0	1	x	x	x	4	x	1	0	0	0	0	x	2
12:30 PM - 12:45 PM	0	x	0	4	x	x	x	6	x	0	0	0	0	0	x	0
12:45 PM - 1:00 PM	0	x	0	0	x	x	x	3	x	0	0	0	0	0	x	0
1:00 PM - 1:15 PM	0	x	0	8	x	x	x	1	x	0	0	0	0	0	x	2
1:15 PM - 1:30 PM	0	x	0	2	x	x	x	6	x	0	0	0	0	0	x	0
1:30 PM - 1:45 PM	0	x	0	0	x	x	x	4	x	0	0	0	0	1	x	2
1:45 PM - 2:00 PM	0	x	0	1	x	x	x	7	x	0	0	0	0	0	x	0
2:00 PM - 2:15 PM	0	x	0	3	x	x	x	0	x	0	0	0	0	0	x	1
2:15 PM - 2:30 PM	0	x	0	0	x	x	x	0	x	0	2	0	1	0	x	1
TOTAL	**0**	**x**	**0**	**29**	**x**	**x**	**x**	**47**	**x**	**3**	**2**	**0**	**1**	**2**	**x**	**14**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
12:30 PM - 1:30 PM	0	x	0	14	x	x	x	16	x	0	0	0	0	0	x	2

	Bikes	Peds
MID Peak Totals	0	32



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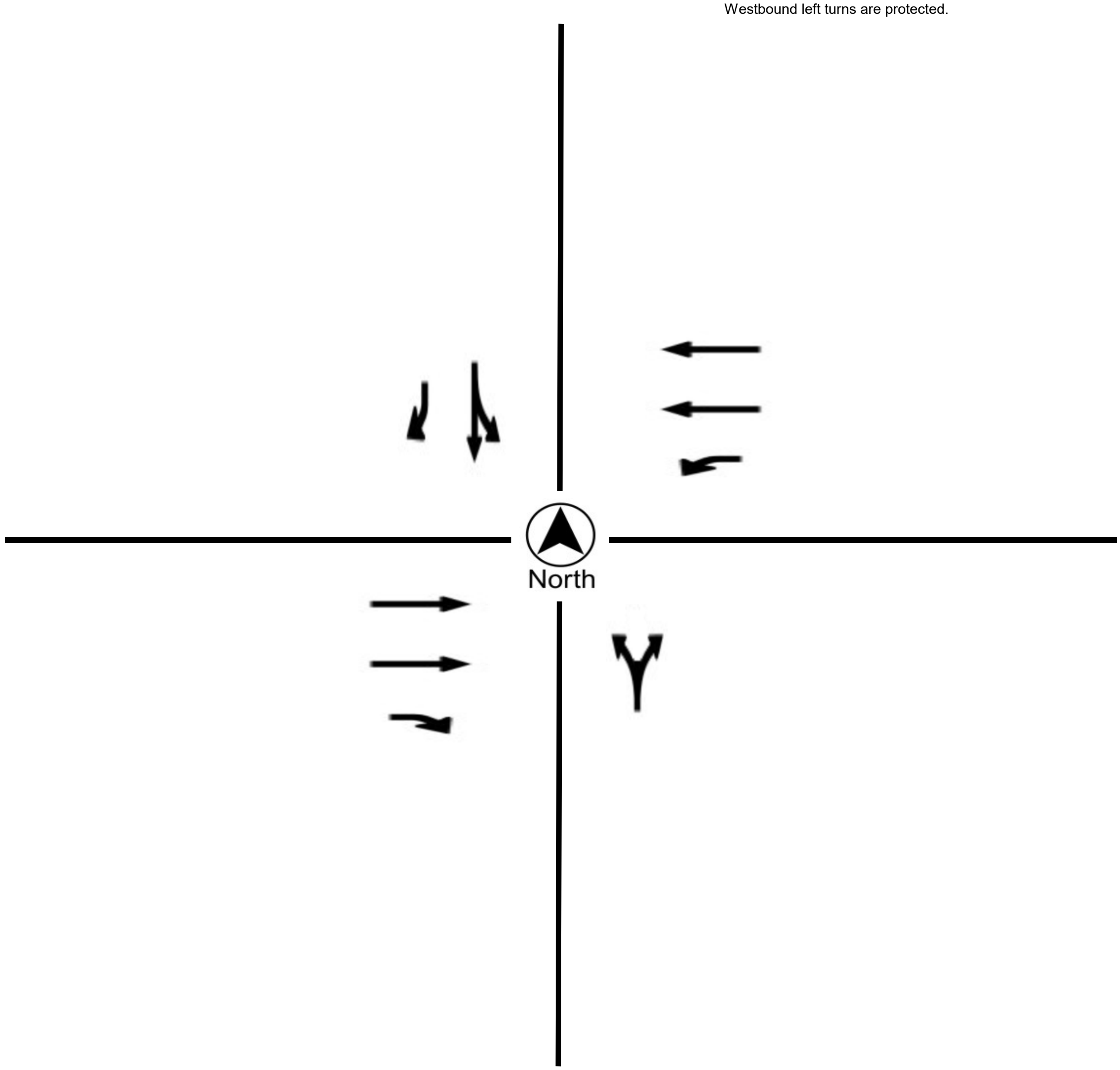
Turning Movement Report

Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION	Tefft Street @ US 101 SB Ramps	**N/S STREET**	US 101 SB Offramp
COUNTY	San Luis Obispo	**E/W STREET**	Tefft Street
COLLECTION DATE	Sunday, June 4, 2017	**WEATHER**	Clear
CYCLE TIME	105 Seconds	**CONTROL TYPE**	Signal

COMMENTS Northbound and southbound approaches are split.
Westbound left turns are protected.



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Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION Tefft Street @ US 101 NB Ramps

LATITUDE 35.0371

COUNTY San Luis Obispo

LONGITUDE -120.4842

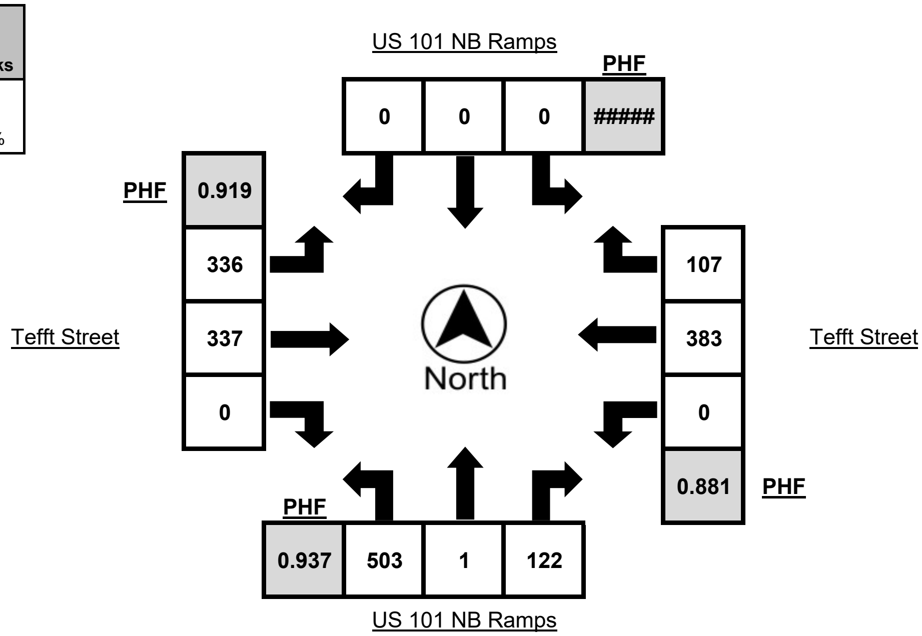
COLLECTION DATE Sunday, June 4, 2017

WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
10:30 AM - 10:45 AM	132	0	17	0	0	0	0	0	68	74	0	0	0	85	30	0
10:45 AM - 11:00 AM	149	0	22	0	0	0	0	0	77	92	0	1	0	105	18	0
11:00 AM - 11:15 AM	113	0	20	0	0	0	0	0	75	81	0	0	0	68	23	2
11:15 AM - 11:30 AM	112	0	22	0	0	0	0	0	75	72	0	1	0	71	22	1
11:30 AM - 11:45 AM	91	0	19	1	0	0	0	0	91	78	0	1	0	90	18	0
11:45 AM - 12:00 PM	134	0	26	0	0	0	0	0	86	82	0	0	0	95	21	0
12:00 PM - 12:15 PM	116	0	28	1	0	0	0	0	82	89	0	1	0	85	31	0
12:15 PM - 12:30 PM	103	0	19	0	0	0	0	0	90	107	0	1	0	108	28	1
12:30 PM - 12:45 PM	134	0	24	1	0	0	0	0	82	79	0	0	0	82	22	1
12:45 PM - 1:00 PM	138	0	29	0	0	0	0	0	89	72	0	0	0	96	17	0
1:00 PM - 1:15 PM	135	0	27	0	0	0	0	0	78	90	0	2	0	104	30	0
1:15 PM - 1:30 PM	96	1	42	1	0	0	0	0	87	96	0	0	0	101	38	1
1:30 PM - 1:45 PM	78	1	29	0	0	0	0	0	95	89	0	0	0	91	40	1
1:45 PM - 2:00 PM	91	0	21	0	0	0	0	0	71	91	0	0	0	102	27	0
2:00 PM - 2:15 PM	53	0	34	0	0	0	0	0	81	88	0	0	0	69	37	1
2:15 PM - 2:30 PM	76	0	31	1	0	0	0	0	71	60	0	1	0	81	32	1
TOTAL	**1751**	**2**	**410**	**5**	**0**	**0**	**0**	**0**	**1298**	**1340**	**0**	**8**	**0**	**1433**	**434**	**9**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
12:30 PM - 1:30 PM	503	1	122	2	0	0	0	0	336	337	0	2	0	383	107	2

	PHF	**Trucks**
MID	0.964	0.3%



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Turning Movement Report

Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION Tefft Street @ US 101 NB Ramps

LATITUDE 35.0371

COUNTY San Luis Obispo

LONGITUDE -120.4842

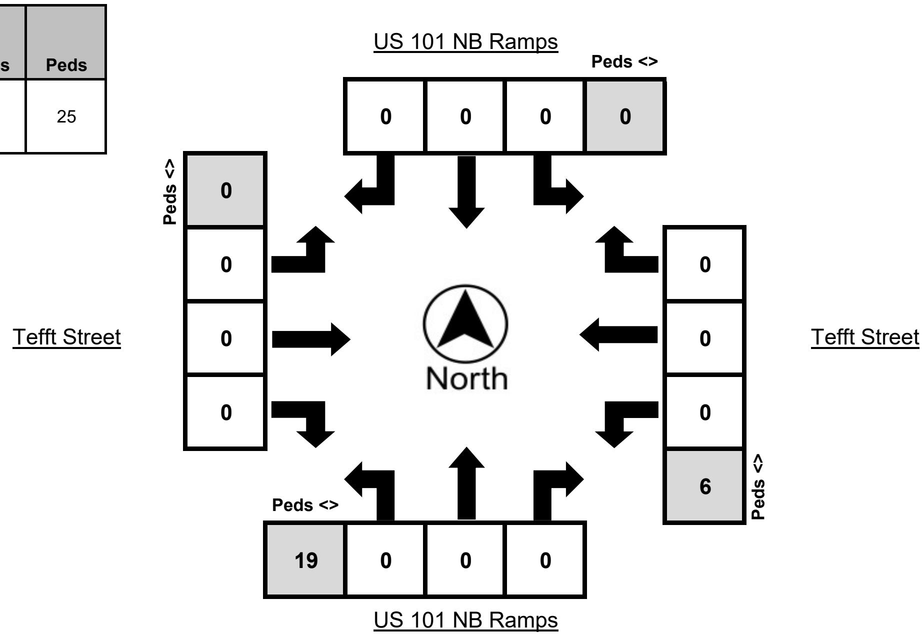
COLLECTION DATE Sunday, June 4, 2017

WEATHER Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
10:30 AM - 10:45 AM	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0
10:45 AM - 11:00 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
11:00 AM - 11:15 AM	0	0	0	0	0	0	0	6	0	2	0	2	0	0	0	1
11:15 AM - 11:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
11:30 AM - 11:45 AM	0	0	0	0	0	0	0	4	0	1	0	1	0	0	0	0
11:45 AM - 12:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
12:00 PM - 12:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
12:15 PM - 12:30 PM	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0
12:30 PM - 12:45 PM	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0
12:45 PM - 1:00 PM	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0
1:00 PM - 1:15 PM	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
1:15 PM - 1:30 PM	0	0	0	0	0	0	0	6	0	0	0	3	0	0	0	0
1:30 PM - 1:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0
1:45 PM - 2:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	8	0	0	0	0	0	1	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**47**	**0**	**6**	**0**	**15**	**0**	**3**	**0**	**2**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
12:30 PM - 1:30 PM	0	0	0	0	0	0	0	19	0	0	0	6	0	0	0	0

	Bikes	Peds
MID Peak Totals	0	25



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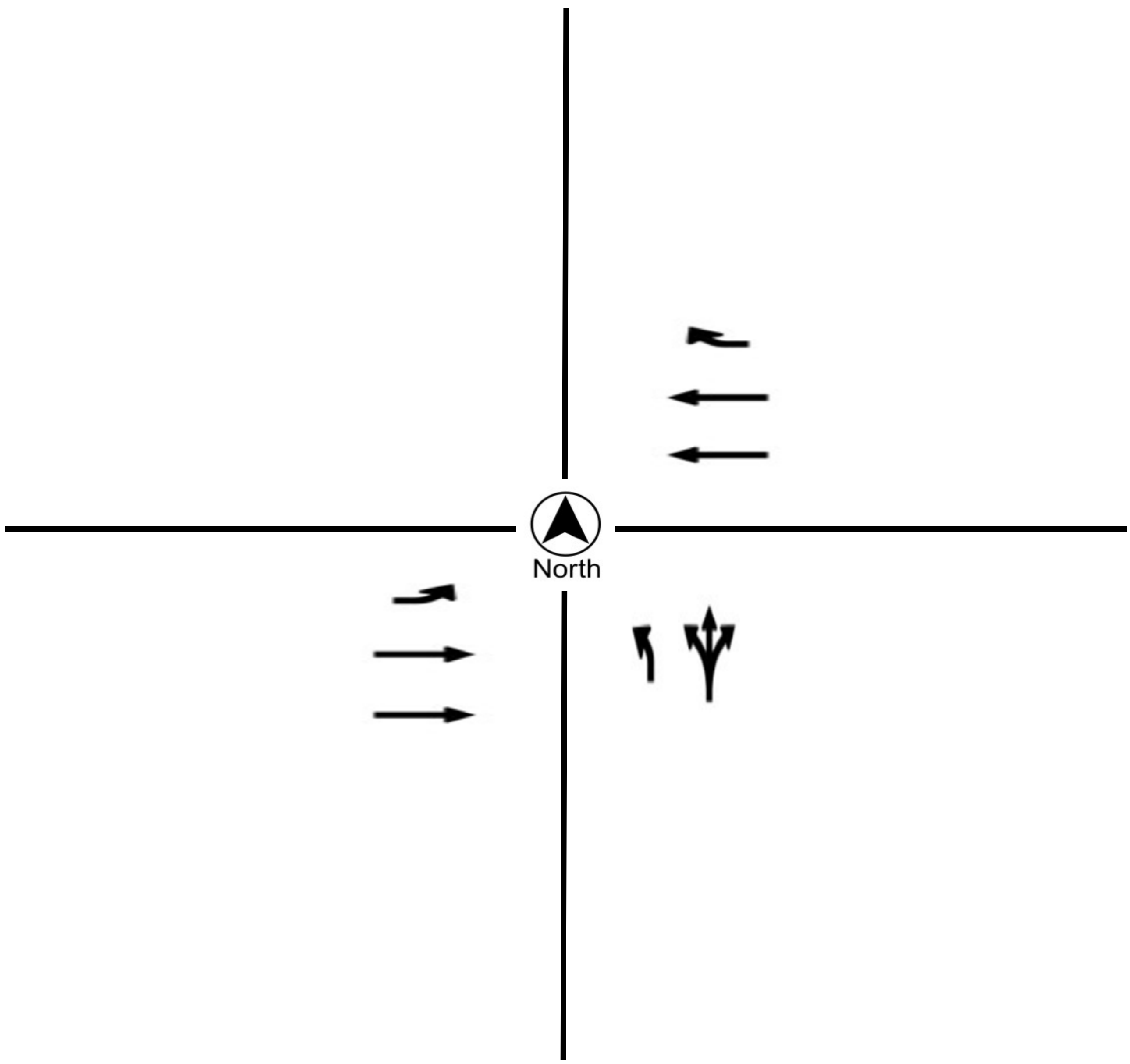
Turning Movement Report

Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION	Tefft Street @ US 101 NB Ramps	**N/S STREET**	US 101 NB Ramps
COUNTY	San Luis Obispo	**E/W STREET**	Tefft Street
COLLECTION DATE	Sunday, June 4, 2017	**WEATHER**	Clear
CYCLE TIME	105 Seconds	**CONTROL TYPE**	Signal

COMMENTS Eastbound left turns are protected/permitted.



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Turning Movement Report

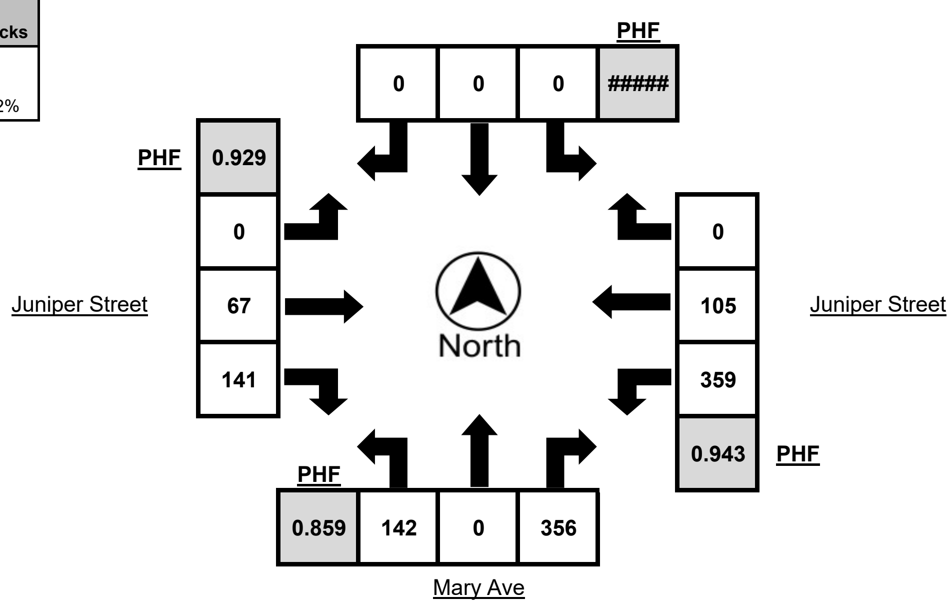
Prepared For:
County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION Mary Ave @ Juniper St
LATITUDE 35.0388
COUNTY San Luis Obispo
LONGITUDE -120.4893
COLLECTION DATE Sunday, June 4, 2017
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
10:30 AM - 10:45 AM	33	0	94	1	0	0	0	0	0	17	33	0	39	6	0	0
10:45 AM - 11:00 AM	32	0	81	0	0	0	0	0	0	15	30	0	57	10	0	0
11:00 AM - 11:15 AM	26	0	103	1	0	0	0	0	0	19	27	0	56	9	0	0
11:15 AM - 11:30 AM	35	0	92	1	0	0	0	0	0	27	26	0	57	11	0	0
11:30 AM - 11:45 AM	35	0	90	0	0	0	0	0	0	17	41	0	76	10	0	1
11:45 AM - 12:00 PM	33	0	96	0	0	0	0	0	0	18	40	0	82	19	0	0
12:00 PM - 12:15 PM	33	0	96	1	0	0	0	0	0	16	25	0	78	24	0	0
12:15 PM - 12:30 PM	33	0	88	0	0	0	0	0	0	23	41	1	70	30	0	0
12:30 PM - 12:45 PM	35	0	89	0	0	0	0	0	0	19	37	1	77	31	0	0
12:45 PM - 1:00 PM	39	0	80	0	0	0	0	0	0	12	38	0	93	23	0	0
1:00 PM - 1:15 PM	27	0	83	0	0	0	0	0	0	23	33	0	95	22	0	0
1:15 PM - 1:30 PM	41	0	104	1	0	0	0	0	0	13	33	0	94	29	0	0
1:30 PM - 1:45 PM	37	0	60	0	0	0	0	0	0	5	19	0	74	34	0	0
1:45 PM - 2:00 PM	35	0	49	1	0	0	0	0	0	2	39	1	92	31	0	2
2:00 PM - 2:15 PM	25	0	39	0	0	0	0	0	0	7	28	0	87	38	0	0
2:15 PM - 2:30 PM	34	0	36	1	0	0	0	0	0	6	34	0	89	44	0	0
TOTAL	**533**	**0**	**1280**	**7**	**0**	**0**	**0**	**0**	**0**	**239**	**524**	**3**	**1216**	**371**	**0**	**3**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
12:30 PM - 1:30 PM	142	0	356	1	0	0	0	0	0	67	141	1	359	105	0	0

	PHF	**Trucks**
MID	0.932	0.2%



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Turning Movement Report

Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION Mary Ave @ Juniper St **LATITUDE** 35.0388

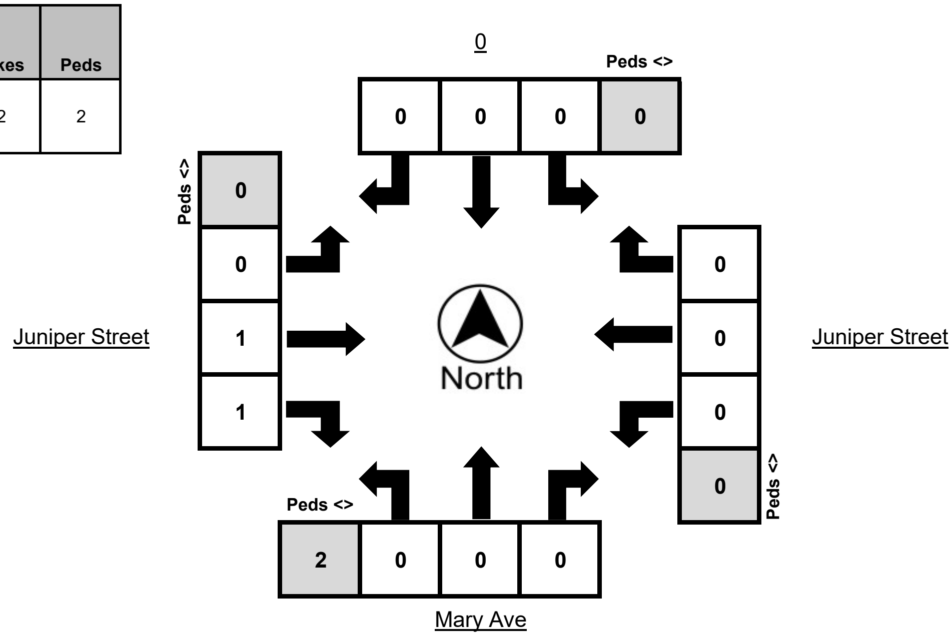
COUNTY San Luis Obispo **LONGITUDE** -120.4893

COLLECTION DATE Sunday, June 4, 2017 **WEATHER** Clear

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
10:30 AM - 10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM - 11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM - 11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM - 11:30 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
11:30 AM - 11:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11:45 AM - 12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM - 12:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0
12:15 PM - 12:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
12:30 PM - 12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM - 1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM - 1:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1:15 PM - 1:30 PM	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0
1:30 PM - 1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM - 2:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0
2:00 PM - 2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**1**	**1**	**1**	**0**	**3**	**0**	**0**

	Northbound Bikes			N.Leg	Southbound Bikes			S.Leg	Eastbound Bikes			E.Leg	Westbound Bikes			W.Leg
PEAK HOUR	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
12:30 PM - 1:30 PM	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0

	Bikes	Peds
MID Peak Totals	2	2



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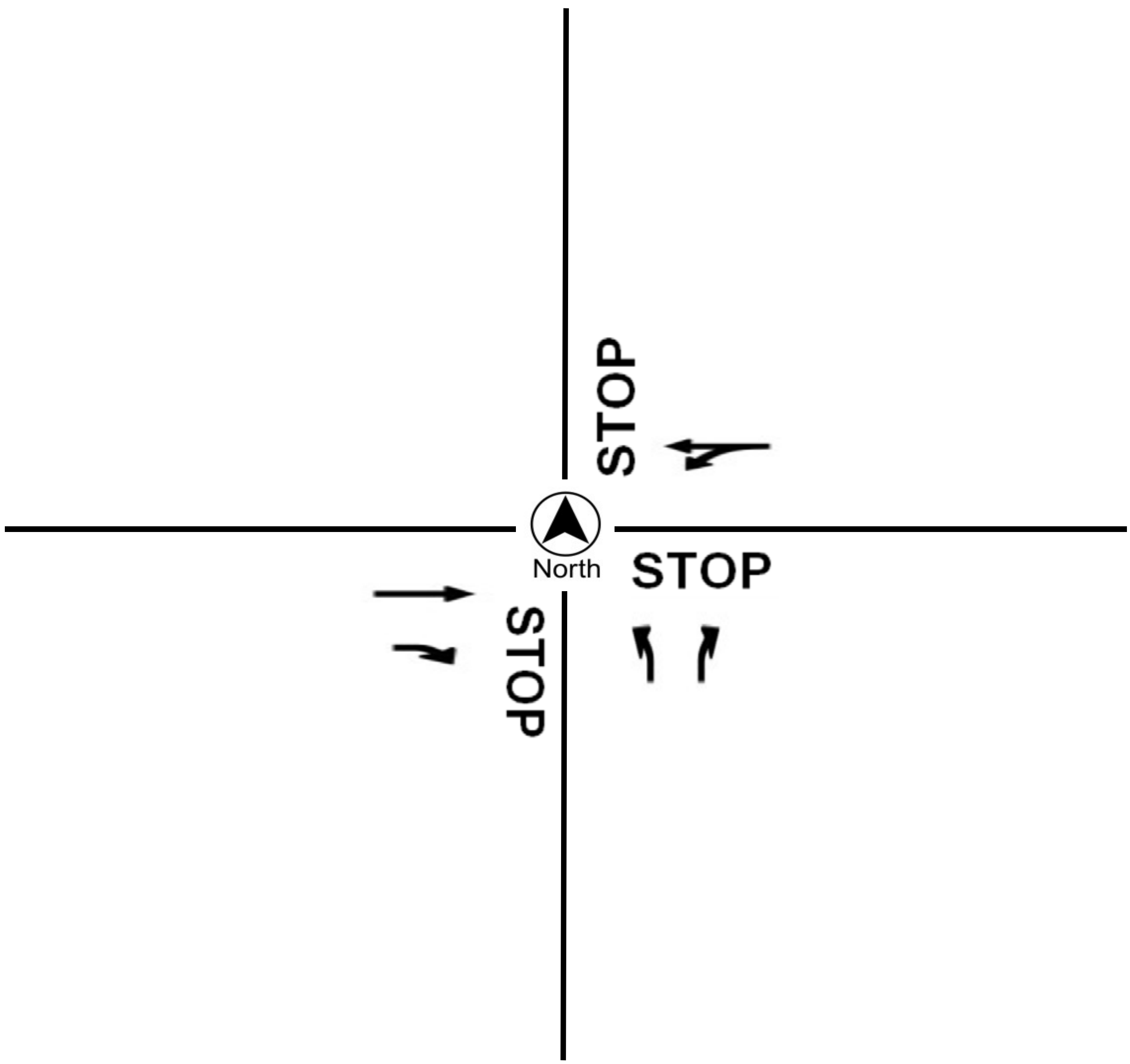
Turning Movement Report

Prepared For:

County of San Luis Obispo
1087 Santa Rosa Street
San Luis Obispo, CA 93408

LOCATION	Mary Ave @ Juniper St	**N/S STREET**	Mary Ave
COUNTY	San Luis Obispo	**E/W STREET**	Juniper Street
COLLECTION DATE	Sunday, June 4, 2017	**WEATHER**	Clear
CYCLE TIME	N/A	**CONTROL TYPE**	All-Way Stop

COMMENTS



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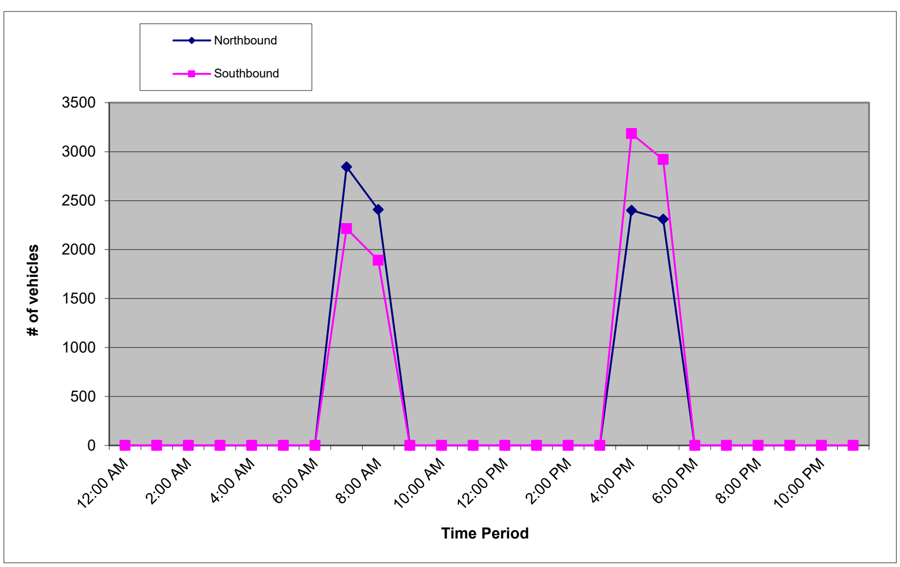
24 Hour Volume Report

Prepared For: **Central Coast Transportation Consulting**
895 Napa Avenue, Suite A-6
Morro Bay, CA 93442

LOCATION US 101 Mainline south of Willow Rd
LATITUDE 35.048938°
COUNTY San Luis Obispo
LONGITUDE -120.495556°
COLLECTION DATE Wednesday, September 4, 2019
WEATHER Clear
NUMBER OF LANES 4

	Northbound					Southbound					Hourly
Hour	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total	Totals
12:00 AM	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	646	739	758	703	2846	509	509	535	662	2215	5061
8:00 AM	651	620	595	544	2410	509	465	459	458	1891	4301
9:00 AM	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	552	617	631	601	2401	767	873	760	786	3186	5587
5:00 PM	661	599	563	488	2311	746	776	760	638	2920	5231
6:00 PM	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0
Total	49.4%				9968	50.6%				10212	
	20180										

AM%	46.4%	AM Peak 5066	7:15 am to 8:15 am	AM P.H.F.	0.93
PM%	53.6%	PM Peak 5675	4:15 pm to 5:15 pm	PM P.H.F.	0.95



Appendix B: Intersection LOS Calculation Sheets

2018 Existing

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	521	52	38	206	127	125
v/c Ratio	0.13	0.28	0.08	0.69	0.29	0.34	0.24	0.47	0.64	0.61
Control Delay	35.9	18.6	0.2	50.4	9.1	49.1	45.9	7.8	58.2	52.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	18.7	0.2	50.4	9.1	49.1	45.9	7.8	58.2	52.3
Queue Length 50th (ft)	18	98	0	104	46	34	25	15	87	77
Queue Length 95th (ft)	44	187	0	m148	m71	63	50	35	137	129
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	285	1801	866	318	1853	327	344	525	326	331
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	110	0	0	0	0	0	5	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.30	0.08	0.46	0.28	0.16	0.11	0.40	0.39	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	78	45	33	179	172	27	20
Future Volume (vph)	30	439	61	128	375	78	45	33	179	172	27	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1539	1770	3448		1770	1863	1576	1681	1668	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1539	1770	3448		1770	1863	1576	1681	1668	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	90	52	38	206	198	31	23
RTOR Reduction (vph)	0	0	36	0	13	0	0	0	132	0	9	0
Lane Group Flow (vph)	34	505	34	147	508	0	52	38	74	127	116	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	13.8	50.5	50.5	14.6	51.3		8.1	8.1	22.7	12.4	12.4	
Effective Green, g (s)	13.8	50.5	50.5	14.6	51.3		8.1	8.1	22.7	12.4	12.4	
Actuated g/C Ratio	0.13	0.48	0.48	0.14	0.49		0.08	0.08	0.22	0.12	0.12	
Clearance Time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	232	1702	740	246	1684		136	143	340	198	196	
v/s Ratio Prot	0.02	0.14		c0.08	c0.15		c0.03	0.02	0.03	c0.08	0.07	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.15	0.30	0.05	0.60	0.30		0.38	0.27	0.22	0.64	0.59	
Uniform Delay, d1	40.4	16.5	14.5	42.4	16.1		46.1	45.6	33.8	44.2	43.9	
Progression Factor	1.00	1.00	1.00	0.79	0.45		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.1	2.4	0.4		0.7	0.4	0.1	5.2	3.2	
Delay (s)	40.5	16.9	14.6	35.8	7.6		46.7	46.0	34.0	49.4	47.1	
Level of Service	D	B	B	D	A		D	D	C	D	D	
Approach Delay (s)		18.0			13.8			37.7			48.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	19.4
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	78	45	33	179	172	27	20
Future Volume (veh/h)	30	439	61	128	375	78	45	33	179	172	27	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	90	52	38	206	126	132	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	851	910	404	705	511	106	96	100	712	195	170	30
Arrive On Green	0.48	0.26	0.26	0.79	0.35	0.35	0.05	0.05	0.05	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1579	1781	2931	607	1781	1870	1576	1781	1549	270
Grp Volume(v), veh/h	34	505	70	147	260	261	52	38	206	126	0	155
Grp Sat Flow(s),veh/h/ln	1781	1777	1579	1781	1777	1761	1781	1870	1576	1781	0	1819
Q Serve(g_s), s	1.1	12.9	3.6	2.2	14.1	14.4	3.0	2.1	0.0	7.1	0.0	8.7
Cycle Q Clear(g_c), s	1.1	12.9	3.6	2.2	14.1	14.4	3.0	2.1	0.0	7.1	0.0	8.7
Prop In Lane	1.00		1.00	1.00		0.34	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	851	910	404	705	310	307	96	100	712	195	0	199
V/C Ratio(X)	0.04	0.55	0.17	0.21	0.84	0.85	0.54	0.38	0.29	0.65	0.00	0.78
Avail Cap(c_a), veh/h	851	910	404	705	641	636	329	346	919	346	0	353
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.6	33.9	30.4	6.8	32.8	32.9	48.4	48.0	18.3	44.8	0.0	45.5
Incr Delay (d2), s/veh	0.0	2.4	0.9	0.0	21.5	22.8	1.8	0.9	0.1	1.3	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.8	1.5	0.8	6.7	6.8	1.4	1.0	3.1	3.2	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.6	36.3	31.3	6.9	54.3	55.7	50.2	48.9	18.4	46.1	0.0	48.0
LnGrp LOS	B	D	C	A	D	E	D	D	B	D	A	D
Approach Vol, veh/h		609			668			296			281	
Approach Delay, s/veh		34.5			44.4			27.9			47.2	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	46.7	32.0		16.1	55.3	23.4		10.2				
Change Period (Y+Rc), s	5.1	5.1		4.6	5.1	5.1		4.6				
Max Green Setting (Gmax), s	18.9	26.9		20.4	7.9	37.9		19.4				
Max Q Clear Time (g_c+I1), s	4.2	14.9		10.7	3.1	16.4		5.0				
Green Ext Time (p_c), s	0.1	1.9		0.5	0.0	1.9		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			38.9									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	1002	81	515	476	159	264
v/c Ratio	0.94	0.88	0.37	1.21	0.39	0.48
Control Delay	47.8	118.0	8.7	152.8	37.0	7.1
Queue Delay	2.6	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	118.0	8.7	152.9	37.0	7.1
Queue Length 50th (ft)	357	54	81	~420	88	0
Queue Length 95th (ft)	#472	#148	93	#609	146	61
Internal Link Dist (ft)	421		23	468	407	
Turn Bay Length (ft)						450
Base Capacity (vph)	1066	92	1405	393	448	585
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	27	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.88	0.37	1.22	0.35	0.45

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	882	10	72	458	0	14	0	409	77	64	235
Future Volume (vph)	0	882	10	72	458	0	14	0	409	77	64	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	1.00
Frt		1.00		1.00	1.00			0.87			1.00	0.85
Flt Protected		1.00		0.95	1.00			1.00			0.97	1.00
Satd. Flow (prot)		3532		1770	3539			1617			1813	1562
Flt Permitted		1.00		0.95	1.00			1.00			0.97	1.00
Satd. Flow (perm)		3532		1770	3539			1617			1813	1562
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	991	11	81	515	0	16	0	460	87	72	264
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	205
Lane Group Flow (vph)	0	1002	0	81	515	0	0	476	0	0	159	59
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	6		7	7		8	8	
Permitted Phases												8
Actuated Green, G (s)		31.7		5.5	41.7			25.6			23.4	23.4
Effective Green, g (s)		31.7		5.5	41.7			25.6			23.4	23.4
Actuated g/C Ratio		0.30		0.05	0.40			0.24			0.22	0.22
Clearance Time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Vehicle Extension (s)		1.5		1.5	1.5			1.5			1.5	1.5
Lane Grp Cap (vph)		1066		92	1405			394			404	348
v/s Ratio Prot		c0.28		c0.05	0.15			c0.29			c0.09	
v/s Ratio Perm												0.04
v/c Ratio		0.94		0.88	0.37			1.21			0.39	0.17
Uniform Delay, d1		35.7		49.4	22.3			39.7			34.8	32.9
Progression Factor		0.86		1.05	0.35			1.00			1.00	1.00
Incremental Delay, d2		16.1		55.3	0.7			115.2			0.2	0.1
Delay (s)		46.9		107.0	8.6			154.9			35.0	33.0
Level of Service		D		F	A			F			C	C
Approach Delay (s)		46.9			22.0			154.9			33.8	
Approach LOS		D			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	59.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	629	497	396	226	227	211
v/c Ratio	0.63	0.19	0.34	0.35	0.80	0.61
Control Delay	13.3	2.8	29.9	6.0	62.0	28.4
Queue Delay	0.6	0.3	0.0	0.0	0.0	0.0
Total Delay	13.9	3.0	29.9	6.0	62.0	28.4
Queue Length 50th (ft)	143	33	109	0	155	73
Queue Length 95th (ft)	377	63	168	60	227	144
Internal Link Dist (ft)		187	384			246
Turn Bay Length (ft)				250	125	
Base Capacity (vph)	1035	2678	1157	649	453	492
Starvation Cap Reductn	140	1461	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.41	0.34	0.35	0.50	0.43

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	572	452	0	0	360	206	268	1	129	0	0	0
Future Volume (vph)	572	452	0	0	360	206	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95				
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.90				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.98				
Satd. Flow (prot)	1764	3539			3539	1523	1681	1566				
Flt Permitted	0.46	1.00			1.00	1.00	0.95	0.98				
Satd. Flow (perm)	847	3539			3539	1523	1681	1566				
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	629	497	0	0	396	226	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	152	0	81	0	0	0	0
Lane Group Flow (vph)	629	497	0	0	396	74	227	130	0	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA				
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6						
Actuated Green, G (s)	79.5	79.5			34.3	34.3	17.7	17.7				
Effective Green, g (s)	79.5	79.5			34.3	34.3	17.7	17.7				
Actuated g/C Ratio	0.76	0.76			0.33	0.33	0.17	0.17				
Clearance Time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Vehicle Extension (s)	2.0	1.0			1.0	1.0	1.0	1.0				
Lane Grp Cap (vph)	995	2679			1156	497	283	263				
v/s Ratio Prot	c0.24	0.14			0.11		c0.14	0.08				
v/s Ratio Perm	c0.23					0.05						
v/c Ratio	0.63	0.19			0.34	0.15	0.80	0.50				
Uniform Delay, d1	9.8	3.6			26.8	25.0	42.0	39.6				
Progression Factor	0.93	0.64			1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.8	0.1			0.8	0.6	14.2	0.5				
Delay (s)	10.0	2.4			27.6	25.6	56.2	40.1				
Level of Service	A	A			C	C	E	D				
Approach Delay (s)		6.6			26.9			48.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	572	452	0	0	360	206	268	1	129	0	0	0
Future Volume (veh/h)	572	452	0	0	360	206	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	629	497	0	0	396	226	219	107	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1047	2695	0	0	724	312	298	122	162			
Arrive On Green	0.85	1.00	0.00	0.00	0.20	0.20	0.17	0.17	0.17			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	1781	729	967			
Grp Volume(v), veh/h	629	497	0	0	396	226	219	0	249			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1696			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	10.5	14.5	12.3	0.0	15.0			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	10.5	14.5	12.3	0.0	15.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		0.57			
Lane Grp Cap(c), veh/h	1047	2695	0	0	724	312	298	0	284			
V/C Ratio(X)	0.60	0.18	0.00	0.00	0.55	0.72	0.74	0.00	0.88			
Avail Cap(c_a), veh/h	1047	2695	0	0	724	312	480	0	457			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.84	0.84	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.3	0.0	0.0	0.0	37.5	39.0	41.5	0.0	42.7			
Incr Delay (d2), s/veh	0.6	0.1	0.0	0.0	3.0	13.6	1.3	0.0	6.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	2.3	0.0	0.0	0.0	4.8	6.5	5.5	0.0	6.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.9	0.1	0.0	0.0	40.4	52.6	42.8	0.0	49.3			
LnGrp LOS	A	A	A	A	D	D	D	A	D			
Approach Vol, veh/h		1126			622			468				
Approach Delay, s/veh		2.2			44.9			46.3				
Approach LOS		A			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		83.7		21.3	57.7	26.0						
Change Period (Y+Rc), s		4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		68.9		28.3	42.9	21.4						
Max Q Clear Time (g_c+I1), s		2.0		17.0	2.0	16.5						
Green Ext Time (p_c), s		1.2		0.5	1.0	0.6						
Intersection Summary												
HCM 6th Ctrl Delay			23.5									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1537	96	596
v/c Ratio	0.53	1.04	0.17
Control Delay	1.4	151.3	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	1.4	151.3	0.1
Queue Length 50th (ft)	8	~60	0
Queue Length 95th (ft)	m0	#177	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2905	92	3522
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	96	0	982
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.55	1.04	0.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1028	340	85	530	0	0
Future Volume (vph)	1028	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		3.5	4.6		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3384		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3384		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1155	382	96	596	0	0
RTOR Reduction (vph)	17	0	0	0	0	0
Lane Group Flow (vph)	1520	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 8		1	6 7 8		
Permitted Phases						
Actuated Green, G (s)	92.0		5.5	105.0		
Effective Green, g (s)	86.3		5.5	95.3		
Actuated g/C Ratio	0.82		0.05	0.91		
Clearance Time (s)			3.5			
Vehicle Extension (s)			1.5			
Lane Grp Cap (vph)	2781		92	3212		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.55		1.04	0.19		
Uniform Delay, d1	3.0		49.8	0.5		
Progression Factor	0.69		0.96	1.00		
Incremental Delay, d2	0.0		102.8	0.0		
Delay (s)	2.1		150.8	0.5		
Level of Service	A		F	A		
Approach Delay (s)	2.1			21.4	0.0	
Approach LOS	A			C	A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	723	100	55	83	188	188
v/c Ratio	0.23	0.27	0.10	0.79	0.55	0.61	0.32	0.20	0.77	0.75
Control Delay	42.8	23.1	4.4	69.0	17.7	71.7	58.5	4.8	73.2	67.5
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	42.8	23.1	4.4	69.0	17.9	71.7	58.5	4.8	73.2	67.5
Queue Length 50th (ft)	65	119	0	161	108	83	44	0	163	152
Queue Length 95th (ft)	122	205	29	m236	275	137	84	22	236	227
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	422	1727	801	316	1326	280	295	482	370	376
Starvation Cap Reductn	0	0	0	0	121	0	0	0	0	0
Spillback Cap Reductn	0	150	0	0	0	0	0	3	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.30	0.10	0.58	0.60	0.36	0.19	0.17	0.51	0.50

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	107	98	54	81	253	72	44
Future Volume (vph)	94	457	81	180	602	107	98	54	81	253	72	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1558	1787	3480		1787	1881	1587	1698	1682	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1558	1787	3480		1787	1881	1587	1698	1682	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	109	100	55	83	258	73	45
RTOR Reduction (vph)	0	0	43	0	10	0	0	0	64	0	9	0
Lane Group Flow (vph)	96	466	40	184	713	0	100	55	19	188	179	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	30.7	62.8	62.8	17.1	49.2		11.9	11.9	29.0	18.8	18.8	
Effective Green, g (s)	30.7	62.8	62.8	17.1	49.2		11.9	11.9	29.0	18.8	18.8	
Actuated g/C Ratio	0.24	0.48	0.48	0.13	0.38		0.09	0.09	0.22	0.14	0.14	
Clearance Time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	422	1726	752	235	1317		163	172	354	245	243	
v/s Ratio Prot	0.05	c0.13		c0.10	c0.20		c0.06	0.03	0.01	c0.11	0.11	
v/s Ratio Perm			0.03						0.00			
v/c Ratio	0.23	0.27	0.05	0.78	0.54		0.61	0.32	0.05	0.77	0.73	
Uniform Delay, d1	40.1	20.0	17.8	54.7	31.6		56.8	55.3	39.7	53.5	53.2	
Progression Factor	1.00	1.00	1.00	0.91	0.50		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.1	12.6	1.4		4.7	0.4	0.0	12.2	9.5	
Delay (s)	40.2	20.4	18.0	62.2	17.3		61.6	55.7	39.7	65.7	62.7	
Level of Service	D	C	B	E	B		E	E	D	E	E	
Approach Delay (s)		23.0			26.4			52.6			64.2	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.4
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	107	98	54	81	253	72	44
Future Volume (veh/h)	94	457	81	180	602	107	98	54	81	253	72	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	109	100	55	83	188	171	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	744	1069	466	607	676	120	136	143	660	248	198	52
Arrive On Green	0.41	0.30	0.30	0.68	0.44	0.44	0.08	0.08	0.08	0.14	0.14	0.14
Sat Flow, veh/h	1795	3582	1561	1795	3039	538	1795	1885	1579	1795	1435	378
Grp Volume(v), veh/h	96	466	83	184	361	362	100	55	83	188	0	216
Grp Sat Flow(s),veh/h/ln	1795	1791	1561	1795	1791	1787	1795	1885	1579	1795	0	1812
Q Serve(g_s), s	4.3	13.6	5.1	5.4	24.4	24.6	7.1	3.6	0.0	13.1	0.0	15.2
Cycle Q Clear(g_c), s	4.3	13.6	5.1	5.4	24.4	24.6	7.1	3.6	0.0	13.1	0.0	15.2
Prop In Lane	1.00		1.00	1.00		0.30	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	744	1069	466	607	398	397	136	143	660	248	0	251
V/C Ratio(X)	0.13	0.44	0.18	0.30	0.91	0.91	0.73	0.38	0.13	0.76	0.00	0.86
Avail Cap(c_a), veh/h	744	1069	466	607	535	533	282	296	788	392	0	396
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.6	36.8	33.8	14.8	34.8	34.9	58.8	57.2	23.5	53.9	0.0	54.8
Incr Delay (d2), s/veh	0.0	1.3	0.8	0.1	23.9	24.4	2.8	0.6	0.0	1.8	0.0	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	6.1	2.1	2.0	11.0	11.1	3.3	1.7	1.6	6.0	0.0	7.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	38.1	34.6	14.9	58.7	59.2	61.6	57.8	23.6	55.7	0.0	61.5
LnGrp LOS	C	D	C	B	E	E	E	E	C	E	A	E
Approach Vol, veh/h		645			907			238			404	
Approach Delay, s/veh		35.5			50.0			47.5			58.8	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	49.0	43.9		22.6	58.9	34.0		14.5
Change Period (Y+Rc), s	5.1	5.1		4.6	5.1	5.1		4.6
Max Green Setting (Gmax), s	23.0	38.8		28.4	23.0	38.8		20.4
Max Q Clear Time (g_c+I1), s	7.4	15.6		17.2	6.3	26.6		9.1
Green Ext Time (p_c), s	0.1	2.1		0.8	0.1	2.4		0.3

Intersection Summary	
HCM 6th Ctrl Delay	47.1
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	917	146	707	325	321	414
v/c Ratio	0.84	0.82	0.45	0.85	0.80	0.63
Control Delay	45.3	83.5	14.9	68.3	64.5	9.1
Queue Delay	1.3	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	83.5	14.9	68.3	64.5	9.1
Queue Length 50th (ft)	404	105	173	261	260	5
Queue Length 95th (ft)	#502	#226	180	#414	#405	100
Internal Link Dist (ft)	421		23	468	491	
Turn Bay Length (ft)						450
Base Capacity (vph)	1088	196	1574	393	400	661
Starvation Cap Reductn	56	0	0	0	0	0
Spillback Cap Reductn	5	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.74	0.45	0.83	0.80	0.63

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	836	26	137	665	0	39	0	267	111	191	389
Future Volume (vph)	0	836	26	137	665	0	39	0	267	111	191	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	1.00
Frt		1.00		1.00	1.00			0.88			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)		3555		1787	3574			1649			1847	1577
Flt Permitted		1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (perm)		3555		1787	3574			1649			1847	1577
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	889	28	146	707	0	41	0	284	118	203	414
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	319
Lane Group Flow (vph)	0	917	0	146	707	0	0	325	0	0	321	95
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	6		7	7		8	8	
Permitted Phases												8
Actuated Green, G (s)		39.9		12.9	57.3			30.2			28.2	28.2
Effective Green, g (s)		39.9		12.9	57.3			30.2			28.2	28.2
Actuated g/C Ratio		0.31		0.10	0.44			0.23			0.22	0.22
Clearance Time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Vehicle Extension (s)		1.5		1.5	1.5			1.5			1.5	1.5
Lane Grp Cap (vph)		1091		177	1575			383			400	342
v/s Ratio Prot		c0.26		c0.08	0.20			c0.20			c0.17	
v/s Ratio Perm												0.06
v/c Ratio		0.84		0.82	0.45			0.85			0.80	0.28
Uniform Delay, d1		42.1		57.4	25.3			47.7			48.3	42.4
Progression Factor		0.87		0.88	0.55			1.00			1.00	1.00
Incremental Delay, d2		7.6		24.3	0.9			15.3			10.5	0.2
Delay (s)		44.3		74.9	14.7			63.0			58.7	42.6
Level of Service		D		E	B			E			E	D
Approach Delay (s)		44.3			25.0			63.0			49.6	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	363	492	467	102	342	318
v/c Ratio	0.46	0.20	0.30	0.14	0.85	0.75
Control Delay	6.8	2.8	27.2	6.2	65.7	46.8
Queue Delay	0.6	0.3	0.0	0.0	0.0	0.0
Total Delay	7.4	3.1	27.2	6.2	65.7	46.8
Queue Length 50th (ft)	36	25	134	0	292	214
Queue Length 95th (ft)	57	33	215	41	371	294
Internal Link Dist (ft)		187	384			486
Turn Bay Length (ft)				250	125	
Base Capacity (vph)	870	2510	1557	722	630	632
Starvation Cap Reductn	219	1388	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.44	0.30	0.14	0.54	0.50

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	467	0	0	444	97	446	5	177	0	0	0
Future Volume (vph)	345	467	0	0	444	97	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95				
Frpb, ped/bikes	1.00	1.00			1.00	0.95	1.00	1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.91				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.98				
Satd. Flow (prot)	1780	3574			3574	1527	1698	1598				
Flt Permitted	0.43	1.00			1.00	1.00	0.95	0.98				
Satd. Flow (perm)	803	3574			3574	1527	1698	1598				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	363	492	0	0	467	102	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	58	0	47	0	0	0	0
Lane Group Flow (vph)	363	492	0	0	467	44	342	271	0	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA				
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6						
Actuated Green, G (s)	91.3	91.3			56.7	56.7	30.9	30.9				
Effective Green, g (s)	91.3	91.3			56.7	56.7	30.9	30.9				
Actuated g/C Ratio	0.70	0.70			0.44	0.44	0.24	0.24				
Clearance Time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Vehicle Extension (s)	2.0	1.0			1.0	1.0	1.0	1.0				
Lane Grp Cap (vph)	789	2510			1558	666	403	379				
v/s Ratio Prot	c0.11	0.14			0.13		c0.20	0.17				
v/s Ratio Perm	c0.22					0.03						
v/c Ratio	0.46	0.20			0.30	0.07	0.85	0.71				
Uniform Delay, d1	13.4	6.7			23.8	21.3	47.3	45.5				
Progression Factor	0.38	0.35			1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.1	0.2			0.5	0.2	14.7	5.2				
Delay (s)	5.3	2.5			24.3	21.5	62.0	50.7				
Level of Service	A	A			C	C	E	D				
Approach Delay (s)		3.7			23.8			56.6			0.0	
Approach LOS		A			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	345	467	0	0	444	97	446	5	177	0	0	0
Future Volume (veh/h)	345	467	0	0	444	97	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	363	492	0	0	467	102	330	200	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	898	2507	0	0	920	398	431	216	201			
Arrive On Green	0.13	0.23	0.00	0.00	0.26	0.26	0.24	0.24	0.24			
Sat Flow, veh/h	1795	3676	0	0	3676	1548	1795	899	836			
Grp Volume(v), veh/h	363	492	0	0	467	102	330	0	386			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1548	1795	0	1735			
Q Serve(g_s), s	11.5	14.4	0.0	0.0	14.5	6.8	22.2	0.0	28.3			
Cycle Q Clear(g_c), s	11.5	14.4	0.0	0.0	14.5	6.8	22.2	0.0	28.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		0.48			
Lane Grp Cap(c), veh/h	898	2507	0	0	920	398	431	0	416			
V/C Ratio(X)	0.40	0.20	0.00	0.00	0.51	0.26	0.77	0.00	0.93			
Avail Cap(c_a), veh/h	898	2507	0	0	920	398	667	0	645			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.89	0.89	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	33.1	20.5	0.0	0.0	41.3	38.4	46.0	0.0	48.3			
Incr Delay (d2), s/veh	0.1	0.2	0.0	0.0	2.0	1.6	1.1	0.0	10.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	11.3	6.9	0.0	0.0	6.6	2.8	10.1	0.0	13.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	20.7	0.0	0.0	43.3	40.0	47.1	0.0	59.1			
LnGrp LOS	C	C	A	A	D	D	D	A	E			
Approach Vol, veh/h		855			569			716				
Approach Delay, s/veh		26.0			42.7			53.6				
Approach LOS		C			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		95.1		34.9	57.1	38.0						
Change Period (Y+Rc), s		4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		73.9		48.3	35.9	33.4						
Max Q Clear Time (g_c+I1), s		16.4		30.3	13.5	16.5						
Green Ext Time (p_c), s		1.2		0.9	0.5	1.1						

Intersection Summary	
HCM 6th Ctrl Delay	39.7
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1292	90	853
v/c Ratio	0.46	0.51	0.24
Control Delay	0.7	59.1	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.7	59.1	0.2
Queue Length 50th (ft)	8	59	0
Queue Length 95th (ft)	3	130	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2829	196	3570
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	917
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.46	0.46	0.32

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	811	403	85	802	0	0
Future Volume (vph)	811	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		3.5	4.6		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3365		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3365		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	863	429	90	853	0	0
RTOR Reduction (vph)	53	0	0	0	0	0
Lane Group Flow (vph)	1239	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 8		1	6 7 8		
Permitted Phases						
Actuated Green, G (s)	107.9		12.9	130.0		
Effective Green, g (s)	103.9		12.9	120.3		
Actuated g/C Ratio	0.80		0.10	0.93		
Clearance Time (s)			3.5			
Vehicle Extension (s)			1.5			
Lane Grp Cap (vph)	2689		177	3307		
v/s Ratio Prot	c0.37		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.46		0.51	0.26		
Uniform Delay, d1	4.1		55.5	0.5		
Progression Factor	0.19		0.90	1.00		
Incremental Delay, d2	0.0		0.8	0.0		
Delay (s)	0.8		50.7	0.5		
Level of Service	A		D	A		
Approach Delay (s)	0.8			5.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	117	409	88	238	819	61	84	76	256	257
v/c Ratio	0.32	0.27	0.12	0.87	0.61	0.41	0.54	0.18	0.82	0.82
Control Delay	48.2	27.1	5.6	67.5	15.7	63.0	68.3	4.6	71.4	70.2
Queue Delay	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	27.2	5.6	67.5	15.8	63.0	68.3	4.6	71.4	70.2
Queue Length 50th (ft)	85	117	0	206	62	50	69	0	218	215
Queue Length 95th (ft)	149	187	34	m#313	215	91	117	19	312	309
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	364	1532	721	316	1332	299	315	464	378	380
Starvation Cap Reductn	0	0	0	0	53	0	0	0	0	0
Spillback Cap Reductn	0	348	0	0	0	0	0	7	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.35	0.12	0.75	0.64	0.20	0.27	0.17	0.68	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	389	84	226	461	317	58	80	72	434	31	22
Future Volume (vph)	111	389	84	226	461	317	58	80	72	434	31	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.98		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (prot)	1787	3574	1558	1787	3295		1787	1881	1587	1698	1693	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (perm)	1787	3574	1558	1787	3295		1787	1881	1587	1698	1693	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	117	409	88	238	485	334	61	84	76	457	33	23
RTOR Reduction (vph)	0	0	50	0	83	0	0	0	58	0	3	0
Lane Group Flow (vph)	117	409	38	238	736	0	61	84	18	256	254	0
Confl. Peds. (#/hr)			1			5			4			6
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	26.5	55.7	55.7	20.1	49.3		10.9	10.9	31.0	23.9	23.9	
Effective Green, g (s)	26.5	55.7	55.7	20.1	49.3		10.9	10.9	31.0	23.9	23.9	
Actuated g/C Ratio	0.20	0.43	0.43	0.15	0.38		0.08	0.08	0.24	0.18	0.18	
Clearance Time (s)	5.1	5.1	5.1	5.1	5.1		4.6	4.6	5.1	4.6	4.6	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	364	1531	667	276	1249		149	157	378	312	311	
v/s Ratio Prot	c0.07	0.11		c0.13	c0.22		0.03	c0.04	0.01	c0.15	0.15	
v/s Ratio Perm			0.02						0.00			
v/c Ratio	0.32	0.27	0.06	0.86	0.59		0.41	0.54	0.05	0.82	0.82	
Uniform Delay, d1	44.1	24.0	21.8	53.6	32.3		56.5	57.1	38.1	51.0	50.9	
Progression Factor	1.00	1.00	1.00	0.76	0.49		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.2	21.0	1.9		0.7	1.8	0.0	15.0	14.4	
Delay (s)	44.3	24.4	21.9	61.6	17.6		57.2	58.9	38.2	66.0	65.3	
Level of Service	D	C	C	E	B		E	E	D	E	E	
Approach Delay (s)		27.8			27.5			51.3			65.7	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.4
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	389	84	226	461	317	58	80	72	434	31	22
Future Volume (veh/h)	111	389	84	226	461	317	58	80	72	434	31	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	117	409	88	238	485	334	61	84	76	502	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	639	1014	442	615	545	374	121	127	653	567	298	0
Arrive On Green	0.36	0.28	0.28	0.57	0.45	0.45	0.07	0.07	0.07	0.16	0.00	0.00
Sat Flow, veh/h	1795	3582	1561	1795	2022	1388	1795	1885	1569	3591	1885	0
Grp Volume(v), veh/h	117	409	88	238	429	390	61	84	76	502	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1561	1795	1791	1620	1795	1885	1569	1795	1885	0
Q Serve(g_s), s	5.8	12.0	5.6	9.5	28.6	28.8	4.3	5.7	0.0	17.8	0.0	0.0
Cycle Q Clear(g_c), s	5.8	12.0	5.6	9.5	28.6	28.8	4.3	5.7	0.0	17.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.86	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	639	1014	442	615	483	436	121	127	653	567	298	0
V/C Ratio(X)	0.18	0.40	0.20	0.39	0.89	0.89	0.51	0.66	0.12	0.88	0.00	0.00
Avail Cap(c_a), veh/h	639	1014	442	615	507	459	301	316	810	801	421	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.89	0.89	0.89	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	28.8	37.7	35.4	20.3	34.0	34.0	58.5	59.2	23.8	53.6	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.2	1.0	0.1	19.3	21.2	1.2	2.2	0.0	6.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	5.4	2.2	3.5	13.1	12.1	2.0	2.8	1.5	8.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.9	38.9	36.4	20.5	53.3	55.2	59.8	61.4	23.8	60.3	0.0	0.0
LnGrp LOS	C	D	D	C	D	E	E	E	C	E	A	A
Approach Vol, veh/h		614			1057			221			502	
Approach Delay, s/veh		36.6			46.6			48.0			60.3	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	49.6	41.9		25.1	51.4	40.1		13.3
Change Period (Y+Rc), s	5.1	5.1		4.6	5.1	5.1		4.6
Max Green Setting (Gmax), s	23.0	36.8		29.0	23.0	36.8		21.8
Max Q Clear Time (g_c+I1), s	11.5	14.0		19.8	7.8	30.8		7.7
Green Ext Time (p_c), s	0.2	1.8		0.7	0.1	4.3		0.4

Intersection Summary	
HCM 6th Ctrl Delay	47.1
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	984	77	741	288	234	235
v/c Ratio	0.82	0.52	0.45	0.84	0.54	0.43
Control Delay	41.4	60.1	15.5	71.2	49.4	7.5
Queue Delay	2.7	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	60.1	15.5	71.2	49.4	7.5
Queue Length 50th (ft)	436	67	232	237	174	0
Queue Length 95th (ft)	515	121	243	#406	261	67
Internal Link Dist (ft)	421		23	468	407	
Turn Bay Length (ft)						450
Base Capacity (vph)	1205	173	1685	344	432	547
Starvation Cap Reductn	126	0	0	0	0	0
Spillback Cap Reductn	57	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.45	0.44	0.84	0.54	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	919	26	74	711	0	35	0	242	63	161	226
Future Volume (vph)	0	919	26	74	711	0	35	0	242	63	161	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	1.00
Frt		1.00		1.00	1.00			0.88			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)		3587		1805	3610			1665			1874	1591
Flt Permitted		1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (perm)		3587		1805	3610			1665			1874	1591
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	957	27	77	741	0	36	0	252	66	168	235
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	181
Lane Group Flow (vph)	0	984	0	77	741	0	0	288	0	0	234	54
Confl. Peds. (#/hr)			16									2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	6		7	7		8	8	
Permitted Phases												8
Actuated Green, G (s)		43.7		10.6	58.8			26.9			30.0	30.0
Effective Green, g (s)		43.7		10.6	58.8			26.9			30.0	30.0
Actuated g/C Ratio		0.34		0.08	0.45			0.21			0.23	0.23
Clearance Time (s)		5.6		3.5	4.6			4.0			5.7	5.7
Vehicle Extension (s)		1.5		1.5	1.5			1.5			1.5	1.5
Lane Grp Cap (vph)		1205		147	1632			344			432	367
v/s Ratio Prot		c0.27		c0.04	0.21			c0.17			c0.12	
v/s Ratio Perm												0.03
v/c Ratio		0.82		0.52	0.45			0.84			0.54	0.15
Uniform Delay, d1		39.5		57.3	24.5			49.4			44.0	39.8
Progression Factor		0.90		0.83	0.60			1.00			1.00	1.00
Incremental Delay, d2		5.7		1.5	0.9			15.4			0.7	0.1
Delay (s)		41.1		49.2	15.6			64.9			44.7	39.9
Level of Service		D		D	B			E			D	D
Approach Delay (s)		41.1			18.7			64.9			42.3	
Approach LOS		D			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT
Lane Group Flow (vph)	350	351	399	111	335	317
v/c Ratio	0.43	0.14	0.26	0.15	0.77	0.72
Control Delay	10.7	3.1	27.4	6.2	55.8	48.5
Queue Delay	1.1	0.4	0.0	0.0	0.0	0.0
Total Delay	11.8	3.5	27.4	6.2	55.8	48.5
Queue Length 50th (ft)	16	8	114	0	276	235
Queue Length 95th (ft)	157	70	187	44	344	304
Internal Link Dist (ft)		187	384			402
Turn Bay Length (ft)				250	125	
Base Capacity (vph)	928	2473	1549	756	663	650
Starvation Cap Reductn	358	1633	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.42	0.26	0.15	0.51	0.49

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	336	337	0	0	383	107	503	1	122	0	0	0
Future Volume (vph)	336	337	0	0	383	107	503	1	122	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95				
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	0.99				
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	0.94				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.97				
Satd. Flow (prot)	1805	3610			3610	1615	1715	1634				
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.97				
Satd. Flow (perm)	898	3610			3610	1615	1715	1634				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	350	351	0	0	399	111	524	1	127	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	63	0	22	0	0	0	0
Lane Group Flow (vph)	350	351	0	0	399	48	335	295	0	0	0	0
Confl. Peds. (#/hr)									6			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Split	NA				
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6						
Actuated Green, G (s)	89.1	89.1			55.8	55.8	33.1	33.1				
Effective Green, g (s)	89.1	89.1			55.8	55.8	33.1	33.1				
Actuated g/C Ratio	0.69	0.69			0.43	0.43	0.25	0.25				
Clearance Time (s)	4.1	4.1			4.6	4.6	3.7	3.7				
Vehicle Extension (s)	2.0	1.0			1.0	1.0	1.0	1.0				
Lane Grp Cap (vph)	815	2474			1549	693	436	416				
v/s Ratio Prot	c0.09	0.10			0.11		c0.20	0.18				
v/s Ratio Perm	c0.20					0.03						
v/c Ratio	0.43	0.14			0.26	0.07	0.77	0.71				
Uniform Delay, d1	12.7	7.1			23.8	21.8	44.9	44.1				
Progression Factor	0.68	0.36			1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.1	0.1			0.4	0.2	7.2	4.5				
Delay (s)	8.8	2.7			24.2	22.0	52.1	48.5				
Level of Service	A	A			C	C	D	D				
Approach Delay (s)		5.7			23.7			50.3			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	336	337	0	0	383	107	503	1	122	0	0	0
Future Volume (veh/h)	336	337	0	0	383	107	503	1	122	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	350	351	0	0	399	111	326	278	127			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	918	2470	0	0	844	377	463	315	144			
Arrive On Green	0.83	1.00	0.00	0.00	0.23	0.23	0.26	0.26	0.26			
Sat Flow, veh/h	1810	3705	0	0	3705	1610	1810	1231	563			
Grp Volume(v), veh/h	350	351	0	0	399	111	326	0	405			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1610	1810	0	1794			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	12.4	7.4	21.3	0.0	28.2			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	12.4	7.4	21.3	0.0	28.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		0.31			
Lane Grp Cap(c), veh/h	918	2470	0	0	844	377	463	0	459			
V/C Ratio(X)	0.38	0.14	0.00	0.00	0.47	0.29	0.70	0.00	0.88			
Avail Cap(c_a), veh/h	918	2470	0	0	844	377	700	0	694			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.89	0.89	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	4.5	0.0	0.0	0.0	42.9	41.0	43.9	0.0	46.5			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.9	2.0	0.7	0.0	6.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	0.0	5.7	3.1	9.6	0.0	13.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.6	0.1	0.0	0.0	44.8	43.0	44.6	0.0	52.7			
LnGrp LOS	A	A	A	A	D	D	D	A	D			
Approach Vol, veh/h		701			510			731				
Approach Delay, s/veh		2.4			44.4			49.1				
Approach LOS		A			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		93.0		37.0	58.0	35.0						
Change Period (Y+Rc), s		4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		71.9		50.3	36.9	30.4						
Max Q Clear Time (g_c+I1), s		2.0		30.2	2.0	14.4						
Green Ext Time (p_c), s		3.4		3.0	0.5	0.9						
Intersection Summary												
HCM 6th Ctrl Delay			31.0									
HCM 6th LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1275	107	818
v/c Ratio	0.45	0.73	0.23
Control Delay	1.4	55.9	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	1.4	55.9	0.2
Queue Length 50th (ft)	25	87	0
Queue Length 95th (ft)	0	146	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2803	173	3580
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	550
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.45	0.62	0.27

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	700	524	103	785	0	0
Future Volume (vph)	700	524	103	785	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		3.5	4.6		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.96		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.94		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3257		1805	3610		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3257		1805	3610		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	729	546	107	818	0	0
RTOR Reduction (vph)	58	0	0	0	0	0
Lane Group Flow (vph)	1217	0	107	818	0	0
Confl. Peds. (#/hr)		16				
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 8		1	6 7 8		
Permitted Phases						
Actuated Green, G (s)	110.3		10.6	130.0		
Effective Green, g (s)	100.6		10.6	120.3		
Actuated g/C Ratio	0.77		0.08	0.93		
Clearance Time (s)			3.5			
Vehicle Extension (s)			1.5			
Lane Grp Cap (vph)	2520		147	3340		
v/s Ratio Prot	c0.37		c0.06	0.23		
v/s Ratio Perm						
v/c Ratio	0.48		0.73	0.24		
Uniform Delay, d1	5.3		58.3	0.5		
Progression Factor	0.57		0.50	1.00		
Incremental Delay, d2	0.0		13.9	0.0		
Delay (s)	3.0		43.2	0.5		
Level of Service	A		D	A		
Approach Delay (s)	3.0			5.4	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Existing

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	165	203	51	90	132
Future Vol, veh/h	50	165	203	51	90	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	58	192	236	59	105	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	629	266	0	0	295	0
Stage 1	266	-	-	-	-	-
Stage 2	363	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	437	758	-	-	1233	-
Stage 1	765	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	400	758	-	-	1233	-
Mov Cap-2 Maneuver	400	-	-	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	3.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	400	758	1233	-
HCM Lane V/C Ratio	-	-	0.145	0.253	0.085	-
HCM Control Delay (s)	-	-	15.5	11.4	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	347	51	46	236	8	96	119	154	33	61	14
v/c Ratio	0.06	0.52	0.08	0.29	0.30	0.01	0.37	0.29	0.33	0.19	0.19	0.03
Control Delay	34.9	21.2	0.2	38.3	14.9	0.0	37.7	25.5	7.2	35.2	26.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	21.2	0.2	38.3	14.9	0.0	37.7	25.5	7.2	35.2	26.7	0.2
Queue Length 50th (ft)	4	116	0	18	54	0	37	33	0	12	22	0
Queue Length 95th (ft)	19	198	0	53	133	0	#112	92	35	41	54	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	158	1105	980	158	1108	1002	263	1032	946	199	1032	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.31	0.05	0.29	0.21	0.01	0.37	0.12	0.16	0.17	0.06	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	288	42	38	196	7	80	99	128	27	51	12
Future Volume (vph)	8	288	42	38	196	7	80	99	128	27	51	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	10	347	51	46	236	8	96	119	154	33	61	14
RTOR Reduction (vph)	0	0	33	0	0	5	0	0	123	0	0	13
Lane Group Flow (vph)	10	347	18	46	236	3	96	119	31	33	61	1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.7	24.0	24.0	2.5	25.8	25.8	9.2	13.6	13.6	1.9	6.3	6.3
Effective Green, g (s)	0.7	24.0	24.0	2.5	25.8	25.8	9.2	13.6	13.6	1.9	6.3	6.3
Actuated g/C Ratio	0.01	0.36	0.36	0.04	0.39	0.39	0.14	0.20	0.20	0.03	0.09	0.09
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	18	653	543	64	702	596	237	370	314	49	171	145
v/s Ratio Prot	0.01	c0.19		c0.03	0.13		c0.06	c0.07		0.02	0.03	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.56	0.53	0.03	0.72	0.34	0.01	0.41	0.32	0.10	0.67	0.36	0.01
Uniform Delay, d1	32.7	16.8	13.7	31.7	14.3	12.5	26.2	22.5	21.5	32.0	28.2	27.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.1	1.5	0.1	32.8	0.6	0.0	0.4	0.9	0.2	25.0	2.2	0.0
Delay (s)	67.8	18.3	13.8	64.4	14.9	12.5	26.6	23.4	21.7	57.0	30.4	27.3
Level of Service	E	B	B	E	B	B	C	C	C	E	C	C
Approach Delay (s)		19.0			22.7			23.5			38.1	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	24.5
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	288	42	38	196	7	80	99	128	27	51	12
Future Volume (veh/h)	8	288	42	38	196	7	80	99	128	27	51	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	10	347	51	46	236	8	96	119	154	33	61	14
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	22	511	424	81	573	485	125	308	261	63	243	206
Arrive On Green	0.01	0.28	0.28	0.05	0.31	0.31	0.07	0.17	0.17	0.04	0.13	0.13
Sat Flow, veh/h	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	10	347	51	46	236	8	96	119	154	33	61	14
Grp Sat Flow(s),veh/h/ln	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.3	8.8	1.3	1.4	5.3	0.2	2.8	3.0	4.8	1.0	1.6	0.4
Cycle Q Clear(g_c), s	0.3	8.8	1.3	1.4	5.3	0.2	2.8	3.0	4.8	1.0	1.6	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	22	511	424	81	573	485	125	308	261	63	243	206
V/C Ratio(X)	0.44	0.68	0.12	0.57	0.41	0.02	0.77	0.39	0.59	0.52	0.25	0.07
Avail Cap(c_a), veh/h	166	1159	961	166	1159	982	209	1082	917	209	1082	917
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.6	16.7	14.0	24.4	14.2	12.4	23.9	19.3	20.1	24.8	20.3	19.8
Incr Delay (d2), s/veh	15.7	3.4	0.3	7.3	1.0	0.0	3.7	1.4	3.6	2.5	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.2	0.4	0.6	1.8	0.1	1.1	1.1	1.6	0.4	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.4	20.1	14.3	31.8	15.2	12.4	27.5	20.7	23.7	27.2	21.2	20.1
LnGrp LOS	D	C	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		408			290			369			108	
Approach Delay, s/veh		19.9			17.7			23.7			22.9	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	21.7	9.1	13.8	6.0	23.5	7.2	15.6
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.0	* 33	6.3	* 31	5.0	* 33	6.3	* 31
Max Q Clear Time (g_c+I1), s	3.4	10.8	4.8	3.6	2.3	7.3	3.0	6.8
Green Ext Time (p_c), s	0.0	3.8	0.0	0.5	0.0	2.3	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	20.8
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	441	1	34	241	2	1	3	175	7	4	2
Future Vol, veh/h	4	441	1	34	241	2	1	3	175	7	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	565	1	44	309	3	1	4	224	9	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	312	0	0	566	0	0	978	975	565	1087	973	309
Stage 1	-	-	-	-	-	-	575	575	-	397	397	-
Stage 2	-	-	-	-	-	-	403	400	-	690	576	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1232	-	-	991	-	-	227	249	519	191	249	724
Stage 1	-	-	-	-	-	-	498	498	-	623	598	-
Stage 2	-	-	-	-	-	-	618	596	-	431	497	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1232	-	-	991	-	-	214	237	519	103	237	724
Mov Cap-2 Maneuver	-	-	-	-	-	-	214	237	-	103	237	-
Stage 1	-	-	-	-	-	-	496	496	-	621	572	-
Stage 2	-	-	-	-	-	-	583	570	-	242	495	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	17.2	31.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	214	237	519	1232	-	-	991	-	-	103	237	724
HCM Lane V/C Ratio	0.006	0.016	0.432	0.004	-	-	0.044	-	-	0.087	0.022	0.004
HCM Control Delay (s)	21.9	20.4	17.1	7.9	-	-	8.8	-	-	43.3	20.5	10
HCM Lane LOS	C	C	C	A	-	-	A	-	-	E	C	B
HCM 95th %tile Q(veh)	0	0	2.2	0	-	-	0.1	-	-	0.3	0.1	0

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	649	0	0	296	0	0
Future Vol, veh/h	649	0	0	296	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	705	0	0	322	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	705	0	1027	705
Stage 1	-	-	-	-	705	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	893	-	260	436
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	893	-	260	436
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	735	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	893	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	649	0	0	296	0	0
Future Vol, veh/h	649	0	0	296	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	705	0	0	322	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	705	0	1027	705
Stage 1	-	-	-	-	705	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	893	-	260	436
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	893	-	260	436
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	735	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	893	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection												
Int Delay, s/veh	2.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	472	177	23	164	0	0	0	0	25	0	132
Future Vol, veh/h	0	472	177	23	164	0	0	0	0	25	0	132
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	656	246	32	228	0	0	0	0	35	0	183

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	902	0	0				1071	1194	228
Stage 1	-	-	-	-	-	-				292	292	-
Stage 2	-	-	-	-	-	-				779	902	-
Critical Hdwy	-	-	-	4.15	-	-				6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-				5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-				3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	741	-	0				241	184	804
Stage 1	0	-	-	-	-	0				751	666	-
Stage 2	0	-	-	-	-	0				447	352	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	741	-	-				231	0	804
Mov Cap-2 Maneuver	-	-	-	-	-	-				231	0	-
Stage 1	-	-	-	-	-	-				751	0	-
Stage 2	-	-	-	-	-	-				428	0	-

Approach	EB			WB						SB		
HCM Control Delay, s	0			1.2						12.8		
HCM LOS										B		

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	741	-	231	804
HCM Lane V/C Ratio	-	-	0.043	-	0.15	0.228
HCM Control Delay (s)	-	-	10.1	-	23.3	10.8
HCM Lane LOS	-	-	B	-	C	B
HCM 95th %tile Q(veh)	-	-	0.1	-	0.5	0.9

Intersection												
Int Delay, s/veh	32.1											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	314	194	0	0	84	22	90	1	23	0	0	0
Future Vol, veh/h	314	194	0	0	84	22	90	1	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	68	68	68	68	68	68	68	68	68	68	68	68
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	462	285	0	0	124	32	132	1	34	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	156	0	-	-	-	0	1349	1365	285
Stage 1	-	-	-	-	-	-	1209	1209	-
Stage 2	-	-	-	-	-	-	140	156	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1418	-	0	0	-	-	165	147	752
Stage 1	-	-	0	0	-	-	281	255	-
Stage 2	-	-	0	0	-	-	884	767	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1418	-	-	-	-	-	~ 111	0	752
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 111	0	-
Stage 1	-	-	-	-	-	-	189	0	-
Stage 2	-	-	-	-	-	-	884	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.4	0	181
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	111	752	1418	-	-	-
HCM Lane V/C Ratio	1.206	0.045	0.326	-	-	-
HCM Control Delay (s)	224.2	10	8.8	-	-	-
HCM Lane LOS	F	B	A	-	-	-
HCM 95th %tile Q(veh)	8.7	0.1	1.4	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	202	86	259	170	18
Future Vol, veh/h	15	202	86	259	170	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	26	354	151	454	298	32

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1070	314	330	0	-	0
Stage 1	314	-	-	-	-	-
Stage 2	756	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	244	724	1224	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	214	724	1224	-	-	-
Mov Cap-2 Maneuver	214	-	-	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	462	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	2.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1224	-	214	724	-	-
HCM Lane V/C Ratio	0.123	-	0.123	0.489	-	-
HCM Control Delay (s)	8.4	-	24.2	14.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.4	2.7	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	306	0	0	150
Future Vol, veh/h	0	0	306	0	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	333	0	0	163

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	496	333	0	0	333	0
Stage 1	333	-	-	-	-	-
Stage 2	163	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	533	709	-	-	1226	-
Stage 1	726	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	533	709	-	-	1226	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	866	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1226	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	187	412	445	105	99
v/c Ratio	0.57	0.18	0.32	0.39	0.31
Control Delay	25.2	8.5	14.3	29.8	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	8.5	14.3	29.8	10.0
Queue Length 50th (ft)	54	21	38	28	0
Queue Length 95th (ft)	62	114	141	101	43
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	334	2322	1517	370	410
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.56	0.18	0.29	0.28	0.24

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	172	379	313	97	97	91
Future Volume (vph)	172	379	313	97	97	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3414		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3414		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	412	340	105	105	99
RTOR Reduction (vph)	0	0	29	0	0	89
Lane Group Flow (vph)	187	412	416	0	105	10
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	10.2	33.1	21.5		6.1	6.1
Effective Green, g (s)	10.2	33.1	21.5		6.1	6.1
Actuated g/C Ratio	0.17	0.56	0.36		0.10	0.10
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	306	1985	1244		183	163
v/s Ratio Prot	c0.11	0.12	c0.12			
v/s Ratio Perm					c0.06	0.01
v/c Ratio	0.61	0.21	0.33		0.57	0.06
Uniform Delay, d1	22.6	6.4	13.6		25.2	23.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.5	0.0	0.1		2.7	0.1
Delay (s)	25.1	6.5	13.6		27.9	23.9
Level of Service	C	A	B		C	C
Approach Delay (s)		12.3	13.6		26.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	521	68	38	206	127	125
v/c Ratio	0.20	0.31	0.09	0.68	0.27	0.36	0.19	0.42	0.57	0.54
Control Delay	35.6	18.9	1.1	44.5	7.0	38.5	34.2	4.8	43.6	38.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	18.9	1.1	44.5	7.0	38.5	34.2	4.8	43.6	38.7
Queue Length 50th (ft)	18	86	0	83	15	35	19	2	68	60
Queue Length 95th (ft)	41	174	5	140	105	62	40	19	110	102
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	265	1622	777	270	1908	374	394	529	375	381
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.31	0.09	0.54	0.27	0.18	0.10	0.39	0.34	0.33

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	78	59	33	179	172	27	20
Future Volume (vph)	30	439	61	128	375	78	59	33	179	172	27	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1544	1770	3448		1770	1863	1575	1681	1668	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1544	1770	3448		1770	1863	1575	1681	1668	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	90	68	38	206	198	31	23
RTOR Reduction (vph)	0	0	41	0	13	0	0	0	148	0	10	0
Lane Group Flow (vph)	34	505	29	147	508	0	68	38	58	127	115	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.6	35.1	35.1	13.4	42.9		8.2	8.2	21.6	11.3	11.3	
Effective Green, g (s)	5.6	35.1	35.1	13.4	42.9		8.2	8.2	21.6	11.3	11.3	
Actuated g/C Ratio	0.07	0.41	0.41	0.16	0.50		0.10	0.10	0.25	0.13	0.13	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	116	1461	637	279	1740		170	179	400	223	221	
v/s Ratio Prot	0.02	c0.14		c0.08	0.15		c0.04	0.02	0.02	c0.08	0.07	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.29	0.35	0.05	0.53	0.29		0.40	0.21	0.14	0.57	0.52	
Uniform Delay, d1	37.8	17.1	14.9	32.9	12.2		36.1	35.4	24.5	34.6	34.3	
Progression Factor	1.00	1.00	1.00	0.82	0.44		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	0.4		0.6	0.2	0.1	2.0	0.9	
Delay (s)	38.3	17.7	15.1	27.7	5.8		36.7	35.6	24.6	36.6	35.2	
Level of Service	D	B	B	C	A		D	D	C	D	D	
Approach Delay (s)		18.6			10.6			28.6			35.9	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	78	59	33	179	172	27	20
Future Volume (veh/h)	30	439	61	128	375	78	59	33	179	172	27	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	90	68	38	206	126	132	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	790	753	334	722	509	105	121	127	749	205	178	31
Arrive On Green	0.44	0.21	0.21	0.81	0.35	0.35	0.07	0.07	0.07	0.12	0.12	0.12
Sat Flow, veh/h	1781	3554	1578	1781	2931	607	1781	1870	1578	1781	1549	270
Grp Volume(v), veh/h	34	505	70	147	260	261	68	38	206	126	0	155
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1761	1781	1870	1578	1781	0	1819
Q Serve(g_s), s	0.9	11.1	3.1	1.6	11.5	11.7	3.1	1.6	0.0	5.7	0.0	7.0
Cycle Q Clear(g_c), s	0.9	11.1	3.1	1.6	11.5	11.7	3.1	1.6	0.0	5.7	0.0	7.0
Prop In Lane	1.00		1.00	1.00		0.34	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	790	753	334	722	309	306	121	127	749	205	0	210
V/C Ratio(X)	0.04	0.67	0.21	0.20	0.84	0.85	0.56	0.30	0.27	0.61	0.00	0.74
Avail Cap(c_a), veh/h	790	753	334	722	397	394	377	396	977	398	0	407
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.4	30.8	27.6	4.9	26.7	26.7	38.4	37.7	13.6	35.8	0.0	36.4
Incr Delay (d2), s/veh	0.0	4.7	1.4	0.0	22.7	24.1	1.5	0.5	0.1	1.1	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.1	1.3	0.5	5.8	5.9	1.4	0.8	2.2	2.5	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	35.5	29.1	5.0	49.3	50.8	39.9	38.2	13.6	36.9	0.0	38.3
LnGrp LOS	B	D	C	A	D	D	D	D	B	D	A	D
Approach Vol, veh/h		609			668			312			281	
Approach Delay, s/veh		33.5			40.1			22.4			37.7	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	39.4	22.0		13.8	42.7	18.8		9.8				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	18.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.6	13.1		9.0	2.9	13.7		5.1				
Green Ext Time (p_c), s	0.1	1.1		0.5	0.0	1.0		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			34.7									
HCM 6th LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1002	81	515	460	87	72	264
v/c Ratio	0.83	0.65	0.32	0.87	0.70	0.09	0.32
Control Delay	27.7	56.2	10.3	45.7	69.1	14.7	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	56.2	10.3	45.7	69.1	14.7	3.6
Queue Length 50th (ft)	270	28	89	228	46	22	3
Queue Length 95th (ft)	168	#104	89	#393	#117	46	44
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1204	124	1623	530	124	806	820
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.65	0.32	0.87	0.70	0.09	0.32

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	882	10	72	458	0	0	0	409	77	64	235
Future Volume (vph)	0	882	10	72	458	0	0	0	409	77	64	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3532		1770	3539				1611	1770	1863	1563
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3532		1770	3539				1611	1770	1863	1563
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	991	11	81	515	0	0	0	460	87	72	264
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	143
Lane Group Flow (vph)	0	1002	0	81	515	0	0	0	460	87	72	121
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Effective Green, g (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Actuated g/C Ratio		0.34		0.07	0.46				0.33	0.07	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1205		124	1623				530	124	806	676
v/s Ratio Prot		c0.28		c0.05	0.15				c0.29	c0.05	0.04	
v/s Ratio Perm												0.08
v/c Ratio		0.83		0.65	0.32				0.87	0.70	0.09	0.18
Uniform Delay, d1		25.8		38.5	14.6				26.8	38.6	14.2	14.8
Progression Factor		0.79		0.78	0.67				1.00	1.00	1.00	1.00
Incremental Delay, d2		6.6		11.6	0.5				14.0	28.2	0.2	0.6
Delay (s)		27.0		41.5	10.2				40.8	66.8	14.4	15.4
Level of Service		C		D	B				D	E	B	B
Approach Delay (s)		27.0			14.5			40.8			25.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	629	497	396	226	147	149	142
v/c Ratio	0.66	0.19	0.31	0.32	0.60	0.61	0.40
Control Delay	9.0	2.4	21.2	4.7	43.6	43.9	9.2
Queue Delay	0.7	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	2.7	21.2	4.7	43.6	43.9	9.2
Queue Length 50th (ft)	77	23	79	0	77	80	0
Queue Length 95th (ft)	139	44	127	49	131	133	46
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	965	2639	1297	703	514	515	582
Starvation Cap Reductn	114	1436	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.41	0.31	0.32	0.29	0.29	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	572	452	0	0	360	206	268	1	129	0	0	0
Future Volume (vph)	572	452	0	0	360	206	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1765	3539			3539	1532	1681	1686	1583			
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	880	3539			3539	1532	1681	1686	1583			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	629	497	0	0	396	226	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	143	0	0	121	0	0	0
Lane Group Flow (vph)	629	497	0	0	396	83	147	149	21	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	63.4	63.4			31.2	31.2	12.4	12.4	12.4			
Effective Green, g (s)	63.4	63.4			31.2	31.2	12.4	12.4	12.4			
Actuated g/C Ratio	0.75	0.75			0.37	0.37	0.15	0.15	0.15			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	948	2639			1299	562	245	245	230			
v/s Ratio Prot	c0.22	0.14			0.11		0.09	c0.09				
v/s Ratio Perm	c0.28					0.05			0.01			
v/c Ratio	0.66	0.19			0.30	0.15	0.60	0.61	0.09			
Uniform Delay, d1	8.6	3.2			19.2	18.0	34.0	34.0	31.4			
Progression Factor	0.57	0.64			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	1.2	0.1			0.6	0.6	3.3	3.6	0.1			
Delay (s)	6.0	2.2			19.8	18.6	37.3	37.6	31.5			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		4.3			19.3			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	572	452	0	0	360	206	268	1	129	0	0	0
Future Volume (veh/h)	572	452	0	0	360	206	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	629	497	0	0	396	226	296	0	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1076	2730	0	0	702	303	436	0	194			
Arrive On Green	0.87	1.00	0.00	0.00	0.20	0.20	0.12	0.00	0.12			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	3563	0	1585			
Grp Volume(v), veh/h	629	497	0	0	396	226	296	0	142			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.6	11.8	6.8	0.0	7.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.6	11.8	6.8	0.0	7.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1076	2730	0	0	702	303	436	0	194			
V/C Ratio(X)	0.58	0.18	0.00	0.00	0.56	0.75	0.68	0.00	0.73			
Avail Cap(c_a), veh/h	1076	2730	0	0	702	303	1090	0	485			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.83	0.83	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	2.3	0.0	0.0	0.0	30.8	32.1	35.7	0.0	36.0			
Incr Delay (d2), s/veh	0.5	0.1	0.0	0.0	3.3	15.4	1.4	0.0	3.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.0	0.0	3.8	5.5	3.0	0.0	6.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.7	0.1	0.0	0.0	34.0	47.5	37.1	0.0	39.9			
LnGrp LOS	A	A	A	A	C	D	D	A	D			
Approach Vol, veh/h		1126			622			438				
Approach Delay, s/veh		1.6			38.9			38.0				
Approach LOS		A			D			D				

Timer - Assigned Phs		2		4	5	6			
Phs Duration (G+Y+Rc), s		69.4		15.6	48.6	20.8			
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0			
Max Green Setting (Gmax), s		* 50		* 26	28.9	16.8			
Max Q Clear Time (g_c+I1), s		2.0		9.3	2.0	13.8			
Green Ext Time (p_c), s		3.6		1.1	1.0	1.0			

Intersection Summary			
HCM 6th Ctrl Delay			19.5
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1537	96	596
v/c Ratio	0.54	0.77	0.17
Control Delay	0.7	66.1	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.7	66.1	0.2
Queue Length 50th (ft)	6	32	0
Queue Length 95th (ft)	0	#119	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2858	124	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	492
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.54	0.77	0.20

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1028	340	85	530	0	0
Future Volume (vph)	1028	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3385		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3385		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1155	382	96	596	0	0
RTOR Reduction (vph)	30	0	0	0	0	0
Lane Group Flow (vph)	1507	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	71.0		6.0	85.0		
Effective Green, g (s)	71.0		6.0	79.8		
Actuated g/C Ratio	0.84		0.07	0.94		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2827		124	3322		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.53		0.77	0.18		
Uniform Delay, d1	2.1		38.8	0.2		
Progression Factor	0.20		0.67	1.00		
Incremental Delay, d2	0.1		24.8	0.1		
Delay (s)	0.5		50.9	0.3		
Level of Service	A		D	A		
Approach Delay (s)	0.5			7.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	103	197	72	213	213
Future Vol, veh/h	37	103	197	72	213	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	39	108	207	76	224	224

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	245	0	0	283	0
Stage 1	245	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	301	791	-	-	1274	-
Stage 1	793	-	-	-	-	-
Stage 2	506	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	248	791	-	-	1274	-
Mov Cap-2 Maneuver	248	-	-	-	-	-
Stage 1	793	-	-	-	-	-
Stage 2	417	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	248	791	1274	-
HCM Lane V/C Ratio	-	-	0.157	0.137	0.176	-
HCM Control Delay (s)	-	-	22.2	10.3	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0.5	0.6	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	337	119	88	276	31	104	49	48	14	84	17
v/c Ratio	0.14	0.53	0.18	0.65	0.31	0.04	0.60	0.10	0.09	0.10	0.30	0.05
Control Delay	33.9	22.1	2.3	56.3	14.2	0.1	49.2	21.0	0.3	33.5	28.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	22.1	2.3	56.3	14.2	0.1	49.2	21.0	0.3	33.5	28.8	0.2
Queue Length 50th (ft)	7	112	0	34	65	0	40	13	0	5	30	0
Queue Length 95th (ft)	29	197	19	#119	159	0	#133	48	0	24	73	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	139	972	901	136	989	914	173	912	856	136	892	825
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.35	0.13	0.65	0.28	0.03	0.60	0.05	0.06	0.10	0.09	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	303	107	79	248	28	94	44	43	13	76	15
Future Volume (vph)	17	303	107	79	248	28	94	44	43	13	76	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1548
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1548
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	337	119	88	276	31	104	49	48	14	84	17
RTOR Reduction (vph)	0	0	76	0	0	18	0	0	37	0	0	14
Lane Group Flow (vph)	19	337	43	88	276	13	104	49	11	14	84	3
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.9	26.9	26.9	5.1	31.1	31.1	6.4	16.8	16.8	0.9	11.3	11.3
Effective Green, g (s)	0.9	26.9	26.9	5.1	31.1	31.1	6.4	16.8	16.8	0.9	11.3	11.3
Actuated g/C Ratio	0.01	0.36	0.36	0.07	0.42	0.42	0.09	0.23	0.23	0.01	0.15	0.15
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	21	675	573	121	780	663	152	421	358	21	283	235
v/s Ratio Prot	0.01	c0.18		c0.05	c0.15		c0.06	0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.90	0.50	0.08	0.73	0.35	0.02	0.68	0.12	0.03	0.67	0.30	0.01
Uniform Delay, d1	36.6	18.4	15.5	33.9	14.7	12.6	32.9	22.8	22.4	36.5	27.9	26.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	153.1	1.2	0.1	20.1	0.6	0.0	9.7	0.2	0.1	47.8	1.0	0.0
Delay (s)	189.7	19.6	15.6	53.9	15.3	12.6	42.6	23.0	22.4	84.3	28.9	26.7
Level of Service	F	B	B	D	B	B	D	C	C	F	C	C
Approach Delay (s)		25.4			23.7			33.0			35.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	303	107	79	248	28	94	44	43	13	76	15
Future Volume (veh/h)	17	303	107	79	248	28	94	44	43	13	76	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	337	119	88	276	31	104	49	48	14	84	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	41	516	437	121	601	509	133	340	288	31	234	193
Arrive On Green	0.02	0.28	0.28	0.07	0.32	0.32	0.07	0.18	0.18	0.02	0.12	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Grp Volume(v), veh/h	19	337	119	88	276	31	104	49	48	14	84	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Q Serve(g_s), s	0.6	8.5	3.2	2.6	6.3	0.7	3.1	1.2	1.4	0.4	2.2	0.5
Cycle Q Clear(g_c), s	0.6	8.5	3.2	2.6	6.3	0.7	3.1	1.2	1.4	0.4	2.2	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	41	516	437	121	601	509	133	340	288	31	234	193
V/C Ratio(X)	0.46	0.65	0.27	0.73	0.46	0.06	0.78	0.14	0.17	0.45	0.36	0.09
Avail Cap(c_a), veh/h	169	1178	998	166	1174	995	189	1104	936	166	1080	894
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	17.2	15.2	24.5	14.5	12.6	24.4	18.4	18.5	26.1	21.5	20.8
Incr Delay (d2), s/veh	9.6	3.0	0.7	11.0	1.2	0.1	7.7	0.3	0.5	3.7	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.2	1.0	1.3	2.2	0.2	1.4	0.4	0.4	0.2	0.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.5	20.1	15.9	35.6	15.7	12.7	32.1	18.8	19.0	29.8	23.1	21.1
LnGrp LOS	D	C	B	D	B	B	C	B	B	C	C	C
Approach Vol, veh/h		475			395			201			115	
Approach Delay, s/veh		19.7			19.9			25.7			23.6	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	21.9	9.3	13.5	6.5	24.3	6.2	16.6				
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8				
Max Green Setting (Gmax), s	5.0	* 34	5.7	* 31	5.1	* 34	5.0	* 32				
Max Q Clear Time (g_c+I1), s	4.6	10.5	5.1	4.2	2.6	8.3	2.4	3.4				
Green Ext Time (p_c), s	0.0	4.3	0.0	0.7	0.0	3.0	0.0	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			21.2									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	355	2	68	341	14	1	3	40	10	8	6
Future Vol, veh/h	6	355	2	68	341	14	1	3	40	10	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	366	2	70	352	14	1	3	41	10	8	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	366	0	0	368	0	0	884	884	366	893	872	352
Stage 1	-	-	-	-	-	-	378	378	-	492	492	-
Stage 2	-	-	-	-	-	-	506	506	-	401	380	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1187	-	-	1185	-	-	265	283	677	261	288	689
Stage 1	-	-	-	-	-	-	642	613	-	557	546	-
Stage 2	-	-	-	-	-	-	547	538	-	624	612	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1187	-	-	1185	-	-	244	265	677	231	270	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	265	-	231	270	-
Stage 1	-	-	-	-	-	-	639	610	-	554	514	-
Stage 2	-	-	-	-	-	-	502	506	-	580	609	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	11.5	17.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	244	265	677	1187	-	-	1185	-	-	231	270	689
HCM Lane V/C Ratio	0.004	0.012	0.061	0.005	-	-	0.059	-	-	0.045	0.031	0.009
HCM Control Delay (s)	19.8	18.7	10.7	8	-	-	8.2	-	-	21.3	18.8	10.3
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C	B
HCM 95th %tile Q(veh)	0	0	0.2	0	-	-	0.2	-	-	0.1	0.1	0

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	417	0	0	543	0	0
Future Vol, veh/h	417	0	0	543	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	453	0	0	590	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	453	0	1043	453
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	590	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1108	-	254	607
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	554	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1108	-	254	607
Mov Cap-2 Maneuver	-	-	-	-	254	-
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	554	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	1108	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	417	0	0	543	0	0
Future Vol, veh/h	417	0	0	543	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	453	0	0	590	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	453	0	1043	453
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	590	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1108	-	254	607
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	554	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1108	-	254	607
Mov Cap-2 Maneuver	-	-	-	-	254	-
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	554	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	1108	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection												
Int Delay, s/veh	4.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	219	198	18	237	0	0	0	0	41	0	306
Future Vol, veh/h	0	219	198	18	237	0	0	0	0	41	0	306
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	226	204	19	244	0	0	0	0	42	0	315

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	430	0	0				610	712	244
Stage 1	-	-	-	-	-	-				282	282	-
Stage 2	-	-	-	-	-	-				328	430	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1129	-	0				458	358	795
Stage 1	0	-	-	-	-	0				766	678	-
Stage 2	0	-	-	-	-	0				730	583	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1129	-	-				450	0	795
Mov Cap-2 Maneuver	-	-	-	-	-	-				450	0	-
Stage 1	-	-	-	-	-	-				766	0	-
Stage 2	-	-	-	-	-	-				718	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1129	-	450	795
HCM Lane V/C Ratio	-	-	0.016	-	0.094	0.397
HCM Control Delay (s)	-	-	8.2	-	13.8	12.5
HCM Lane LOS	-	-	A	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	-	0.3	1.9

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	157	126	0	0	73	14	171	1	21	0	0	0
Future Vol, veh/h	157	126	0	0	73	14	171	1	21	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	173	138	0	0	80	15	188	1	23	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	95	0	-	-	-	0	572	579	138
Stage 1	-	-	-	-	-	-	484	484	-
Stage 2	-	-	-	-	-	-	88	95	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1493	-	0	0	-	-	480	425	908
Stage 1	-	-	0	0	-	-	618	550	-
Stage 2	-	-	0	0	-	-	933	814	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1493	-	-	-	-	-	424	0	908
Mov Cap-2 Maneuver	-	-	-	-	-	-	424	0	-
Stage 1	-	-	-	-	-	-	546	0	-
Stage 2	-	-	-	-	-	-	933	0	-

Approach	EB	WB	NB
HCM Control Delay, s	4.3	0	18.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	424	908	1493	-	-	-
HCM Lane V/C Ratio	0.446	0.025	0.116	-	-	-
HCM Control Delay (s)	20.1	9.1	7.7	-	-	-
HCM Lane LOS	C	A	A	-	-	-
HCM 95th %tile Q(veh)	2.2	0.1	0.4	-	-	-

Intersection						
Int Delay, s/veh	3.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	121	66	102	251	17
Future Vol, veh/h	15	121	66	102	251	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	134	73	113	279	19

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	548	289	298	0	-	0
Stage 1	289	-	-	-	-	-
Stage 2	259	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	497	750	1263	-	-	-
Stage 1	760	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	468	750	1263	-	-	-
Mov Cap-2 Maneuver	468	-	-	-	-	-
Stage 1	716	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	3.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1263	-	468	750	-	-
HCM Lane V/C Ratio	0.058	-	0.036	0.179	-	-
HCM Control Delay (s)	8	-	13	10.8	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.7	-	-

Intersection						
Int Delay, s/veh	0					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	196	0	0	316
Future Vol, veh/h	0	0	196	0	0	316
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	213	0	0	343

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	556	213	0	0	213	0
Stage 1	213	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	492	827	-	-	1357	-
Stage 1	823	-	-	-	-	-
Stage 2	719	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	492	827	-	-	1357	-
Mov Cap-2 Maneuver	492	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	719	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1357	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	142	426	684	140	152
v/c Ratio	0.50	0.22	0.49	0.48	0.39
Control Delay	24.5	9.3	15.9	31.4	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	9.3	15.9	31.4	9.3
Queue Length 50th (ft)	41	23	66	38	0
Queue Length 95th (ft)	57	122	230	134	52
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	288	2454	1707	460	524
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.17	0.40	0.30	0.29

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	135	405	485	164	133	144
Future Volume (vph)	135	405	485	164	133	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3420		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3420		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	142	426	511	173	140	152
RTOR Reduction (vph)	0	0	32	0	0	129
Lane Group Flow (vph)	142	426	652	0	140	23
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	7.4	31.2	22.3		9.0	9.0
Effective Green, g (s)	7.4	31.2	22.3		9.0	9.0
Actuated g/C Ratio	0.12	0.52	0.37		0.15	0.15
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	220	1861	1273		268	240
v/s Ratio Prot	c0.08	0.12	c0.19			
v/s Ratio Perm					c0.08	0.01
v/c Ratio	0.65	0.23	0.51		0.52	0.10
Uniform Delay, d1	25.0	7.8	14.6		23.5	21.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.8	0.0	0.1		0.8	0.1
Delay (s)	29.8	7.8	14.7		24.3	22.0
Level of Service	C	A	B		C	C
Approach Delay (s)		13.3	14.7		23.1	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	21.2
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	723	140	55	83	188	188
v/c Ratio	0.43	0.35	0.12	0.80	0.51	0.58	0.22	0.18	0.69	0.66
Control Delay	39.6	22.5	2.3	59.3	16.1	43.3	32.8	3.5	46.4	41.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	22.5	2.3	59.3	16.1	43.3	32.8	3.5	46.4	41.2
Queue Length 50th (ft)	47	93	0	104	77	72	27	0	101	91
Queue Length 95th (ft)	94	166	15	#198	#291	117	55	13	161	151
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	257	1342	666	252	1407	378	398	480	379	389
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.35	0.12	0.73	0.51	0.37	0.14	0.17	0.50	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	107	137	54	81	253	72	44
Future Volume (vph)	94	457	81	180	602	107	137	54	81	253	72	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1562	1787	3482		1787	1881	1586	1698	1684	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1562	1787	3482		1787	1881	1586	1698	1684	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	109	140	55	83	258	73	45
RTOR Reduction (vph)	0	0	53	0	13	0	0	0	60	0	14	0
Lane Group Flow (vph)	96	466	30	184	710	0	140	55	23	188	174	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	9.8	30.9	30.9	12.0	33.1		11.5	11.5	23.5	13.6	13.6	
Effective Green, g (s)	9.8	30.9	30.9	12.0	33.1		11.5	11.5	23.5	13.6	13.6	
Actuated g/C Ratio	0.12	0.36	0.36	0.14	0.39		0.14	0.14	0.28	0.16	0.16	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	206	1299	567	252	1355		241	254	438	271	269	
v/s Ratio Prot	0.05	0.13		c0.10	c0.20		c0.08	0.03	0.01	c0.11	0.10	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.47	0.36	0.05	0.73	0.52		0.58	0.22	0.05	0.69	0.65	
Uniform Delay, d1	35.2	19.8	17.6	34.9	19.9		34.5	32.7	22.6	33.7	33.4	
Progression Factor	1.00	1.00	1.00	0.99	0.60		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	8.2	1.3		2.3	0.2	0.0	6.1	4.0	
Delay (s)	35.8	20.6	17.7	42.7	13.4		36.8	32.9	22.6	39.8	37.4	
Level of Service	D	C	B	D	B		D	C	C	D	D	
Approach Delay (s)		22.5			19.3			31.8			38.6	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	107	137	54	81	253	72	44
Future Volume (veh/h)	94	457	81	180	602	107	137	54	81	253	72	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	109	140	55	83	188	171	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	583	801	349	574	663	118	192	202	680	269	215	57
Arrive On Green	0.32	0.22	0.22	0.64	0.44	0.44	0.11	0.11	0.11	0.15	0.15	0.15
Sat Flow, veh/h	1795	3582	1560	1795	3039	538	1795	1885	1584	1795	1435	378
Grp Volume(v), veh/h	96	466	83	184	361	362	140	55	83	188	0	216
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1787	1795	1885	1584	1795	0	1813
Q Serve(g_s), s	3.2	9.9	3.7	4.0	16.2	16.3	6.4	2.3	0.0	8.5	0.0	9.8
Cycle Q Clear(g_c), s	3.2	9.9	3.7	4.0	16.2	16.3	6.4	2.3	0.0	8.5	0.0	9.8
Prop In Lane	1.00		1.00	1.00		0.30	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	583	801	349	574	391	390	192	202	680	269	0	272
V/C Ratio(X)	0.16	0.58	0.24	0.32	0.92	0.93	0.73	0.27	0.12	0.70	0.00	0.79
Avail Cap(c_a), veh/h	583	801	349	574	400	399	380	399	846	401	0	405
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.89	0.89	0.89	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.5	29.5	27.1	11.2	23.3	23.3	36.8	34.9	14.7	34.3	0.0	34.9
Incr Delay (d2), s/veh	0.0	3.1	1.6	0.1	27.6	28.2	2.0	0.3	0.0	1.2	0.0	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.4	1.5	1.4	7.7	7.7	2.8	1.0	0.9	3.7	0.0	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.5	32.5	28.7	11.3	50.9	51.5	38.7	35.2	14.8	35.5	0.0	38.3
LnGrp LOS	C	C	C	B	D	D	D	D	B	D	A	D
Approach Vol, veh/h		645			907			278			404	
Approach Delay, s/veh		30.3			43.1			30.9			37.0	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	32.2	23.0		16.8	32.6	22.5		13.1				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	12.0	19.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	6.0	11.9		11.8	5.2	18.3		8.4				
Green Ext Time (p_c), s	0.1	1.3		0.7	0.0	0.3		0.4				

Intersection Summary			
HCM 6th Ctrl Delay			36.8
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	917	146	707	284	118	203	414
v/c Ratio	0.76	0.68	0.39	0.72	0.64	0.27	0.57
Control Delay	23.4	48.0	8.3	42.0	53.6	18.5	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	48.0	8.3	42.0	53.6	18.5	14.6
Queue Length 50th (ft)	249	68	108	140	62	71	93
Queue Length 95th (ft)	167	141	127	#250	#133	121	183
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1203	252	1799	392	185	747	731
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.58	0.39	0.72	0.64	0.27	0.57

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	836	26	137	665	0	0	0	267	111	191	389
Future Volume (vph)	0	836	26	137	665	0	0	0	267	111	191	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3555		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3555		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	889	28	146	707	0	0	0	284	118	203	414
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	104
Lane Group Flow (vph)	0	917	0	146	707	0	0	0	284	118	203	310
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Effective Green, g (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Actuated g/C Ratio		0.34		0.12	0.50				0.24	0.10	0.40	0.40
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1204		214	1799				392	185	747	627
v/s Ratio Prot		c0.26		c0.08	0.20				c0.17	c0.07	0.11	
v/s Ratio Perm												0.20
v/c Ratio		0.76		0.68	0.39				0.72	0.64	0.27	0.49
Uniform Delay, d1		25.0		35.8	13.1				29.7	36.6	17.3	19.2
Progression Factor		0.72		0.90	0.58				1.00	1.00	1.00	1.00
Incremental Delay, d2		4.4		6.8	0.6				6.5	15.6	0.9	2.8
Delay (s)		22.5		39.0	8.2				36.2	52.2	18.2	22.0
Level of Service		C		D	A				D	D	B	C
Approach Delay (s)		22.5			13.5			36.2			25.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	363	492	467	102	239	235	186
v/c Ratio	0.46	0.20	0.30	0.14	0.67	0.66	0.39
Control Delay	6.6	3.4	18.2	5.0	39.6	39.0	6.4
Queue Delay	0.6	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	3.6	18.2	5.0	39.6	39.0	6.4
Queue Length 50th (ft)	46	31	86	0	124	122	0
Queue Length 95th (ft)	78	50	144	33	182	177	45
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	829	2514	1553	728	585	587	673
Starvation Cap Reductn	192	1220	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.38	0.30	0.14	0.41	0.40	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	467	0	0	444	97	446	5	177	0	0	0
Future Volume (vph)	345	467	0	0	444	97	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1782	3574			3574	1545	1698	1704	1599			
Flt Permitted	0.45	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	843	3574			3574	1545	1698	1704	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	363	492	0	0	467	102	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	58	0	0	147	0	0	0
Lane Group Flow (vph)	363	492	0	0	467	44	239	235	39	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	59.8	59.8			37.0	37.0	17.8	17.8	17.8			
Effective Green, g (s)	59.8	59.8			37.0	37.0	17.8	17.8	17.8			
Actuated g/C Ratio	0.70	0.70			0.44	0.44	0.21	0.21	0.21			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	789	2514			1555	672	355	356	334			
v/s Ratio Prot	c0.10	0.14			0.13		c0.14	0.14				
v/s Ratio Perm	c0.23					0.03			0.02			
v/c Ratio	0.46	0.20			0.30	0.07	0.67	0.66	0.12			
Uniform Delay, d1	7.8	4.3			15.6	14.0	30.9	30.8	27.2			
Progression Factor	0.53	0.63			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.2			0.5	0.2	4.5	4.1	0.1			
Delay (s)	4.2	2.9			16.1	14.1	35.4	34.9	27.3			
Level of Service	A	A			B	B	D	C	C			
Approach Delay (s)		3.5			15.7			33.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	345	467	0	0	444	97	446	5	177	0	0	0
Future Volume (veh/h)	345	467	0	0	444	97	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	363	492	0	0	467	102	473	0	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	941	2647	0	0	986	427	608	0	271			
Arrive On Green	0.82	1.00	0.00	0.00	0.28	0.28	0.17	0.00	0.17			
Sat Flow, veh/h	1795	3676	0	0	3676	1549	3591	0	1598			
Grp Volume(v), veh/h	363	492	0	0	467	102	473	0	186			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1549	1795	0	1598			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.2	4.3	10.7	0.0	9.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.2	4.3	10.7	0.0	9.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	941	2647	0	0	986	427	608	0	271			
V/C Ratio(X)	0.39	0.19	0.00	0.00	0.47	0.24	0.78	0.00	0.69			
Avail Cap(c_a), veh/h	941	2647	0	0	986	427	1238	0	551			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.0	0.0	0.0	0.0	25.7	23.9	33.8	0.0	33.2			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.6	1.3	1.6	0.0	2.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.0	0.1	0.0	0.0	4.0	1.7	4.7	0.0	8.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.1	0.1	0.0	0.0	27.3	25.2	35.4	0.0	35.5			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		855			569			659				
Approach Delay, s/veh		1.4			26.9			35.4				
Approach LOS		A			C			D				

Timer - Assigned Phs		2		4	5	6			
Phs Duration (G+Y+Rc), s		66.9		18.1	38.9	28.0			
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6			
Max Green Setting (Gmax), s		* 48		29.3	19.9	23.4			
Max Q Clear Time (g_c+I1), s		2.0		12.7	2.0	11.2			
Green Ext Time (p_c), s		2.9		1.7	0.5	1.8			

Intersection Summary			
HCM 6th Ctrl Delay			19.1
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1292	90	853
v/c Ratio	0.48	0.42	0.24
Control Delay	0.6	35.9	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	35.9	0.2
Queue Length 50th (ft)	4	37	0
Queue Length 95th (ft)	0	0	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2712	252	3574
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	763
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.48	0.36	0.30

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	811	403	85	802	0	0
Future Volume (vph)	811	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3368		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3368		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	863	429	90	853	0	0
RTOR Reduction (vph)	67	0	0	0	0	0
Lane Group Flow (vph)	1225	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	66.6		10.2	85.0		
Effective Green, g (s)	66.6		10.2	76.5		
Actuated g/C Ratio	0.78		0.12	0.90		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2638		214	3216		
v/s Ratio Prot	c0.36		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.46		0.42	0.27		
Uniform Delay, d1	3.1		34.7	0.6		
Progression Factor	0.09		0.88	1.00		
Incremental Delay, d2	0.1		0.5	0.0		
Delay (s)	0.4		31.0	0.6		
Level of Service	A		C	A		
Approach Delay (s)	0.4			3.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	314	0	0	304	0	0
Future Vol, veh/h	314	0	0	304	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	341	0	0	330	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	341	0	671	341
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	330	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1218	-	422	701
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1218	-	422	701
Mov Cap-2 Maneuver	-	-	-	-	422	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	1218	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	187	391	519	162	246
v/c Ratio	0.48	0.22	0.46	0.60	0.55
Control Delay	15.9	10.4	15.6	36.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	10.4	15.6	36.0	9.0
Queue Length 50th (ft)	35	42	61	61	0
Queue Length 95th (ft)	64	81	122	122	56
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	1011	2485	1584	637	728
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.16	0.33	0.25	0.34

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	371	297	196	154	234
Future Volume (vph)	178	371	297	196	154	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3361		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3361		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	187	391	313	206	162	246
RTOR Reduction (vph)	0	0	95	0	0	208
Lane Group Flow (vph)	187	391	424	0	162	38
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	14.1	32.3	20.1		10.0	10.0
Effective Green, g (s)	14.1	32.3	20.1		10.0	10.0
Actuated g/C Ratio	0.22	0.49	0.31		0.15	0.15
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	385	1765	1032		273	244
v/s Ratio Prot	c0.10	0.11	c0.13			
v/s Ratio Perm					c0.09	0.02
v/c Ratio	0.49	0.22	0.41		0.59	0.15
Uniform Delay, d1	22.5	9.4	18.0		25.8	24.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.0	0.1		2.3	0.1
Delay (s)	22.8	9.4	18.1		28.1	24.1
Level of Service	C	A	B		C	C
Approach Delay (s)		13.8	18.1		25.7	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	65.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	117	409	88	238	819	98	84	76	256	257
v/c Ratio	0.51	0.31	0.13	0.78	0.56	0.53	0.43	0.16	0.78	0.78
Control Delay	52.0	27.7	1.4	50.1	9.6	54.0	49.7	3.4	56.5	55.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	27.7	1.4	50.1	9.7	54.0	49.7	3.4	56.5	55.5
Queue Length 50th (ft)	77	101	0	157	38	64	54	0	171	169
Queue Length 95th (ft)	134	180	8	228	65	109	95	14	255	252
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	238	1326	670	391	1468	306	322	549	404	406
Starvation Cap Reductn	0	0	0	0	44	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.31	0.13	0.61	0.58	0.32	0.26	0.14	0.63	0.63

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	389	84	226	461	317	93	80	72	434	31	22
Future Volume (vph)	111	389	84	226	461	317	93	80	72	434	31	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (prot)	1787	3574	1561	1787	3309		1787	1881	1588	1698	1693	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (perm)	1787	3574	1561	1787	3309		1787	1881	1588	1698	1693	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	117	409	88	238	485	334	98	84	76	457	33	23
RTOR Reduction (vph)	0	0	55	0	100	0	0	0	55	0	3	0
Lane Group Flow (vph)	117	409	33	238	719	0	98	84	21	256	254	0
Confl. Peds. (#/hr)			1			5			4			6
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	13.5	39.0	39.0	17.9	43.4		10.8	10.8	28.7	20.3	20.3	
Effective Green, g (s)	13.5	39.0	39.0	17.9	43.4		10.8	10.8	28.7	20.3	20.3	
Actuated g/C Ratio	0.13	0.37	0.37	0.17	0.41		0.10	0.10	0.27	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	229	1327	579	304	1367		183	193	434	328	327	
v/s Ratio Prot	0.07	0.11		c0.13	c0.22		c0.05	0.04	0.01	c0.15	0.15	
v/s Ratio Perm			0.02						0.00			
v/c Ratio	0.51	0.31	0.06	0.78	0.53		0.54	0.44	0.05	0.78	0.78	
Uniform Delay, d1	42.7	23.4	21.2	41.7	23.1		44.7	44.2	28.1	40.2	40.2	
Progression Factor	1.00	1.00	1.00	0.80	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.6	0.2	10.9	1.4		1.5	0.6	0.0	10.6	10.1	
Delay (s)	43.5	24.0	21.4	44.4	10.9		46.2	44.8	28.1	50.8	50.3	
Level of Service	D	C	C	D	B		D	D	C	D	D	
Approach Delay (s)		27.4			18.4			40.4			50.5	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	389	84	226	461	317	93	80	72	434	31	22
Future Volume (veh/h)	111	389	84	226	461	317	93	80	72	434	31	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	117	409	88	238	485	334	98	84	76	502	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	560	750	327	690	570	392	146	153	742	585	307	0
Arrive On Green	0.31	0.21	0.21	0.64	0.47	0.47	0.08	0.08	0.08	0.16	0.00	0.00
Sat Flow, veh/h	1795	3582	1559	1795	2023	1389	1795	1885	1574	3591	1885	0
Grp Volume(v), veh/h	117	409	88	238	429	390	98	84	76	502	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1559	1795	1791	1621	1795	1885	1574	1795	1885	0
Q Serve(g_s), s	5.0	10.7	5.0	6.4	22.2	22.3	5.6	4.5	0.0	14.3	0.0	0.0
Cycle Q Clear(g_c), s	5.0	10.7	5.0	6.4	22.2	22.3	5.6	4.5	0.0	14.3	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.86	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	560	750	327	690	505	457	146	153	742	585	307	0
V/C Ratio(X)	0.21	0.54	0.27	0.34	0.85	0.85	0.67	0.55	0.10	0.86	0.00	0.00
Avail Cap(c_a), veh/h	560	750	327	690	546	494	308	323	884	855	449	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	26.6	37.0	34.8	12.7	25.8	25.9	46.9	46.4	15.7	42.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	2.8	2.0	0.1	15.2	16.8	2.0	1.1	0.0	4.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.9	2.0	2.2	9.5	8.8	2.5	2.1	1.0	6.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	39.9	36.8	12.8	41.0	42.6	48.9	47.5	15.8	47.0	0.0	0.0
LnGrp LOS	C	D	D	B	D	D	D	D	B	D	A	A
Approach Vol, veh/h		614			1057			258			502	
Approach Delay, s/veh		36.9			35.3			38.7			47.0	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	45.4	26.0		21.1	37.8	33.6		12.5				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	23.0	22.0		25.0	13.0	32.0		18.0				
Max Q Clear Time (g_c+I1), s	8.4	12.7		16.3	7.0	24.3		7.6				
Green Ext Time (p_c), s	0.2	1.3		0.7	0.0	5.3		0.4				

Intersection Summary			
HCM 6th Ctrl Delay			38.5
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	984	77	741	252	66	168	235
v/c Ratio	0.82	0.45	0.44	0.79	0.17	0.20	0.31
Control Delay	35.6	60.5	4.8	57.8	32.7	16.2	11.0
Queue Delay	4.3	0.0	0.0	61.4	0.0	0.0	0.0
Total Delay	39.8	60.5	4.8	119.2	32.7	16.2	11.0
Queue Length 50th (ft)	359	36	22	162	35	61	56
Queue Length 95th (ft)	#519	71	33	238	71	91	95
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1205	207	1685	407	446	1016	891
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	154	0	0	180	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.37	0.44	1.11	0.15	0.17	0.26

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	919	26	74	711	0	0	0	242	63	161	226
Future Volume (vph)	0	919	26	74	711	0	0	0	242	63	161	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3588		1805	3610				1644	1805	1900	1592
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3588		1805	3610				1644	1805	1900	1592
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	957	27	77	741	0	0	0	252	66	168	235
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	46
Lane Group Flow (vph)	0	984	0	77	741	0	0	0	252	66	168	189
Confl. Peds. (#/hr)			16									2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		35.2		10.0	49.0				20.4	23.0	47.6	47.6
Effective Green, g (s)		35.2		10.0	49.0				20.4	23.0	47.6	47.6
Actuated g/C Ratio		0.34		0.10	0.47				0.19	0.22	0.45	0.45
Clearance Time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		1202		171	1684				319	395	861	721
v/s Ratio Prot		c0.27		0.04	c0.21				c0.15	0.04	0.09	
v/s Ratio Perm												c0.12
v/c Ratio		0.82		0.45	0.44				0.79	0.17	0.20	0.26
Uniform Delay, d1		32.0		44.9	18.8				40.3	33.2	17.2	17.8
Progression Factor		0.81		1.18	0.19				1.00	1.00	1.00	1.00
Incremental Delay, d2		5.8		0.7	0.8				11.8	0.1	0.1	0.1
Delay (s)		31.8		53.6	4.5				52.1	33.4	17.3	17.9
Level of Service		C		D	A				D	C	B	B
Approach Delay (s)		31.8			9.1			52.1			19.9	
Approach LOS		C			A			D			B	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	350	351	399	111	262	263	127
v/c Ratio	0.43	0.14	0.24	0.14	0.68	0.68	0.28
Control Delay	4.3	1.2	20.6	5.2	45.0	45.1	6.5
Queue Delay	0.7	0.2	0.0	0.0	0.5	0.5	0.0
Total Delay	5.0	1.5	20.6	5.2	45.5	45.6	6.5
Queue Length 50th (ft)	14	7	87	0	170	171	0
Queue Length 95th (ft)	49	11	148	38	229	229	41
Internal Link Dist (ft)		187	384			402	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	883	2513	1644	796	552	553	596
Starvation Cap Reductn	261	1481	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	77	77	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.34	0.24	0.14	0.55	0.55	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	336	337	0	0	383	107	503	1	122	0	0	0
Future Volume (vph)	336	337	0	0	383	107	503	1	122	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	0.98			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1805	3610			3610	1615	1715	1719	1584			
Flt Permitted	0.48	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	919	3610			3610	1615	1715	1719	1584			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	350	351	0	0	399	111	524	1	127	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	98	0	0	0
Lane Group Flow (vph)	350	351	0	0	399	51	262	263	29	0	0	0
Confl. Peds. (#/hr)									6			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	73.1	73.1			47.8	47.8	23.7	23.7	23.7			
Effective Green, g (s)	73.1	73.1			47.8	47.8	23.7	23.7	23.7			
Actuated g/C Ratio	0.70	0.70			0.46	0.46	0.23	0.23	0.23			
Clearance Time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Vehicle Extension (s)	2.0	2.5			2.5	2.5	2.5	2.5	2.5			
Lane Grp Cap (vph)	816	2513			1643	735	387	388	357			
v/s Ratio Prot	c0.09	0.10			0.11		0.15	c0.15				
v/s Ratio Perm	c0.21					0.03			0.02			
v/c Ratio	0.43	0.14			0.24	0.07	0.68	0.68	0.08			
Uniform Delay, d1	9.2	5.4			17.5	16.1	37.2	37.2	32.1			
Progression Factor	0.28	0.18			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.4	0.2	4.2	4.2	0.1			
Delay (s)	2.7	1.1			17.9	16.3	41.4	41.4	32.1			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		1.9			17.5			39.6			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	336	337	0	0	383	107	503	1	122	0	0	0
Future Volume (veh/h)	336	337	0	0	383	107	503	1	122	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	350	351	0	0	399	111	525	0	127			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	951	2673	0	0	1162	518	653	0	288			
Arrive On Green	0.76	1.00	0.00	0.00	0.32	0.32	0.18	0.00	0.18			
Sat Flow, veh/h	1810	3705	0	0	3705	1610	3619	0	1594			
Grp Volume(v), veh/h	350	351	0	0	399	111	525	0	127			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1610	1810	0	1594			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.8	5.3	14.6	0.0	7.4			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.8	5.3	14.6	0.0	7.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	951	2673	0	0	1162	518	653	0	288			
V/C Ratio(X)	0.37	0.13	0.00	0.00	0.34	0.21	0.80	0.00	0.44			
Avail Cap(c_a), veh/h	951	2673	0	0	1162	518	1165	0	513			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.75	0.75	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.9	0.0	0.0	0.0	27.1	25.9	41.2	0.0	38.3			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	0.8	0.9	1.8	0.0	0.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	0.0	3.9	2.1	6.6	0.0	6.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.0	0.1	0.0	0.0	27.9	26.9	43.0	0.0	39.1			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		701			510			652				
Approach Delay, s/veh		2.0			27.7			42.3				
Approach LOS		A			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		81.8		23.2	43.8	38.0						
Change Period (Y+Rc), s		* 4.1		* 4.2	* 4.1	4.2						
Max Green Setting (Gmax), s		* 63		* 34	* 25	33.8						
Max Q Clear Time (g_c+I1), s		2.0		16.6	2.0	10.8						
Green Ext Time (p_c), s		5.4		1.7	0.5	2.3						
Intersection Summary												
HCM 6th Ctrl Delay			23.1									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	18.8
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	67	141	359	105	142	356
Future Vol, veh/h	67	141	359	105	142	356
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	72	152	386	113	153	383
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	13.1	23.5	16.7
HCM LOS	B	C	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	32%	0%	100%
Vol Right, %	0%	100%	68%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	356	208	359	105
LT Vol	142	0	0	359	0
Through Vol	0	0	67	0	105
RT Vol	0	356	141	0	0
Lane Flow Rate	153	383	224	386	113
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.302	0.627	0.385	0.743	0.201
Departure Headway (Hd)	7.118	5.9	6.201	6.926	6.418
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	504	609	577	521	558
Service Time	4.883	3.664	4.267	4.686	4.177
HCM Lane V/C Ratio	0.304	0.629	0.388	0.741	0.203
HCM Control Delay	13	18.2	13.1	27.2	10.8
HCM Lane LOS	B	C	B	D	B
HCM 95th-tile Q	1.3	4.4	1.8	6.3	0.7

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1275	107	818
v/c Ratio	0.62	0.63	0.31
Control Delay	10.1	90.3	4.3
Queue Delay	0.0	0.0	0.5
Total Delay	10.1	90.3	4.8
Queue Length 50th (ft)	76	77	186
Queue Length 95th (ft)	193	131	213
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2147	207	2724
Starvation Cap Reductn	0	0	1370
Spillback Cap Reductn	0	0	571
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.59	0.52	0.60

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	700	524	103	785	0	0
Future Volume (vph)	700	524	103	785	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.97		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.94		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3279		1805	3610		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3279		1805	3610		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	729	546	107	818	0	0
RTOR Reduction (vph)	110	0	0	0	0	0
Lane Group Flow (vph)	1165	0	107	818	0	0
Confl. Peds. (#/hr)		16				
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2 8		1	6 2 8		
Permitted Phases						
Actuated Green, G (s)	62.2		10.0	76.2		
Effective Green, g (s)	62.2		10.0	72.2		
Actuated g/C Ratio	0.59		0.10	0.69		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	1942		171	2482		
v/s Ratio Prot	c0.36		c0.06	0.23		
v/s Ratio Perm						
v/c Ratio	0.60		0.63	0.33		
Uniform Delay, d1	13.5		45.7	6.6		
Progression Factor	0.80		1.64	0.71		
Incremental Delay, d2	0.3		5.0	0.1		
Delay (s)	11.1		79.9	4.8		
Level of Service	B		E	A		
Approach Delay (s)	11.1			13.5	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Existing Plus Project

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	173	203	55	94	132
Future Vol, veh/h	58	173	203	55	94	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	67	201	236	64	109	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	639	268	0	0	300	0
Stage 1	268	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	431	756	-	-	1228	-
Stage 1	763	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	393	756	-	-	1228	-
Mov Cap-2 Maneuver	393	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	3.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	393	756	1228	-
HCM Lane V/C Ratio	-	-	0.172	0.266	0.089	-
HCM Control Delay (s)	-	-	16	11.5	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	1.1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	371	55	46	282	18	106	119	154	37	61	14
v/c Ratio	0.06	0.54	0.08	0.30	0.36	0.02	0.41	0.34	0.36	0.22	0.18	0.03
Control Delay	35.9	21.6	0.2	39.7	15.4	0.1	39.9	28.8	7.8	36.5	27.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	21.6	0.2	39.7	15.4	0.1	39.9	28.8	7.8	36.5	27.2	0.2
Queue Length 50th (ft)	4	133	0	19	71	0	44	45	0	15	22	0
Queue Length 95th (ft)	19	212	0	54	158	0	#130	94	35	45	55	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	155	1151	1015	155	1160	1042	260	1016	933	196	1016	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.32	0.05	0.30	0.24	0.02	0.41	0.12	0.17	0.19	0.06	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	8	308	46	38	234	15	88	99	128	31	51	12
Future Volume (vph)	8	308	46	38	234	15	88	99	128	31	51	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	10	371	55	46	282	18	106	119	154	37	61	14
RTOR Reduction (vph)	0	0	35	0	0	11	0	0	125	0	0	13
Lane Group Flow (vph)	10	371	20	46	282	7	106	119	29	37	61	1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.7	25.0	25.0	2.4	26.7	26.7	9.3	13.0	13.0	3.0	6.7	6.7
Effective Green, g (s)	0.7	25.0	25.0	2.4	26.7	26.7	9.3	13.0	13.0	3.0	6.7	6.7
Actuated g/C Ratio	0.01	0.37	0.37	0.04	0.39	0.39	0.14	0.19	0.19	0.04	0.10	0.10
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	17	666	554	60	711	604	235	346	294	75	178	151
v/s Ratio Prot	0.01	c0.21		c0.03	0.16		c0.06	c0.07		0.02	0.03	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.59	0.56	0.04	0.77	0.40	0.01	0.45	0.34	0.10	0.49	0.34	0.01
Uniform Delay, d1	33.5	17.0	13.7	32.5	14.8	12.6	27.0	23.8	22.6	31.7	28.5	27.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.2	1.7	0.1	44.6	0.8	0.0	0.5	1.0	0.3	1.9	2.0	0.0
Delay (s)	78.7	18.8	13.8	77.0	15.6	12.6	27.5	24.8	22.9	33.6	30.5	27.6
Level of Service	E	B	B	E	B	B	C	C	C	C	C	C
Approach Delay (s)		19.5			23.6			24.8			31.2	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	308	46	38	234	15	88	99	128	31	51	12
Future Volume (veh/h)	8	308	46	38	234	15	88	99	128	31	51	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	10	371	55	46	282	18	106	119	154	37	61	14
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	22	535	443	80	595	505	134	305	259	69	236	200
Arrive On Green	0.01	0.29	0.29	0.05	0.33	0.33	0.08	0.17	0.17	0.04	0.13	0.13
Sat Flow, veh/h	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	10	371	55	46	282	18	106	119	154	37	61	14
Grp Sat Flow(s),veh/h/ln	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.3	9.7	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Cycle Q Clear(g_c), s	0.3	9.7	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	22	535	443	80	595	505	134	305	259	69	236	200
V/C Ratio(X)	0.45	0.69	0.12	0.57	0.47	0.04	0.79	0.39	0.59	0.54	0.26	0.07
Avail Cap(c_a), veh/h	161	1124	932	161	1124	953	203	1050	890	203	1050	890
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	16.9	14.0	25.2	14.5	12.4	24.4	20.0	20.8	25.4	21.1	20.6
Incr Delay (d2), s/veh	15.8	3.4	0.3	7.5	1.3	0.1	5.7	1.4	3.7	2.4	1.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.6	0.4	0.7	2.2	0.1	1.3	1.2	1.7	0.4	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	20.4	14.3	32.7	15.7	12.5	30.1	21.4	24.5	27.9	22.1	20.9
LnGrp LOS	D	C	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		436			346			379			112	
Approach Delay, s/veh		20.1			17.8			25.1			23.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	22.9	9.5	13.8	6.0	24.7	7.4	15.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.0	* 33	6.3	* 31	5.0	* 33	6.3	* 31
Max Q Clear Time (g_c+I1), s	3.4	11.7	5.2	3.6	2.3	8.6	3.1	7.0
Green Ext Time (p_c), s	0.0	4.1	0.0	0.5	0.0	2.9	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	21.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	465	1	18	286	10	1	3	141	11	4	2
Future Vol, veh/h	4	465	1	18	286	10	1	3	141	11	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	596	1	23	367	13	1	4	181	14	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	380	0	0	597	0	0	1030	1032	596	1112	1020	367
Stage 1	-	-	-	-	-	-	606	606	-	413	413	-
Stage 2	-	-	-	-	-	-	424	426	-	699	607	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1162	-	-	965	-	-	209	230	498	184	234	672
Stage 1	-	-	-	-	-	-	479	482	-	610	588	-
Stage 2	-	-	-	-	-	-	602	581	-	426	482	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1162	-	-	965	-	-	200	224	498	113	227	672
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	224	-	113	227	-
Stage 1	-	-	-	-	-	-	477	480	-	608	574	-
Stage 2	-	-	-	-	-	-	580	567	-	268	480	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	16.5	33
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	200	224	498	1162	-	-	965	-	-	113	227	672
HCM Lane V/C Ratio	0.006	0.017	0.363	0.004	-	-	0.024	-	-	0.125	0.023	0.004
HCM Control Delay (s)	23.1	21.4	16.3	8.1	-	-	8.8	-	-	41.4	21.2	10.4
HCM Lane LOS	C	C	C	A	-	-	A	-	-	E	C	B
HCM 95th %tile Q(veh)	0	0.1	1.6	0	-	-	0.1	-	-	0.4	0.1	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	632	12	105	310	23	199
Future Vol, veh/h	632	12	105	310	23	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	687	13	114	337	25	216

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	700	0	1252	687
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	565	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	897	-	190	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	897	-	166	447
Mov Cap-2 Maneuver	-	-	-	-	166	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	497	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	21.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	166	447	-	-	897	-
HCM Lane V/C Ratio	0.151	0.484	-	-	0.127	-
HCM Control Delay (s)	30.5	20.4	-	-	9.6	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	2.6	-	-	0.4	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	886	17	171	418	33	298
v/c Ratio	0.82	0.02	0.46	0.26	0.18	0.67
Control Delay	20.8	4.8	9.2	3.0	39.2	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	4.8	9.2	3.0	39.2	25.3
Queue Length 50th (ft)	342	1	19	53	16	81
Queue Length 95th (ft)	552	9	63	91	46	177
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1432	1220	377	1623	616	447
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.01	0.45	0.26	0.05	0.67

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	815	16	157	385	30	274
Future Volume (vph)	815	16	157	385	30	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	221	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	886	17	171	418	33	298
RTOR Reduction (vph)	0	5	0	0	0	93
Lane Group Flow (vph)	886	12	171	418	33	205
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	42.3	42.3	57.8	57.8	4.0	13.0
Effective Green, g (s)	42.3	42.3	57.8	57.8	4.0	13.0
Actuated g/C Ratio	0.57	0.57	0.77	0.77	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1053	895	357	1439	94	412
v/s Ratio Prot	c0.48		0.06	0.22	0.02	c0.06
v/s Ratio Perm		0.01	0.31			0.07
v/c Ratio	0.84	0.01	0.48	0.29	0.35	0.50
Uniform Delay, d1	13.5	7.1	11.3	2.5	34.1	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	0.0	1.0	0.1	2.3	1.0
Delay (s)	19.7	7.1	12.3	2.6	36.4	28.9
Level of Service	B	A	B	A	D	C
Approach Delay (s)	19.4			5.4	29.7	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	74.8	Sum of lost time (s)	19.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	815	16	157	385	30	274
Future Volume (veh/h)	815	16	157	385	30	274
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	886	17	171	418	33	298
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	962	815	245	1221	356	420
Arrive On Green	0.51	0.51	0.07	0.65	0.20	0.20
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	886	17	171	418	33	298
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	38.6	0.5	3.7	8.8	1.3	15.0
Cycle Q Clear(g_c), s	38.6	0.5	3.7	8.8	1.3	15.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	962	815	245	1221	356	420
V/C Ratio(X)	0.92	0.02	0.70	0.34	0.09	0.71
Avail Cap(c_a), veh/h	1145	970	301	1463	464	516
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.8	10.5	19.5	6.8	28.8	29.4
Incr Delay (d2), s/veh	10.8	0.0	5.3	0.2	0.1	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.2	0.1	1.9	2.5	0.6	6.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.6	10.5	24.8	7.0	28.9	32.8
LnGrp LOS	C	B	C	A	C	C
Approach Vol, veh/h	903			589	331	
Approach Delay, s/veh	30.2			12.2	32.4	
Approach LOS	C			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.2	51.9				64.1		24.1
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	8.5	54.0				69.0		23.0
Max Q Clear Time (g_c+I1), s	5.7	40.6				10.8		17.0
Green Ext Time (p_c), s	0.1	4.8				2.3		0.6

Intersection Summary			
HCM 6th Ctrl Delay			24.8
HCM 6th LOS			C

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	716	373	23	309	0	0	0	0	25	0	233
Future Vol, veh/h	0	716	373	23	309	0	0	0	0	25	0	233
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	994	518	32	429	0	0	0	0	35	0	324

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	1512	0	0				1746	2005	429
Stage 1	-	-	-	-	-	-				493	493	-
Stage 2	-	-	-	-	-	-				1253	1512	-
Critical Hdwy	-	-	-	4.15	-	-				6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-				5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-				3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	433	-	0				93	58	620
Stage 1	0	-	-	-	-	0				608	542	-
Stage 2	0	-	-	-	-	0				265	180	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	433	-	-				86	0	620
Mov Cap-2 Maneuver	-	-	-	-	-	-				86	0	-
Stage 1	-	-	-	-	-	-				608	0	-
Stage 2	-	-	-	-	-	-				245	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1	22.4
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	433	-	86	620
HCM Lane V/C Ratio	-	-	0.074	-	0.404	0.522
HCM Control Delay (s)	-	-	14	-	72.7	17
HCM Lane LOS	-	-	B	-	F	C
HCM 95th %tile Q(veh)	-	-	0.2	-	1.6	3

Intersection	
Int Delay, s/veh	729.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	483	269	0	0	124	22	195	1	23	0	0	0
Future Vol, veh/h	483	269	0	0	124	22	195	1	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	68	68	68	68	68	68	68	68	68	68	68	68
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	710	396	0	0	182	32	287	1	34	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	214	0	-	-	-	0	2014	2030	396
Stage 1	-	-	-	-	-	-	1816	1816	-
Stage 2	-	-	-	-	-	-	198	214	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1350	-	0	0	-	-	~ 64	57	651
Stage 1	-	-	0	0	-	-	~ 141	128	-
Stage 2	-	-	0	0	-	-	833	724	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1350	-	-	-	-	-	~ 30	0	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	0	-
Stage 1	-	-	-	-	-	-	~ 67	0	-
Stage 2	-	-	-	-	-	-	833	0	-

Approach	EB	WB	NB
HCM Control Delay, s	6.8	0	$ 3695.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	30	651	1350	-	-	-
HCM Lane V/C Ratio	9.608	0.052	0.526	-	-	-
HCM Control Delay (s)	$ 4128.1	10.8	10.6	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	35.3	0.2	3.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	270	122	259	170	22
Future Vol, veh/h	23	270	122	259	170	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	40	474	214	454	298	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1200	318	337	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	882	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	204	720	1217	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	403	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	720	1217	-	-	-
Mov Cap-2 Maneuver	168	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	403	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.2	2.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1217	-	168	720	-	-
HCM Lane V/C Ratio	0.176	-	0.24	0.658	-	-
HCM Control Delay (s)	8.6	-	33.1	19.1	-	-
HCM Lane LOS	A	-	D	C	-	-
HCM 95th %tile Q(veh)	0.6	-	0.9	5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	189	53	272	127	28	134
Future Vol, veh/h	189	53	272	127	28	134
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	58	296	138	30	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	502	296	0	0	434	0
Stage 1	296	-	-	-	-	-
Stage 2	206	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	529	743	-	-	1126	-
Stage 1	755	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	515	743	-	-	1126	-
Mov Cap-2 Maneuver	515	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	515	743	1126	-
HCM Lane V/C Ratio	-	-	0.399	0.078	0.027	-
HCM Control Delay (s)	-	-	16.6	10.3	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	226	412	467	147	173
v/c Ratio	0.72	0.21	0.37	0.55	0.45
Control Delay	34.6	9.1	14.8	34.0	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	9.1	14.8	34.0	9.5
Queue Length 50th (ft)	~71	23	42	41	0
Queue Length 95th (ft)	74	114	144	#152	55
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	314	2119	1389	338	442
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.72	0.19	0.34	0.43	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	208	379	313	117	135	159
Future Volume (vph)	208	379	313	117	135	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3395		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3395		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	412	340	127	147	173
RTOR Reduction (vph)	0	0	40	0	0	148
Lane Group Flow (vph)	226	412	427	0	147	25
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	10.3	32.3	20.8		8.7	8.7
Effective Green, g (s)	10.3	32.3	20.8		8.7	8.7
Actuated g/C Ratio	0.17	0.53	0.34		0.14	0.14
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	298	1873	1157		252	225
v/s Ratio Prot	c0.13	0.12	c0.13			
v/s Ratio Perm					c0.08	0.02
v/c Ratio	0.76	0.22	0.37		0.58	0.11
Uniform Delay, d1	24.2	7.6	15.2		24.5	22.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.4	0.0	0.1		2.2	0.1
Delay (s)	33.6	7.7	15.2		26.7	22.9
Level of Service	C	A	B		C	C
Approach Delay (s)		16.8	15.2		24.6	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	493	68	43	206	116	115
v/c Ratio	0.19	0.31	0.09	0.68	0.26	0.36	0.22	0.42	0.54	0.51
Control Delay	35.4	18.7	1.1	43.9	6.7	38.5	34.8	4.4	42.7	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	18.7	1.1	43.9	6.7	38.5	34.8	4.4	42.7	36.8
Queue Length 50th (ft)	18	85	0	82	12	35	22	0	63	53
Queue Length 95th (ft)	41	174	5	140	87	62	44	18	102	93
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	267	1636	782	270	1926	374	394	534	375	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.31	0.09	0.54	0.26	0.18	0.11	0.39	0.31	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	62	68	43	206	168	40	23
RTOR Reduction (vph)	0	0	41	0	8	0	0	0	154	0	12	0
Lane Group Flow (vph)	34	505	29	147	485	0	68	43	52	116	103	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Effective Green, g (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Actuated g/C Ratio	0.07	0.42	0.42	0.16	0.51		0.10	0.10	0.25	0.13	0.13	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	118	1478	644	279	1764		170	179	400	215	214	
v/s Ratio Prot	0.02	c0.14		c0.08	0.14		c0.04	0.02	0.02	c0.07	0.06	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.29	0.34	0.05	0.53	0.27		0.40	0.24	0.13	0.54	0.48	
Uniform Delay, d1	37.7	16.8	14.7	32.9	11.9		36.1	35.5	24.5	34.7	34.4	
Progression Factor	1.00	1.00	1.00	0.80	0.43		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	0.4		0.6	0.3	0.1	1.3	0.6	
Delay (s)	38.2	17.4	14.8	27.1	5.5		36.7	35.8	24.5	36.0	35.0	
Level of Service	D	B	B	C	A		D	D	C	D	D	
Approach Delay (s)		18.3			10.4			28.6			35.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	62	68	43	206	116	113	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	822	753	334	740	516	74	121	127	765	187	158	32
Arrive On Green	0.46	0.21	0.21	0.83	0.33	0.33	0.07	0.07	0.07	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1578	1781	3121	446	1781	1870	1578	1781	1506	306
Grp Volume(v), veh/h	34	505	70	147	244	249	68	43	206	116	0	136
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1790	1781	1870	1578	1781	0	1812
Q Serve(g_s), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Cycle Q Clear(g_c), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	822	753	334	740	294	296	121	127	765	187	0	190
V/C Ratio(X)	0.04	0.67	0.21	0.20	0.83	0.84	0.56	0.34	0.27	0.62	0.00	0.71
Avail Cap(c_a), veh/h	822	753	334	740	397	400	377	396	992	398	0	405
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.6	30.8	27.6	4.3	27.3	27.4	38.4	37.8	13.0	36.4	0.0	36.8
Incr Delay (d2), s/veh	0.0	4.7	1.4	0.0	22.4	23.2	1.5	0.6	0.1	1.2	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.1	1.3	0.5	5.5	5.6	1.4	0.9	2.2	2.3	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.6	35.5	29.1	4.4	49.7	50.6	39.9	38.4	13.1	37.7	0.0	38.7
LnGrp LOS	B	D	C	A	D	D	D	D	B	D	A	D
Approach Vol, veh/h		609			640			317			252	
Approach Delay, s/veh		33.5			39.6			22.3			38.2	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	40.3	22.0		12.9	44.2	18.1		9.8				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	18.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.4	13.1		8.2	2.9	12.9		5.1				
Green Ext Time (p_c), s	0.1	1.1		0.4	0.0	1.0		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			34.4									
HCM 6th LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	973	81	515	460	137	72	237
v/c Ratio	0.81	0.65	0.32	0.87	1.10	0.09	0.29
Control Delay	25.8	56.2	10.5	45.7	152.1	14.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	56.2	10.5	45.7	152.1	14.7	3.2
Queue Length 50th (ft)	257	28	89	228	~84	22	0
Queue Length 95th (ft)	156	#104	89	#393	#192	46	38
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1204	124	1623	530	124	806	811
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.65	0.32	0.87	1.10	0.09	0.29

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	856	10	72	458	0	0	0	409	122	64	211
Future Volume (vph)	0	856	10	72	458	0	0	0	409	122	64	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3532		1770	3539				1611	1770	1863	1563
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3532		1770	3539				1611	1770	1863	1563
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	962	11	81	515	0	0	0	460	137	72	237
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	134
Lane Group Flow (vph)	0	973	0	81	515	0	0	0	460	137	72	103
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Effective Green, g (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Actuated g/C Ratio		0.34		0.07	0.46				0.33	0.07	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1205		124	1623				530	124	806	676
v/s Ratio Prot		c0.28		c0.05	0.15				c0.29	c0.08	0.04	
v/s Ratio Perm												0.07
v/c Ratio		0.81		0.65	0.32				0.87	1.10	0.09	0.15
Uniform Delay, d1		25.5		38.5	14.6				26.8	39.5	14.2	14.6
Progression Factor		0.77		0.78	0.68				1.00	1.00	1.00	1.00
Incremental Delay, d2		5.7		11.6	0.5				14.0	111.8	0.2	0.5
Delay (s)		25.2		41.6	10.4				40.8	151.3	14.4	15.1
Level of Service		C		D	B				D	F	B	B
Approach Delay (s)		25.2			14.6			40.8			56.8	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	600	546	396	253	147	149	142
v/c Ratio	0.63	0.21	0.30	0.35	0.60	0.61	0.40
Control Delay	8.5	2.7	21.1	4.6	43.6	43.9	9.2
Queue Delay	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	3.0	21.1	4.6	43.6	43.9	9.2
Queue Length 50th (ft)	80	28	79	0	77	80	0
Queue Length 95th (ft)	135	49	127	52	131	133	46
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	969	2639	1313	726	514	515	582
Starvation Cap Reductn	142	1394	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.44	0.30	0.35	0.29	0.29	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	546	497	0	0	360	230	268	1	129	0	0	0
Future Volume (vph)	546	497	0	0	360	230	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1765	3539			3539	1532	1681	1686	1583			
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	882	3539			3539	1532	1681	1686	1583			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	600	546	0	0	396	253	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	159	0	0	121	0	0	0
Lane Group Flow (vph)	600	546	0	0	396	94	147	149	21	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Effective Green, g (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Actuated g/C Ratio	0.75	0.75			0.37	0.37	0.15	0.15	0.15			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	946	2639			1311	567	245	245	230			
v/s Ratio Prot	c0.21	0.15			0.11		0.09	c0.09				
v/s Ratio Perm	c0.27					0.06			0.01			
v/c Ratio	0.63	0.21			0.30	0.17	0.60	0.61	0.09			
Uniform Delay, d1	8.5	3.2			19.0	17.9	34.0	34.0	31.4			
Progression Factor	0.58	0.70			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.9	0.2			0.6	0.6	3.3	3.6	0.1			
Delay (s)	5.9	2.4			19.6	18.6	37.3	37.6	31.5			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		4.2			19.2			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	546	497	0	0	360	230	268	1	129	0	0	0
Future Volume (veh/h)	546	497	0	0	360	230	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	600	546	0	0	396	253	296	0	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1075	2730	0	0	702	303	436	0	194			
Arrive On Green	0.87	1.00	0.00	0.00	0.20	0.20	0.12	0.00	0.12			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	3563	0	1585			
Grp Volume(v), veh/h	600	546	0	0	396	253	296	0	142			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.6	13.5	6.8	0.0	7.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.6	13.5	6.8	0.0	7.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1075	2730	0	0	702	303	436	0	194			
V/C Ratio(X)	0.56	0.20	0.00	0.00	0.56	0.84	0.68	0.00	0.73			
Avail Cap(c_a), veh/h	1075	2730	0	0	702	303	1090	0	485			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	2.2	0.0	0.0	0.0	30.8	32.8	35.7	0.0	36.0			
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	3.3	23.1	1.4	0.0	3.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.1	0.0	0.0	3.8	6.7	3.0	0.0	6.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.6	0.1	0.0	0.0	34.0	55.8	37.1	0.0	39.9			
LnGrp LOS	A	A	A	A	C	E	D	A	D			
Approach Vol, veh/h		1146			649			438				
Approach Delay, s/veh		1.4			42.5			38.0				
Approach LOS		A			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		69.4		15.6	48.6	20.8						
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0						
Max Green Setting (Gmax), s		* 50		* 26	28.9	16.8						
Max Q Clear Time (g_c+I1), s		2.0		9.3	2.0	15.5						
Green Ext Time (p_c), s		4.0		1.1	0.9	0.5						
Intersection Summary												
HCM 6th Ctrl Delay			20.5									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1558	96	596
v/c Ratio	0.55	0.77	0.17
Control Delay	0.7	66.2	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.7	66.2	0.2
Queue Length 50th (ft)	6	32	0
Queue Length 95th (ft)	m0	#119	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2858	124	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	11	0	492
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.55	0.77	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1047	340	85	530	0	0
Future Volume (vph)	1047	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3388		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3388		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1176	382	96	596	0	0
RTOR Reduction (vph)	30	0	0	0	0	0
Lane Group Flow (vph)	1528	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	71.0		6.0	85.0		
Effective Green, g (s)	71.0		6.0	79.8		
Actuated g/C Ratio	0.84		0.07	0.94		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2829		124	3322		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.54		0.77	0.18		
Uniform Delay, d1	2.1		38.8	0.2		
Progression Factor	0.16		0.67	1.00		
Incremental Delay, d2	0.1		24.8	0.1		
Delay (s)	0.4		51.0	0.3		
Level of Service	A		D	A		
Approach Delay (s)	0.4			7.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	109	197	80	221	213
Future Vol, veh/h	43	109	197	80	221	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	45	115	207	84	233	224

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	939	249	0	0	291	0
Stage 1	249	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	292	787	-	-	1265	-
Stage 1	790	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	238	787	-	-	1265	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	790	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	4.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	238	787	1265	-
HCM Lane V/C Ratio	-	-	0.19	0.146	0.184	-
HCM Control Delay (s)	-	-	23.6	10.4	8.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	382	128	88	307	38	111	49	48	23	84	17
v/c Ratio	0.14	0.57	0.19	0.67	0.34	0.04	0.66	0.12	0.10	0.17	0.30	0.05
Control Delay	35.3	22.4	2.7	59.8	14.1	0.1	55.2	24.7	0.4	36.0	30.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	22.4	2.7	59.8	14.1	0.1	55.2	24.7	0.4	36.0	30.1	0.3
Queue Length 50th (ft)	7	131	0	35	74	0	45	14	0	9	31	0
Queue Length 95th (ft)	30	224	22	#123	176	0	#149	50	0	34	77	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	135	943	879	132	972	901	168	884	835	132	865	805
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.41	0.15	0.67	0.32	0.04	0.66	0.06	0.06	0.17	0.10	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	344	115	79	276	34	100	44	43	21	76	15
Future Volume (vph)	17	344	115	79	276	34	100	44	43	21	76	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	382	128	88	307	38	111	49	48	23	84	17
RTOR Reduction (vph)	0	0	79	0	0	21	0	0	38	0	0	15
Lane Group Flow (vph)	19	382	49	88	307	17	111	49	10	23	84	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.9	28.9	28.9	5.1	33.1	33.1	6.4	14.9	14.9	1.8	10.3	10.3
Effective Green, g (s)	0.9	28.9	28.9	5.1	33.1	33.1	6.4	14.9	14.9	1.8	10.3	10.3
Actuated g/C Ratio	0.01	0.38	0.38	0.07	0.44	0.44	0.09	0.20	0.20	0.02	0.14	0.14
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	21	715	608	120	820	696	150	369	313	42	255	211
v/s Ratio Prot	0.01	c0.21		c0.05	c0.16		c0.06	c0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.90	0.53	0.08	0.73	0.37	0.02	0.74	0.13	0.03	0.55	0.33	0.01
Uniform Delay, d1	37.1	17.9	14.7	34.4	14.1	11.9	33.6	24.8	24.3	36.3	29.3	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	153.1	1.4	0.1	21.1	0.6	0.0	15.1	0.3	0.1	7.6	1.3	0.0
Delay (s)	190.2	19.3	14.8	55.5	14.7	11.9	48.7	25.1	24.4	43.9	30.6	28.1
Level of Service	F	B	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		24.4			22.8			37.5			32.7	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	344	115	79	276	34	100	44	43	21	76	15
Future Volume (veh/h)	17	344	115	79	276	34	100	44	43	21	76	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	382	128	88	307	38	111	49	48	23	84	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	41	560	475	118	642	544	142	324	274	48	225	186
Arrive On Green	0.02	0.30	0.30	0.07	0.34	0.34	0.08	0.17	0.17	0.03	0.12	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Grp Volume(v), veh/h	19	382	128	88	307	38	111	49	48	23	84	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Q Serve(g_s), s	0.6	10.1	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Cycle Q Clear(g_c), s	0.6	10.1	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	41	560	475	118	642	544	142	324	274	48	225	186
V/C Ratio(X)	0.47	0.68	0.27	0.75	0.48	0.07	0.78	0.15	0.18	0.48	0.37	0.09
Avail Cap(c_a), veh/h	161	1120	949	158	1117	947	180	1051	890	158	1028	851
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	17.4	15.1	25.9	14.6	12.5	25.5	19.8	19.9	27.1	22.9	22.1
Incr Delay (d2), s/veh	9.7	3.1	0.6	13.8	1.2	0.1	12.0	0.4	0.5	2.8	1.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	1.1	1.4	2.5	0.3	1.7	0.5	0.5	0.3	1.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	20.5	15.7	39.6	15.7	12.6	37.5	20.2	20.4	29.8	24.6	22.4
LnGrp LOS	D	C	B	D	B	B	D	C	C	C	C	C
Approach Vol, veh/h		529			433			208			124	
Approach Delay, s/veh		19.9			20.3			29.5			25.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	24.0	9.8	13.6	6.6	26.5	6.8	16.6
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.0	* 34	5.7	* 31	5.1	* 34	5.0	* 32
Max Q Clear Time (g_c+I1), s	4.7	12.1	5.5	4.3	2.6	9.3	2.7	3.5
Green Ext Time (p_c), s	0.0	4.8	0.0	0.7	0.0	3.3	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	22.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	404	2	40	375	20	1	3	18	18	8	6
Future Vol, veh/h	6	404	2	40	375	20	1	3	18	18	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	416	2	41	387	21	1	3	19	19	8	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	408	0	0	418	0	0	915	918	416	909	899	387
Stage 1	-	-	-	-	-	-	428	428	-	469	469	-
Stage 2	-	-	-	-	-	-	487	490	-	440	430	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1145	-	-	1136	-	-	252	271	634	255	278	659
Stage 1	-	-	-	-	-	-	603	583	-	573	559	-
Stage 2	-	-	-	-	-	-	560	547	-	594	582	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1145	-	-	1136	-	-	236	260	634	238	267	659
Mov Cap-2 Maneuver	-	-	-	-	-	-	236	260	-	238	267	-
Stage 1	-	-	-	-	-	-	600	580	-	570	539	-
Stage 2	-	-	-	-	-	-	527	527	-	571	579	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	12.4	18.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	236	260	634	1145	-	-	1136	-	-	238	267	659
HCM Lane V/C Ratio	0.004	0.012	0.029	0.005	-	-	0.036	-	-	0.078	0.031	0.009
HCM Control Delay (s)	20.3	19	10.8	8.2	-	-	8.3	-	-	21.4	18.9	10.5
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C	B
HCM 95th %tile Q(veh)	0	0	0.1	0	-	-	0.1	-	-	0.3	0.1	0

Intersection	
Int Delay, s/veh	3.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	428	25	208	537	17	145
Future Vol, veh/h	428	25	208	537	17	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	465	27	226	584	18	158

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	492	0	1501	465
Stage 1	-	-	-	-	465	-
Stage 2	-	-	-	-	1036	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	134	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	342	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	106	597
Mov Cap-2 Maneuver	-	-	-	-	106	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	270	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	106	597	-	-	1071	-
HCM Lane V/C Ratio	0.174	0.264	-	-	0.211	-
HCM Control Delay (s)	46	13.2	-	-	9.3	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	1.1	-	-	0.8	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	552	71	372	737	73	262
v/c Ratio	0.75	0.11	0.65	0.52	0.30	0.38
Control Delay	25.9	4.8	12.5	6.9	34.5	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	4.8	12.5	6.9	34.5	8.5
Queue Length 50th (ft)	200	1	51	132	30	30
Queue Length 95th (ft)	356	24	143	242	75	86
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1086	952	711	1590	702	839
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.07	0.52	0.46	0.10	0.31

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	508	65	342	678	67	241
Future Volume (vph)	508	65	342	678	67	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.22	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	405	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	552	71	372	737	73	262
RTOR Reduction (vph)	0	41	0	0	0	103
Lane Group Flow (vph)	552	30	372	737	73	159
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	26.8	26.8	46.7	46.7	6.6	20.0
Effective Green, g (s)	26.8	26.8	46.7	46.7	6.6	20.0
Actuated g/C Ratio	0.40	0.40	0.70	0.70	0.10	0.30
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	753	639	561	1312	176	632
v/s Ratio Prot	c0.30		0.13	c0.40	c0.04	0.05
v/s Ratio Perm		0.02	0.33			0.05
v/c Ratio	0.73	0.05	0.66	0.56	0.41	0.25
Uniform Delay, d1	16.7	12.0	7.8	4.8	28.0	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	0.0	2.9	0.6	1.6	0.2
Delay (s)	20.4	12.0	10.7	5.3	29.6	17.7
Level of Service	C	B	B	A	C	B
Approach Delay (s)	19.5			7.1	20.3	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	508	65	342	678	67	241
Future Volume (veh/h)	508	65	342	678	67	241
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	552	71	372	737	73	262
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	654	555	467	1153	314	538
Arrive On Green	0.35	0.35	0.16	0.62	0.18	0.18
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	552	71	372	737	73	262
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	17.1	1.9	7.5	15.7	2.2	8.2
Cycle Q Clear(g_c), s	17.1	1.9	7.5	15.7	2.2	8.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	654	555	467	1153	314	538
V/C Ratio(X)	0.84	0.13	0.80	0.64	0.23	0.49
Avail Cap(c_a), veh/h	1030	873	685	1757	652	839
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.8	13.9	12.4	7.6	22.2	16.4
Incr Delay (d2), s/veh	3.8	0.1	4.1	0.6	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.6	2.4	3.4	0.9	2.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.7	14.0	16.5	8.2	22.6	17.1
LnGrp LOS	C	B	B	A	C	B
Approach Vol, veh/h	623			1109	335	
Approach Delay, s/veh	21.7			11.0	18.3	
Approach LOS	C			B	B	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.7	28.5				45.2		17.6
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	17.9	34.6				59.0		23.0
Max Q Clear Time (g_c+I1), s	9.5	19.1				17.7		10.2
Green Ext Time (p_c), s	0.7	2.9				5.0		0.9

Intersection Summary			
HCM 6th Ctrl Delay			15.4
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	14.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	405	344	18	532	0	0	0	0	41	0	488
Future Vol, veh/h	0	405	344	18	532	0	0	0	0	41	0	488
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	418	355	19	548	0	0	0	0	42	0	503

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	773	0	0				1182	1359	548
Stage 1	-	-	-	-	-	-				586	586	-
Stage 2	-	-	-	-	-	-				596	773	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	842	-	0				210	149	536
Stage 1	0	-	-	-	-	0				556	497	-
Stage 2	0	-	-	-	-	0				550	409	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	842	-	-				205	0	536
Mov Cap-2 Maneuver	-	-	-	-	-	-				205	0	-
Stage 1	-	-	-	-	-	-				556	0	-
Stage 2	-	-	-	-	-	-				537	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.3	50.9
HCM LOS			F

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	842	-	205	536
HCM Lane V/C Ratio	-	-	0.022	-	0.206	0.939
HCM Control Delay (s)	-	-	9.4	-	27.1	52.9
HCM Lane LOS	-	-	A	-	D	F
HCM 95th %tile Q(veh)	-	-	0.1	-	0.8	11.8

Intersection	
Int Delay, s/veh	199.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	287	182	0	0	155	14	384	1	21	0	0	0
Future Vol, veh/h	287	182	0	0	155	14	384	1	21	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	315	200	0	0	170	15	422	1	23	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	185	0	-	-	-	0	1008	1015	200
Stage 1	-	-	-	-	-	-	830	830	-
Stage 2	-	-	-	-	-	-	178	185	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1384	-	0	0	-	-	~ 265	237	838
Stage 1	-	-	0	0	-	-	426	383	-
Stage 2	-	-	0	0	-	-	850	745	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1384	-	-	-	-	-	~ 205	0	838
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 205	0	-
Stage 1	-	-	-	-	-	-	~ 329	0	-
Stage 2	-	-	-	-	-	-	850	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.1	0	$ 506.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	205	838	1384	-	-	-
HCM Lane V/C Ratio	2.064	0.028	0.228	-	-	-
HCM Control Delay (s)	$ 533.2	9.4	8.4	-	-	-
HCM Lane LOS	F	A	A	-	-	-
HCM 95th %tile Q(veh)	32.2	0.1	0.9	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	4.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	171	140	102	251	25
Future Vol, veh/h	21	171	140	102	251	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	190	156	113	279	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	718	293	307	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	425	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	396	746	1254	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	659	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	347	746	1254	-	-	-
Mov Cap-2 Maneuver	347	-	-	-	-	-
Stage 1	663	-	-	-	-	-
Stage 2	659	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1254	-	347	746	-	-
HCM Lane V/C Ratio	0.124	-	0.067	0.255	-	-
HCM Control Delay (s)	8.3	-	16.1	11.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	1	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	157	39	174	210	57	288
Future Vol, veh/h	157	39	174	210	57	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	171	42	189	228	62	313

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	626	189	0	0	417	0
Stage 1	189	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	448	853	-	-	1142	-
Stage 1	843	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	424	853	-	-	1142	-
Mov Cap-2 Maneuver	424	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.2	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	424	853	1142	-
HCM Lane V/C Ratio	-	-	0.402	0.05	0.054	-
HCM Control Delay (s)	-	-	19.1	9.4	8.3	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	220	426	727	169	204
v/c Ratio	0.80	0.21	0.55	0.58	0.47
Control Delay	45.9	9.3	16.8	33.9	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	9.3	16.8	33.9	9.0
Queue Length 50th (ft)	~80	25	72	46	0
Queue Length 95th (ft)	86	122	242	#171	60
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	276	2291	1595	429	539
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.19	0.46	0.39	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	209	405	485	205	161	194
Future Volume (vph)	209	405	485	205	161	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3393		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3393		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	220	426	511	216	169	204
RTOR Reduction (vph)	0	0	47	0	0	173
Lane Group Flow (vph)	220	426	680	0	169	31
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	9.2	32.4	21.8		9.5	9.5
Effective Green, g (s)	9.2	32.4	21.8		9.5	9.5
Actuated g/C Ratio	0.15	0.53	0.35		0.15	0.15
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	266	1876	1198		275	246
v/s Ratio Prot	c0.12	0.12	c0.20			
v/s Ratio Perm					c0.09	0.02
v/c Ratio	0.83	0.23	0.57		0.61	0.13
Uniform Delay, d1	25.5	7.9	16.1		24.4	22.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	17.8	0.0	0.4		2.9	0.1
Delay (s)	43.3	7.9	16.5		27.2	22.6
Level of Service	D	A	B		C	C
Approach Delay (s)		20.0	16.5		24.7	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	21.2
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	697	140	63	83	180	179
v/c Ratio	0.42	0.34	0.12	0.80	0.49	0.58	0.25	0.18	0.68	0.64
Control Delay	39.2	22.2	2.3	58.9	15.2	43.3	33.4	3.5	46.2	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	22.2	2.3	58.9	15.2	43.3	33.4	3.5	46.2	40.3
Queue Length 50th (ft)	47	92	0	103	72	72	31	0	96	85
Queue Length 95th (ft)	94	165	15	#199	#271	117	61	13	155	144
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	262	1357	672	252	1416	378	398	480	379	390
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.34	0.12	0.73	0.49	0.37	0.16	0.17	0.47	0.46

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (prot)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (perm)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	83	140	63	83	234	80	45
RTOR Reduction (vph)	0	0	53	0	10	0	0	0	60	0	15	0
Lane Group Flow (vph)	96	466	30	184	687	0	140	63	23	180	164	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Effective Green, g (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Actuated g/C Ratio	0.12	0.37	0.37	0.14	0.39		0.14	0.14	0.28	0.16	0.16	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	212	1311	573	252	1363		241	254	438	265	263	
v/s Ratio Prot	0.05	0.13		c0.10	c0.20		c0.08	0.03	0.01	c0.11	0.10	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.45	0.36	0.05	0.73	0.50		0.58	0.25	0.05	0.68	0.62	
Uniform Delay, d1	34.9	19.6	17.4	34.9	19.7		34.5	32.9	22.6	33.8	33.5	
Progression Factor	1.00	1.00	1.00	0.97	0.59		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	8.3	1.2		2.3	0.2	0.0	5.4	3.3	
Delay (s)	35.4	20.3	17.5	42.1	12.8		36.8	33.1	22.6	39.2	36.8	
Level of Service	D	C	B	D	B		D	C	C	D	D	
Approach Delay (s)		22.2			18.9			31.8			38.0	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	83	140	63	83	180	156	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	607	801	349	587	672	91	193	202	692	256	200	58
Arrive On Green	0.34	0.22	0.22	0.65	0.42	0.42	0.11	0.11	0.11	0.14	0.14	0.14
Sat Flow, veh/h	1795	3582	1560	1795	3170	428	1795	1885	1584	1795	1403	405
Grp Volume(v), veh/h	96	466	83	184	346	351	140	63	83	180	0	201
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1807	1795	1885	1584	1795	0	1807
Q Serve(g_s), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Cycle Q Clear(g_c), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	607	801	349	587	380	383	193	202	692	256	0	258
V/C Ratio(X)	0.16	0.58	0.24	0.31	0.91	0.92	0.73	0.31	0.12	0.70	0.00	0.78
Avail Cap(c_a), veh/h	607	801	349	587	400	404	380	399	857	401	0	404
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	29.5	27.1	10.6	23.7	23.8	36.7	35.0	14.4	34.7	0.0	35.2
Incr Delay (d2), s/veh	0.0	3.1	1.6	0.1	26.6	26.9	2.0	0.3	0.0	1.3	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.4	1.5	1.3	7.4	7.5	2.8	1.2	0.9	3.5	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	32.5	28.7	10.7	50.3	50.6	38.7	35.4	14.4	36.1	0.0	37.1
LnGrp LOS	B	C	C	B	D	D	D	D	B	D	A	D
Approach Vol, veh/h		645			881			286			381	
Approach Delay, s/veh		30.1			42.2			30.9			36.6	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.8	23.0		16.1	33.8	22.0		13.1
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	12.0	19.0		19.0	12.0	19.0		18.0
Max Q Clear Time (g_c+I1), s	5.8	11.9		11.1	5.2	17.5		8.4
Green Ext Time (p_c), s	0.1	1.3		0.6	0.0	0.5		0.4

Intersection Summary			
HCM 6th Ctrl Delay			36.2
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	892	146	707	284	154	203	386
v/c Ratio	0.74	0.68	0.39	0.72	0.83	0.27	0.53
Control Delay	22.1	47.7	8.8	42.0	73.3	18.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	47.7	8.8	42.0	73.3	18.5	13.3
Queue Length 50th (ft)	240	65	110	140	82	71	79
Queue Length 95th (ft)	156	141	127	#250	#186	121	162
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1203	252	1799	392	185	747	731
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.58	0.39	0.72	0.83	0.27	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	812	26	137	665	0	0	0	267	145	191	363
Future Volume (vph)	0	812	26	137	665	0	0	0	267	145	191	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3555		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3555		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	864	28	146	707	0	0	0	284	154	203	386
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	104
Lane Group Flow (vph)	0	892	0	146	707	0	0	0	284	154	203	282
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Effective Green, g (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Actuated g/C Ratio		0.34		0.12	0.50				0.24	0.10	0.40	0.40
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1204		214	1799				392	185	747	627
v/s Ratio Prot		c0.25		c0.08	0.20				c0.17	c0.09	0.11	
v/s Ratio Perm												0.18
v/c Ratio		0.74		0.68	0.39				0.72	0.83	0.27	0.45
Uniform Delay, d1		24.8		35.8	13.1				29.7	37.4	17.3	18.8
Progression Factor		0.70		0.89	0.61				1.00	1.00	1.00	1.00
Incremental Delay, d2		4.0		6.8	0.6				6.5	33.5	0.9	2.3
Delay (s)		21.4		38.7	8.7				36.2	70.9	18.2	21.1
Level of Service		C		D	A				D	E	B	C
Approach Delay (s)		21.4			13.8			36.2			30.6	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	338	527	467	154	239	235	186
v/c Ratio	0.43	0.21	0.30	0.20	0.67	0.66	0.39
Control Delay	6.9	4.0	17.9	4.4	39.6	39.0	6.4
Queue Delay	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	4.2	17.9	4.4	39.6	39.0	6.4
Queue Length 50th (ft)	50	40	84	0	124	122	0
Queue Length 95th (ft)	76	55	144	40	182	177	45
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	837	2514	1583	769	585	587	673
Starvation Cap Reductn	200	1187	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.40	0.30	0.20	0.41	0.40	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	501	0	0	444	146	446	5	177	0	0	0
Future Volume (vph)	321	501	0	0	444	146	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1782	3574			3574	1545	1698	1704	1599			
Flt Permitted	0.45	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	847	3574			3574	1545	1698	1704	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	338	527	0	0	467	154	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	86	0	0	147	0	0	0
Lane Group Flow (vph)	338	527	0	0	467	68	239	235	39	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	59.8	59.8			37.7	37.7	17.8	17.8	17.8			
Effective Green, g (s)	59.8	59.8			37.7	37.7	17.8	17.8	17.8			
Actuated g/C Ratio	0.70	0.70			0.44	0.44	0.21	0.21	0.21			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	783	2514			1585	685	355	356	334			
v/s Ratio Prot	c0.09	0.15			0.13		c0.14	0.14				
v/s Ratio Perm	c0.22					0.04			0.02			
v/c Ratio	0.43	0.21			0.29	0.10	0.67	0.66	0.12			
Uniform Delay, d1	7.4	4.4			15.1	13.8	30.9	30.8	27.2			
Progression Factor	0.60	0.74			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.2			0.5	0.3	4.5	4.1	0.1			
Delay (s)	4.6	3.4			15.6	14.1	35.4	34.9	27.3			
Level of Service	A	A			B	B	D	C	C			
Approach Delay (s)		3.9			15.2			33.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	321	501	0	0	444	146	446	5	177	0	0	0
Future Volume (veh/h)	321	501	0	0	444	146	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	338	527	0	0	467	154	473	0	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	935	2647	0	0	986	427	608	0	271			
Arrive On Green	0.82	1.00	0.00	0.00	0.28	0.28	0.17	0.00	0.17			
Sat Flow, veh/h	1795	3676	0	0	3676	1549	3591	0	1598			
Grp Volume(v), veh/h	338	527	0	0	467	154	473	0	186			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1549	1795	0	1598			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.2	6.8	10.7	0.0	9.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.2	6.8	10.7	0.0	9.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	935	2647	0	0	986	427	608	0	271			
V/C Ratio(X)	0.36	0.20	0.00	0.00	0.47	0.36	0.78	0.00	0.69			
Avail Cap(c_a), veh/h	935	2647	0	0	986	427	1238	0	551			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.0	0.0	0.0	0.0	25.7	24.8	33.8	0.0	33.2			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.6	2.4	1.6	0.0	2.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	0.1	0.0	0.0	4.0	2.7	4.7	0.0	8.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.1	0.1	0.0	0.0	27.3	27.1	35.4	0.0	35.5			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		865			621			659				
Approach Delay, s/veh		1.3			27.3			35.4				
Approach LOS		A			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		66.9		18.1	38.9	28.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 48		29.3	19.9	23.4						
Max Q Clear Time (g_c+I1), s		2.0		12.7	2.0	11.2						
Green Ext Time (p_c), s		3.1		1.7	0.4	1.9						
Intersection Summary												
HCM 6th Ctrl Delay			19.3									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1302	90	853
v/c Ratio	0.48	0.42	0.24
Control Delay	0.5	35.5	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	0.5	35.5	0.2
Queue Length 50th (ft)	4	36	0
Queue Length 95th (ft)	0	0	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2713	252	3574
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	469
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.48	0.36	0.27

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	821	403	85	802	0	0
Future Volume (vph)	821	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3370		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3370		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	873	429	90	853	0	0
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	1237	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	66.6		10.2	85.0		
Effective Green, g (s)	66.6		10.2	76.5		
Actuated g/C Ratio	0.78		0.12	0.90		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2640		214	3216		
v/s Ratio Prot	c0.37		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.47		0.42	0.27		
Uniform Delay, d1	3.1		34.7	0.6		
Progression Factor	0.06		0.87	1.00		
Incremental Delay, d2	0.1		0.5	0.0		
Delay (s)	0.3		30.7	0.6		
Level of Service	A		C	A		
Approach Delay (s)	0.3			3.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	470	39	264	462	41	249
v/c Ratio	0.65	0.06	0.43	0.29	0.14	0.45
Control Delay	16.9	4.9	5.4	3.5	21.9	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	4.9	5.4	3.5	21.9	8.0
Queue Length 50th (ft)	66	0	1	0	7	14
Queue Length 95th (ft)	223	15	60	112	38	63
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1134	979	651	1604	1110	604
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.04	0.41	0.29	0.04	0.41

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	432	36	243	425	38	229
Future Volume (vph)	432	36	243	425	38	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.28	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	517	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	470	39	264	462	41	249
RTOR Reduction (vph)	0	25	0	0	0	124
Lane Group Flow (vph)	470	14	264	462	41	125
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	17.5	17.5	31.9	31.9	2.3	10.2
Effective Green, g (s)	17.5	17.5	31.9	31.9	2.3	10.2
Actuated g/C Ratio	0.37	0.37	0.68	0.68	0.05	0.22
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690	586	559	1259	86	560
v/s Ratio Prot	c0.25		0.08	c0.25	0.02	c0.04
v/s Ratio Perm		0.01	0.24			0.04
v/c Ratio	0.68	0.02	0.47	0.37	0.48	0.22
Uniform Delay, d1	12.5	9.4	4.6	3.3	21.9	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	0.0	0.6	0.2	4.1	0.2
Delay (s)	15.3	9.4	5.2	3.5	26.0	15.4
Level of Service	B	A	A	A	C	B
Approach Delay (s)	14.8			4.1	16.9	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	19.5
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	432	36	243	425	38	229
Future Volume (veh/h)	432	36	243	425	38	229
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	470	39	264	462	41	249
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	488	440	1057	322	492
Arrive On Green	0.31	0.31	0.13	0.57	0.18	0.18
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	470	39	264	462	41	249
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.9	0.9	4.7	7.3	1.0	6.6
Cycle Q Clear(g_c), s	11.9	0.9	4.7	7.3	1.0	6.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	576	488	440	1057	322	492
V/C Ratio(X)	0.82	0.08	0.60	0.44	0.13	0.51
Avail Cap(c_a), veh/h	878	744	505	1427	802	919
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	12.5	10.8	6.4	17.6	14.4
Incr Delay (d2), s/veh	3.6	0.1	1.5	0.3	0.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	0.2	1.2	1.4	0.4	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.9	12.6	12.3	6.7	17.7	15.2
LnGrp LOS	B	B	B	A	B	B
Approach Vol, veh/h	509			726	290	
Approach Delay, s/veh	19.4			8.7	15.6	
Approach LOS	B			A	B	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.1	22.2				35.4		15.7
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	8.5	24.0				39.0		23.0
Max Q Clear Time (g_c+I1), s	6.7	13.9				9.3		8.6
Green Ext Time (p_c), s	0.1	1.9				2.5		0.8

Intersection Summary			
HCM 6th Ctrl Delay			13.6
HCM 6th LOS			B

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	245	391	552	193	302
v/c Ratio	0.57	0.23	0.50	0.66	0.59
Control Delay	17.6	11.7	16.8	39.2	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	11.7	16.8	39.2	9.0
Queue Length 50th (ft)	48	46	66	77	1
Queue Length 95th (ft)	80	92	138	151	63
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	958	2354	1521	604	738
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.17	0.36	0.32	0.41

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	233	371	297	227	183	287
Future Volume (vph)	233	371	297	227	183	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3342		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3342		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	245	391	313	239	193	302
RTOR Reduction (vph)	0	0	122	0	0	250
Lane Group Flow (vph)	245	391	430	0	193	52
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	16.4	33.6	20.2		11.4	11.4
Effective Green, g (s)	16.4	33.6	20.2		11.4	11.4
Actuated g/C Ratio	0.24	0.49	0.29		0.16	0.16
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	423	1735	975		294	263
v/s Ratio Prot	c0.14	0.11	c0.13			
v/s Ratio Perm					c0.11	0.03
v/c Ratio	0.58	0.23	0.44		0.66	0.20
Uniform Delay, d1	23.3	10.3	19.9		27.1	25.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.2	0.0	0.1		4.0	0.1
Delay (s)	24.5	10.3	20.0		31.1	25.1
Level of Service	C	B	C		C	C
Approach Delay (s)		15.8	20.0		27.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	21.2
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	117	409	88	238	792	98	91	76	246	247
v/c Ratio	0.50	0.30	0.13	0.79	0.54	0.53	0.47	0.16	0.78	0.77
Control Delay	50.9	27.2	1.4	49.9	9.3	54.0	51.0	3.4	56.6	55.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	27.2	1.4	49.9	9.3	54.0	51.0	3.4	56.6	55.1
Queue Length 50th (ft)	76	98	0	159	37	64	59	0	165	162
Queue Length 95th (ft)	134	180	8	231	260	109	102	14	244	242
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	242	1350	679	391	1460	306	322	549	404	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.30	0.13	0.61	0.54	0.32	0.28	0.14	0.61	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	389	84	226	461	292	93	86	72	409	37	22
Future Volume (vph)	111	389	84	226	461	292	93	86	72	409	37	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (prot)	1787	3574	1561	1787	3322		1787	1881	1588	1698	1695	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (perm)	1787	3574	1561	1787	3322		1787	1881	1588	1698	1695	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	117	409	88	238	485	307	98	91	76	431	39	23
RTOR Reduction (vph)	0	0	55	0	81	0	0	0	55	0	4	0
Lane Group Flow (vph)	117	409	33	238	711	0	98	91	21	246	243	0
Confl. Peds. (#/hr)			1			5			4			6
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	13.9	39.7	39.7	17.8	43.6		10.8	10.8	28.6	19.7	19.7	
Effective Green, g (s)	13.9	39.7	39.7	17.8	43.6		10.8	10.8	28.6	19.7	19.7	
Actuated g/C Ratio	0.13	0.38	0.38	0.17	0.42		0.10	0.10	0.27	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	236	1351	590	302	1379		183	193	432	318	318	
v/s Ratio Prot	0.07	0.11		c0.13	c0.21		c0.05	0.05	0.01	c0.14	0.14	
v/s Ratio Perm			0.02						0.00			
v/c Ratio	0.50	0.30	0.06	0.79	0.52		0.54	0.47	0.05	0.77	0.76	
Uniform Delay, d1	42.3	22.9	20.7	41.8	22.8		44.7	44.4	28.2	40.5	40.4	
Progression Factor	1.00	1.00	1.00	0.79	0.39		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.6	0.2	11.3	1.3		1.5	0.7	0.0	10.2	9.4	
Delay (s)	42.9	23.5	20.9	44.2	10.2		46.2	45.1	28.2	50.7	49.9	
Level of Service	D	C	C	D	B		D	D	C	D	D	
Approach Delay (s)		26.8			18.0			40.7			50.3	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	389	84	226	461	292	93	86	72	409	37	22
Future Volume (veh/h)	111	389	84	226	461	292	93	86	72	409	37	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	117	409	88	238	485	307	98	91	76	480	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	579	750	327	700	581	366	146	153	751	564	296	0
Arrive On Green	0.32	0.21	0.21	0.65	0.46	0.46	0.08	0.08	0.08	0.16	0.00	0.00
Sat Flow, veh/h	1795	3582	1559	1795	2100	1324	1795	1885	1574	3591	1885	0
Grp Volume(v), veh/h	117	409	88	238	413	379	98	91	76	480	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1559	1795	1791	1633	1795	1885	1574	1795	1885	0
Q Serve(g_s), s	5.0	10.7	5.0	6.2	21.2	21.4	5.6	4.9	0.0	13.7	0.0	0.0
Cycle Q Clear(g_c), s	5.0	10.7	5.0	6.2	21.2	21.4	5.6	4.9	0.0	13.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.81	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	579	750	327	700	496	452	146	153	751	564	296	0
V/C Ratio(X)	0.20	0.54	0.27	0.34	0.83	0.84	0.67	0.59	0.10	0.85	0.00	0.00
Avail Cap(c_a), veh/h	579	750	327	700	546	498	308	323	893	855	449	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	25.8	37.0	34.8	12.3	26.1	26.2	46.9	46.5	15.4	43.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	2.8	2.0	0.1	14.1	15.6	2.0	1.4	0.0	3.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.9	2.0	2.2	9.0	8.4	2.5	2.3	1.0	6.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.8	39.9	36.8	12.4	40.2	41.8	48.8	47.9	15.4	46.4	0.0	0.0
LnGrp LOS	C	D	D	B	D	D	D	D	B	D	A	A
Approach Vol, veh/h		614			1030			265			480	
Approach Delay, s/veh		36.7			34.4			38.9			46.4	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	45.9	26.0		20.5	38.9	33.1		12.5
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	23.0	22.0		25.0	13.0	32.0		18.0
Max Q Clear Time (g_c+I1), s	8.2	12.7		15.7	7.0	23.4		7.6
Green Ext Time (p_c), s	0.2	1.3		0.7	0.0	5.7		0.4

Intersection Summary	
HCM 6th Ctrl Delay	37.9
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	958	77	741	252	102	168	209
v/c Ratio	0.81	0.45	0.45	0.79	0.25	0.19	0.27
Control Delay	35.7	60.6	4.9	57.8	34.0	15.9	9.6
Queue Delay	3.7	0.0	0.0	61.4	0.0	0.0	0.0
Total Delay	39.4	60.6	4.9	119.2	34.0	15.9	9.6
Queue Length 50th (ft)	347	36	21	162	55	61	45
Queue Length 95th (ft)	#498	71	33	238	101	91	81
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1181	207	1661	407	446	1016	891
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	147	0	0	180	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.37	0.45	1.11	0.23	0.17	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	894	26	74	711	0	0	0	242	98	161	201
Future Volume (vph)	0	894	26	74	711	0	0	0	242	98	161	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3588		1805	3610				1644	1805	1900	1592
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3588		1805	3610				1644	1805	1900	1592
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	931	27	77	741	0	0	0	252	102	168	209
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	45
Lane Group Flow (vph)	0	958	0	77	741	0	0	0	252	102	168	164
Confl. Peds. (#/hr)			16									2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		34.5		10.0	48.3				20.4	23.7	48.3	48.3
Effective Green, g (s)		34.5		10.0	48.3				20.4	23.7	48.3	48.3
Actuated g/C Ratio		0.33		0.10	0.46				0.19	0.23	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		1178		171	1660				319	407	874	732
v/s Ratio Prot		c0.27		0.04	c0.21				c0.15	c0.06	0.09	
v/s Ratio Perm												0.10
v/c Ratio		0.81		0.45	0.45				0.79	0.25	0.19	0.22
Uniform Delay, d1		32.3		44.9	19.3				40.3	33.4	16.8	17.1
Progression Factor		0.82		1.18	0.19				1.00	1.00	1.00	1.00
Incremental Delay, d2		5.8		0.7	0.8				11.8	0.2	0.1	0.1
Delay (s)		32.1		53.7	4.6				52.1	33.6	16.9	17.2
Level of Service		C		D	A				D	C	B	B
Approach Delay (s)		32.1			9.2			52.1			20.6	
Approach LOS		C			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	324	388	399	150	262	263	127
v/c Ratio	0.40	0.15	0.24	0.18	0.68	0.68	0.28
Control Delay	3.4	1.2	20.1	4.7	45.0	45.1	6.5
Queue Delay	0.5	0.2	0.0	0.0	0.7	0.7	0.0
Total Delay	3.9	1.4	20.1	4.7	45.7	45.7	6.5
Queue Length 50th (ft)	12	7	84	0	170	171	0
Queue Length 95th (ft)	27	12	148	44	229	229	41
Internal Link Dist (ft)		187	384			402	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	895	2513	1681	832	552	553	596
Starvation Cap Reductn	261	1429	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	93	93	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.36	0.24	0.18	0.57	0.57	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	311	372	0	0	383	144	503	1	122	0	0	0
Future Volume (vph)	311	372	0	0	383	144	503	1	122	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	0.98			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1805	3610			3610	1615	1715	1719	1584			
Flt Permitted	0.49	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	923	3610			3610	1615	1715	1719	1584			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	324	388	0	0	399	150	524	1	127	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	80	0	0	98	0	0	0
Lane Group Flow (vph)	324	388	0	0	399	70	262	263	29	0	0	0
Confl. Peds. (#/hr)									6			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	73.1	73.1			48.9	48.9	23.7	23.7	23.7			
Effective Green, g (s)	73.1	73.1			48.9	48.9	23.7	23.7	23.7			
Actuated g/C Ratio	0.70	0.70			0.47	0.47	0.23	0.23	0.23			
Clearance Time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Vehicle Extension (s)	2.0	2.5			2.5	2.5	2.5	2.5	2.5			
Lane Grp Cap (vph)	809	2513			1681	752	387	388	357			
v/s Ratio Prot	c0.08	0.11			0.11		0.15	c0.15				
v/s Ratio Perm	c0.20					0.04			0.02			
v/c Ratio	0.40	0.15			0.24	0.09	0.68	0.68	0.08			
Uniform Delay, d1	8.8	5.4			16.8	15.7	37.2	37.2	32.1			
Progression Factor	0.22	0.16			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.3	0.2	4.2	4.2	0.1			
Delay (s)	2.0	1.0			17.2	15.9	41.4	41.4	32.1			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		1.5			16.8			39.6			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	311	372	0	0	383	144	503	1	122	0	0	0
Future Volume (veh/h)	311	372	0	0	383	144	503	1	122	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	324	388	0	0	399	150	525	0	127			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	944	2673	0	0	1162	518	653	0	288			
Arrive On Green	0.76	1.00	0.00	0.00	0.32	0.32	0.18	0.00	0.18			
Sat Flow, veh/h	1810	3705	0	0	3705	1610	3619	0	1594			
Grp Volume(v), veh/h	324	388	0	0	399	150	525	0	127			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1610	1810	0	1594			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.8	7.3	14.6	0.0	7.4			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.8	7.3	14.6	0.0	7.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	944	2673	0	0	1162	518	653	0	288			
V/C Ratio(X)	0.34	0.15	0.00	0.00	0.34	0.29	0.80	0.00	0.44			
Avail Cap(c_a), veh/h	944	2673	0	0	1162	518	1165	0	513			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.74	0.74	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.9	0.0	0.0	0.0	27.1	26.6	41.2	0.0	38.3			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	0.8	1.4	1.8	0.0	0.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	0.0	3.9	3.0	6.6	0.0	6.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.0	0.1	0.0	0.0	27.9	28.0	43.0	0.0	39.1			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		712			549			652				
Approach Delay, s/veh		1.8			28.0			42.3				
Approach LOS		A			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		81.8		23.2	43.8	38.0						
Change Period (Y+Rc), s		* 4.1		* 4.2	* 4.1	4.2						
Max Green Setting (Gmax), s		* 63		* 34	* 25	33.8						
Max Q Clear Time (g_c+I1), s		2.0		16.6	2.0	10.8						
Green Ext Time (p_c), s		6.0		1.7	0.4	2.4						
Intersection Summary												
HCM 6th Ctrl Delay			23.1									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	18.8
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	73	141	357	111	142	356
Future Vol, veh/h	73	141	357	111	142	356
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	78	152	384	119	153	383
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	13.4	23.3	16.8
HCM LOS	B	C	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	34%	0%	100%
Vol Right, %	0%	100%	66%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	356	214	357	111
LT Vol	142	0	0	357	0
Through Vol	0	0	73	0	111
RT Vol	0	356	141	0	0
Lane Flow Rate	153	383	230	384	119
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.303	0.63	0.398	0.74	0.213
Departure Headway (Hd)	7.142	5.923	6.219	6.943	6.434
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	502	609	575	518	556
Service Time	4.907	3.687	4.285	4.705	4.197
HCM Lane V/C Ratio	0.305	0.629	0.4	0.741	0.214
HCM Control Delay	13	18.3	13.4	27.1	10.9
HCM Lane LOS	B	C	B	D	B
HCM 95th-tile Q	1.3	4.4	1.9	6.2	0.8

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1286	107	818
v/c Ratio	0.62	0.63	0.31
Control Delay	9.9	91.3	5.3
Queue Delay	0.0	0.0	0.6
Total Delay	9.9	91.3	5.9
Queue Length 50th (ft)	77	77	191
Queue Length 95th (ft)	179	131	213
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2125	207	2699
Starvation Cap Reductn	0	0	1416
Spillback Cap Reductn	0	0	587
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.61	0.52	0.64

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	710	524	103	785	0	0
Future Volume (vph)	710	524	103	785	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.97		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.94		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3282		1805	3610		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3282		1805	3610		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	740	546	107	818	0	0
RTOR Reduction (vph)	108	0	0	0	0	0
Lane Group Flow (vph)	1178	0	107	818	0	0
Confl. Peds. (#/hr)		16				
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2 8		1	6 2 8		
Permitted Phases						
Actuated Green, G (s)	62.2		10.0	76.2		
Effective Green, g (s)	62.2		10.0	72.2		
Actuated g/C Ratio	0.59		0.10	0.69		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	1944		171	2482		
v/s Ratio Prot	c0.36		c0.06	0.23		
v/s Ratio Perm						
v/c Ratio	0.61		0.63	0.33		
Uniform Delay, d1	13.6		45.7	6.6		
Progression Factor	0.77		1.66	0.89		
Incremental Delay, d2	0.3		5.0	0.1		
Delay (s)	10.7		80.9	5.9		
Level of Service	B		F	A		
Approach Delay (s)	10.7			14.6	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Mitigated Existing Plus Project

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	173	203	55	94	132
Future Vol, veh/h	58	173	203	55	94	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	67	201	236	64	109	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	639	268	0	0	300	0
Stage 1	268	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	431	756	-	-	1228	-
Stage 1	763	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	393	756	-	-	1228	-
Mov Cap-2 Maneuver	393	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	3.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	393	756	1228	-
HCM Lane V/C Ratio	-	-	0.172	0.266	0.089	-
HCM Control Delay (s)	-	-	16	11.5	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	1.1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	371	55	46	282	18	106	119	154	37	61	14
v/c Ratio	0.06	0.56	0.08	0.26	0.36	0.02	0.39	0.33	0.36	0.21	0.20	0.04
Control Delay	36.6	22.4	0.3	38.2	15.5	0.1	35.2	29.2	8.4	36.9	30.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	22.4	0.3	38.2	15.5	0.1	35.2	29.2	8.4	36.9	30.4	0.2
Queue Length 50th (ft)	4	140	0	19	74	0	44	46	0	15	24	0
Queue Length 95th (ft)	20	216	0	53	159	0	97	95	39	45	59	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	156	1187	1039	178	1153	1034	313	1125	1013	207	1022	935
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.31	0.05	0.26	0.24	0.02	0.34	0.11	0.15	0.18	0.06	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	308	46	38	234	15	88	99	128	31	51	12
Future Volume (vph)	8	308	46	38	234	15	88	99	128	31	51	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	10	371	55	46	282	18	106	119	154	37	61	14
RTOR Reduction (vph)	0	0	35	0	0	11	0	0	124	0	0	12
Lane Group Flow (vph)	10	371	20	46	282	7	106	119	30	37	61	2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.7	24.5	24.5	2.8	26.6	26.6	7.9	12.9	12.9	3.1	8.1	8.1
Effective Green, g (s)	0.7	24.5	24.5	2.8	26.6	26.6	7.9	12.9	12.9	3.1	8.1	8.1
Actuated g/C Ratio	0.01	0.36	0.36	0.04	0.39	0.39	0.12	0.19	0.19	0.05	0.12	0.12
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	17	654	544	70	710	603	200	344	292	78	216	183
v/s Ratio Prot	0.01	c0.21		c0.03	0.16		c0.06	c0.07		0.02	0.03	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.59	0.57	0.04	0.66	0.40	0.01	0.53	0.35	0.10	0.47	0.28	0.01
Uniform Delay, d1	33.4	17.4	14.0	32.0	14.8	12.6	28.2	23.8	22.7	31.6	27.2	26.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.2	1.9	0.1	20.8	0.8	0.0	1.4	1.0	0.3	1.7	1.2	0.0
Delay (s)	78.6	19.3	14.1	52.9	15.6	12.6	29.6	24.8	22.9	33.2	28.4	26.3
Level of Service	E	B	B	D	B	B	C	C	C	C	C	C
Approach Delay (s)		20.0			20.4			25.4			29.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	67.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	8	308	46	38	234	15	88	99	128	31	51	12
Future Volume (veh/h)	8	308	46	38	234	15	88	99	128	31	51	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	10	371	55	46	282	18	106	119	154	37	61	14
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	22	536	445	80	597	506	135	306	259	69	236	200
Arrive On Green	0.01	0.29	0.29	0.05	0.33	0.33	0.08	0.17	0.17	0.04	0.13	0.13
Sat Flow, veh/h	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	10	371	55	46	282	18	106	119	154	37	61	14
Grp Sat Flow(s),veh/h/ln	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.3	9.7	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Cycle Q Clear(g_c), s	0.3	9.7	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	22	536	445	80	597	506	135	306	259	69	236	200
V/C Ratio(X)	0.45	0.69	0.12	0.57	0.47	0.04	0.78	0.39	0.59	0.54	0.26	0.07
Avail Cap(c_a), veh/h	161	1152	956	183	1176	997	312	1152	977	212	1048	888
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	16.9	14.0	25.2	14.5	12.4	24.5	20.0	20.8	25.5	21.2	20.7
Incr Delay (d2), s/veh	15.8	3.4	0.3	7.6	1.2	0.1	3.7	1.4	3.7	2.4	1.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.6	0.4	0.7	2.2	0.1	1.3	1.2	1.7	0.4	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	20.3	14.3	32.8	15.7	12.4	28.2	21.4	24.5	27.9	22.2	20.9
LnGrp LOS	D	C	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		436			346			379			112	
Approach Delay, s/veh		20.1			17.8			24.6			23.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	23.0	9.5	13.8	6.0	24.8	7.4	15.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.7	* 34	9.7	* 31	5.0	* 35	6.6	* 34
Max Q Clear Time (g_c+I1), s	3.4	11.7	5.2	3.6	2.3	8.6	3.1	7.0
Green Ext Time (p_c), s	0.0	4.1	0.0	0.5	0.0	3.0	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	21.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	465	1	18	286	10	1	3	141	11	4	2
Future Vol, veh/h	4	465	1	18	286	10	1	3	141	11	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	596	1	23	367	13	1	4	181	14	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	380	0	0	597	0	0	1030	1032	596	1112	1020	367
Stage 1	-	-	-	-	-	-	606	606	-	413	413	-
Stage 2	-	-	-	-	-	-	424	426	-	699	607	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1162	-	-	965	-	-	209	230	498	184	234	672
Stage 1	-	-	-	-	-	-	479	482	-	610	588	-
Stage 2	-	-	-	-	-	-	602	581	-	426	482	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1162	-	-	965	-	-	200	224	498	113	227	672
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	224	-	113	227	-
Stage 1	-	-	-	-	-	-	477	480	-	608	574	-
Stage 2	-	-	-	-	-	-	580	567	-	268	480	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	16.5	33
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	200	224	498	1162	-	-	965	-	-	113	227	672
HCM Lane V/C Ratio	0.006	0.017	0.363	0.004	-	-	0.024	-	-	0.125	0.023	0.004
HCM Control Delay (s)	23.1	21.4	16.3	8.1	-	-	8.8	-	-	41.4	21.2	10.4
HCM Lane LOS	C	C	C	A	-	-	A	-	-	E	C	B
HCM 95th %tile Q(veh)	0	0.1	1.6	0	-	-	0.1	-	-	0.4	0.1	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	632	12	105	310	23	199
Future Vol, veh/h	632	12	105	310	23	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	687	13	114	337	25	216

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	700	0	1252	687
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	565	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	897	-	190	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	897	-	166	447
Mov Cap-2 Maneuver	-	-	-	-	166	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	497	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	21.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	166	447	-	-	897	-
HCM Lane V/C Ratio	0.151	0.484	-	-	0.127	-
HCM Control Delay (s)	30.5	20.4	-	-	9.6	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	2.6	-	-	0.4	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	886	17	171	418	33	298
v/c Ratio	0.70	0.02	0.37	0.25	0.27	0.71
Control Delay	17.3	5.5	7.7	1.7	53.5	31.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	5.5	7.7	1.7	53.5	31.5
Queue Length 50th (ft)	378	1	24	79	23	112
Queue Length 95th (ft)	691	11	50	22	53	184
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1263	1077	458	1642	370	419
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.02	0.37	0.25	0.09	0.71

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	815	16	157	385	30	274
Future Volume (vph)	815	16	157	385	30	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.18	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	331	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	886	17	171	418	33	298
RTOR Reduction (vph)	0	4	0	0	0	102
Lane Group Flow (vph)	886	13	171	418	33	196
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	72.0	72.0	91.8	91.8	5.2	18.5
Effective Green, g (s)	72.0	72.0	91.8	91.8	5.2	18.5
Actuated g/C Ratio	0.65	0.65	0.83	0.83	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1219	1036	450	1554	83	359
v/s Ratio Prot	c0.48		0.05	0.22	0.02	c0.07
v/s Ratio Perm		0.01	0.27			0.06
v/c Ratio	0.73	0.01	0.38	0.27	0.40	0.55
Uniform Delay, d1	12.5	6.6	10.2	1.9	50.9	41.9
Progression Factor	1.00	1.00	2.82	0.64	1.00	1.00
Incremental Delay, d2	3.8	0.0	0.5	0.4	3.1	1.7
Delay (s)	16.3	6.6	29.2	1.6	54.0	43.6
Level of Service	B	A	C	A	D	D
Approach Delay (s)	16.1			9.6	44.6	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	815	16	157	385	30	274
Future Volume (veh/h)	815	16	157	385	30	274
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	886	17	171	418	33	298
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1068	905	283	1287	345	399
Arrive On Green	0.57	0.57	0.12	1.00	0.19	0.19
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	886	17	171	418	33	298
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	42.5	0.5	4.3	0.0	1.7	19.1
Cycle Q Clear(g_c), s	42.5	0.5	4.3	0.0	1.7	19.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1068	905	283	1287	345	399
V/C Ratio(X)	0.83	0.02	0.60	0.32	0.10	0.75
Avail Cap(c_a), veh/h	1068	905	317	1287	372	423
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.86	0.86	1.00	1.00
Uniform Delay (d), s/veh	19.2	10.2	18.5	0.0	36.4	37.9
Incr Delay (d2), s/veh	7.5	0.0	2.3	0.6	0.1	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.5	0.2	2.0	0.2	0.7	8.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.7	10.3	20.8	0.6	36.6	44.7
LnGrp LOS	C	B	C	A	D	D
Approach Vol, veh/h	903			589	331	
Approach Delay, s/veh	26.4			6.5	43.9	
Approach LOS	C			A	D	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.9	69.3				82.2		27.8
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	8.5	59.0				74.0		23.0
Max Q Clear Time (g_c+I1), s	6.3	44.5				2.0		21.1
Green Ext Time (p_c), s	0.1	5.0				2.3		0.2

Intersection Summary	
HCM 6th Ctrl Delay	23.1
HCM 6th LOS	C

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	994	518	32	429	35	324
v/c Ratio	0.74	0.43	0.10	0.29	0.23	0.76
Control Delay	12.0	2.8	4.4	6.1	48.1	16.7
Queue Delay	0.0	0.0	0.0	1.0	0.0	0.0
Total Delay	12.0	2.8	4.4	7.1	48.1	16.7
Queue Length 50th (ft)	484	0	1	13	24	0
Queue Length 95th (ft)	270	27	m17	253	41	19
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1350	1214	327	1475	500	677
Starvation Cap Reductn	0	0	0	770	0	0
Spillback Cap Reductn	10	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.43	0.10	0.61	0.07	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	716	373	23	309	0	0	0	0	25	0	233
Future Volume (vph)	0	716	373	23	309	0	0	0	0	25	0	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1810	1538	1719	1810						1719	1538
Flt Permitted		1.00	1.00	0.17	1.00						0.95	1.00
Satd. Flow (perm)		1810	1538	308	1810						1719	1538
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	0	994	518	32	429	0	0	0	0	35	0	324
RTOR Reduction (vph)	0	0	73	0	0	0	0	0	0	0	0	296
Lane Group Flow (vph)	0	994	445	32	429	0	0	0	0	0	35	28
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		79.5	79.5	89.7	89.7						9.6	9.6
Effective Green, g (s)		79.5	79.5	89.7	89.7						9.6	9.6
Actuated g/C Ratio		0.72	0.72	0.82	0.82						0.09	0.09
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1308	1111	298	1475						150	134
v/s Ratio Prot		c0.55		0.00	c0.24						c0.02	
v/s Ratio Perm			0.29	0.08								0.02
v/c Ratio		0.76	0.40	0.11	0.29						0.23	0.21
Uniform Delay, d1		9.4	6.0	8.7	2.5						46.8	46.7
Progression Factor		0.75	0.52	1.43	1.88						1.00	1.00
Incremental Delay, d2		3.6	0.9	0.1	0.5						0.8	0.8
Delay (s)		10.5	4.0	12.6	5.1						47.6	47.5
Level of Service		B	A	B	A						D	D
Approach Delay (s)		8.3			5.6			0.0			47.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	716	373	23	309	0	0	0	0	25	0	233
Future Volume (veh/h)	0	716	373	23	309	0	0	0	0	25	0	233
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1826	1826
Adj Flow Rate, veh/h	0	994	518	32	429	0				35	0	324
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72				0.72	0.72	0.72
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	1069	906	313	1229	0				399	0	355
Arrive On Green	0.00	1.00	1.00	0.06	1.00	0.00				0.23	0.00	0.23
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1739	0	1547
Grp Volume(v), veh/h	0	994	518	32	429	0				35	0	324
Grp Sat Flow(s),veh/h/ln	0	1826	1547	1739	1826	0				1739	0	1547
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0				1.7	0.0	22.4
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.8	0.0	0.0				1.7	0.0	22.4
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1069	906	313	1229	0				399	0	355
V/C Ratio(X)	0.00	0.93	0.57	0.10	0.35	0.00				0.09	0.00	0.91
Avail Cap(c_a), veh/h	0	1069	906	342	1229	0				506	0	450
HCM Platoon Ratio	1.00	2.00	2.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.64	0.64	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	7.4	0.0	0.0				33.3	0.0	41.3
Incr Delay (d2), s/veh	0.0	10.7	1.7	0.1	0.8	0.0				0.1	0.0	19.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	0.4	0.2	0.3	0.0				0.7	0.0	10.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	10.7	1.7	7.5	0.8	0.0				33.4	0.0	60.9
LnGrp LOS	A	B	A	A	A	A				C	A	E
Approach Vol, veh/h		1512			461						359	
Approach Delay, s/veh		7.6			1.2						58.2	
Approach LOS		A			A						E	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.6	70.9		29.5		80.5
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5
Max Green Setting (Gmax), s	5.0	55.8		* 32		67.3
Max Q Clear Time (g_c+I1), s	2.8	2.0		24.4		2.0
Green Ext Time (p_c), s	0.0	12.0		0.8		2.4

Intersection Summary	
HCM 6th Ctrl Delay	14.1
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	710	396	182	32	288	34
v/c Ratio	0.80	0.31	0.28	0.05	0.77	0.08
Control Delay	10.3	2.9	32.3	0.2	54.3	0.4
Queue Delay	0.4	0.4	0.0	0.0	0.2	0.0
Total Delay	10.7	3.3	32.3	0.2	54.6	0.4
Queue Length 50th (ft)	30	17	93	0	193	0
Queue Length 95th (ft)	92	36	135	0	186	0
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	929	1273	654	605	511	526
Starvation Cap Reductn	33	457	0	0	0	0
Spillback Cap Reductn	0	0	0	0	25	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.49	0.28	0.05	0.59	0.06

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	483	269	0	0	124	22	195	1	23	0	0	0
Future Volume (vph)	483	269	0	0	124	22	195	1	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1757	1568			
Flt Permitted	0.53	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	970	1845			1845	1568		1757	1568			
Peak-hour factor, PHF	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Adj. Flow (vph)	710	396	0	0	182	32	287	1	34	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	21	0	0	27	0	0	0
Lane Group Flow (vph)	710	396	0	0	182	11	0	288	7	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	75.9	75.9			38.1	38.1		23.4	23.4			
Effective Green, g (s)	75.9	75.9			38.1	38.1		23.4	23.4			
Actuated g/C Ratio	0.69	0.69			0.35	0.35		0.21	0.21			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	891	1273			639	543		373	333			
v/s Ratio Prot	c0.23	0.21			0.10			c0.16				
v/s Ratio Perm	c0.32					0.01			0.00			
v/c Ratio	0.80	0.31			0.28	0.02		0.77	0.02			
Uniform Delay, d1	9.6	6.7			26.1	23.7		40.8	34.2			
Progression Factor	0.43	0.31			1.00	1.00		1.00	1.00			
Incremental Delay, d2	3.8	0.5			1.1	0.1		9.5	0.0			
Delay (s)	7.9	2.6			27.2	23.7		50.3	34.3			
Level of Service	A	A			C	C		D	C			
Approach Delay (s)		6.0			26.7			48.6			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	483	269	0	0	124	22	195	1	23	0	0	0
Future Volume (veh/h)	483	269	0	0	124	22	195	1	23	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	710	396	0	0	182	32	287	1	34			
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	913	1324	0	0	701	594	333	1	298			
Arrive On Green	0.37	0.95	0.00	0.00	0.38	0.38	0.19	0.19	0.19			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1761	6	1572			
Grp Volume(v), veh/h	710	396	0	0	182	32	288	0	34			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1767	0	1572			
Q Serve(g_s), s	27.2	1.7	0.0	0.0	7.4	1.4	17.4	0.0	2.0			
Cycle Q Clear(g_c), s	27.2	1.7	0.0	0.0	7.4	1.4	17.4	0.0	2.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	913	1324	0	0	701	594	334	0	298			
V/C Ratio(X)	0.78	0.30	0.00	0.00	0.26	0.05	0.86	0.00	0.11			
Avail Cap(c_a), veh/h	979	1324	0	0	701	594	514	0	457			
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.60	0.60	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	9.8	0.8	0.0	0.0	23.6	21.7	43.2	0.0	37.0			
Incr Delay (d2), s/veh	2.3	0.3	0.0	0.0	0.9	0.2	9.0	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.3	0.5	0.0	0.0	3.2	0.5	8.4	0.0	0.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.1	1.2	0.0	0.0	24.5	21.9	52.2	0.0	37.1			
LnGrp LOS	B	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		1106			214			322				
Approach Delay, s/veh		8.2			24.1			50.6				
Approach LOS		A			C			D				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		85.0			36.9	48.0		25.0				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		67.3			34.5	26.3		32.0				
Max Q Clear Time (g_c+I1), s		3.7			29.2	9.4		19.4				
Green Ext Time (p_c), s		2.2			1.3	0.8		1.5				

Intersection Summary			
HCM 6th Ctrl Delay			18.6
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	270	122	259	170	22
Future Vol, veh/h	23	270	122	259	170	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	40	474	214	454	298	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1200	318	337	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	882	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	204	720	1217	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	403	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	168	720	1217	-	-	-
Mov Cap-2 Maneuver	168	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	403	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.2	2.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1217	-	168	720	-	-
HCM Lane V/C Ratio	0.176	-	0.24	0.658	-	-
HCM Control Delay (s)	8.6	-	33.1	19.1	-	-
HCM Lane LOS	A	-	D	C	-	-
HCM 95th %tile Q(veh)	0.6	-	0.9	5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	189	53	272	127	28	134
Future Vol, veh/h	189	53	272	127	28	134
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	58	296	138	30	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	502	296	0	0	434	0
Stage 1	296	-	-	-	-	-
Stage 2	206	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	529	743	-	-	1126	-
Stage 1	755	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	515	743	-	-	1126	-
Mov Cap-2 Maneuver	515	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	515	743	1126	-
HCM Lane V/C Ratio	-	-	0.399	0.078	0.027	-
HCM Control Delay (s)	-	-	16.6	10.3	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	226	412	467	147	173
v/c Ratio	0.51	0.25	0.45	0.59	0.46
Control Delay	15.4	13.0	20.6	39.1	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	13.0	20.6	39.1	9.9
Queue Length 50th (ft)	44	45	67	56	0
Queue Length 95th (ft)	73	123	158	136	54
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	878	1767	1097	389	483
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.23	0.43	0.38	0.36

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	208	379	313	117	135	159
Future Volume (vph)	208	379	313	117	135	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3395		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3395		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	412	340	127	147	173
RTOR Reduction (vph)	0	0	39	0	0	148
Lane Group Flow (vph)	226	412	428	0	147	25
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	17.0	32.6	20.4		9.8	9.8
Effective Green, g (s)	17.0	32.6	20.4		9.8	9.8
Actuated g/C Ratio	0.25	0.48	0.30		0.14	0.14
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	439	1686	1012		253	226
v/s Ratio Prot	c0.13	0.12	c0.13			
v/s Ratio Perm					c0.08	0.02
v/c Ratio	0.51	0.24	0.42		0.58	0.11
Uniform Delay, d1	22.1	10.6	19.3		27.4	25.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.0	0.1		2.2	0.1
Delay (s)	22.6	10.6	19.4		29.6	25.6
Level of Service	C	B	B		C	C
Approach Delay (s)		14.9	19.4		27.4	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	493	68	43	206	116	115
v/c Ratio	0.19	0.31	0.09	0.68	0.26	0.36	0.22	0.42	0.54	0.51
Control Delay	35.4	18.7	1.1	41.2	6.5	38.5	34.8	4.4	42.7	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	18.7	1.1	41.2	6.5	38.5	34.8	4.4	42.7	36.8
Queue Length 50th (ft)	18	85	0	81	13	35	22	0	63	53
Queue Length 95th (ft)	41	174	5	139	57	62	44	18	102	93
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	267	1636	782	270	1926	374	394	534	375	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.31	0.09	0.54	0.26	0.18	0.11	0.39	0.31	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	62	68	43	206	168	40	23
RTOR Reduction (vph)	0	0	41	0	8	0	0	0	154	0	12	0
Lane Group Flow (vph)	34	505	29	147	485	0	68	43	52	116	103	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Effective Green, g (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Actuated g/C Ratio	0.07	0.42	0.42	0.16	0.51		0.10	0.10	0.25	0.13	0.13	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	118	1478	644	279	1764		170	179	400	215	214	
v/s Ratio Prot	0.02	c0.14		c0.08	0.14		c0.04	0.02	0.02	c0.07	0.06	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.29	0.34	0.05	0.53	0.27		0.40	0.24	0.13	0.54	0.48	
Uniform Delay, d1	37.7	16.8	14.7	32.9	11.9		36.1	35.5	24.5	34.7	34.4	
Progression Factor	1.00	1.00	1.00	0.72	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	0.4		0.6	0.3	0.1	1.3	0.6	
Delay (s)	38.2	17.4	14.8	24.5	5.3		36.7	35.8	24.5	36.0	35.0	
Level of Service	D	B	B	C	A		D	D	C	D	D	
Approach Delay (s)		18.3			9.7			28.6			35.5	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	62	68	43	206	116	113	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	822	753	334	740	516	74	121	127	765	187	158	32
Arrive On Green	0.46	0.21	0.21	0.83	0.33	0.33	0.07	0.07	0.07	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1578	1781	3121	446	1781	1870	1578	1781	1506	306
Grp Volume(v), veh/h	34	505	70	147	244	249	68	43	206	116	0	136
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1790	1781	1870	1578	1781	0	1812
Q Serve(g_s), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Cycle Q Clear(g_c), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	822	753	334	740	294	296	121	127	765	187	0	190
V/C Ratio(X)	0.04	0.67	0.21	0.20	0.83	0.84	0.56	0.34	0.27	0.62	0.00	0.71
Avail Cap(c_a), veh/h	822	753	334	740	397	400	377	396	992	398	0	405
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.6	30.8	27.6	4.3	27.3	27.4	38.4	37.8	13.0	36.4	0.0	36.8
Incr Delay (d2), s/veh	0.0	4.7	1.4	0.0	22.4	23.2	1.5	0.6	0.1	1.2	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.1	1.3	0.5	5.5	5.6	1.4	0.9	2.2	2.3	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.6	35.5	29.1	4.4	49.7	50.6	39.9	38.4	13.1	37.7	0.0	38.7
LnGrp LOS	B	D	C	A	D	D	D	D	B	D	A	D
Approach Vol, veh/h		609			640			317			252	
Approach Delay, s/veh		33.5			39.6			22.3			38.2	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	40.3	22.0		12.9	44.2	18.1		9.8				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	18.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.4	13.1		8.2	2.9	12.9		5.1				
Green Ext Time (p_c), s	0.1	1.1		0.4	0.0	1.0		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			34.4
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	973	81	515	460	137	72	237
v/c Ratio	0.87	0.65	0.33	0.87	0.83	0.08	0.28
Control Delay	31.7	56.2	10.6	45.7	75.8	13.5	3.1
Queue Delay	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	56.2	10.6	45.7	75.8	13.5	3.1
Queue Length 50th (ft)	265	28	89	228	73	21	1
Queue Length 95th (ft)	#168	#104	90	#393	#169	44	38
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1121	124	1540	530	166	850	840
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	3	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.65	0.33	0.87	0.83	0.08	0.28

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	856	10	72	458	0	0	0	409	122	64	211
Future Volume (vph)	0	856	10	72	458	0	0	0	409	122	64	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3532		1770	3539				1611	1770	1863	1563
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3532		1770	3539				1611	1770	1863	1563
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	962	11	81	515	0	0	0	460	137	72	237
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	127
Lane Group Flow (vph)	0	973	0	81	515	0	0	0	460	137	72	110
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		27.0		6.0	37.0				28.0	8.0	38.8	38.8
Effective Green, g (s)		27.0		6.0	37.0				28.0	8.0	38.8	38.8
Actuated g/C Ratio		0.32		0.07	0.44				0.33	0.09	0.46	0.46
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1121		124	1540				530	166	850	713
v/s Ratio Prot		c0.28		c0.05	0.15				c0.29	c0.08	0.04	
v/s Ratio Perm												0.07
v/c Ratio		0.87		0.65	0.33				0.87	0.83	0.08	0.15
Uniform Delay, d1		27.3		38.5	15.9				26.8	37.8	13.1	13.5
Progression Factor		0.80		0.78	0.62				1.00	1.00	1.00	1.00
Incremental Delay, d2		8.9		11.6	0.6				14.0	35.3	0.2	0.5
Delay (s)		30.8		41.6	10.5				40.8	73.2	13.3	14.0
Level of Service		C		D	B				D	E	B	B
Approach Delay (s)		30.8			14.7			40.8			32.0	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	600	546	396	253	147	149	142
v/c Ratio	0.63	0.21	0.30	0.35	0.60	0.61	0.40
Control Delay	8.1	2.5	21.1	4.6	43.6	43.9	9.2
Queue Delay	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	2.8	21.1	4.6	43.6	43.9	9.2
Queue Length 50th (ft)	70	25	79	0	77	80	0
Queue Length 95th (ft)	133	48	127	52	131	133	46
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	969	2639	1313	726	514	515	582
Starvation Cap Reductn	142	1394	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.44	0.30	0.35	0.29	0.29	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	546	497	0	0	360	230	268	1	129	0	0	0
Future Volume (vph)	546	497	0	0	360	230	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1765	3539			3539	1532	1681	1686	1583			
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	882	3539			3539	1532	1681	1686	1583			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	600	546	0	0	396	253	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	159	0	0	121	0	0	0
Lane Group Flow (vph)	600	546	0	0	396	94	147	149	21	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Effective Green, g (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Actuated g/C Ratio	0.75	0.75			0.37	0.37	0.15	0.15	0.15			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	946	2639			1311	567	245	245	230			
v/s Ratio Prot	c0.21	0.15			0.11		0.09	c0.09				
v/s Ratio Perm	c0.27					0.06			0.01			
v/c Ratio	0.63	0.21			0.30	0.17	0.60	0.61	0.09			
Uniform Delay, d1	8.5	3.2			19.0	17.9	34.0	34.0	31.4			
Progression Factor	0.54	0.64			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.9	0.2			0.6	0.6	3.3	3.6	0.1			
Delay (s)	5.5	2.2			19.6	18.6	37.3	37.6	31.5			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		4.0			19.2			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	546	497	0	0	360	230	268	1	129	0	0	0
Future Volume (veh/h)	546	497	0	0	360	230	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	600	546	0	0	396	253	296	0	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1075	2730	0	0	702	303	436	0	194			
Arrive On Green	0.87	1.00	0.00	0.00	0.20	0.20	0.12	0.00	0.12			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	3563	0	1585			
Grp Volume(v), veh/h	600	546	0	0	396	253	296	0	142			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.6	13.5	6.8	0.0	7.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.6	13.5	6.8	0.0	7.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1075	2730	0	0	702	303	436	0	194			
V/C Ratio(X)	0.56	0.20	0.00	0.00	0.56	0.84	0.68	0.00	0.73			
Avail Cap(c_a), veh/h	1075	2730	0	0	702	303	1090	0	485			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	2.2	0.0	0.0	0.0	30.8	32.8	35.7	0.0	36.0			
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	3.3	23.1	1.4	0.0	3.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.1	0.0	0.0	3.8	6.7	3.0	0.0	6.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.6	0.1	0.0	0.0	34.0	55.8	37.1	0.0	39.9			
LnGrp LOS	A	A	A	A	C	E	D	A	D			
Approach Vol, veh/h		1146			649			438				
Approach Delay, s/veh		1.4			42.5			38.0				
Approach LOS		A			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		69.4		15.6	48.6	20.8						
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0						
Max Green Setting (Gmax), s		* 50		* 26	28.9	16.8						
Max Q Clear Time (g_c+I1), s		2.0		9.3	2.0	15.5						
Green Ext Time (p_c), s		4.0		1.1	0.9	0.5						
Intersection Summary												
HCM 6th Ctrl Delay			20.5									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1558	96	596
v/c Ratio	0.55	0.77	0.17
Control Delay	0.8	66.2	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	66.2	0.2
Queue Length 50th (ft)	6	32	0
Queue Length 95th (ft)	3	#119	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2858	124	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	10	0	492
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.55	0.77	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1047	340	85	530	0	0
Future Volume (vph)	1047	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3388		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3388		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1176	382	96	596	0	0
RTOR Reduction (vph)	30	0	0	0	0	0
Lane Group Flow (vph)	1528	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	71.0		6.0	85.0		
Effective Green, g (s)	71.0		6.0	79.8		
Actuated g/C Ratio	0.84		0.07	0.94		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2829		124	3322		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.54		0.77	0.18		
Uniform Delay, d1	2.1		38.8	0.2		
Progression Factor	0.24		0.67	1.00		
Incremental Delay, d2	0.1		24.8	0.1		
Delay (s)	0.6		51.0	0.3		
Level of Service	A		D	A		
Approach Delay (s)	0.6			7.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	109	197	80	221	213
Future Vol, veh/h	43	109	197	80	221	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	45	115	207	84	233	224

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	939	249	0	0	291	0
Stage 1	249	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	292	787	-	-	1265	-
Stage 1	790	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	238	787	-	-	1265	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	790	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	4.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	238	787	1265	-
HCM Lane V/C Ratio	-	-	0.19	0.146	0.184	-
HCM Control Delay (s)	-	-	23.6	10.4	8.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	382	128	88	307	38	111	49	48	23	84	17
v/c Ratio	0.12	0.45	0.16	0.38	0.30	0.04	0.48	0.10	0.09	0.15	0.29	0.05
Control Delay	41.0	24.3	3.7	40.5	16.7	0.1	42.8	26.8	0.4	41.3	35.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	24.3	3.7	40.5	16.7	0.1	42.8	26.8	0.4	41.3	35.7	0.3
Queue Length 50th (ft)	9	162	0	40	85	0	51	16	0	11	38	0
Queue Length 95th (ft)	34	268	30	99	193	0	118	55	0	38	89	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	152	1002	917	274	1082	979	302	1037	946	161	922	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.38	0.14	0.32	0.28	0.04	0.37	0.05	0.05	0.14	0.09	0.02

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	344	115	79	276	34	100	44	43	21	76	15
Future Volume (vph)	17	344	115	79	276	34	100	44	43	21	76	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	382	128	88	307	38	111	49	48	23	84	17
RTOR Reduction (vph)	0	0	77	0	0	21	0	0	39	0	0	15
Lane Group Flow (vph)	19	382	51	88	307	17	111	49	9	23	84	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.7	31.7	31.7	6.7	36.7	36.7	6.9	15.2	15.2	1.8	10.1	10.1
Effective Green, g (s)	1.7	31.7	31.7	6.7	36.7	36.7	6.9	15.2	15.2	1.8	10.1	10.1
Actuated g/C Ratio	0.02	0.40	0.40	0.08	0.46	0.46	0.09	0.19	0.19	0.02	0.13	0.13
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	37	739	628	148	855	727	152	354	301	39	235	195
v/s Ratio Prot	0.01	c0.21		c0.05	c0.16		c0.06	c0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.51	0.52	0.08	0.59	0.36	0.02	0.73	0.14	0.03	0.59	0.36	0.01
Uniform Delay, d1	38.7	18.3	15.0	35.3	14.0	11.8	35.6	26.9	26.3	38.7	31.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	1.2	0.1	6.6	0.5	0.0	14.3	0.3	0.1	13.8	1.6	0.0
Delay (s)	52.0	19.5	15.1	41.9	14.5	11.8	49.9	27.2	26.4	52.5	33.5	30.6
Level of Service	D	B	B	D	B	B	D	C	C	D	C	C
Approach Delay (s)		19.6			19.9			39.2			36.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	79.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	344	115	79	276	34	100	44	43	21	76	15
Future Volume (veh/h)	17	344	115	79	276	34	100	44	43	21	76	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	382	128	88	307	38	111	49	48	23	84	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	41	561	475	118	642	544	143	325	275	48	224	186
Arrive On Green	0.02	0.30	0.30	0.07	0.34	0.34	0.08	0.17	0.17	0.03	0.12	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Grp Volume(v), veh/h	19	382	128	88	307	38	111	49	48	23	84	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Q Serve(g_s), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Cycle Q Clear(g_c), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	41	561	475	118	642	544	143	325	275	48	224	186
V/C Ratio(X)	0.47	0.68	0.27	0.75	0.48	0.07	0.78	0.15	0.17	0.48	0.37	0.09
Avail Cap(c_a), veh/h	170	1129	957	306	1271	1077	337	1192	1010	180	1026	850
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	17.4	15.1	25.9	14.6	12.5	25.5	19.8	19.9	27.1	22.9	22.1
Incr Delay (d2), s/veh	9.7	3.1	0.6	10.7	1.2	0.1	3.4	0.4	0.5	2.8	1.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	1.1	1.3	2.5	0.3	1.4	0.5	0.5	0.3	1.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	20.5	15.7	36.6	15.8	12.6	28.9	20.2	20.4	29.9	24.7	22.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		529			433			208			124	
Approach Delay, s/veh		19.9			19.7			24.9			25.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	24.0	9.8	13.6	6.6	26.5	6.8	16.6
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	9.7	* 34	10.7	* 31	5.4	* 38	5.7	* 36
Max Q Clear Time (g_c+I1), s	4.7	12.2	5.5	4.3	2.6	9.3	2.7	3.5
Green Ext Time (p_c), s	0.1	4.8	0.0	0.7	0.0	3.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	21.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	404	2	40	375	20	1	3	18	18	8	6
Future Vol, veh/h	6	404	2	40	375	20	1	3	18	18	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	416	2	41	387	21	1	3	19	19	8	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	408	0	0	418	0	0	915	918	416	909	899	387
Stage 1	-	-	-	-	-	-	428	428	-	469	469	-
Stage 2	-	-	-	-	-	-	487	490	-	440	430	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1145	-	-	1136	-	-	252	271	634	255	278	659
Stage 1	-	-	-	-	-	-	603	583	-	573	559	-
Stage 2	-	-	-	-	-	-	560	547	-	594	582	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1145	-	-	1136	-	-	236	260	634	238	267	659
Mov Cap-2 Maneuver	-	-	-	-	-	-	236	260	-	238	267	-
Stage 1	-	-	-	-	-	-	600	580	-	570	539	-
Stage 2	-	-	-	-	-	-	527	527	-	571	579	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	12.4	18.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	236	260	634	1145	-	-	1136	-	-	238	267	659
HCM Lane V/C Ratio	0.004	0.012	0.029	0.005	-	-	0.036	-	-	0.078	0.031	0.009
HCM Control Delay (s)	20.3	19	10.8	8.2	-	-	8.3	-	-	21.4	18.9	10.5
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C	B
HCM 95th %tile Q(veh)	0	0	0.1	0	-	-	0.1	-	-	0.3	0.1	0

Intersection	
Int Delay, s/veh	3.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	428	25	208	537	17	145
Future Vol, veh/h	428	25	208	537	17	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	465	27	226	584	18	158

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	492	0	1501	465
Stage 1	-	-	-	-	465	-
Stage 2	-	-	-	-	1036	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	134	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	342	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	106	597
Mov Cap-2 Maneuver	-	-	-	-	106	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	270	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	106	597	-	-	1071	-
HCM Lane V/C Ratio	0.174	0.264	-	-	0.211	-
HCM Control Delay (s)	46	13.2	-	-	9.3	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	1.1	-	-	0.8	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	552	71	372	737	73	262
v/c Ratio	0.50	0.07	0.54	0.48	0.46	0.44
Control Delay	17.5	4.3	5.8	2.7	56.0	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	4.3	5.8	2.7	56.0	9.7
Queue Length 50th (ft)	229	2	24	79	50	34
Queue Length 95th (ft)	390	26	77	138	94	88
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1102	962	723	1540	370	645
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.07	0.51	0.48	0.20	0.41

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	508	65	342	678	67	241
Future Volume (vph)	508	65	342	678	67	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.32	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	604	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	552	71	372	737	73	262
RTOR Reduction (vph)	0	27	0	0	0	147
Lane Group Flow (vph)	552	44	372	737	73	115
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	63.7	63.7	88.3	88.3	8.7	26.8
Effective Green, g (s)	63.7	63.7	88.3	88.3	8.7	26.8
Actuated g/C Ratio	0.58	0.58	0.80	0.80	0.08	0.24
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1078	916	676	1495	139	479
v/s Ratio Prot	0.30		0.09	c0.40	c0.04	0.04
v/s Ratio Perm		0.03	c0.35			0.03
v/c Ratio	0.51	0.05	0.55	0.49	0.53	0.24
Uniform Delay, d1	13.9	10.0	6.1	3.5	48.7	33.4
Progression Factor	1.00	1.00	0.98	0.42	1.00	1.00
Incremental Delay, d2	1.7	0.1	0.9	1.0	3.6	0.3
Delay (s)	15.6	10.1	6.8	2.5	52.2	33.7
Level of Service	B	B	A	A	D	C
Approach Delay (s)	15.0			4.0	37.7	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	508	65	342	678	67	241
Future Volume (veh/h)	508	65	342	678	67	241
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	552	71	372	737	73	262
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	999	847	559	1342	292	457
Arrive On Green	0.53	0.53	0.25	1.00	0.16	0.16
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	552	71	372	737	73	262
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	21.4	2.4	10.9	0.0	3.9	15.5
Cycle Q Clear(g_c), s	21.4	2.4	10.9	0.0	3.9	15.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	999	847	559	1342	292	457
V/C Ratio(X)	0.55	0.08	0.67	0.55	0.25	0.57
Avail Cap(c_a), veh/h	999	847	686	1342	372	528
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.71	0.71	1.00	1.00
Uniform Delay (d), s/veh	16.9	12.5	10.0	0.0	40.1	33.4
Incr Delay (d2), s/veh	2.2	0.2	1.3	1.2	0.4	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	0.8	2.5	0.4	1.8	6.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.1	12.7	11.3	1.2	40.5	34.5
LnGrp LOS	B	B	B	A	D	C
Approach Vol, veh/h	623			1109	335	
Approach Delay, s/veh	18.4			4.6	35.8	
Approach LOS	B			A	D	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	20.2	65.3	85.4	24.6
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	21.5	46.0	74.0	23.0
Max Q Clear Time (g_c+I1), s	12.9	23.4	2.0	17.5
Green Ext Time (p_c), s	0.7	3.2	5.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	13.8
HCM 6th LOS	B

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	418	355	19	548	42	503
v/c Ratio	0.37	0.32	0.03	0.45	0.10	0.87
Control Delay	10.0	1.1	5.5	7.5	28.1	34.1
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	10.0	1.1	5.5	7.8	28.1	34.1
Queue Length 50th (ft)	77	0	3	96	23	176
Queue Length 95th (ft)	151	11	m8	237	43	267
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1142	1103	564	1231	720	797
Starvation Cap Reductn	0	0	0	236	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.32	0.03	0.55	0.06	0.63

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	405	344	18	532	0	0	0	0	41	0	488
Future Volume (vph)	0	405	344	18	532	0	0	0	0	41	0	488
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1770	1583
Flt Permitted		1.00	1.00	0.41	1.00						0.95	1.00
Satd. Flow (perm)		1863	1583	771	1863						1770	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	418	355	19	548	0	0	0	0	42	0	503
RTOR Reduction (vph)	0	0	145	0	0	0	0	0	0	0	0	196
Lane Group Flow (vph)	0	418	210	19	548	0	0	0	0	0	42	307
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		63.6	63.6	72.7	72.7						26.6	26.6
Effective Green, g (s)		63.6	63.6	72.7	72.7						26.6	26.6
Actuated g/C Ratio		0.58	0.58	0.66	0.66						0.24	0.24
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1077	915	533	1231						428	382
v/s Ratio Prot		0.22		0.00	c0.29						0.02	
v/s Ratio Perm			0.13	0.02								c0.19
v/c Ratio		0.39	0.23	0.04	0.45						0.10	0.80
Uniform Delay, d1		12.6	11.3	7.3	9.0						32.4	39.3
Progression Factor		0.62	0.17	0.55	0.57						1.00	1.00
Incremental Delay, d2		0.9	0.5	0.0	1.0						0.1	11.7
Delay (s)		8.7	2.5	4.0	6.1						32.5	50.9
Level of Service		A	A	A	A						C	D
Approach Delay (s)		5.9			6.0			0.0			49.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	405	344	18	532	0	0	0	0	41	0	488
Future Volume (veh/h)	0	405	344	18	532	0	0	0	0	41	0	488
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	418	355	19	548	0				42	0	503
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	906	768	335	1054	0				604	0	538
Arrive On Green	0.00	0.48	0.48	0.04	1.00	0.00				0.34	0.00	0.34
Sat Flow, veh/h	0	1870	1585	1781	1870	0				1781	0	1585
Grp Volume(v), veh/h	0	418	355	19	548	0				42	0	503
Grp Sat Flow(s),veh/h/ln	0	1870	1585	1781	1870	0				1781	0	1585
Q Serve(g_s), s	0.0	16.3	16.4	0.6	0.0	0.0				1.8	0.0	33.8
Cycle Q Clear(g_c), s	0.0	16.3	16.4	0.6	0.0	0.0				1.8	0.0	33.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	906	768	335	1054	0				604	0	538
V/C Ratio(X)	0.00	0.46	0.46	0.06	0.52	0.00				0.07	0.00	0.94
Avail Cap(c_a), veh/h	0	906	768	389	1054	0				725	0	646
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.87	0.87	0.98	0.98	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	18.8	18.8	14.0	0.0	0.0				24.6	0.0	35.2
Incr Delay (d2), s/veh	0.0	1.5	1.7	0.1	1.8	0.0				0.0	0.0	19.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	6.7	5.7	0.2	0.5	0.0				0.8	0.0	15.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	20.3	20.6	14.0	1.8	0.0				24.6	0.0	54.3
LnGrp LOS	A	C	C	B	A	A				C	A	D
Approach Vol, veh/h		773			567						545	
Approach Delay, s/veh		20.4			2.2						52.0	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.7	59.8		41.5		68.5
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5
Max Green Setting (Gmax), s	5.5	42.5		* 45		54.5
Max Q Clear Time (g_c+I1), s	2.6	18.4		35.8		2.0
Green Ext Time (p_c), s	0.0	3.4		1.5		3.3

Intersection Summary	
HCM 6th Ctrl Delay	24.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	315	200	170	15	423	23
v/c Ratio	0.43	0.18	0.23	0.02	0.82	0.04
Control Delay	17.3	13.8	26.3	0.1	48.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	17.3	13.8	26.3	0.1	48.4	0.1
Queue Length 50th (ft)	133	79	76	0	277	0
Queue Length 95th (ft)	285	159	163	0	351	0
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	767	1120	751	683	699	683
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	12	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.18	0.23	0.02	0.62	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	182	0	0	155	14	384	1	21	0	0	0
Future Volume (vph)	287	182	0	0	155	14	384	1	21	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1757	1568			
Flt Permitted	0.56	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1039	1845			1845	1568		1757	1568			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	315	200	0	0	170	15	422	1	23	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	0	16	0	0	0
Lane Group Flow (vph)	315	200	0	0	170	6	0	423	7	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	66.8	66.8			44.7	44.7		32.5	32.5			
Effective Green, g (s)	66.8	66.8			44.7	44.7		32.5	32.5			
Actuated g/C Ratio	0.61	0.61			0.41	0.41		0.30	0.30			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	732	1120			749	637		519	463			
v/s Ratio Prot	c0.06	0.11			0.09			c0.24				
v/s Ratio Perm	c0.20					0.00			0.00			
v/c Ratio	0.43	0.18			0.23	0.01		0.82	0.01			
Uniform Delay, d1	10.6	9.5			21.4	19.5		36.0	27.4			
Progression Factor	1.31	1.21			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.4	0.3			0.7	0.0		9.5	0.0			
Delay (s)	14.3	11.9			22.1	19.5		45.5	27.4			
Level of Service	B	B			C	B		D	C			
Approach Delay (s)		13.4			21.8			44.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	287	182	0	0	155	14	384	1	21	0	0	0
Future Volume (veh/h)	287	182	0	0	155	14	384	1	21	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	315	200	0	0	170	15	422	1	23			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	745	1173	0	0	864	732	477	1	426			
Arrive On Green	0.04	0.21	0.00	0.00	0.47	0.47	0.27	0.27	0.27			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1763	4	1572			
Grp Volume(v), veh/h	315	200	0	0	170	15	423	0	23			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1767	0	1572			
Q Serve(g_s), s	9.2	9.7	0.0	0.0	5.9	0.6	25.2	0.0	1.2			
Cycle Q Clear(g_c), s	9.2	9.7	0.0	0.0	5.9	0.6	25.2	0.0	1.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	745	1173	0	0	864	732	479	0	426			
V/C Ratio(X)	0.42	0.17	0.00	0.00	0.20	0.02	0.88	0.00	0.05			
Avail Cap(c_a), veh/h	884	1173	0	0	864	732	704	0	626			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.94	0.94	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	12.4	19.9	0.0	0.0	17.3	15.9	38.4	0.0	29.7			
Incr Delay (d2), s/veh	0.4	0.3	0.0	0.0	0.5	0.1	9.1	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.6	4.1	0.0	0.0	2.4	0.2	12.0	0.0	0.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	20.2	0.0	0.0	17.8	15.9	47.6	0.0	29.7			
LnGrp LOS	B	C	A	A	B	B	D	A	C			
Approach Vol, veh/h		515			185			446				
Approach Delay, s/veh		15.6			17.7			46.7				
Approach LOS		B			B			D				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		76.0			18.3	57.7		34.0				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		55.5			20.5	28.5		43.8				
Max Q Clear Time (g_c+I1), s		11.7			11.2	7.9		27.2				
Green Ext Time (p_c), s		1.0			0.6	0.7		2.5				

Intersection Summary			
HCM 6th Ctrl Delay			28.0
HCM 6th LOS			C

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	171	140	102	251	25
Future Vol, veh/h	21	171	140	102	251	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	190	156	113	279	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	718	293	307	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	425	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	396	746	1254	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	659	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	347	746	1254	-	-	-
Mov Cap-2 Maneuver	347	-	-	-	-	-
Stage 1	663	-	-	-	-	-
Stage 2	659	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1254	-	347	746	-	-
HCM Lane V/C Ratio	0.124	-	0.067	0.255	-	-
HCM Control Delay (s)	8.3	-	16.1	11.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	1	-	-

Intersection						
Int Delay, s/veh	4.2					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	157	39	174	210	57	288
Future Vol, veh/h	157	39	174	210	57	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	171	42	189	228	62	313

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	626	189	0	0	417	0
Stage 1	189	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	448	853	-	-	1142	-
Stage 1	843	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	424	853	-	-	1142	-
Mov Cap-2 Maneuver	424	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.2	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	424	853	1142	-
HCM Lane V/C Ratio	-	-	0.402	0.05	0.054	-
HCM Control Delay (s)	-	-	19.1	9.4	8.3	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	220	426	727	169	204
v/c Ratio	0.53	0.25	0.66	0.64	0.50
Control Delay	18.3	13.0	23.3	41.7	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	13.0	23.3	41.7	9.8
Queue Length 50th (ft)	43	48	115	63	0
Queue Length 95th (ft)	93	124	249	#169	61
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	837	2065	1450	374	495
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.21	0.50	0.45	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	209	405	485	205	161	194
Future Volume (vph)	209	405	485	205	161	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3393		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3393		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	220	426	511	216	169	204
RTOR Reduction (vph)	0	0	48	0	0	173
Lane Group Flow (vph)	220	426	679	0	169	31
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	16.0	33.0	21.8		10.4	10.4
Effective Green, g (s)	16.0	33.0	21.8		10.4	10.4
Actuated g/C Ratio	0.23	0.48	0.31		0.15	0.15
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	411	1699	1065		267	239
v/s Ratio Prot	c0.12	0.12	c0.20			
v/s Ratio Perm					c0.09	0.02
v/c Ratio	0.54	0.25	0.64		0.63	0.13
Uniform Delay, d1	23.4	10.8	20.4		27.7	25.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.0	0.9		3.6	0.1
Delay (s)	24.1	10.9	21.3		31.3	25.7
Level of Service	C	B	C		C	C
Approach Delay (s)		15.4	21.3		28.2	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	69.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	697	140	63	83	180	179
v/c Ratio	0.42	0.34	0.12	0.80	0.49	0.58	0.25	0.18	0.68	0.64
Control Delay	39.2	22.2	2.3	58.4	15.2	43.3	33.4	3.5	46.2	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	22.2	2.3	58.4	15.2	43.3	33.4	3.5	46.2	40.3
Queue Length 50th (ft)	47	92	0	103	73	72	31	0	96	85
Queue Length 95th (ft)	94	165	15	#198	#270	117	61	13	155	144
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	262	1357	672	252	1416	378	398	480	379	390
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.34	0.12	0.73	0.49	0.37	0.16	0.17	0.47	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (prot)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (perm)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	83	140	63	83	234	80	45
RTOR Reduction (vph)	0	0	53	0	10	0	0	0	60	0	15	0
Lane Group Flow (vph)	96	466	30	184	687	0	140	63	23	180	164	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Effective Green, g (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Actuated g/C Ratio	0.12	0.37	0.37	0.14	0.39		0.14	0.14	0.28	0.16	0.16	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	212	1311	573	252	1363		241	254	438	265	263	
v/s Ratio Prot	0.05	0.13		c0.10	c0.20		c0.08	0.03	0.01	c0.11	0.10	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.45	0.36	0.05	0.73	0.50		0.58	0.25	0.05	0.68	0.62	
Uniform Delay, d1	34.9	19.6	17.4	34.9	19.7		34.5	32.9	22.6	33.8	33.5	
Progression Factor	1.00	1.00	1.00	0.96	0.59		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	8.3	1.2		2.3	0.2	0.0	5.4	3.3	
Delay (s)	35.4	20.3	17.5	41.7	12.8		36.8	33.1	22.6	39.2	36.8	
Level of Service	D	C	B	D	B		D	C	C	D	D	
Approach Delay (s)		22.2			18.8			31.8			38.0	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	83	140	63	83	180	156	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	607	801	349	587	672	91	193	202	692	256	200	58
Arrive On Green	0.34	0.22	0.22	0.65	0.42	0.42	0.11	0.11	0.11	0.14	0.14	0.14
Sat Flow, veh/h	1795	3582	1560	1795	3170	428	1795	1885	1584	1795	1403	405
Grp Volume(v), veh/h	96	466	83	184	346	351	140	63	83	180	0	201
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1807	1795	1885	1584	1795	0	1807
Q Serve(g_s), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Cycle Q Clear(g_c), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	607	801	349	587	380	383	193	202	692	256	0	258
V/C Ratio(X)	0.16	0.58	0.24	0.31	0.91	0.92	0.73	0.31	0.12	0.70	0.00	0.78
Avail Cap(c_a), veh/h	607	801	349	587	400	404	380	399	857	401	0	404
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	29.5	27.1	10.6	23.7	23.8	36.7	35.0	14.4	34.7	0.0	35.2
Incr Delay (d2), s/veh	0.0	3.1	1.6	0.1	26.6	26.9	2.0	0.3	0.0	1.3	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.4	1.5	1.3	7.4	7.5	2.8	1.2	0.9	3.5	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	32.5	28.7	10.7	50.3	50.6	38.7	35.4	14.4	36.1	0.0	37.1
LnGrp LOS	B	C	C	B	D	D	D	D	B	D	A	D
Approach Vol, veh/h		645			881			286			381	
Approach Delay, s/veh		30.1			42.2			30.9			36.6	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.8	23.0		16.1	33.8	22.0		13.1
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	12.0	19.0		19.0	12.0	19.0		18.0
Max Q Clear Time (g_c+I1), s	5.8	11.9		11.1	5.2	17.5		8.4
Green Ext Time (p_c), s	0.1	1.3		0.6	0.0	0.5		0.4

Intersection Summary		
HCM 6th Ctrl Delay		36.2
HCM 6th LOS		D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	892	146	707	284	154	203	386
v/c Ratio	0.77	0.68	0.40	0.76	0.68	0.26	0.52
Control Delay	24.1	48.0	8.8	45.7	52.0	17.8	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	48.0	8.8	45.7	52.0	17.8	13.2
Queue Length 50th (ft)	243	68	111	142	80	70	81
Queue Length 95th (ft)	#158	141	129	#261	#163	118	162
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1162	252	1757	373	227	770	743
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.58	0.40	0.76	0.68	0.26	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	812	26	137	665	0	0	0	267	145	191	363
Future Volume (vph)	0	812	26	137	665	0	0	0	267	145	191	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3555		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3555		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	864	28	146	707	0	0	0	284	154	203	386
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	0	892	0	146	707	0	0	0	284	154	203	289
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		27.8		10.2	41.8				19.5	10.8	34.8	34.8
Effective Green, g (s)		27.8		10.2	41.8				19.5	10.8	34.8	34.8
Actuated g/C Ratio		0.33		0.12	0.49				0.23	0.13	0.41	0.41
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1162		214	1757				373	227	770	646
v/s Ratio Prot		c0.25		c0.08	0.20				c0.17	c0.09	0.11	
v/s Ratio Perm												0.18
v/c Ratio		0.77		0.68	0.40				0.76	0.68	0.26	0.45
Uniform Delay, d1		25.7		35.8	13.7				30.6	35.4	16.6	18.1
Progression Factor		0.71		0.90	0.59				1.00	1.00	1.00	1.00
Incremental Delay, d2		4.7		6.8	0.7				8.9	15.1	0.8	2.2
Delay (s)		23.1		39.0	8.7				39.5	50.6	17.5	20.4
Level of Service		C		D	A				D	D	B	C
Approach Delay (s)		23.1			13.9			39.5			25.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	338	527	467	154	239	235	186
v/c Ratio	0.44	0.21	0.29	0.20	0.67	0.66	0.39
Control Delay	6.4	3.6	17.4	4.2	39.6	39.0	6.4
Queue Delay	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	3.8	17.4	4.2	39.6	39.0	6.4
Queue Length 50th (ft)	45	33	84	0	124	122	0
Queue Length 95th (ft)	76	56	141	39	182	177	45
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	822	2514	1603	777	585	587	673
Starvation Cap Reductn	196	1179	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.39	0.29	0.20	0.41	0.40	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	501	0	0	444	146	446	5	177	0	0	0
Future Volume (vph)	321	501	0	0	444	146	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1782	3574			3574	1545	1698	1704	1599			
Flt Permitted	0.45	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	849	3574			3574	1545	1698	1704	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	338	527	0	0	467	154	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	85	0	0	147	0	0	0
Lane Group Flow (vph)	338	527	0	0	467	69	239	235	39	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	59.8	59.8			38.1	38.1	17.8	17.8	17.8			
Effective Green, g (s)	59.8	59.8			38.1	38.1	17.8	17.8	17.8			
Actuated g/C Ratio	0.70	0.70			0.45	0.45	0.21	0.21	0.21			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	780	2514			1601	692	355	356	334			
v/s Ratio Prot	c0.09	0.15			0.13		c0.14	0.14				
v/s Ratio Perm	c0.22					0.04			0.02			
v/c Ratio	0.43	0.21			0.29	0.10	0.67	0.66	0.12			
Uniform Delay, d1	7.4	4.4			14.9	13.5	30.9	30.8	27.2			
Progression Factor	0.55	0.66			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.2			0.5	0.3	4.5	4.1	0.1			
Delay (s)	4.2	3.1			15.3	13.8	35.4	34.9	27.3			
Level of Service	A	A			B	B	D	C	C			
Approach Delay (s)		3.5			15.0			33.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	321	501	0	0	444	146	446	5	177	0	0	0
Future Volume (veh/h)	321	501	0	0	444	146	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	338	527	0	0	467	154	473	0	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	925	2647	0	0	1028	445	608	0	271			
Arrive On Green	0.80	1.00	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1795	3676	0	0	3676	1550	3591	0	1598			
Grp Volume(v), veh/h	338	527	0	0	467	154	473	0	186			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1550	1795	0	1598			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.1	6.7	10.7	0.0	9.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.1	6.7	10.7	0.0	9.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	925	2647	0	0	1028	445	608	0	271			
V/C Ratio(X)	0.37	0.20	0.00	0.00	0.45	0.35	0.78	0.00	0.69			
Avail Cap(c_a), veh/h	925	2647	0	0	1028	445	1238	0	551			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.3	0.0	0.0	0.0	24.8	24.0	33.8	0.0	33.2			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.4	2.1	1.6	0.0	2.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.0	0.1	0.0	0.0	3.9	2.6	4.7	0.0	8.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.4	0.1	0.0	0.0	26.3	26.1	35.4	0.0	35.5			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		865			621			659				
Approach Delay, s/veh		1.4			26.2			35.4				
Approach LOS		A			C			D				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		66.9		18.1	37.9	29.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 48		29.3	18.9	24.4						
Max Q Clear Time (g_c+I1), s		2.0		12.7	2.0	11.1						
Green Ext Time (p_c), s		3.1		1.7	0.4	1.9						

Intersection Summary			
HCM 6th Ctrl Delay			19.1
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1302	90	853
v/c Ratio	0.48	0.42	0.24
Control Delay	0.6	35.8	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	35.8	0.2
Queue Length 50th (ft)	3	37	0
Queue Length 95th (ft)	0	0	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2713	252	3574
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	755
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.48	0.36	0.30

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	821	403	85	802	0	0
Future Volume (vph)	821	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3370		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3370		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	873	429	90	853	0	0
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	1237	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	66.6		10.2	85.0		
Effective Green, g (s)	66.6		10.2	76.5		
Actuated g/C Ratio	0.78		0.12	0.90		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2640		214	3216		
v/s Ratio Prot	c0.37		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.47		0.42	0.27		
Uniform Delay, d1	3.1		34.7	0.6		
Progression Factor	0.09		0.88	1.00		
Incremental Delay, d2	0.1		0.5	0.0		
Delay (s)	0.4		31.0	0.6		
Level of Service	A		C	A		
Approach Delay (s)	0.4			3.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	470	39	264	462	41	249
v/c Ratio	0.65	0.06	0.43	0.29	0.14	0.45
Control Delay	16.9	4.9	5.4	3.5	21.9	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	4.9	5.4	3.5	21.9	8.0
Queue Length 50th (ft)	66	0	1	0	7	14
Queue Length 95th (ft)	223	15	60	112	38	63
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1134	979	651	1604	1110	604
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.04	0.41	0.29	0.04	0.41

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	432	36	243	425	38	229
Future Volume (vph)	432	36	243	425	38	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.28	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	517	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	470	39	264	462	41	249
RTOR Reduction (vph)	0	25	0	0	0	124
Lane Group Flow (vph)	470	14	264	462	41	125
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	17.5	17.5	31.9	31.9	2.3	10.2
Effective Green, g (s)	17.5	17.5	31.9	31.9	2.3	10.2
Actuated g/C Ratio	0.37	0.37	0.68	0.68	0.05	0.22
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	690	586	559	1259	86	560
v/s Ratio Prot	c0.25		0.08	c0.25	0.02	c0.04
v/s Ratio Perm		0.01	0.24			0.04
v/c Ratio	0.68	0.02	0.47	0.37	0.48	0.22
Uniform Delay, d1	12.5	9.4	4.6	3.3	21.9	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	0.0	0.6	0.2	4.1	0.2
Delay (s)	15.3	9.4	5.2	3.5	26.0	15.4
Level of Service	B	A	A	A	C	B
Approach Delay (s)	14.8			4.1	16.9	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	19.5
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	432	36	243	425	38	229
Future Volume (veh/h)	432	36	243	425	38	229
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	470	39	264	462	41	249
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	488	440	1057	322	492
Arrive On Green	0.31	0.31	0.13	0.57	0.18	0.18
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	470	39	264	462	41	249
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.9	0.9	4.7	7.3	1.0	6.6
Cycle Q Clear(g_c), s	11.9	0.9	4.7	7.3	1.0	6.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	576	488	440	1057	322	492
V/C Ratio(X)	0.82	0.08	0.60	0.44	0.13	0.51
Avail Cap(c_a), veh/h	878	744	505	1427	802	919
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	12.5	10.8	6.4	17.6	14.4
Incr Delay (d2), s/veh	3.6	0.1	1.5	0.3	0.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	0.2	1.2	1.4	0.4	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.9	12.6	12.3	6.7	17.7	15.2
LnGrp LOS	B	B	B	A	B	B
Approach Vol, veh/h	509			726	290	
Approach Delay, s/veh	19.4			8.7	15.6	
Approach LOS	B			A	B	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.1	22.2				35.4		15.7
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	8.5	24.0				39.0		23.0
Max Q Clear Time (g_c+I1), s	6.7	13.9				9.3		8.6
Green Ext Time (p_c), s	0.1	1.9				2.5		0.8

Intersection Summary		
HCM 6th Ctrl Delay		13.6
HCM 6th LOS		B

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	245	391	552	193	302
v/c Ratio	0.62	0.24	0.48	0.66	0.59
Control Delay	20.5	12.4	14.4	37.8	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	12.4	14.4	37.8	8.7
Queue Length 50th (ft)	48	46	56	74	0
Queue Length 95th (ft)	86	95	121	145	61
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	853	1728	1202	434	617
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.29	0.23	0.46	0.44	0.49

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	233	371	297	227	183	287
Future Volume (vph)	233	371	297	227	183	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3342		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3342		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	245	391	313	239	193	302
RTOR Reduction (vph)	0	0	141	0	0	252
Lane Group Flow (vph)	245	391	411	0	193	50
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	14.5	31.2	20.2		11.1	11.1
Effective Green, g (s)	14.5	31.2	20.2		11.1	11.1
Actuated g/C Ratio	0.22	0.47	0.30		0.17	0.17
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	386	1664	1007		296	264
v/s Ratio Prot	c0.14	0.11	c0.12			
v/s Ratio Perm					c0.11	0.03
v/c Ratio	0.63	0.23	0.41		0.65	0.19
Uniform Delay, d1	23.8	10.7	18.6		26.1	24.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.5	0.0	0.1		3.9	0.1
Delay (s)	26.4	10.8	18.7		30.0	24.2
Level of Service	C	B	B		C	C
Approach Delay (s)		16.8	18.7		26.5	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	117	409	88	238	792	98	91	76	246	247
v/c Ratio	0.50	0.30	0.13	0.79	0.54	0.53	0.47	0.16	0.78	0.77
Control Delay	50.9	27.2	1.4	49.6	9.5	54.0	51.0	3.4	56.6	55.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	27.2	1.4	49.6	9.5	54.0	51.0	3.4	56.6	55.1
Queue Length 50th (ft)	76	98	0	160	37	64	59	0	165	162
Queue Length 95th (ft)	134	180	8	230	68	109	102	14	244	242
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	242	1350	679	391	1460	306	322	549	404	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.30	0.13	0.61	0.54	0.32	0.28	0.14	0.61	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	389	84	226	461	292	93	86	72	409	37	22
Future Volume (vph)	111	389	84	226	461	292	93	86	72	409	37	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (prot)	1787	3574	1561	1787	3322		1787	1881	1588	1698	1695	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.96	
Satd. Flow (perm)	1787	3574	1561	1787	3322		1787	1881	1588	1698	1695	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	117	409	88	238	485	307	98	91	76	431	39	23
RTOR Reduction (vph)	0	0	55	0	81	0	0	0	55	0	4	0
Lane Group Flow (vph)	117	409	33	238	711	0	98	91	21	246	243	0
Confl. Peds. (#/hr)			1			5			4			6
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	13.9	39.7	39.7	17.8	43.6		10.8	10.8	28.6	19.7	19.7	
Effective Green, g (s)	13.9	39.7	39.7	17.8	43.6		10.8	10.8	28.6	19.7	19.7	
Actuated g/C Ratio	0.13	0.38	0.38	0.17	0.42		0.10	0.10	0.27	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	236	1351	590	302	1379		183	193	432	318	318	
v/s Ratio Prot	0.07	0.11		c0.13	c0.21		c0.05	0.05	0.01	c0.14	0.14	
v/s Ratio Perm			0.02						0.00			
v/c Ratio	0.50	0.30	0.06	0.79	0.52		0.54	0.47	0.05	0.77	0.76	
Uniform Delay, d1	42.3	22.9	20.7	41.8	22.8		44.7	44.4	28.2	40.5	40.4	
Progression Factor	1.00	1.00	1.00	0.78	0.40		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.6	0.2	11.3	1.3		1.5	0.7	0.0	10.2	9.4	
Delay (s)	42.9	23.5	20.9	43.9	10.4		46.2	45.1	28.2	50.7	49.9	
Level of Service	D	C	C	D	B		D	D	C	D	D	
Approach Delay (s)		26.8			18.2			40.7			50.3	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	389	84	226	461	292	93	86	72	409	37	22
Future Volume (veh/h)	111	389	84	226	461	292	93	86	72	409	37	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	117	409	88	238	485	307	98	91	76	480	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	579	750	327	700	581	366	146	153	751	564	296	0
Arrive On Green	0.32	0.21	0.21	0.65	0.46	0.46	0.08	0.08	0.08	0.16	0.00	0.00
Sat Flow, veh/h	1795	3582	1559	1795	2100	1324	1795	1885	1574	3591	1885	0
Grp Volume(v), veh/h	117	409	88	238	413	379	98	91	76	480	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1559	1795	1791	1633	1795	1885	1574	1795	1885	0
Q Serve(g_s), s	5.0	10.7	5.0	6.2	21.2	21.4	5.6	4.9	0.0	13.7	0.0	0.0
Cycle Q Clear(g_c), s	5.0	10.7	5.0	6.2	21.2	21.4	5.6	4.9	0.0	13.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.81	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	579	750	327	700	496	452	146	153	751	564	296	0
V/C Ratio(X)	0.20	0.54	0.27	0.34	0.83	0.84	0.67	0.59	0.10	0.85	0.00	0.00
Avail Cap(c_a), veh/h	579	750	327	700	546	498	308	323	893	855	449	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	25.8	37.0	34.8	12.3	26.1	26.2	46.9	46.5	15.4	43.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	2.8	2.0	0.1	14.1	15.6	2.0	1.4	0.0	3.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.9	2.0	2.2	9.0	8.4	2.5	2.3	1.0	6.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.8	39.9	36.8	12.4	40.2	41.8	48.8	47.9	15.4	46.4	0.0	0.0
LnGrp LOS	C	D	D	B	D	D	D	D	B	D	A	A
Approach Vol, veh/h		614			1030			265			480	
Approach Delay, s/veh		36.7			34.4			38.9			46.4	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	45.9	26.0		20.5	38.9	33.1		12.5
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	23.0	22.0		25.0	13.0	32.0		18.0
Max Q Clear Time (g_c+I1), s	8.2	12.7		15.7	7.0	23.4		7.6
Green Ext Time (p_c), s	0.2	1.3		0.7	0.0	5.7		0.4

Intersection Summary			
HCM 6th Ctrl Delay			37.9
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	958	77	741	252	102	168	209
v/c Ratio	0.81	0.45	0.45	0.79	0.25	0.19	0.27
Control Delay	35.7	60.1	5.6	57.8	34.0	15.9	9.6
Queue Delay	3.7	0.0	0.0	61.4	0.0	0.0	0.0
Total Delay	39.4	60.1	5.6	119.2	34.0	15.9	9.6
Queue Length 50th (ft)	347	36	23	162	55	61	45
Queue Length 95th (ft)	#498	71	44	238	101	91	81
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1181	207	1661	407	446	1016	891
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	147	0	0	180	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.37	0.45	1.11	0.23	0.17	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	894	26	74	711	0	0	0	242	98	161	201
Future Volume (vph)	0	894	26	74	711	0	0	0	242	98	161	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3588		1805	3610				1644	1805	1900	1592
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3588		1805	3610				1644	1805	1900	1592
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	931	27	77	741	0	0	0	252	102	168	209
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	45
Lane Group Flow (vph)	0	958	0	77	741	0	0	0	252	102	168	164
Confl. Peds. (#/hr)			16									2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		34.5		10.0	48.3				20.4	23.7	48.3	48.3
Effective Green, g (s)		34.5		10.0	48.3				20.4	23.7	48.3	48.3
Actuated g/C Ratio		0.33		0.10	0.46				0.19	0.23	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.2	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		1178		171	1660				319	407	874	732
v/s Ratio Prot		c0.27		0.04	c0.21				c0.15	c0.06	0.09	
v/s Ratio Perm												0.10
v/c Ratio		0.81		0.45	0.45				0.79	0.25	0.19	0.22
Uniform Delay, d1		32.3		44.9	19.3				40.3	33.4	16.8	17.1
Progression Factor		0.82		1.17	0.23				1.00	1.00	1.00	1.00
Incremental Delay, d2		5.8		0.7	0.8				11.8	0.2	0.1	0.1
Delay (s)		32.1		53.2	5.3				52.1	33.6	16.9	17.2
Level of Service		C		D	A				D	C	B	B
Approach Delay (s)		32.1			9.8			52.1			20.6	
Approach LOS		C			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	324	388	399	150	262	263	127
v/c Ratio	0.40	0.15	0.24	0.18	0.68	0.68	0.28
Control Delay	3.8	1.2	19.8	4.6	44.8	44.8	6.5
Queue Delay	0.6	0.2	0.0	0.0	0.4	0.4	0.0
Total Delay	4.5	1.5	19.8	4.6	45.2	45.2	6.5
Queue Length 50th (ft)	12	7	84	0	170	171	0
Queue Length 95th (ft)	36	12	147	43	228	228	40
Internal Link Dist (ft)		187	384			402	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	880	2509	1692	836	568	570	609
Starvation Cap Reductn	271	1440	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	75	75	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.36	0.24	0.18	0.53	0.53	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	311	372	0	0	383	144	503	1	122	0	0	0
Future Volume (vph)	311	372	0	0	383	144	503	1	122	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	0.98			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1805	3610			3610	1615	1715	1719	1584			
Flt Permitted	0.49	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	924	3610			3610	1615	1715	1719	1584			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	324	388	0	0	399	150	524	1	127	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	80	0	0	98	0	0	0
Lane Group Flow (vph)	324	388	0	0	399	70	262	263	29	0	0	0
Confl. Peds. (#/hr)									6			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	73.0	73.0			49.2	49.2	23.8	23.8	23.8			
Effective Green, g (s)	73.0	73.0			49.2	49.2	23.8	23.8	23.8			
Actuated g/C Ratio	0.70	0.70			0.47	0.47	0.23	0.23	0.23			
Clearance Time (s)	4.1	4.0			4.2	4.2	4.2	4.2	4.2			
Vehicle Extension (s)	2.0	2.5			2.5	2.5	2.5	2.5	2.5			
Lane Grp Cap (vph)	806	2509			1691	756	388	389	359			
v/s Ratio Prot	c0.07	0.11			0.11		0.15	c0.15				
v/s Ratio Perm	c0.20					0.04			0.02			
v/c Ratio	0.40	0.15			0.24	0.09	0.68	0.68	0.08			
Uniform Delay, d1	8.8	5.5			16.7	15.5	37.1	37.1	32.0			
Progression Factor	0.26	0.17			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.3	0.2	4.2	4.2	0.1			
Delay (s)	2.4	1.1			17.0	15.7	41.3	41.3	32.0			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		1.7			16.7			39.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	311	372	0	0	383	144	503	1	122	0	0	0
Future Volume (veh/h)	311	372	0	0	383	144	503	1	122	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	324	388	0	0	399	150	525	0	127			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	944	2673	0	0	1162	518	654	0	288			
Arrive On Green	0.76	1.00	0.00	0.00	0.32	0.32	0.18	0.00	0.18			
Sat Flow, veh/h	1810	3705	0	0	3705	1610	3619	0	1594			
Grp Volume(v), veh/h	324	388	0	0	399	150	525	0	127			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1610	1810	0	1594			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.8	7.3	14.6	0.0	7.4			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.8	7.3	14.6	0.0	7.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	944	2673	0	0	1162	518	654	0	288			
V/C Ratio(X)	0.34	0.15	0.00	0.00	0.34	0.29	0.80	0.00	0.44			
Avail Cap(c_a), veh/h	944	2673	0	0	1162	518	1199	0	528			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.74	0.74	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.9	0.0	0.0	0.0	27.1	26.6	41.2	0.0	38.3			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	0.8	1.4	1.8	0.0	0.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	0.0	3.9	3.0	6.6	0.0	6.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.0	0.1	0.0	0.0	27.9	28.0	43.0	0.0	39.1			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		712			549			652				
Approach Delay, s/veh		1.8			28.0			42.2				
Approach LOS		A			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		81.8		23.2	43.8	38.0						
Change Period (Y+Rc), s		* 4.1		* 4.2	* 4.1	4.2						
Max Green Setting (Gmax), s		* 62		* 35	* 24	33.8						
Max Q Clear Time (g_c+I1), s		2.0		16.6	2.0	10.8						
Green Ext Time (p_c), s		6.0		1.7	0.4	2.4						
Intersection Summary												
HCM 6th Ctrl Delay			23.1									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	18.8
Intersection LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	73	141	357	111	142	356
Future Vol, veh/h	73	141	357	111	142	356
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	78	152	384	119	153	383
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	13.4	23.3	16.8
HCM LOS	B	C	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	34%	0%	100%
Vol Right, %	0%	100%	66%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	356	214	357	111
LT Vol	142	0	0	357	0
Through Vol	0	0	73	0	111
RT Vol	0	356	141	0	0
Lane Flow Rate	153	383	230	384	119
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.303	0.63	0.398	0.74	0.213
Departure Headway (Hd)	7.142	5.923	6.219	6.943	6.434
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	502	609	575	518	556
Service Time	4.907	3.687	4.285	4.705	4.197
HCM Lane V/C Ratio	0.305	0.629	0.4	0.741	0.214
HCM Control Delay	13	18.3	13.4	27.1	10.9
HCM Lane LOS	B	C	B	D	B
HCM 95th-tile Q	1.3	4.4	1.9	6.2	0.8

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1286	107	818
v/c Ratio	0.62	0.63	0.31
Control Delay	9.9	89.6	4.4
Queue Delay	0.0	0.0	0.5
Total Delay	9.9	89.6	4.9
Queue Length 50th (ft)	77	77	186
Queue Length 95th (ft)	179	131	199
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2125	207	2699
Starvation Cap Reductn	0	0	1363
Spillback Cap Reductn	0	0	571
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.61	0.52	0.61

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	710	524	103	785	0	0
Future Volume (vph)	710	524	103	785	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.97		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.94		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3282		1805	3610		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3282		1805	3610		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	740	546	107	818	0	0
RTOR Reduction (vph)	108	0	0	0	0	0
Lane Group Flow (vph)	1178	0	107	818	0	0
Confl. Peds. (#/hr)		16				
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2 8		1	6 2 8		
Permitted Phases						
Actuated Green, G (s)	62.2		10.0	76.2		
Effective Green, g (s)	62.2		10.0	72.2		
Actuated g/C Ratio	0.59		0.10	0.69		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	1944		171	2482		
v/s Ratio Prot	c0.36		c0.06	0.23		
v/s Ratio Perm						
v/c Ratio	0.61		0.63	0.33		
Uniform Delay, d1	13.6		45.7	6.6		
Progression Factor	0.77		1.62	0.72		
Incremental Delay, d2	0.3		5.0	0.1		
Delay (s)	10.7		79.2	4.8		
Level of Service	B		E	A		
Approach Delay (s)	10.7			13.4	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.4
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Cumulative

Intersection	
Int Delay, s/veh	5.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	180	210	70	140	160
Future Vol, veh/h	80	180	210	70	140	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	87	196	228	76	152	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	744	266	0	0	304	0
Stage 1	266	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	373	758	-	-	1223	-
Stage 1	765	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	327	758	-	-	1223	-
Mov Cap-2 Maneuver	327	-	-	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	535	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	3.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	327	758	1223	-
HCM Lane V/C Ratio	-	-	0.266	0.258	0.124	-
HCM Control Delay (s)	-	-	20	11.4	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.1	1	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	478	54	43	359	11	109	109	141	33	65	22
v/c Ratio	0.14	0.67	0.08	0.28	0.47	0.01	0.47	0.26	0.31	0.21	0.24	0.06
Control Delay	42.2	25.3	0.2	44.5	19.3	0.0	42.1	31.1	8.7	42.4	36.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	25.3	0.2	44.5	19.3	0.0	42.1	31.1	8.7	42.4	36.4	0.2
Queue Length 50th (ft)	10	198	0	20	102	0	50	47	1	15	29	0
Queue Length 95th (ft)	38	335	0	62	238	0	118	108	51	50	76	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	156	1127	1008	153	1125	1027	342	1047	948	183	879	845
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.42	0.05	0.28	0.32	0.01	0.32	0.10	0.15	0.18	0.07	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	440	50	40	330	10	100	100	130	30	60	20
Future Volume (vph)	20	440	50	40	330	10	100	100	130	30	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	478	54	43	359	11	109	109	141	33	65	22
RTOR Reduction (vph)	0	0	33	0	0	7	0	0	109	0	0	19
Lane Group Flow (vph)	22	478	21	43	359	4	109	109	32	33	65	3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.8	29.4	29.4	2.8	30.4	30.4	7.6	16.4	16.4	3.2	12.0	12.0
Effective Green, g (s)	1.8	29.4	29.4	2.8	30.4	30.4	7.6	16.4	16.4	3.2	12.0	12.0
Actuated g/C Ratio	0.02	0.39	0.39	0.04	0.40	0.40	0.10	0.21	0.21	0.04	0.16	0.16
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	40	697	580	63	721	612	171	389	330	72	284	241
v/s Ratio Prot	0.01	c0.26		c0.03	0.20		c0.06	c0.06		0.02	0.04	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.55	0.69	0.04	0.68	0.50	0.01	0.64	0.28	0.10	0.46	0.23	0.01
Uniform Delay, d1	36.8	19.6	14.6	36.3	17.2	13.8	33.0	25.0	24.0	35.7	28.1	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8	3.6	0.1	27.2	1.1	0.0	5.6	0.7	0.2	1.7	0.7	0.0
Delay (s)	53.6	23.2	14.7	63.6	18.4	13.9	38.6	25.7	24.2	37.4	28.8	27.2
Level of Service	D	C	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		23.6			22.9			29.1			30.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	24.5
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	440	50	40	330	10	100	100	130	30	60	20
Future Volume (veh/h)	20	440	50	40	330	10	100	100	130	30	60	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	22	478	54	43	359	11	109	109	141	33	65	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	44	650	540	74	681	578	140	293	249	61	211	179
Arrive On Green	0.03	0.36	0.36	0.04	0.37	0.37	0.08	0.16	0.16	0.04	0.12	0.12
Sat Flow, veh/h	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	22	478	54	43	359	11	109	109	141	33	65	22
Grp Sat Flow(s),veh/h/ln	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.8	13.8	1.4	1.5	9.3	0.3	3.7	3.2	5.1	1.1	2.0	0.8
Cycle Q Clear(g_c), s	0.8	13.8	1.4	1.5	9.3	0.3	3.7	3.2	5.1	1.1	2.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	650	540	74	681	578	140	293	249	61	211	179
V/C Ratio(X)	0.50	0.73	0.10	0.58	0.53	0.02	0.78	0.37	0.57	0.54	0.31	0.12
Avail Cap(c_a), veh/h	167	1242	1030	164	1239	1050	365	1115	945	196	937	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.1	17.0	13.0	28.4	14.8	12.0	27.3	22.6	23.4	28.7	24.5	24.0
Incr Delay (d2), s/veh	9.9	3.4	0.2	8.4	1.4	0.0	3.6	1.3	3.5	2.7	1.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.0	0.4	0.7	3.2	0.1	1.5	1.3	1.8	0.5	0.8	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.0	20.4	13.2	36.8	16.1	12.0	30.8	24.0	26.9	31.4	25.9	24.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		554			413			359			120	
Approach Delay, s/veh		20.4			18.2			27.2			27.2	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	28.6	10.1	13.8	6.8	29.7	7.4	16.5
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.7	* 41	12.7	* 31	5.8	* 41	6.8	* 37
Max Q Clear Time (g_c+I1), s	3.5	15.8	5.7	4.0	2.8	11.3	3.1	7.1
Green Ext Time (p_c), s	0.0	5.7	0.1	0.5	0.0	4.0	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	22.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	560	20	60	350	20	10	10	180	20	20	20
Future Vol, veh/h	20	560	20	60	350	20	10	10	180	20	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	22	609	22	65	380	22	11	11	196	22	22	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	402	0	0	631	0	0	1196	1185	609	1278	1185	380
Stage 1	-	-	-	-	-	-	653	653	-	510	510	-
Stage 2	-	-	-	-	-	-	543	532	-	768	675	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1141	-	-	937	-	-	161	186	490	141	186	660
Stage 1	-	-	-	-	-	-	451	459	-	541	533	-
Stage 2	-	-	-	-	-	-	519	521	-	390	449	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1141	-	-	937	-	-	131	170	490	75	170	660
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	170	-	75	170	-
Stage 1	-	-	-	-	-	-	442	450	-	531	496	-
Stage 2	-	-	-	-	-	-	447	485	-	224	440	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.3	18.5	37.1
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	131	170	490	1141	-	-	937	-	-	75	170	660
HCM Lane V/C Ratio	0.083	0.064	0.399	0.019	-	-	0.07	-	-	0.29	0.128	0.033
HCM Control Delay (s)	35	27.6	17.1	8.2	-	-	9.1	-	-	71.5	29.3	10.6
HCM Lane LOS	E	D	C	A	-	-	A	-	-	F	D	B
HCM 95th %tile Q(veh)	0.3	0.2	1.9	0.1	-	-	0.2	-	-	1.1	0.4	0.1

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	690	0	0	360	0	0
Future Vol, veh/h	690	0	0	360	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	750	0	0	391	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	750	0	1141	750
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	391	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	859	-	222	411
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	683	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	859	-	222	411
Mov Cap-2 Maneuver	-	-	-	-	222	-
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	683	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	859	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	690	0	0	360	0	0
Future Vol, veh/h	690	0	0	360	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	750	0	0	391	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	750	0	1141	750
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	391	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	859	-	222	411
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	683	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	859	-	222	411
Mov Cap-2 Maneuver	-	-	-	-	222	-
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	683	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	859	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	480	210	60	170	0	0	0	0	60	0	190
Future Vol, veh/h	0	480	210	60	170	0	0	0	0	60	0	190
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	522	228	65	185	0	0	0	0	65	0	207

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	750	0	0	951	1065	185
Stage 1	-	-	-	-	-	-	315	315	-
Stage 2	-	-	-	-	-	-	636	750	-
Critical Hdwy	-	-	-	4.15	-	-	6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-	3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	846	-	0	285	220	850
Stage 1	0	-	-	-	-	0	733	650	-
Stage 2	0	-	-	-	-	0	522	414	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	846	-	-	263	0	850
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	0	-
Stage 1	-	-	-	-	-	-	733	0	-
Stage 2	-	-	-	-	-	-	482	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2.5	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	846	-	263	850
HCM Lane V/C Ratio	-	-	0.077	-	0.248	0.243
HCM Control Delay (s)	-	-	9.6	-	23.1	10.6
HCM Lane LOS	-	-	A	-	C	B
HCM 95th %tile Q(veh)	-	-	0.2	-	1	1

Intersection	
Int Delay, s/veh	14.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	320	230	0	0	110	30	120	10	80	0	0	0
Future Vol, veh/h	320	230	0	0	110	30	120	10	80	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	348	250	0	0	120	33	130	11	87	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	153	0	-	-	-	0	1083	1099	250
Stage 1	-	-	-	-	-	-	946	946	-
Stage 2	-	-	-	-	-	-	137	153	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1421	-	0	0	-	-	239	212	786
Stage 1	-	-	0	0	-	-	376	339	-
Stage 2	-	-	0	0	-	-	887	769	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1421	-	-	-	-	-	180	0	786
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	0	-
Stage 1	-	-	-	-	-	-	284	0	-
Stage 2	-	-	-	-	-	-	887	0	-

Approach	EB	WB	NB
HCM Control Delay, s	4.9	0	49.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	180	786	1421	-	-	-
HCM Lane V/C Ratio	0.785	0.111	0.245	-	-	-
HCM Control Delay (s)	73.6	10.1	8.4	-	-	-
HCM Lane LOS	F	B	A	-	-	-
HCM 95th %tile Q(veh)	5.3	0.4	1	-	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	270	90	320	230	30
Future Vol, veh/h	40	270	90	320	230	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	43	293	98	348	250	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	811	267	283	0	-	0
Stage 1	267	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	348	769	1274	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	580	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	769	1274	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	580	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1274	-	321	769	-	-
HCM Lane V/C Ratio	0.077	-	0.135	0.382	-	-
HCM Control Delay (s)	8.1	-	18	12.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	1.8	-	-

Intersection						
Int Delay, s/veh	0					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	320	0	0	230
Future Vol, veh/h	0	0	320	0	0	230
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	348	0	0	250

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	598	348	0	0	348	0
Stage 1	348	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	465	695	-	-	1211	-
Stage 1	715	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	465	695	-	-	1211	-
Mov Cap-2 Maneuver	465	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	792	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1211	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	196	446	457	174	109
v/c Ratio	0.58	0.22	0.38	0.59	0.31
Control Delay	25.3	10.1	17.6	33.8	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	10.1	17.6	33.8	8.9
Queue Length 50th (ft)	60	27	47	52	0
Queue Length 95th (ft)	63	141	167	158	43
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	354	2165	1341	560	575
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.55	0.21	0.34	0.31	0.19

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	410	320	100	160	100
Future Volume (vph)	180	410	320	100	160	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3413		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3413		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	446	348	109	174	109
RTOR Reduction (vph)	0	0	28	0	0	92
Lane Group Flow (vph)	196	446	429	0	174	17
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	11.9	34.3	21.1		10.2	10.2
Effective Green, g (s)	11.9	34.3	21.1		10.2	10.2
Actuated g/C Ratio	0.18	0.53	0.33		0.16	0.16
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	327	1884	1118		280	250
v/s Ratio Prot	c0.11	0.13	c0.13			
v/s Ratio Perm					c0.10	0.01
v/c Ratio	0.60	0.24	0.38		0.62	0.07
Uniform Delay, d1	24.1	8.0	16.7		25.3	23.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.0	0.0	0.1		3.1	0.0
Delay (s)	26.0	8.1	16.7		28.4	23.1
Level of Service	C	A	B		C	C
Approach Delay (s)		13.6	16.7		26.3	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	43	641	76	196	729	65	43	217	185	184
v/c Ratio	0.17	0.38	0.09	0.76	0.41	0.42	0.27	0.53	0.76	0.74
Control Delay	39.5	22.2	0.3	58.0	9.5	54.0	48.6	15.9	64.0	59.5
Queue Delay	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	39.5	23.0	0.3	58.0	9.5	54.0	48.6	16.0	64.0	59.5
Queue Length 50th (ft)	24	148	0	139	65	45	29	52	132	125
Queue Length 95th (ft)	59	267	2	202	229	82	60	65	205	197
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	299	1709	816	354	1850	289	304	494	320	325
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	712	0	0	0	0	0	18	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.64	0.09	0.55	0.39	0.22	0.14	0.46	0.58	0.57

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	590	70	180	480	190	60	40	200	270	40	30
Future Volume (vph)	40	590	70	180	480	190	60	40	200	270	40	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1542	1770	3388		1770	1863	1576	1681	1668	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1542	1770	3388		1770	1863	1576	1681	1668	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	641	76	196	522	207	65	43	217	293	43	33
RTOR Reduction (vph)	0	0	41	0	31	0	0	0	69	0	8	0
Lane Group Flow (vph)	43	641	35	196	698	0	65	43	148	185	176	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	13.8	50.3	50.3	18.0	54.5		8.7	8.7	26.7	16.0	16.0	
Effective Green, g (s)	13.8	50.3	50.3	18.0	54.5		8.7	8.7	26.7	16.0	16.0	
Actuated g/C Ratio	0.13	0.46	0.46	0.16	0.50		0.08	0.08	0.24	0.15	0.15	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	222	1618	705	289	1678		139	147	382	244	242	
v/s Ratio Prot	0.02	0.18		c0.11	c0.21		c0.04	0.02	0.06	c0.11	0.11	
v/s Ratio Perm			0.02						0.03			
v/c Ratio	0.19	0.40	0.05	0.68	0.42		0.47	0.29	0.39	0.76	0.73	
Uniform Delay, d1	43.1	19.8	16.6	43.3	17.6		48.4	47.7	34.8	45.1	44.9	
Progression Factor	1.00	1.00	1.00	0.91	0.44		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.7	0.1	4.5	0.7		0.9	0.4	0.2	11.3	8.9	
Delay (s)	43.3	20.5	16.7	43.8	8.5		49.3	48.2	35.1	56.5	53.9	
Level of Service	D	C	B	D	A		D	D	D	E	D	
Approach Delay (s)		21.4			16.0			39.6			55.2	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	590	70	180	480	190	60	40	200	270	40	30
Future Volume (veh/h)	40	590	70	180	480	190	60	40	200	270	40	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	641	76	196	522	207	65	43	217	184	195	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	718	1034	460	620	587	232	107	112	646	261	228	39
Arrive On Green	0.40	0.29	0.29	0.70	0.47	0.47	0.06	0.06	0.06	0.15	0.15	0.15
Sat Flow, veh/h	1781	3554	1580	1781	2488	982	1781	1870	1577	1781	1557	264
Grp Volume(v), veh/h	43	641	76	196	372	357	65	43	217	184	0	228
Grp Sat Flow(s),veh/h/ln	1781	1777	1580	1781	1777	1694	1781	1870	1577	1781	0	1821
Q Serve(g_s), s	1.6	17.2	3.9	4.7	20.9	21.2	3.9	2.4	0.0	10.8	0.0	13.4
Cycle Q Clear(g_c), s	1.6	17.2	3.9	4.7	20.9	21.2	3.9	2.4	0.0	10.8	0.0	13.4
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	718	1034	460	620	419	400	107	112	646	261	0	267
V/C Ratio(X)	0.06	0.62	0.17	0.32	0.89	0.89	0.61	0.38	0.34	0.71	0.00	0.86
Avail Cap(c_a), veh/h	718	1034	460	620	678	647	291	306	810	340	0	348
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.1	33.7	29.1	11.6	27.7	27.8	50.5	49.8	22.3	44.7	0.0	45.8
Incr Delay (d2), s/veh	0.0	2.8	0.8	0.1	21.4	22.9	2.1	0.8	0.1	2.5	0.0	12.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	7.7	1.6	1.6	8.8	8.7	1.8	1.2	3.8	4.9	0.0	6.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.1	36.5	29.8	11.7	49.1	50.7	52.5	50.6	22.4	47.2	0.0	58.1
LnGrp LOS	C	D	C	B	D	D	D	D	C	D	A	E
Approach Vol, veh/h		760			925			325			412	
Approach Delay, s/veh		34.9			41.8			32.2			53.3	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	43.3	36.0		20.1	49.3	30.0		10.6
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	22.0	32.0		21.0	12.0	42.0		18.0
Max Q Clear Time (g_c+I1), s	6.7	19.2		15.4	3.6	23.2		5.9
Green Ext Time (p_c), s	0.1	2.5		0.6	0.0	2.8		0.5

Intersection Summary			
HCM 6th Ctrl Delay			40.3
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1370	217	772	598	261	98	304
v/c Ratio	1.13	1.23	0.45	1.32	1.16	0.12	0.40
Control Delay	98.5	182.1	6.9	191.4	153.2	19.1	13.4
Queue Delay	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.0	182.1	6.9	191.4	153.2	19.1	13.4
Queue Length 50th (ft)	~600	~179	85	~546	~219	40	77
Queue Length 95th (ft)	#705	#335	93	#763	#382	74	147
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1217	177	1705	454	225	809	753
Starvation Cap Reductn	16	0	0	0	0	0	0
Spillback Cap Reductn	132	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.26	1.23	0.45	1.32	1.16	0.12	0.40

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1230	30	200	710	0	0	0	550	240	90	280
Future Volume (vph)	0	1230	30	200	710	0	0	0	550	240	90	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3524		1770	3539				1611	1770	1863	1562
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3524		1770	3539				1611	1770	1863	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1337	33	217	772	0	0	0	598	261	98	304
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	75
Lane Group Flow (vph)	0	1370	0	217	772	0	0	0	598	261	98	229
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Effective Green, g (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Actuated g/C Ratio		0.35		0.10	0.48				0.28	0.13	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1217		177	1705				454	225	809	678
v/s Ratio Prot		c0.39		c0.12	0.22				c0.37	c0.15	0.05	
v/s Ratio Perm												0.15
v/c Ratio		1.13		1.23	0.45				1.32	1.16	0.12	0.34
Uniform Delay, d1		36.0		49.5	18.9				39.5	48.0	18.6	20.6
Progression Factor		0.89		0.97	0.32				1.00	1.00	1.00	1.00
Incremental Delay, d2		67.1		140.6	0.8				157.6	110.0	0.3	1.4
Delay (s)		99.1		188.7	6.9				197.1	158.0	18.9	22.0
Level of Service		F		F	A				F	F	B	C
Approach Delay (s)		99.1			46.8			197.1			75.1	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	96.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	707	1098	935	370	158	157	228
v/c Ratio	0.94	0.40	0.68	0.45	0.68	0.67	0.69
Control Delay	34.9	3.6	32.2	4.7	58.7	58.1	29.8
Queue Delay	1.8	1.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	4.6	32.2	4.7	58.7	58.1	29.8
Queue Length 50th (ft)	353	80	285	0	113	112	64
Queue Length 95th (ft)	#636	151	397	66	174	174	140
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	755	2750	1366	816	397	399	473
Starvation Cap Reductn	13	1307	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.76	0.68	0.45	0.40	0.39	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	650	1010	0	0	860	340	280	10	210	0	0	0
Future Volume (vph)	650	1010	0	0	860	340	280	10	210	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (prot)	1770	3539			3539	1527	1681	1691	1583			
Flt Permitted	0.17	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (perm)	308	3539			3539	1527	1681	1691	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	707	1098	0	0	935	370	304	11	228	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	227	0	0	112	0	0	0
Lane Group Flow (vph)	707	1098	0	0	935	143	158	157	116	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	85.5	85.5			42.5	42.5	15.3	15.3	15.3			
Effective Green, g (s)	85.5	85.5			42.5	42.5	15.3	15.3	15.3			
Actuated g/C Ratio	0.78	0.78			0.39	0.39	0.14	0.14	0.14			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	756	2750			1367	589	233	235	220			
v/s Ratio Prot	c0.33	0.31			0.26		c0.09	0.09				
v/s Ratio Perm	c0.40					0.09			0.07			
v/c Ratio	0.94	0.40			0.68	0.24	0.68	0.67	0.53			
Uniform Delay, d1	22.8	4.0			28.1	22.9	45.0	44.9	44.0			
Progression Factor	0.69	0.75			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	13.1	0.3			2.8	1.0	6.9	6.3	1.7			
Delay (s)	28.8	3.2			30.9	23.8	51.9	51.3	45.7			
Level of Service	C	A			C	C	D	D	D			
Approach Delay (s)		13.2			28.9			49.1			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	650	1010	0	0	860	340	280	10	210	0	0	0
Future Volume (veh/h)	650	1010	0	0	860	340	280	10	210	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	707	1098	0	0	935	370	312	0	228			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	825	2658	0	0	1027	445	597	0	266			
Arrive On Green	0.56	0.99	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1781	3647	0	0	3647	1539	3563	0	1585			
Grp Volume(v), veh/h	707	1098	0	0	935	370	312	0	228			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1539	1781	0	1585			
Q Serve(g_s), s	31.0	0.3	0.0	0.0	27.9	24.8	8.8	0.0	15.4			
Cycle Q Clear(g_c), s	31.0	0.3	0.0	0.0	27.9	24.8	8.8	0.0	15.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	825	2658	0	0	1027	445	597	0	266			
V/C Ratio(X)	0.86	0.41	0.00	0.00	0.91	0.83	0.52	0.00	0.86			
Avail Cap(c_a), veh/h	825	2658	0	0	1027	445	842	0	375			
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.55	0.55	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	19.1	0.1	0.0	0.0	37.7	36.6	41.8	0.0	44.5			
Incr Delay (d2), s/veh	4.9	0.3	0.0	0.0	13.3	16.4	0.5	0.0	11.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	12.5	0.2	0.0	0.0	13.7	11.1	3.9	0.0	13.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	0.3	0.0	0.0	51.1	53.0	42.3	0.0	56.4			
LnGrp LOS	C	A	A	A	D	D	D	A	E			
Approach Vol, veh/h		1805			1305			540				
Approach Delay, s/veh		9.6			51.6			48.2				
Approach LOS		A			D			D				

Timer - Assigned Phs		2		4	5	6			
Phs Duration (G+Y+Rc), s		86.4		23.6	50.6	35.8			
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0			
Max Green Setting (Gmax), s		* 75		* 26	38.9	31.8			
Max Q Clear Time (g_c+I1), s		2.3		17.4	33.0	29.9			
Green Ext Time (p_c), s		10.5		1.1	0.8	1.3			

Intersection Summary			
HCM 6th Ctrl Delay			30.3
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2185	261	978
v/c Ratio	0.77	1.47	0.28
Control Delay	2.4	269.9	0.2
Queue Delay	0.3	0.0	0.1
Total Delay	2.7	269.9	0.3
Queue Length 50th (ft)	58	~244	0
Queue Length 95th (ft)	m0	#410	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2836	177	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	172	0	1023
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	1.47	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1630	380	240	900	0	0
Future Volume (vph)	1630	380	240	900	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3421		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3421		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1772	413	261	978	0	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	2179	0	261	978	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	91.0		11.0	110.0		
Effective Green, g (s)	91.0		11.0	104.8		
Actuated g/C Ratio	0.83		0.10	0.95		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2830		177	3371		
v/s Ratio Prot	c0.64		c0.15	0.28		
v/s Ratio Perm						
v/c Ratio	0.77		1.47	0.29		
Uniform Delay, d1	4.5		49.5	0.2		
Progression Factor	0.47		0.90	1.00		
Incremental Delay, d2	0.1		236.2	0.2		
Delay (s)	2.3		280.5	0.3		
Level of Service	A		F	A		
Approach Delay (s)	2.3			59.4	0.0	
Approach LOS	A			E	A	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	6.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	90	170	230	80	220	220
Future Vol, veh/h	90	170	230	80	220	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	95	179	242	84	232	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	980	284	0	0	326	0
Stage 1	284	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	276	753	-	-	1228	-
Stage 1	762	-	-	-	-	-
Stage 2	493	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	224	753	-	-	1228	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	762	-	-	-	-	-
Stage 2	400	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.6	0	4.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	224	753	1228	-
HCM Lane V/C Ratio	-	-	0.423	0.238	0.189	-
HCM Control Delay (s)	-	-	32.4	11.3	8.6	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	2	0.9	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	489	120	87	446	33	109	65	65	22	87	22
v/c Ratio	0.21	0.53	0.14	0.41	0.43	0.03	0.50	0.15	0.14	0.16	0.32	0.06
Control Delay	46.1	25.1	1.1	46.5	19.9	0.1	48.0	30.8	0.6	46.1	40.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	25.1	1.1	46.5	19.9	0.1	48.0	30.8	0.6	46.1	40.5	0.3
Queue Length 50th (ft)	17	229	0	45	189	0	57	25	0	12	44	0
Queue Length 95th (ft)	53	366	9	107	307	0	127	75	0	40	100	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	164	1091	1002	245	1145	1042	295	969	887	159	825	787
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.45	0.12	0.36	0.39	0.03	0.37	0.07	0.07	0.14	0.11	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	450	110	80	410	30	100	60	60	20	80	20
Future Volume (vph)	30	450	110	80	410	30	100	60	60	20	80	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	489	120	87	446	33	109	65	65	22	87	22
RTOR Reduction (vph)	0	0	68	0	0	17	0	0	53	0	0	19
Lane Group Flow (vph)	33	489	52	87	446	16	109	65	12	22	87	3
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	3.3	37.7	37.7	6.8	41.2	41.2	7.4	16.0	16.0	2.0	10.6	10.6
Effective Green, g (s)	3.3	37.7	37.7	6.8	41.2	41.2	7.4	16.0	16.0	2.0	10.6	10.6
Actuated g/C Ratio	0.04	0.43	0.43	0.08	0.47	0.47	0.09	0.18	0.18	0.02	0.12	0.12
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	67	807	685	138	882	749	150	342	291	40	226	188
v/s Ratio Prot	0.02	c0.26		c0.05	c0.24		c0.06	0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.49	0.61	0.08	0.63	0.51	0.02	0.73	0.19	0.04	0.55	0.38	0.01
Uniform Delay, d1	41.0	18.9	14.4	38.9	15.9	12.2	38.8	30.0	29.2	42.1	35.2	33.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.9	0.1	9.4	1.0	0.0	13.8	0.5	0.1	9.0	1.9	0.1
Delay (s)	47.6	20.8	14.5	48.3	16.8	12.2	52.6	30.5	29.3	51.0	37.1	33.7
Level of Service	D	C	B	D	B	B	D	C	C	D	D	C
Approach Delay (s)		21.0			21.4			40.2			38.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	450	110	80	410	30	100	60	60	20	80	20
Future Volume (veh/h)	30	450	110	80	410	30	100	60	60	20	80	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	489	120	87	446	33	109	65	65	22	87	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	62	676	573	113	729	618	140	305	258	45	205	169
Arrive On Green	0.03	0.36	0.36	0.06	0.39	0.39	0.08	0.16	0.16	0.03	0.11	0.11
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Grp Volume(v), veh/h	33	489	120	87	446	33	109	65	65	22	87	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Q Serve(g_s), s	1.2	14.3	3.3	3.0	12.1	0.8	3.8	1.9	2.3	0.8	2.7	0.8
Cycle Q Clear(g_c), s	1.2	14.3	3.3	3.0	12.1	0.8	3.8	1.9	2.3	0.8	2.7	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	62	676	573	113	729	618	140	305	258	45	205	169
V/C Ratio(X)	0.53	0.72	0.21	0.77	0.61	0.05	0.78	0.21	0.25	0.49	0.42	0.13
Avail Cap(c_a), veh/h	183	1274	1079	273	1368	1160	329	1076	912	177	916	758
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	17.5	14.0	29.2	15.5	12.0	28.6	23.0	23.1	30.4	26.3	25.5
Incr Delay (d2), s/veh	8.3	3.1	0.4	12.5	1.8	0.1	3.4	0.6	0.9	3.0	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	5.4	1.0	1.5	4.3	0.2	1.6	0.8	0.8	0.3	1.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.4	20.6	14.4	41.7	17.3	12.1	32.0	23.6	24.0	33.4	28.7	26.0
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		642			566			239			131	
Approach Delay, s/veh		20.4			20.7			27.5			29.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.3	30.0	10.3	13.7	7.5	31.8	6.9	17.1
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	9.7	* 43	11.7	* 31	6.5	* 46	6.3	* 36
Max Q Clear Time (g_c+I1), s	5.0	16.3	5.8	4.7	3.2	14.1	2.8	4.3
Green Ext Time (p_c), s	0.1	6.5	0.1	0.7	0.0	5.5	0.0	0.9

Intersection Summary		
HCM 6th Ctrl Delay		22.3
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	490	20	90	490	30	10	10	40	20	20	20
Future Vol, veh/h	20	490	20	90	490	30	10	10	40	20	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	505	21	93	505	31	10	10	41	21	21	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	536	0	0	526	0	0	1275	1269	505	1274	1259	505
Stage 1	-	-	-	-	-	-	547	547	-	691	691	-
Stage 2	-	-	-	-	-	-	728	722	-	583	568	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1027	-	-	1036	-	-	143	168	565	143	170	565
Stage 1	-	-	-	-	-	-	519	516	-	433	444	-
Stage 2	-	-	-	-	-	-	413	430	-	496	505	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1027	-	-	1036	-	-	113	150	565	115	152	565
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	150	-	115	152	-
Stage 1	-	-	-	-	-	-	509	506	-	424	404	-
Stage 2	-	-	-	-	-	-	344	391	-	441	495	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.3	19.7	29
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	113	150	565	1027	-	-	1036	-	-	115	152	565
HCM Lane V/C Ratio	0.091	0.069	0.073	0.02	-	-	0.09	-	-	0.179	0.136	0.036
HCM Control Delay (s)	40	30.8	11.9	8.6	-	-	8.8	-	-	43	32.4	11.6
HCM Lane LOS	E	D	B	A	-	-	A	-	-	E	D	B
HCM 95th %tile Q(veh)	0.3	0.2	0.2	0.1	-	-	0.3	-	-	0.6	0.5	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Vol, veh/h	510	0	0	550	0	0
Future Vol, veh/h	510	0	0	550	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	554	0	0	598	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	554	0	1152	554
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	598	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1016	-	219	532
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	549	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1016	-	219	532
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	549	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	1016	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	510	0	0	550	0	0
Future Vol, veh/h	510	0	0	550	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	280	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	554	0	0	598	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	554	0	1152	554
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	598	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1016	-	219	532
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	549	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1016	-	219	532
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	549	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	-	1016	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-
HCM Lane LOS	A	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	310	200	70	240	0	0	0	0	70	10	310
Future Vol, veh/h	0	310	200	70	240	0	0	0	0	70	10	310
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	320	206	72	247	0	0	0	0	72	10	320

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	526	0	0				814	917	247
Stage 1	-	-	-	-	-	-				391	391	-
Stage 2	-	-	-	-	-	-				423	526	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1041	-	0				347	272	792
Stage 1	0	-	-	-	-	0				683	607	-
Stage 2	0	-	-	-	-	0				661	529	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1041	-	-				323	0	792
Mov Cap-2 Maneuver	-	-	-	-	-	-				323	0	-
Stage 1	-	-	-	-	-	-				683	0	-
Stage 2	-	-	-	-	-	-				615	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2	14.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1041	-	323	792
HCM Lane V/C Ratio	-	-	0.069	-	0.255	0.404
HCM Control Delay (s)	-	-	8.7	-	19.9	12.6
HCM Lane LOS	-	-	A	-	C	B
HCM 95th %tile Q(veh)	-	-	0.2	-	1	2

Intersection	
Int Delay, s/veh	13.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	230	150	0	0	120	20	180	10	60	0	0	0
Future Vol, veh/h	230	150	0	0	120	20	180	10	60	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	250	163	0	0	130	22	196	11	65	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	152	0	-	-	-	0	804	815	163
Stage 1	-	-	-	-	-	-	663	663	-
Stage 2	-	-	-	-	-	-	141	152	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1423	-	0	0	-	-	351	311	879
Stage 1	-	-	0	0	-	-	511	457	-
Stage 2	-	-	0	0	-	-	883	770	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1423	-	-	-	-	-	289	0	879
Mov Cap-2 Maneuver	-	-	-	-	-	-	289	0	-
Stage 1	-	-	-	-	-	-	421	0	-
Stage 2	-	-	-	-	-	-	883	0	-

Approach	EB	WB	NB
HCM Control Delay, s	4.9	0	35.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	289	879	1423	-	-	-
HCM Lane V/C Ratio	0.715	0.074	0.176	-	-	-
HCM Control Delay (s)	43.4	9.4	8.1	-	-	-
HCM Lane LOS	E	A	A	-	-	-
HCM 95th %tile Q(veh)	5	0.2	0.6	-	-	-

Intersection						
Int Delay, s/veh	4.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	170	100	230	260	60
Future Vol, veh/h	50	170	100	230	260	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	185	109	250	283	65

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	784	316	348	0	-	0
Stage 1	316	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	362	724	1211	-	-	-
Stage 1	739	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	329	724	1211	-	-	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	13.2		2.5		0	
HCM LOS	B					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1211	-	329	724	-	-
HCM Lane V/C Ratio	0.09	-	0.165	0.255	-	-
HCM Control Delay (s)	8.3	-	18.1	11.7	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	1	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	220	0	0	380
Future Vol, veh/h	0	0	220	0	0	380
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	239	0	0	413

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	652	239	0	0	239	0
Stage 1	239	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	433	800	-	-	1328	-
Stage 1	801	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	433	800	-	-	1328	-
Mov Cap-2 Maneuver	433	-	-	-	-	-
Stage 1	801	-	-	-	-	-
Stage 2	668	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	-	1328	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	0	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	147	432	705	200	158
v/c Ratio	0.47	0.21	0.56	0.62	0.38
Control Delay	24.7	10.1	19.7	35.5	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	10.1	19.7	35.5	9.5
Queue Length 50th (ft)	45	28	85	60	2
Queue Length 95th (ft)	69	141	279	203	60
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	337	2877	1939	671	694
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.44	0.15	0.36	0.30	0.23

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	140	410	490	180	190	150
Future Volume (vph)	140	410	490	180	190	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3411		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3411		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	432	516	189	200	158
RTOR Reduction (vph)	0	0	32	0	0	123
Lane Group Flow (vph)	147	432	673	0	200	35
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	11.5	36.4	23.2		11.7	11.7
Effective Green, g (s)	11.5	36.4	23.2		11.7	11.7
Actuated g/C Ratio	0.17	0.54	0.34		0.17	0.17
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	304	1924	1170		309	276
v/s Ratio Prot	c0.08	0.12	c0.20			
v/s Ratio Perm					c0.11	0.02
v/c Ratio	0.48	0.22	0.58		0.65	0.13
Uniform Delay, d1	25.4	8.2	18.2		26.0	23.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.0	0.4		3.5	0.1
Delay (s)	25.8	8.2	18.6		29.5	23.7
Level of Service	C	A	B		C	C
Approach Delay (s)		12.7	18.6		26.9	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	21.2
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	102	633	92	276	1030	143	82	143	277	274
v/c Ratio	0.41	0.48	0.14	0.85	0.72	0.70	0.38	0.28	0.84	0.82
Control Delay	54.3	33.4	2.8	67.2	25.7	69.3	53.4	9.2	68.6	63.9
Queue Delay	0.0	2.7	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	36.1	2.8	67.2	26.2	69.3	53.4	9.2	68.6	63.9
Queue Length 50th (ft)	73	200	0	211	363	108	60	24	217	206
Queue Length 95th (ft)	137	303	20	m299	473	172	107	40	311	300
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	251	1321	656	402	1432	268	282	572	396	400
Starvation Cap Reductn	0	0	0	0	120	0	0	0	0	0
Spillback Cap Reductn	0	548	0	0	0	0	0	10	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.82	0.14	0.69	0.79	0.53	0.29	0.25	0.70	0.69

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	620	90	270	800	210	140	80	140	400	80	60
Future Volume (vph)	100	620	90	270	800	210	140	80	140	400	80	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1560	1787	3446		1787	1881	1588	1698	1679	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1560	1787	3446		1787	1881	1588	1698	1679	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	102	633	92	276	816	214	143	82	143	408	82	61
RTOR Reduction (vph)	0	0	58	0	18	0	0	0	49	0	9	0
Lane Group Flow (vph)	102	633	34	276	1012	0	143	82	94	277	265	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	17.0	44.4	44.4	21.8	49.2		13.6	13.6	35.4	23.2	23.2	
Effective Green, g (s)	17.0	44.4	44.4	21.8	49.2		13.6	13.6	35.4	23.2	23.2	
Actuated g/C Ratio	0.14	0.37	0.37	0.18	0.41		0.11	0.11	0.29	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	253	1322	577	324	1412		202	213	468	328	324	
v/s Ratio Prot	0.06	0.18		c0.15	c0.29		c0.08	0.04	0.04	c0.16	0.16	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.40	0.48	0.06	0.85	0.72		0.71	0.38	0.20	0.84	0.82	
Uniform Delay, d1	46.9	28.9	24.3	47.5	29.6		51.3	49.3	31.7	46.7	46.4	
Progression Factor	1.00	1.00	1.00	1.02	0.78		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.2	0.2	14.9	2.5		8.9	0.4	0.1	17.1	14.0	
Delay (s)	47.3	30.2	24.5	63.2	25.6		60.2	49.7	31.8	63.7	60.4	
Level of Service	D	C	C	E	C		E	D	C	E	E	
Approach Delay (s)		31.7			33.5			46.8			62.1	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	620	90	270	800	210	140	80	140	400	80	60
Future Volume (veh/h)	100	620	90	270	800	210	140	80	140	400	80	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	102	633	92	276	816	214	143	82	143	276	267	61
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	445	895	390	553	870	228	181	190	652	358	296	68
Arrive On Green	0.25	0.25	0.25	0.62	0.62	0.62	0.10	0.10	0.10	0.20	0.20	0.20
Sat Flow, veh/h	1795	3582	1560	1795	2806	736	1795	1885	1583	1795	1482	339
Grp Volume(v), veh/h	102	633	92	276	521	509	143	82	143	276	0	328
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1751	1795	1885	1583	1795	0	1821
Q Serve(g_s), s	5.4	19.3	5.6	10.2	31.7	31.7	9.3	4.9	0.0	17.4	0.0	21.1
Cycle Q Clear(g_c), s	5.4	19.3	5.6	10.2	31.7	31.7	9.3	4.9	0.0	17.4	0.0	21.1
Prop In Lane	1.00		1.00	1.00		0.42	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	445	895	390	553	555	543	181	190	652	358	0	363
V/C Ratio(X)	0.23	0.71	0.24	0.50	0.94	0.94	0.79	0.43	0.22	0.77	0.00	0.90
Avail Cap(c_a), veh/h	445	895	390	553	672	657	269	283	730	419	0	425
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.75	0.75	0.75	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	41.0	35.9	17.9	21.8	21.8	52.7	50.7	23.0	45.4	0.0	46.9
Incr Delay (d2), s/veh	0.1	4.7	1.4	0.2	21.0	21.4	4.9	0.6	0.1	5.9	0.0	18.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	9.0	2.3	3.4	11.3	11.1	4.4	2.3	2.6	8.3	0.0	11.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.1	45.7	37.3	18.1	42.8	43.1	57.6	51.3	23.1	51.4	0.0	65.6
LnGrp LOS	D	D	D	B	D	D	E	D	C	D	A	E
Approach Vol, veh/h		827			1306			368			604	
Approach Delay, s/veh		43.6			37.7			42.8			59.1	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2	4	5	6	8
Phs Duration (G+Y+Rc), s	42.0	34.0	27.9	34.8	41.2	16.1
Change Period (Y+Rc), s	5.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	27.0	30.0	28.0	12.0	45.0	18.0
Max Q Clear Time (g_c+I1), s	12.2	21.3	23.1	7.4	33.7	11.3
Green Ext Time (p_c), s	0.2	2.1	0.8	0.0	3.5	0.4

Intersection Summary	
HCM 6th Ctrl Delay	44.0
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1224	309	947	500	351	245	553
v/c Ratio	1.15	1.22	0.56	1.25	1.14	0.29	0.73
Control Delay	108.6	170.1	9.4	171.5	138.0	21.5	29.2
Queue Delay	0.6	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	109.3	170.1	9.5	171.5	138.0	21.5	29.3
Queue Length 50th (ft)	~596	~285	126	~484	~316	116	297
Queue Length 95th (ft)	#700	#466	147	#695	#505	175	442
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1065	253	1691	399	309	858	761
Starvation Cap Reductn	1	0	0	0	0	0	0
Spillback Cap Reductn	131	0	157	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.31	1.22	0.62	1.25	1.14	0.29	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1110	40	290	890	0	0	0	470	330	230	520
Future Volume (vph)	0	1110	40	290	890	0	0	0	470	330	230	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		0.99		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3552		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3552		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1181	43	309	947	0	0	0	500	351	245	553
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	1224	0	309	947	0	0	0	500	351	245	512
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Effective Green, g (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Actuated g/C Ratio		0.30		0.14	0.47				0.25	0.17	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1065		253	1691				399	309	858	720
v/s Ratio Prot		c0.34		c0.17	0.26				c0.31	c0.20	0.13	
v/s Ratio Perm												0.32
v/c Ratio		1.15		1.22	0.56				1.25	1.14	0.29	0.71
Uniform Delay, d1		42.0		51.5	22.6				45.2	49.6	20.4	26.2
Progression Factor		0.77		0.94	0.35				1.00	1.00	1.00	1.00
Incremental Delay, d2		77.1		128.6	1.3				133.0	93.1	0.8	5.9
Delay (s)		109.6		176.9	9.3				178.3	142.7	21.2	32.1
Level of Service		F		F	A				F	F	C	C
Approach Delay (s)		109.6			50.5			178.3			63.6	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	87.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	442	1211	1084	326	242	243	274
v/c Ratio	0.75	0.45	0.65	0.37	0.78	0.78	0.71
Control Delay	24.1	4.8	28.5	4.2	63.0	63.0	35.9
Queue Delay	0.2	1.2	0.1	0.0	1.1	1.1	0.0
Total Delay	24.3	5.9	28.6	4.2	64.1	64.1	35.9
Queue Length 50th (ft)	153	134	346	4	188	189	116
Queue Length 95th (ft)	279	168	457	62	273	274	204
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	621	2695	1661	883	386	387	452
Starvation Cap Reductn	15	1170	0	0	0	0	0
Spillback Cap Reductn	0	0	66	0	37	37	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.79	0.68	0.37	0.69	0.69	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	420	1150	0	0	1030	310	450	10	260	0	0	0
Future Volume (vph)	420	1150	0	0	1030	310	450	10	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1787	3574			3574	1536	1698	1706	1599			
Flt Permitted	0.15	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	290	3574			3574	1536	1698	1706	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	442	1211	0	0	1084	326	474	11	274	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	169	0	0	94	0	0	0
Lane Group Flow (vph)	442	1211	0	0	1084	157	242	243	180	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	90.5	90.5			55.8	55.8	22.1	22.1	22.1			
Effective Green, g (s)	90.5	90.5			55.8	55.8	22.1	22.1	22.1			
Actuated g/C Ratio	0.75	0.75			0.46	0.46	0.18	0.18	0.18			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	589	2695			1661	714	312	314	294			
v/s Ratio Prot	c0.19	0.34			0.30		c0.14	0.14				
v/s Ratio Perm	c0.38					0.10			0.11			
v/c Ratio	0.75	0.45			0.65	0.22	0.78	0.77	0.61			
Uniform Delay, d1	24.2	5.5			24.7	19.1	46.6	46.6	45.0			
Progression Factor	0.65	0.73			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	3.3	0.4			2.0	0.7	11.0	10.9	3.2			
Delay (s)	19.1	4.3			26.7	19.8	57.6	57.4	48.2			
Level of Service	B	A			C	B	E	E	D			
Approach Delay (s)		8.3			25.1			54.2			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	109.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	1150	0	0	1030	310	450	10	260	0	0	0
Future Volume (veh/h)	420	1150	0	0	1030	310	450	10	260	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	442	1211	0	0	1084	326	482	0	274			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	648	2656	0	0	1445	627	695	0	309			
Arrive On Green	0.30	0.74	0.00	0.00	0.40	0.40	0.19	0.00	0.19			
Sat Flow, veh/h	1795	3676	0	0	3676	1554	3591	0	1598			
Grp Volume(v), veh/h	442	1211	0	0	1084	326	482	0	274			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1554	1795	0	1598			
Q Serve(g_s), s	17.8	15.8	0.0	0.0	31.1	19.0	15.0	0.0	20.0			
Cycle Q Clear(g_c), s	17.8	15.8	0.0	0.0	31.1	19.0	15.0	0.0	20.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	648	2656	0	0	1445	627	695	0	309			
V/C Ratio(X)	0.68	0.46	0.00	0.00	0.75	0.52	0.69	0.00	0.89			
Avail Cap(c_a), veh/h	648	2656	0	0	1445	627	817	0	363			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.59	0.59	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	32.6	6.1	0.0	0.0	30.6	27.0	45.1	0.0	47.1			
Incr Delay (d2), s/veh	1.5	0.3	0.0	0.0	3.6	3.1	1.8	0.0	19.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	10.9	5.2	0.0	0.0	13.8	7.5	6.8	0.0	18.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	6.4	0.0	0.0	34.3	30.1	46.9	0.0	66.5			
LnGrp LOS	C	A	A	A	C	C	D	A	E			
Approach Vol, veh/h		1653			1410			756				
Approach Delay, s/veh		13.8			33.3			54.0				
Approach LOS		B			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		93.1		26.9	40.1	53.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 85		27.3	31.9	48.4						
Max Q Clear Time (g_c+I1), s		17.8		22.0	19.8	33.1						
Green Ext Time (p_c), s		9.5		1.2	0.6	5.4						
Intersection Summary												
HCM 6th Ctrl Delay			28.9									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2042	255	1255
v/c Ratio	0.74	1.01	0.35
Control Delay	2.4	99.2	0.2
Queue Delay	0.1	30.7	0.0
Total Delay	2.5	129.9	0.3
Queue Length 50th (ft)	66	~180	0
Queue Length 95th (ft)	m0	#369	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2743	253	3574
Starvation Cap Reductn	0	28	0
Spillback Cap Reductn	72	0	590
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.76	1.13	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	1510	410	240	1180	0	0
Future Volume (vph)	1510	410	240	1180	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3440		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3440		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1606	436	255	1255	0	0
RTOR Reduction (vph)	21	0	0	0	0	0
Lane Group Flow (vph)	2021	0	255	1255	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	94.8		17.0	120.0		
Effective Green, g (s)	94.8		17.0	111.5		
Actuated g/C Ratio	0.79		0.14	0.93		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2717		253	3320		
v/s Ratio Prot	c0.59		c0.14	0.35		
v/s Ratio Perm						
v/c Ratio	0.74		1.01	0.38		
Uniform Delay, d1	6.4		51.5	0.5		
Progression Factor	0.36		0.92	1.00		
Incremental Delay, d2	0.1		51.3	0.1		
Delay (s)	2.4		98.5	0.5		
Level of Service	A		F	A		
Approach Delay (s)	2.4			17.1	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Cumulative Plus Project

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	88	188	210	74	144	160
Future Vol, veh/h	88	188	210	74	144	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	96	204	228	80	157	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	756	268	0	0	308	0
Stage 1	268	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	367	756	-	-	1219	-
Stage 1	763	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	320	756	-	-	1219	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	527	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	320	756	1219	-
HCM Lane V/C Ratio	-	-	0.299	0.27	0.128	-
HCM Control Delay (s)	-	-	21	11.5	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	1.1	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	500	59	43	400	20	117	109	141	37	65	22
v/c Ratio	0.14	0.69	0.08	0.28	0.51	0.03	0.50	0.26	0.31	0.24	0.24	0.06
Control Delay	43.0	25.9	0.2	45.5	20.1	0.1	43.2	31.6	8.7	43.6	37.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	25.9	0.2	45.5	20.1	0.1	43.2	31.6	8.7	43.6	37.3	0.3
Queue Length 50th (ft)	11	215	0	21	120	0	57	49	1	18	31	0
Queue Length 95th (ft)	38	356	0	62	269	0	126	108	51	54	76	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	153	1105	992	151	1107	1013	336	1029	934	180	864	834
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.45	0.06	0.28	0.36	0.02	0.35	0.11	0.15	0.21	0.08	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	460	54	40	368	18	108	100	130	34	60	20
Future Volume (vph)	20	460	54	40	368	18	108	100	130	34	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	500	59	43	400	20	117	109	141	37	65	22
RTOR Reduction (vph)	0	0	36	0	0	12	0	0	109	0	0	19
Lane Group Flow (vph)	22	500	23	43	400	8	117	109	32	37	65	3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.8	30.5	30.5	2.8	31.5	31.5	7.9	16.7	16.7	3.3	12.1	12.1
Effective Green, g (s)	1.8	30.5	30.5	2.8	31.5	31.5	7.9	16.7	16.7	3.3	12.1	12.1
Actuated g/C Ratio	0.02	0.39	0.39	0.04	0.40	0.40	0.10	0.21	0.21	0.04	0.16	0.16
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	39	709	590	61	732	622	174	388	330	72	281	239
v/s Ratio Prot	0.01	c0.28		c0.03	0.22		c0.07	c0.06		0.02	0.04	
v/s Ratio Perm			0.02			0.01			0.02			0.00
v/c Ratio	0.56	0.71	0.04	0.70	0.55	0.01	0.67	0.28	0.10	0.51	0.23	0.01
Uniform Delay, d1	37.6	19.9	14.6	37.1	17.7	13.8	33.7	25.5	24.5	36.5	28.8	27.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.8	4.0	0.1	31.8	1.5	0.0	7.8	0.7	0.2	2.6	0.7	0.0
Delay (s)	56.4	23.9	14.7	68.9	19.2	13.9	41.5	26.2	24.7	39.0	29.5	27.8
Level of Service	E	C	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		24.2			23.6			30.5			32.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	460	54	40	368	18	108	100	130	34	60	20
Future Volume (veh/h)	20	460	54	40	368	18	108	100	130	34	60	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	22	500	59	43	400	20	117	109	141	37	65	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	44	670	556	73	700	593	149	292	248	66	205	173
Arrive On Green	0.03	0.37	0.37	0.04	0.38	0.38	0.09	0.16	0.16	0.04	0.11	0.11
Sat Flow, veh/h	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	22	500	59	43	400	20	117	109	141	37	65	22
Grp Sat Flow(s),veh/h/ln	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.2	1.3	2.0	0.8
Cycle Q Clear(g_c), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.2	1.3	2.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	670	556	73	700	593	149	292	248	66	205	173
V/C Ratio(X)	0.50	0.75	0.11	0.59	0.57	0.03	0.78	0.37	0.57	0.56	0.32	0.13
Avail Cap(c_a), veh/h	162	1204	999	159	1201	1018	354	1081	916	190	908	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	17.2	13.0	29.3	15.2	12.0	27.9	23.4	24.2	29.5	25.5	24.9
Incr Delay (d2), s/veh	10.1	3.5	0.2	8.7	1.6	0.0	3.4	1.4	3.5	2.8	1.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.4	0.5	0.7	3.7	0.1	1.6	1.3	1.9	0.5	0.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	20.8	13.2	38.0	16.7	12.0	31.3	24.7	27.7	32.2	27.0	25.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		581			463			367			124	
Approach Delay, s/veh		20.7			18.5			28.0			28.3	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	30.0	10.7	13.8	6.9	31.0	7.7	16.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.7	* 41	12.7	* 31	5.8	* 41	6.8	* 37
Max Q Clear Time (g_c+I1), s	3.5	16.9	6.1	4.0	2.8	12.8	3.3	7.2
Green Ext Time (p_c), s	0.0	6.0	0.1	0.5	0.0	4.6	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	584	20	43	395	28	10	10	147	24	20	20
Future Vol, veh/h	20	584	20	43	395	28	10	10	147	24	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	22	635	22	47	429	30	11	11	160	26	22	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	459	0	0	657	0	0	1239	1232	635	1299	1224	429
Stage 1	-	-	-	-	-	-	679	679	-	523	523	-
Stage 2	-	-	-	-	-	-	560	553	-	776	701	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1086	-	-	916	-	-	150	175	473	136	177	620
Stage 1	-	-	-	-	-	-	437	447	-	532	526	-
Stage 2	-	-	-	-	-	-	508	509	-	386	436	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1086	-	-	916	-	-	123	163	473	81	165	620
Mov Cap-2 Maneuver	-	-	-	-	-	-	123	163	-	81	165	-
Stage 1	-	-	-	-	-	-	428	438	-	521	499	-
Stage 2	-	-	-	-	-	-	445	483	-	244	427	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	18.4	38.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	123	163	473	1086	-	-	916	-	-	81	165	620
HCM Lane V/C Ratio	0.088	0.067	0.338	0.02	-	-	0.051	-	-	0.322	0.132	0.035
HCM Control Delay (s)	37.1	28.7	16.4	8.4	-	-	9.1	-	-	69.3	30.1	11
HCM Lane LOS	E	D	C	A	-	-	A	-	-	F	D	B
HCM 95th %tile Q(veh)	0.3	0.2	1.5	0.1	-	-	0.2	-	-	1.2	0.4	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Vol, veh/h	674	12	106	373	23	198
Future Vol, veh/h	674	12	106	373	23	198
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	733	13	115	405	25	215

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	746	0	1368	733
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	635	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	862	-	162	421
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	862	-	140	421
Mov Cap-2 Maneuver	-	-	-	-	140	-
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	23.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	140	421	-	-	862	-
HCM Lane V/C Ratio	0.179	0.511	-	-	0.134	-
HCM Control Delay (s)	36.2	22.2	-	-	9.8	-
HCM Lane LOS	E	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	2.8	-	-	0.5	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	930	17	171	488	33	298
v/c Ratio	0.83	0.02	0.49	0.30	0.19	0.70
Control Delay	21.1	4.6	11.2	3.1	41.7	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	4.6	11.2	3.1	41.7	28.1
Queue Length 50th (ft)	377	1	19	65	17	89
Queue Length 95th (ft)	604	9	74	111	48	191
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1456	1240	355	1637	582	429
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.01	0.48	0.30	0.06	0.69

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	856	16	157	449	30	274
Future Volume (vph)	856	16	157	449	30	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.11	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	204	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	930	17	171	488	33	298
RTOR Reduction (vph)	0	5	0	0	0	92
Lane Group Flow (vph)	930	12	171	488	33	206
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	46.3	46.3	61.9	61.9	4.0	13.1
Effective Green, g (s)	46.3	46.3	61.9	61.9	4.0	13.1
Actuated g/C Ratio	0.59	0.59	0.78	0.78	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1093	928	340	1461	89	393
v/s Ratio Prot	c0.50		0.06	0.26	0.02	c0.06
v/s Ratio Perm		0.01	0.34			0.07
v/c Ratio	0.85	0.01	0.50	0.33	0.37	0.52
Uniform Delay, d1	13.5	6.8	12.8	2.5	36.2	30.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.5	0.0	1.2	0.1	2.6	1.3
Delay (s)	20.0	6.8	14.0	2.6	38.8	31.3
Level of Service	B	A	B	A	D	C
Approach Delay (s)	19.7			5.6	32.1	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	856	16	157	449	30	274
Future Volume (veh/h)	856	16	157	449	30	274
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	930	17	171	488	33	298
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1000	848	231	1244	352	412
Arrive On Green	0.53	0.53	0.06	0.67	0.20	0.20
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	930	17	171	488	33	298
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	43.7	0.5	3.9	11.2	1.4	16.3
Cycle Q Clear(g_c), s	43.7	0.5	3.9	11.2	1.4	16.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1000	848	231	1244	352	412
V/C Ratio(X)	0.93	0.02	0.74	0.39	0.09	0.72
Avail Cap(c_a), veh/h	1162	985	280	1458	431	482
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.4	10.4	21.4	7.2	31.1	32.0
Incr Delay (d2), s/veh	11.9	0.0	8.2	0.2	0.1	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.6	0.1	2.3	3.2	0.6	6.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.3	10.4	29.6	7.4	31.2	36.5
LnGrp LOS	C	B	C	A	C	D
Approach Vol, veh/h	947			659	331	
Approach Delay, s/veh	31.9			13.2	36.0	
Approach LOS	C			B	D	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	12.4	57.3	69.7	25.3
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.0	74.0	23.0
Max Q Clear Time (g_c+I1), s	5.9	45.7	13.2	18.3
Green Ext Time (p_c), s	0.1	5.1	2.8	0.5

Intersection Summary	
HCM 6th Ctrl Delay	26.2
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	724	406	60	315	0	0	0	0	60	0	291
Future Vol, veh/h	0	724	406	60	315	0	0	0	0	60	0	291
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	787	441	65	342	0	0	0	0	65	0	316

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	1228	0	0				1480	1700	342
Stage 1	-	-	-	-	-	-				472	472	-
Stage 2	-	-	-	-	-	-				1008	1228	-
Critical Hdwy	-	-	-	4.15	-	-				6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-				5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-				3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	557	-	0				136	91	694
Stage 1	0	-	-	-	-	0				621	554	-
Stage 2	0	-	-	-	-	0				348	247	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	557	-	-				120	0	694
Mov Cap-2 Maneuver	-	-	-	-	-	-				120	0	-
Stage 1	-	-	-	-	-	-				621	0	-
Stage 2	-	-	-	-	-	-				307	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2	23.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	557	-	120	694
HCM Lane V/C Ratio	-	-	0.117	-	0.543	0.456
HCM Control Delay (s)	-	-	12.3	-	66	14.5
HCM Lane LOS	-	-	B	-	F	B
HCM 95th %tile Q(veh)	-	-	0.4	-	2.6	2.4

Intersection	
Int Delay, s/veh	231

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	489	305	0	0	150	30	225	10	80	0	0	0
Future Vol, veh/h	489	305	0	0	150	30	225	10	80	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	532	332	0	0	163	33	245	11	87	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	196	0	-	-	-	0	1576	1592	332
Stage 1	-	-	-	-	-	-	1396	1396	-
Stage 2	-	-	-	-	-	-	180	196	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1371	-	0	0	-	-	~ 120	107	707
Stage 1	-	-	0	0	-	-	~ 228	207	-
Stage 2	-	-	0	0	-	-	849	737	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1371	-	-	-	-	-	~ 73	0	707
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 73	0	-
Stage 1	-	-	-	-	-	-	~ 140	0	-
Stage 2	-	-	-	-	-	-	849	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.7	0	$ 931
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	73	707	1371	-	-	-
HCM Lane V/C Ratio	3.499	0.123	0.388	-	-	-
HCM Control Delay (s)	$ 1244.2	10.8	9.3	-	-	-
HCM Lane LOS	F	B	A	-	-	-
HCM 95th %tile Q(veh)	26.4	0.4	1.9	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	48	338	126	320	230	34
Future Vol, veh/h	48	338	126	320	230	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	52	367	137	348	250	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	891	269	287	0	-	0
Stage 1	269	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	312	767	1269	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	278	767	1269	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	533	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1269	-	278	767	-	-
HCM Lane V/C Ratio	0.108	-	0.188	0.479	-	-
HCM Control Delay (s)	8.2	-	20.9	13.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.7	2.6	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱	↰	↑
Traffic Vol, veh/h	190	53	287	126	28	213
Future Vol, veh/h	190	53	287	126	28	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	207	58	312	137	30	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	604	312	0	0	449	0
Stage 1	312	-	-	-	-	-
Stage 2	292	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	461	728	-	-	1111	-
Stage 1	742	-	-	-	-	-
Stage 2	758	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	449	728	-	-	1111	-
Mov Cap-2 Maneuver	449	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.7	0	1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	449	728	1111	-
HCM Lane V/C Ratio	-	-	0.46	0.079	0.027	-
HCM Control Delay (s)	-	-	19.7	10.4	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2.4	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	235	446	478	215	183
v/c Ratio	0.69	0.23	0.40	0.67	0.42
Control Delay	31.4	10.4	17.8	36.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	10.4	17.8	36.8	8.2
Queue Length 50th (ft)	77	30	51	66	0
Queue Length 95th (ft)	77	140	172	195	55
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	348	2118	1314	547	616
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.68	0.21	0.36	0.39	0.30

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	216	410	320	120	198	168
Future Volume (vph)	216	410	320	120	198	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3395		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3395		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	446	348	130	215	183
RTOR Reduction (vph)	0	0	36	0	0	152
Lane Group Flow (vph)	235	446	442	0	215	31
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	12.0	34.5	21.2		11.2	11.2
Effective Green, g (s)	12.0	34.5	21.2		11.2	11.2
Actuated g/C Ratio	0.18	0.53	0.32		0.17	0.17
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	323	1861	1097		302	270
v/s Ratio Prot	c0.13	0.13	c0.13			
v/s Ratio Perm					c0.12	0.02
v/c Ratio	0.73	0.24	0.40		0.71	0.12
Uniform Delay, d1	25.3	8.4	17.3		25.7	23.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.8	0.0	0.1		6.5	0.1
Delay (s)	32.0	8.5	17.4		32.1	23.1
Level of Service	C	A	B		C	C
Approach Delay (s)		16.6	17.4		28.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.6	Sum of lost time (s)	21.2
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	43	641	76	196	702	65	48	217	175	175
v/c Ratio	0.17	0.37	0.09	0.76	0.39	0.42	0.30	0.51	0.74	0.72
Control Delay	38.8	22.0	0.3	56.8	9.0	54.0	49.5	14.2	63.0	58.7
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	38.8	22.6	0.3	56.8	9.0	54.0	49.5	14.3	63.0	58.7
Queue Length 50th (ft)	24	146	0	138	61	45	33	48	126	118
Queue Length 95th (ft)	59	267	2	202	213	82	65	61	194	187
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	306	1724	822	354	1860	289	304	503	320	326
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	695	0	0	0	0	0	19	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.62	0.09	0.55	0.38	0.22	0.16	0.45	0.55	0.54

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	641	76	196	522	180	65	48	217	265	52	33
RTOR Reduction (vph)	0	0	41	0	25	0	0	0	78	0	8	0
Lane Group Flow (vph)	43	641	35	196	677	0	65	48	139	175	167	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Effective Green, g (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Actuated g/C Ratio	0.13	0.46	0.46	0.16	0.49		0.08	0.08	0.24	0.14	0.14	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	230	1631	710	289	1682		139	147	382	238	236	
v/s Ratio Prot	0.02	0.18		c0.11	c0.20		c0.04	0.03	0.06	c0.10	0.10	
v/s Ratio Perm			0.02						0.03			
v/c Ratio	0.19	0.39	0.05	0.68	0.40		0.47	0.33	0.36	0.74	0.71	
Uniform Delay, d1	42.7	19.5	16.4	43.3	17.5		48.4	47.9	34.6	45.2	45.0	
Progression Factor	1.00	1.00	1.00	0.88	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.7	0.1	4.5	0.7		0.9	0.5	0.2	9.7	7.7	
Delay (s)	42.8	20.2	16.5	42.6	7.9		49.3	48.4	34.8	54.9	52.7	
Level of Service	D	C	B	D	A		D	D	C	D	D	
Approach Delay (s)		21.1			15.5			39.6			53.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	641	76	196	522	180	65	48	217	175	178	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	748	1034	460	635	590	203	107	112	660	246	211	39
Arrive On Green	0.42	0.29	0.29	0.71	0.45	0.45	0.06	0.06	0.06	0.14	0.14	0.14
Sat Flow, veh/h	1781	3554	1580	1781	2596	891	1781	1870	1577	1781	1533	284
Grp Volume(v), veh/h	43	641	76	196	357	345	65	48	217	175	0	211
Grp Sat Flow(s),veh/h/ln	1781	1777	1580	1781	1777	1710	1781	1870	1577	1781	0	1817
Q Serve(g_s), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Cycle Q Clear(g_c), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	748	1034	460	635	404	389	107	112	660	246	0	251
V/C Ratio(X)	0.06	0.62	0.17	0.31	0.88	0.89	0.61	0.43	0.33	0.71	0.00	0.84
Avail Cap(c_a), veh/h	748	1034	460	635	678	653	291	306	823	340	0	347
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	33.7	29.1	10.8	28.6	28.7	50.4	49.9	21.7	45.3	0.0	46.2
Incr Delay (d2), s/veh	0.0	2.8	0.8	0.1	21.4	22.8	2.1	1.0	0.1	1.9	0.0	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.7	1.6	1.5	8.6	8.5	1.8	1.3	3.7	4.6	0.0	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	36.5	29.8	10.9	50.0	51.5	52.5	50.8	21.8	47.2	0.0	55.7
LnGrp LOS	B	D	C	B	D	D	D	D	C	D	A	E
Approach Vol, veh/h		760			898			330			386	
Approach Delay, s/veh		34.9			42.0			32.1			51.8	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	44.2	36.0		19.2	51.2	29.0		10.6				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	22.0	32.0		21.0	12.0	42.0		18.0				
Max Q Clear Time (g_c+I1), s	6.5	19.2		14.5	3.6	22.3		5.9				
Green Ext Time (p_c), s	0.1	2.5		0.6	0.0	2.7		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			39.9									
HCM 6th LOS			D									
Notes												

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1342	217	772	598	310	98	278
v/c Ratio	1.10	1.23	0.45	1.32	1.38	0.12	0.37
Control Delay	89.4	182.2	6.9	191.4	232.7	19.1	12.1
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.8	182.2	6.9	191.4	232.7	19.1	12.1
Queue Length 50th (ft)	~576	~179	85	~546	~291	40	63
Queue Length 95th (ft)	#683	#334	93	#763	#465	74	128
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1217	177	1705	454	225	809	753
Starvation Cap Reductn	16	0	0	0	0	0	0
Spillback Cap Reductn	103	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.23	0.45	1.32	1.38	0.12	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1204	30	200	710	0	0	0	550	285	90	256
Future Volume (vph)	0	1204	30	200	710	0	0	0	550	285	90	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3524		1770	3539				1611	1770	1863	1562
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3524		1770	3539				1611	1770	1863	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1309	33	217	772	0	0	0	598	310	98	278
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	75
Lane Group Flow (vph)	0	1342	0	217	772	0	0	0	598	310	98	203
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Effective Green, g (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Actuated g/C Ratio		0.35		0.10	0.48				0.28	0.13	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1217		177	1705				454	225	809	678
v/s Ratio Prot		c0.38		c0.12	0.22				c0.37	c0.18	0.05	
v/s Ratio Perm												0.13
v/c Ratio		1.10		1.23	0.45				1.32	1.38	0.12	0.30
Uniform Delay, d1		36.0		49.5	18.9				39.5	48.0	18.6	20.2
Progression Factor		0.87		0.97	0.32				1.00	1.00	1.00	1.00
Incremental Delay, d2		58.2		140.6	0.8				157.6	195.4	0.3	1.1
Delay (s)		89.7		188.8	6.9				197.1	243.4	18.9	21.4
Level of Service		F		F	A				F	F	B	C
Approach Delay (s)		89.7			46.8			197.1			121.3	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	101.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	678	1147	935	396	158	157	228
v/c Ratio	0.90	0.42	0.69	0.48	0.67	0.67	0.71
Control Delay	29.7	3.7	32.4	4.8	58.4	57.8	33.4
Queue Delay	1.1	1.1	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	4.9	32.4	4.8	58.4	57.8	33.4
Queue Length 50th (ft)	298	84	285	0	113	112	74
Queue Length 95th (ft)	#592	161	399	68	173	173	149
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	755	2748	1364	831	397	399	463
Starvation Cap Reductn	14	1272	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.78	0.69	0.48	0.40	0.39	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	624	1055	0	0	860	364	280	10	210	0	0	0
Future Volume (vph)	624	1055	0	0	860	364	280	10	210	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (prot)	1770	3539			3539	1527	1681	1691	1583			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (perm)	307	3539			3539	1527	1681	1691	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	678	1147	0	0	935	396	304	11	228	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	243	0	0	101	0	0	0
Lane Group Flow (vph)	678	1147	0	0	935	153	158	157	127	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Effective Green, g (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Actuated g/C Ratio	0.78	0.78			0.39	0.39	0.14	0.14	0.14			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	755	2747			1364	588	235	236	221			
v/s Ratio Prot	c0.32	0.32			0.26		c0.09	0.09				
v/s Ratio Perm	c0.38					0.10			0.08			
v/c Ratio	0.90	0.42			0.69	0.26	0.67	0.67	0.58			
Uniform Delay, d1	22.1	4.1			28.2	23.1	44.9	44.9	44.2			
Progression Factor	0.68	0.75			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	8.8	0.3			2.8	1.1	6.7	6.2	3.0			
Delay (s)	23.8	3.4			31.1	24.2	51.6	51.1	47.2			
Level of Service	C	A			C	C	D	D	D			
Approach Delay (s)		10.9			29.0			49.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	624	1055	0	0	860	364	280	10	210	0	0	0
Future Volume (veh/h)	624	1055	0	0	860	364	280	10	210	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	678	1147	0	0	935	396	312	0	228			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	825	2658	0	0	1027	445	597	0	266			
Arrive On Green	0.42	0.75	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1781	3647	0	0	3647	1539	3563	0	1585			
Grp Volume(v), veh/h	678	1147	0	0	935	396	312	0	228			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1539	1781	0	1585			
Q Serve(g_s), s	31.8	13.2	0.0	0.0	27.9	27.1	8.8	0.0	15.4			
Cycle Q Clear(g_c), s	31.8	13.2	0.0	0.0	27.9	27.1	8.8	0.0	15.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	825	2658	0	0	1027	445	597	0	266			
V/C Ratio(X)	0.82	0.43	0.00	0.00	0.91	0.89	0.52	0.00	0.86			
Avail Cap(c_a), veh/h	825	2658	0	0	1027	445	842	0	375			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.54	0.54	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.8	5.2	0.0	0.0	37.7	37.4	41.8	0.0	44.5			
Incr Delay (d2), s/veh	3.5	0.3	0.0	0.0	13.3	22.5	0.5	0.0	11.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	15.4	4.0	0.0	0.0	13.7	12.7	3.9	0.0	13.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	5.4	0.0	0.0	51.1	60.0	42.3	0.0	56.4			
LnGrp LOS	C	A	A	A	D	E	D	A	E			
Approach Vol, veh/h		1825			1331			540				
Approach Delay, s/veh		14.3			53.7			48.2				
Approach LOS		B			D			D				

Timer - Assigned Phs		2		4	5	6			
Phs Duration (G+Y+Rc), s		86.4		23.6	50.6	35.8			
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0			
Max Green Setting (Gmax), s		* 75		* 26	38.9	31.8			
Max Q Clear Time (g_c+I1), s		15.2		17.4	33.8	29.9			
Green Ext Time (p_c), s		11.1		1.1	0.7	1.3			

Intersection Summary	
HCM 6th Ctrl Delay	33.5
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2205	261	978
v/c Ratio	0.78	1.47	0.28
Control Delay	2.1	269.9	0.2
Queue Delay	0.2	0.0	0.1
Total Delay	2.4	269.9	0.3
Queue Length 50th (ft)	45	~244	0
Queue Length 95th (ft)	m0	#409	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2837	177	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	147	0	1023
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	1.47	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1649	380	240	900	0	0
Future Volume (vph)	1649	380	240	900	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3422		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3422		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1792	413	261	978	0	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	2199	0	261	978	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	91.0		11.0	110.0		
Effective Green, g (s)	91.0		11.0	104.8		
Actuated g/C Ratio	0.83		0.10	0.95		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2830		177	3371		
v/s Ratio Prot	c0.64		c0.15	0.28		
v/s Ratio Perm						
v/c Ratio	0.78		1.47	0.29		
Uniform Delay, d1	4.6		49.5	0.2		
Progression Factor	0.40		0.90	1.00		
Incremental Delay, d2	0.1		236.1	0.2		
Delay (s)	2.0		280.6	0.3		
Level of Service	A		F	A		
Approach Delay (s)	2.0			59.4	0.0	
Approach LOS	A			E	A	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	7.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	96	176	230	88	228	220
Future Vol, veh/h	96	176	230	88	228	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	101	185	242	93	240	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1001	289	0	0	335	0
Stage 1	289	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	268	748	-	-	1219	-
Stage 1	758	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	215	748	-	-	1219	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	389	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	215	748	1219	-
HCM Lane V/C Ratio	-	-	0.47	0.248	0.197	-
HCM Control Delay (s)	-	-	35.8	11.4	8.7	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.3	1	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	534	128	87	476	39	115	65	65	30	87	22
v/c Ratio	0.24	0.66	0.16	0.46	0.52	0.05	0.52	0.18	0.15	0.24	0.35	0.06
Control Delay	48.6	27.6	1.5	50.2	20.9	0.1	50.1	34.2	0.8	49.5	43.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.6	27.6	1.5	50.2	20.9	0.1	50.1	34.2	0.8	49.5	43.0	0.3
Queue Length 50th (ft)	19	264	0	48	211	0	64	33	0	17	47	0
Queue Length 95th (ft)	53	411	13	107	333	0	133	75	0	50	100	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	142	991	926	211	1065	982	255	837	785	137	713	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.54	0.14	0.41	0.45	0.04	0.45	0.08	0.08	0.22	0.12	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	491	118	80	438	36	106	60	60	28	80	20
Future Volume (vph)	30	491	118	80	438	36	106	60	60	28	80	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	534	128	87	476	39	115	65	65	30	87	22
RTOR Reduction (vph)	0	0	74	0	0	21	0	0	53	0	0	20
Lane Group Flow (vph)	33	534	54	87	476	18	115	65	12	30	87	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	3.4	38.4	38.4	7.0	42.0	42.0	10.7	17.0	17.0	3.3	9.6	9.6
Effective Green, g (s)	3.4	38.4	38.4	7.0	42.0	42.0	10.7	17.0	17.0	3.3	9.6	9.6
Actuated g/C Ratio	0.04	0.43	0.43	0.08	0.47	0.47	0.12	0.19	0.19	0.04	0.11	0.11
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	66	793	673	137	867	737	209	351	298	64	198	164
v/s Ratio Prot	0.02	c0.29		c0.05	c0.26		c0.06	0.03		0.02	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.50	0.67	0.08	0.64	0.55	0.02	0.55	0.19	0.04	0.47	0.44	0.01
Uniform Delay, d1	42.6	20.9	15.4	40.4	17.3	13.0	37.5	30.8	29.9	42.6	37.8	36.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	3.0	0.1	9.7	1.3	0.0	1.8	0.4	0.1	2.0	2.7	0.1
Delay (s)	49.4	23.8	15.5	50.0	18.6	13.1	39.3	31.2	30.0	44.6	40.5	36.1
Level of Service	D	C	B	D	B	B	D	C	C	D	D	D
Approach Delay (s)		23.5			22.7			34.7			40.7	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	491	118	80	438	36	106	60	60	28	80	20
Future Volume (veh/h)	30	491	118	80	438	36	106	60	60	28	80	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	534	128	87	476	39	115	65	65	30	87	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	715	606	113	770	652	148	290	246	57	195	161
Arrive On Green	0.03	0.38	0.38	0.06	0.41	0.41	0.08	0.16	0.16	0.03	0.10	0.10
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Grp Volume(v), veh/h	33	534	128	87	476	39	115	65	65	30	87	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Q Serve(g_s), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Cycle Q Clear(g_c), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	61	715	606	113	770	652	148	290	246	57	195	161
V/C Ratio(X)	0.54	0.75	0.21	0.77	0.62	0.06	0.78	0.22	0.26	0.53	0.45	0.14
Avail Cap(c_a), veh/h	173	1208	1024	259	1297	1100	312	1020	864	168	869	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	17.8	13.8	30.8	15.5	11.8	30.0	24.7	24.8	31.8	28.1	27.2
Incr Delay (d2), s/veh	8.7	3.3	0.4	12.5	1.7	0.1	3.3	0.7	1.0	2.8	2.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.2	1.1	1.6	4.8	0.3	1.7	0.8	0.9	0.5	1.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.4	21.1	14.2	43.2	17.2	11.9	33.3	25.3	25.8	34.6	30.8	27.8
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		695			602			245			139	
Approach Delay, s/veh		20.8			20.6			29.2			31.2	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.5	32.6	10.8	13.8	7.6	34.6	7.4	17.2				
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8				
Max Green Setting (Gmax), s	9.7	* 43	11.7	* 31	6.5	* 46	6.3	* 36				
Max Q Clear Time (g_c+I1), s	5.2	18.5	6.2	4.9	3.2	15.4	3.1	4.4				
Green Ext Time (p_c), s	0.1	7.1	0.1	0.7	0.0	5.9	0.0	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			22.8									
HCM 6th LOS			C									

Notes
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	20	539	20	64	524	36	10	10	16	28	20	20
Future Vol, veh/h	20	539	20	64	524	36	10	10	16	28	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	556	21	66	540	37	10	10	16	29	21	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	577	0	0	577	0	0	1310	1307	556	1294	1291	540
Stage 1	-	-	-	-	-	-	598	598	-	672	672	-
Stage 2	-	-	-	-	-	-	712	709	-	622	619	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	992	-	-	992	-	-	135	159	529	139	162	540
Stage 1	-	-	-	-	-	-	487	489	-	444	453	-
Stage 2	-	-	-	-	-	-	422	436	-	473	479	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	992	-	-	109	145	529	119	148	540
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	145	-	119	148	-
Stage 1	-	-	-	-	-	-	477	479	-	435	423	-
Stage 2	-	-	-	-	-	-	360	407	-	439	469	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.9	25.6	31.7
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	109	145	529	992	-	-	992	-	-	119	148	540
HCM Lane V/C Ratio	0.095	0.071	0.031	0.021	-	-	0.067	-	-	0.243	0.139	0.038
HCM Control Delay (s)	41.4	31.7	12	8.7	-	-	8.9	-	-	44.7	33.2	11.9
HCM Lane LOS	E	D	B	A	-	-	A	-	-	E	D	B
HCM 95th %tile Q(veh)	0.3	0.2	0.1	0.1	-	-	0.2	-	-	0.9	0.5	0.1

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Vol, veh/h	519	25	206	546	17	147
Future Vol, veh/h	519	25	206	546	17	147
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	564	27	224	593	18	160

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	591	0	1605	564
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	1041	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	985	-	116	525
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	340	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	985	-	90	525
Mov Cap-2 Maneuver	-	-	-	-	90	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	263	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	19
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	90	525	-	-	985	-
HCM Lane V/C Ratio	0.205	0.304	-	-	0.227	-
HCM Control Delay (s)	55.1	14.8	-	-	9.7	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	1.3	-	-	0.9	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	653	71	372	745	73	262
v/c Ratio	0.80	0.10	0.70	0.51	0.33	0.40
Control Delay	27.8	5.6	18.3	6.3	40.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	5.6	18.3	6.3	40.2	10.8
Queue Length 50th (ft)	286	4	73	138	35	38
Queue Length 95th (ft)	454	27	194	246	83	106
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1161	1008	641	1609	614	767
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.07	0.58	0.46	0.12	0.34

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	601	65	342	685	67	241
Future Volume (vph)	601	65	342	685	67	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.17	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	316	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	653	71	372	745	73	262
RTOR Reduction (vph)	0	32	0	0	0	99
Lane Group Flow (vph)	653	39	372	745	73	163
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	33.7	33.7	55.7	55.7	6.9	22.4
Effective Green, g (s)	33.7	33.7	55.7	55.7	6.9	22.4
Actuated g/C Ratio	0.45	0.45	0.74	0.74	0.09	0.30
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	830	705	530	1372	161	605
v/s Ratio Prot	c0.35		c0.14	0.40	c0.04	0.06
v/s Ratio Perm		0.02	0.37			0.05
v/c Ratio	0.79	0.06	0.70	0.54	0.45	0.27
Uniform Delay, d1	17.9	11.9	12.4	4.4	32.6	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	0.0	4.2	0.4	2.0	0.2
Delay (s)	22.8	11.9	16.6	4.8	34.6	20.6
Level of Service	C	B	B	A	C	C
Approach Delay (s)	21.8			8.7	23.6	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.6	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	601	65	342	685	67	241
Future Volume (veh/h)	601	65	342	685	67	241
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	653	71	372	745	73	262
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	753	638	427	1203	310	512
Arrive On Green	0.40	0.40	0.15	0.64	0.17	0.17
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	653	71	372	745	73	262
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	22.8	2.0	7.9	16.8	2.5	9.5
Cycle Q Clear(g_c), s	22.8	2.0	7.9	16.8	2.5	9.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	753	638	427	1203	310	512
V/C Ratio(X)	0.87	0.11	0.87	0.62	0.24	0.51
Avail Cap(c_a), veh/h	1158	981	625	1816	576	749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.5	13.3	14.1	7.5	25.3	19.5
Incr Delay (d2), s/veh	4.6	0.1	9.1	0.5	0.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.6	3.1	3.9	1.1	3.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.1	13.4	23.1	8.0	25.7	20.3
LnGrp LOS	C	B	C	A	C	C
Approach Vol, veh/h	724			1117	335	
Approach Delay, s/veh	23.0			13.1	21.5	
Approach LOS	C			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	17.1	35.1				52.2		18.9
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	18.5	44.0				69.0		23.0
Max Q Clear Time (g_c+I1), s	9.9	24.8				18.8		11.5
Green Ext Time (p_c), s	0.7	3.8				5.1		0.9

Intersection Summary		
HCM 6th Ctrl Delay		17.7
HCM 6th LOS		B

Intersection	
Int Delay, s/veh	16.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	496	346	70	535	0	0	0	0	70	10	492
Future Vol, veh/h	0	496	346	70	535	0	0	0	0	70	10	492
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	511	357	72	552	0	0	0	0	72	10	507

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	868	0	0				1386	1564	552
Stage 1	-	-	-	-	-	-				696	696	-
Stage 2	-	-	-	-	-	-				690	868	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	776	-	0				158	112	533
Stage 1	0	-	-	-	-	0				495	443	-
Stage 2	0	-	-	-	-	0				498	370	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	776	-	-				143	0	533
Mov Cap-2 Maneuver	-	-	-	-	-	-				143	0	-
Stage 1	-	-	-	-	-	-				495	0	-
Stage 2	-	-	-	-	-	-				452	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.2	56.3
HCM LOS			F

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	776	-	143	533
HCM Lane V/C Ratio	-	-	0.093	-	0.577	0.952
HCM Control Delay (s)	-	-	10.1	-	59.9	55.7
HCM Lane LOS	-	-	B	-	F	F
HCM 95th %tile Q(veh)	-	-	0.3	-	2.9	12.3

Intersection	
Int Delay, s/veh	347

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	360	206	0	0	202	20	393	10	60	0	0	0
Future Vol, veh/h	360	206	0	0	202	20	393	10	60	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	391	224	0	0	220	22	427	11	65	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	242	0	-	-	-	0	1237	1248	224
Stage 1	-	-	-	-	-	-	1006	1006	-
Stage 2	-	-	-	-	-	-	231	242	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1319	-	0	0	-	-	~ 193	172	813
Stage 1	-	-	0	0	-	-	~ 352	318	-
Stage 2	-	-	0	0	-	-	805	704	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1319	-	-	-	-	-	~ 136	0	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 136	0	-
Stage 1	-	-	-	-	-	-	~ 248	0	-
Stage 2	-	-	-	-	-	-	805	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.6	0	$ 930.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	136	813	1319	-	-	-
HCM Lane V/C Ratio	3.221	0.08	0.297	-	-	-
HCM Control Delay (s)	$ 1067.9	9.8	8.9	-	-	-
HCM Lane LOS	F	A	A	-	-	-
HCM 95th %tile Q(veh)	41.7	0.3	1.3	-	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	220	174	230	260	68
Future Vol, veh/h	56	220	174	230	260	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	239	189	250	283	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	948	320	357	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	628	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	289	721	1202	-	-	-
Stage 1	736	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	244	721	1202	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	532	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	3.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1202	-	244	721	-	-
HCM Lane V/C Ratio	0.157	-	0.249	0.332	-	-
HCM Control Delay (s)	8.6	-	24.6	12.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.6	-	1	1.5	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	155	39	196	212	57	354
Future Vol, veh/h	155	39	196	212	57	354
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	42	213	230	62	385

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	722	213	0	0	443	0
Stage 1	213	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	394	827	-	-	1117	-
Stage 1	823	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	372	827	-	-	1117	-
Mov Cap-2 Maneuver	372	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	570	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.8	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	372	827	1117	-
HCM Lane V/C Ratio	-	-	0.453	0.051	0.055	-
HCM Control Delay (s)	-	-	22.4	9.6	8.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	2.3	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	225	432	749	229	211
v/c Ratio	0.70	0.22	0.61	0.67	0.47
Control Delay	35.0	10.3	20.5	37.2	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	10.3	20.5	37.2	11.5
Queue Length 50th (ft)	75	31	94	70	10
Queue Length 95th (ft)	105	141	294	233	89
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	329	2713	1876	651	693
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.68	0.16	0.40	0.35	0.30

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	214	410	490	221	218	200
Future Volume (vph)	214	410	490	221	218	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3384		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3384		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	225	432	516	233	229	211
RTOR Reduction (vph)	0	0	45	0	0	142
Lane Group Flow (vph)	225	432	704	0	229	69
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	12.2	37.0	23.2		12.7	12.7
Effective Green, g (s)	12.2	37.0	23.2		12.7	12.7
Actuated g/C Ratio	0.18	0.53	0.33		0.18	0.18
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	314	1908	1132		327	293
v/s Ratio Prot	c0.13	0.12	c0.21			
v/s Ratio Perm					c0.13	0.04
v/c Ratio	0.72	0.23	0.62		0.70	0.24
Uniform Delay, d1	26.9	8.6	19.4		26.5	24.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.4	0.0	0.8		5.4	0.2
Delay (s)	33.3	8.6	20.1		32.0	24.3
Level of Service	C	A	C		C	C
Approach Delay (s)		17.0	20.1		28.3	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	21.2
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	102	633	92	276	1004	143	90	143	269	264
v/c Ratio	0.39	0.47	0.14	0.85	0.70	0.70	0.42	0.28	0.84	0.81
Control Delay	53.1	32.8	2.8	67.1	24.8	69.3	54.6	8.4	69.0	63.0
Queue Delay	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	34.9	2.8	67.1	25.2	69.3	54.6	8.5	69.0	63.1
Queue Length 50th (ft)	72	198	0	211	353	108	66	22	212	197
Queue Length 95th (ft)	137	303	20	300	454	172	115	38	302	287
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	263	1339	663	402	1429	268	282	577	396	401
Starvation Cap Reductn	0	0	0	0	123	0	0	0	0	0
Spillback Cap Reductn	0	533	0	0	0	0	0	11	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.79	0.14	0.69	0.77	0.53	0.32	0.25	0.68	0.66

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	102	633	92	276	816	188	143	90	143	384	88	61
RTOR Reduction (vph)	0	0	57	0	16	0	0	0	55	0	10	0
Lane Group Flow (vph)	102	633	35	276	988	0	143	90	88	269	254	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Effective Green, g (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Actuated g/C Ratio	0.15	0.38	0.38	0.18	0.41		0.11	0.11	0.29	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	263	1343	586	323	1415		202	213	467	319	316	
v/s Ratio Prot	0.06	0.18		c0.15	c0.29		c0.08	0.05	0.03	c0.16	0.15	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.39	0.47	0.06	0.85	0.70		0.71	0.42	0.19	0.84	0.80	
Uniform Delay, d1	46.3	28.4	23.9	47.6	29.3		51.3	49.5	31.6	47.0	46.6	
Progression Factor	1.00	1.00	1.00	1.00	0.76		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.2	0.2	15.4	2.3		8.9	0.5	0.1	17.3	13.1	
Delay (s)	46.6	29.6	24.1	63.2	24.5		60.2	50.0	31.7	64.3	59.7	
Level of Service	D	C	C	E	C		E	D	C	E	E	
Approach Delay (s)		31.1			32.8			46.9			62.0	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	102	633	92	276	816	188	143	90	143	266	252	61
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	472	895	390	566	874	201	181	190	663	345	281	68
Arrive On Green	0.26	0.25	0.25	0.63	0.60	0.60	0.10	0.10	0.10	0.19	0.19	0.19
Sat Flow, veh/h	1795	3582	1560	1795	2889	666	1795	1885	1583	1795	1464	354
Grp Volume(v), veh/h	102	633	92	276	506	498	143	90	143	266	0	313
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1764	1795	1885	1583	1795	0	1818
Q Serve(g_s), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Cycle Q Clear(g_c), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	472	895	390	566	542	533	181	190	663	345	0	349
V/C Ratio(X)	0.22	0.71	0.24	0.49	0.93	0.93	0.79	0.47	0.22	0.77	0.00	0.90
Avail Cap(c_a), veh/h	472	895	390	566	672	662	269	283	741	419	0	424
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.76	0.76	0.76	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.6	41.0	35.9	17.0	22.6	22.6	52.7	50.9	22.5	46.0	0.0	47.3
Incr Delay (d2), s/veh	0.1	4.7	1.4	0.2	21.0	21.2	4.9	0.7	0.1	5.5	0.0	16.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.0	2.3	3.2	11.2	11.1	4.4	2.6	2.6	8.0	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.6	45.7	37.3	17.2	43.6	43.8	57.6	51.6	22.5	51.4	0.0	64.2
LnGrp LOS	C	D	D	B	D	D	E	D	C	D	A	E
Approach Vol, veh/h		827			1280			376			579	
Approach Delay, s/veh		43.4			38.0			42.8			58.3	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.8	34.0		27.1	36.6	40.3		16.1
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	27.0	30.0		28.0	12.0	45.0		18.0
Max Q Clear Time (g_c+I1), s	11.8	21.3		22.2	7.3	32.8		11.3
Green Ext Time (p_c), s	0.2	2.1		0.9	0.0	3.5		0.5

Intersection Summary			
HCM 6th Ctrl Delay			43.9
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1198	309	947	500	387	245	526
v/c Ratio	1.12	1.22	0.56	1.25	1.25	0.29	0.69
Control Delay	99.1	169.5	10.0	171.5	178.8	21.5	27.5
Queue Delay	0.5	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	99.6	169.5	10.1	171.5	178.8	21.5	27.6
Queue Length 50th (ft)	~574	~284	146	~484	~374	116	273
Queue Length 95th (ft)	#676	#466	147	#695	#569	175	408
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1065	253	1691	399	309	858	761
Starvation Cap Reductn	1	0	0	0	0	0	0
Spillback Cap Reductn	109	0	137	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.22	0.61	1.25	1.25	0.29	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1086	40	290	890	0	0	0	470	364	230	494
Future Volume (vph)	0	1086	40	290	890	0	0	0	470	364	230	494
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		0.99		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3552		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3552		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1155	43	309	947	0	0	0	500	387	245	526
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	1198	0	309	947	0	0	0	500	387	245	485
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Effective Green, g (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Actuated g/C Ratio		0.30		0.14	0.47				0.25	0.17	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1065		253	1691				399	309	858	720
v/s Ratio Prot		c0.34		c0.17	0.26				c0.31	c0.22	0.13	
v/s Ratio Perm												0.31
v/c Ratio		1.12		1.22	0.56				1.25	1.25	0.29	0.67
Uniform Delay, d1		42.0		51.5	22.6				45.2	49.6	20.4	25.6
Progression Factor		0.77		0.92	0.38				1.00	1.00	1.00	1.00
Incremental Delay, d2		67.4		128.6	1.3				133.0	137.5	0.8	5.0
Delay (s)		99.6		176.0	9.9				178.3	187.1	21.2	30.6
Level of Service		F		F	A				F	F	C	C
Approach Delay (s)		99.6			50.7			178.3			80.9	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	89.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	417	1246	1084	378	242	243	274
v/c Ratio	0.72	0.46	0.64	0.41	0.78	0.78	0.72
Control Delay	22.6	5.1	27.7	4.2	63.0	63.0	38.1
Queue Delay	0.3	1.3	0.1	0.0	1.1	1.1	0.0
Total Delay	23.0	6.4	27.8	4.2	64.1	64.1	38.1
Queue Length 50th (ft)	125	142	340	5	188	189	123
Queue Length 95th (ft)	243	175	457	67	273	274	211
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	626	2695	1691	919	386	387	446
Starvation Cap Reductn	28	1158	0	0	0	0	0
Spillback Cap Reductn	0	0	66	0	37	37	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.81	0.67	0.41	0.69	0.69	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	396	1184	0	0	1030	359	450	10	260	0	0	0
Future Volume (vph)	396	1184	0	0	1030	359	450	10	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1787	3574			3574	1536	1698	1706	1599			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	297	3574			3574	1536	1698	1706	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	417	1246	0	0	1084	378	474	11	274	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	193	0	0	87	0	0	0
Lane Group Flow (vph)	417	1246	0	0	1084	185	242	243	187	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Effective Green, g (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Actuated g/C Ratio	0.75	0.75			0.47	0.47	0.18	0.18	0.18			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	580	2695			1691	727	312	314	294			
v/s Ratio Prot	c0.17	0.35			0.30		c0.14	0.14				
v/s Ratio Perm	c0.37					0.12			0.12			
v/c Ratio	0.72	0.46			0.64	0.25	0.78	0.77	0.64			
Uniform Delay, d1	23.6	5.6			23.9	18.9	46.6	46.6	45.2			
Progression Factor	0.66	0.77			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	2.4	0.4			1.9	0.8	11.0	10.9	3.9			
Delay (s)	18.0	4.7			25.8	19.8	57.6	57.4	49.1			
Level of Service	B	A			C	B	E	E	D			
Approach Delay (s)		8.0			24.2			54.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	1184	0	0	1030	359	450	10	260	0	0	0
Future Volume (veh/h)	396	1184	0	0	1030	359	450	10	260	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	417	1246	0	0	1084	378	482	0	274			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	645	2656	0	0	1445	627	695	0	309			
Arrive On Green	0.30	0.74	0.00	0.00	0.40	0.40	0.19	0.00	0.19			
Sat Flow, veh/h	1795	3676	0	0	3676	1554	3591	0	1598			
Grp Volume(v), veh/h	417	1246	0	0	1084	378	482	0	274			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1554	1795	0	1598			
Q Serve(g_s), s	16.1	16.5	0.0	0.0	31.1	23.0	15.0	0.0	20.0			
Cycle Q Clear(g_c), s	16.1	16.5	0.0	0.0	31.1	23.0	15.0	0.0	20.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	645	2656	0	0	1445	627	695	0	309			
V/C Ratio(X)	0.65	0.47	0.00	0.00	0.75	0.60	0.69	0.00	0.89			
Avail Cap(c_a), veh/h	645	2656	0	0	1445	627	817	0	363			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.58	0.58	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	32.1	6.1	0.0	0.0	30.6	28.2	45.1	0.0	47.1			
Incr Delay (d2), s/veh	1.0	0.3	0.0	0.0	3.6	4.3	1.8	0.0	19.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	10.1	5.4	0.0	0.0	13.8	9.1	6.8	0.0	18.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	6.5	0.0	0.0	34.3	32.5	46.9	0.0	66.5			
LnGrp LOS	C	A	A	A	C	C	D	A	E			
Approach Vol, veh/h		1663			1462			756				
Approach Delay, s/veh		13.2			33.8			54.0				
Approach LOS		B			C			D				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		93.1		26.9	40.1	53.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 85		27.3	31.9	48.4						
Max Q Clear Time (g_c+I1), s		18.5		22.0	18.1	33.1						
Green Ext Time (p_c), s		10.0		1.2	0.5	5.5						

Intersection Summary			
HCM 6th Ctrl Delay			28.9
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2053	255	1255
v/c Ratio	0.75	1.01	0.35
Control Delay	2.1	98.7	0.2
Queue Delay	0.1	30.7	0.1
Total Delay	2.2	129.4	0.3
Queue Length 50th (ft)	54	~180	0
Queue Length 95th (ft)	m0	#369	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2743	253	3574
Starvation Cap Reductn	0	28	0
Spillback Cap Reductn	46	0	598
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.76	1.13	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1520	410	240	1180	0	0
Future Volume (vph)	1520	410	240	1180	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3441		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3441		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1617	436	255	1255	0	0
RTOR Reduction (vph)	20	0	0	0	0	0
Lane Group Flow (vph)	2033	0	255	1255	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	94.8		17.0	120.0		
Effective Green, g (s)	94.8		17.0	111.5		
Actuated g/C Ratio	0.79		0.14	0.93		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2718		253	3320		
v/s Ratio Prot	c0.59		c0.14	0.35		
v/s Ratio Perm						
v/c Ratio	0.75		1.01	0.38		
Uniform Delay, d1	6.5		51.5	0.5		
Progression Factor	0.31		0.90	1.00		
Incremental Delay, d2	0.1		51.6	0.1		
Delay (s)	2.1		97.9	0.5		
Level of Service	A		F	A		
Approach Delay (s)	2.1			17.0	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Mitigated Cumulative Plus Project

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	88	188	210	74	144	160
Future Vol, veh/h	88	188	210	74	144	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	96	204	228	80	157	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	756	268	0	0	308	0
Stage 1	268	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	367	756	-	-	1219	-
Stage 1	763	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	320	756	-	-	1219	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	527	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	320	756	1219	-
HCM Lane V/C Ratio	-	-	0.299	0.27	0.128	-
HCM Control Delay (s)	-	-	21	11.5	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	1.1	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	500	59	43	400	20	117	109	141	37	65	22
v/c Ratio	0.14	0.69	0.08	0.28	0.51	0.03	0.50	0.26	0.31	0.24	0.24	0.06
Control Delay	43.0	25.9	0.2	45.5	20.1	0.1	43.2	31.6	8.7	43.6	37.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	25.9	0.2	45.5	20.1	0.1	43.2	31.6	8.7	43.6	37.3	0.3
Queue Length 50th (ft)	11	215	0	21	120	0	57	49	1	18	31	0
Queue Length 95th (ft)	38	356	0	62	269	0	126	108	51	54	76	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	153	1105	992	151	1107	1013	336	1029	934	180	864	834
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.45	0.06	0.28	0.36	0.02	0.35	0.11	0.15	0.21	0.08	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	20	460	54	40	368	18	108	100	130	34	60	20
Future Volume (vph)	20	460	54	40	368	18	108	100	130	34	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	500	59	43	400	20	117	109	141	37	65	22
RTOR Reduction (vph)	0	0	36	0	0	12	0	0	109	0	0	19
Lane Group Flow (vph)	22	500	23	43	400	8	117	109	32	37	65	3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.8	30.5	30.5	2.8	31.5	31.5	7.9	16.7	16.7	3.3	12.1	12.1
Effective Green, g (s)	1.8	30.5	30.5	2.8	31.5	31.5	7.9	16.7	16.7	3.3	12.1	12.1
Actuated g/C Ratio	0.02	0.39	0.39	0.04	0.40	0.40	0.10	0.21	0.21	0.04	0.16	0.16
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	39	709	590	61	732	622	174	388	330	72	281	239
v/s Ratio Prot	0.01	c0.28		c0.03	0.22		c0.07	c0.06		0.02	0.04	
v/s Ratio Perm			0.02			0.01			0.02			0.00
v/c Ratio	0.56	0.71	0.04	0.70	0.55	0.01	0.67	0.28	0.10	0.51	0.23	0.01
Uniform Delay, d1	37.6	19.9	14.6	37.1	17.7	13.8	33.7	25.5	24.5	36.5	28.8	27.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.8	4.0	0.1	31.8	1.5	0.0	7.8	0.7	0.2	2.6	0.7	0.0
Delay (s)	56.4	23.9	14.7	68.9	19.2	13.9	41.5	26.2	24.7	39.0	29.5	27.8
Level of Service	E	C	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		24.2			23.6			30.5			32.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	460	54	40	368	18	108	100	130	34	60	20
Future Volume (veh/h)	20	460	54	40	368	18	108	100	130	34	60	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	22	500	59	43	400	20	117	109	141	37	65	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	44	670	556	73	700	593	149	292	248	66	205	173
Arrive On Green	0.03	0.37	0.37	0.04	0.38	0.38	0.09	0.16	0.16	0.04	0.11	0.11
Sat Flow, veh/h	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	22	500	59	43	400	20	117	109	141	37	65	22
Grp Sat Flow(s),veh/h/ln	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.2	1.3	2.0	0.8
Cycle Q Clear(g_c), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.2	1.3	2.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	670	556	73	700	593	149	292	248	66	205	173
V/C Ratio(X)	0.50	0.75	0.11	0.59	0.57	0.03	0.78	0.37	0.57	0.56	0.32	0.13
Avail Cap(c_a), veh/h	162	1204	999	159	1201	1018	354	1081	916	190	908	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	17.2	13.0	29.3	15.2	12.0	27.9	23.4	24.2	29.5	25.5	24.9
Incr Delay (d2), s/veh	10.1	3.5	0.2	8.7	1.6	0.0	3.4	1.4	3.5	2.8	1.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.4	0.5	0.7	3.7	0.1	1.6	1.3	1.9	0.5	0.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	20.8	13.2	38.0	16.7	12.0	31.3	24.7	27.7	32.2	27.0	25.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		581			463			367			124	
Approach Delay, s/veh		20.7			18.5			28.0			28.3	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	30.0	10.7	13.8	6.9	31.0	7.7	16.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.7	* 41	12.7	* 31	5.8	* 41	6.8	* 37
Max Q Clear Time (g_c+I1), s	3.5	16.9	6.1	4.0	2.8	12.8	3.3	7.2
Green Ext Time (p_c), s	0.0	6.0	0.1	0.5	0.0	4.6	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	584	20	43	395	28	10	10	147	24	20	20
Future Vol, veh/h	20	584	20	43	395	28	10	10	147	24	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	22	635	22	47	429	30	11	11	160	26	22	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	459	0	0	657	0	0	1239	1232	635	1299	1224	429
Stage 1	-	-	-	-	-	-	679	679	-	523	523	-
Stage 2	-	-	-	-	-	-	560	553	-	776	701	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1086	-	-	916	-	-	150	175	473	136	177	620
Stage 1	-	-	-	-	-	-	437	447	-	532	526	-
Stage 2	-	-	-	-	-	-	508	509	-	386	436	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1086	-	-	916	-	-	123	163	473	81	165	620
Mov Cap-2 Maneuver	-	-	-	-	-	-	123	163	-	81	165	-
Stage 1	-	-	-	-	-	-	428	438	-	521	499	-
Stage 2	-	-	-	-	-	-	445	483	-	244	427	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	18.4	38.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	123	163	473	1086	-	-	916	-	-	81	165	620
HCM Lane V/C Ratio	0.088	0.067	0.338	0.02	-	-	0.051	-	-	0.322	0.132	0.035
HCM Control Delay (s)	37.1	28.7	16.4	8.4	-	-	9.1	-	-	69.3	30.1	11
HCM Lane LOS	E	D	C	A	-	-	A	-	-	F	D	B
HCM 95th %tile Q(veh)	0.3	0.2	1.5	0.1	-	-	0.2	-	-	1.2	0.4	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	674	12	106	373	23	198
Future Vol, veh/h	674	12	106	373	23	198
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	733	13	115	405	25	215

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	746	0	1368	733
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	635	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	862	-	162	421
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	862	-	140	421
Mov Cap-2 Maneuver	-	-	-	-	140	-
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	23.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	140	421	-	-	862	-
HCM Lane V/C Ratio	0.179	0.511	-	-	0.134	-
HCM Control Delay (s)	36.2	22.2	-	-	9.8	-
HCM Lane LOS	E	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	2.8	-	-	0.5	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	930	17	171	488	33	298
v/c Ratio	0.76	0.02	0.41	0.30	0.26	0.70
Control Delay	20.3	5.9	9.4	2.1	50.6	32.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	5.9	9.4	2.1	50.6	32.0
Queue Length 50th (ft)	425	1	13	38	21	117
Queue Length 95th (ft)	#831	12	41	104	51	187
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1224	1044	422	1633	387	426
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.02	0.41	0.30	0.09	0.70

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	856	16	157	449	30	274
Future Volume (vph)	856	16	157	449	30	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.14	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	261	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	930	17	171	488	33	298
RTOR Reduction (vph)	0	4	0	0	0	84
Lane Group Flow (vph)	930	13	171	488	33	214
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	66.5	66.5	86.9	86.9	5.1	19.0
Effective Green, g (s)	66.5	66.5	86.9	86.9	5.1	19.0
Actuated g/C Ratio	0.63	0.63	0.83	0.83	0.05	0.18
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1179	1002	415	1541	85	384
v/s Ratio Prot	c0.50		0.05	0.26	0.02	c0.07
v/s Ratio Perm		0.01	0.29			0.06
v/c Ratio	0.79	0.01	0.41	0.32	0.39	0.56
Uniform Delay, d1	14.1	7.1	13.0	2.1	48.4	39.2
Progression Factor	1.00	1.00	2.84	0.74	1.00	1.00
Incremental Delay, d2	5.4	0.0	0.6	0.5	2.9	1.8
Delay (s)	19.5	7.1	37.6	2.1	51.4	40.9
Level of Service	B	A	D	A	D	D
Approach Delay (s)	19.3			11.3	42.0	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	856	16	157	449	30	274
Future Volume (veh/h)	856	16	157	449	30	274
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	930	17	171	488	33	298
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1047	887	248	1274	347	403
Arrive On Green	0.56	0.56	0.12	1.00	0.19	0.19
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	930	17	171	488	33	298
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	45.7	0.5	4.2	0.0	1.6	18.1
Cycle Q Clear(g_c), s	45.7	0.5	4.2	0.0	1.6	18.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1047	887	248	1274	347	403
V/C Ratio(X)	0.89	0.02	0.69	0.38	0.10	0.74
Avail Cap(c_a), veh/h	1047	887	276	1274	390	442
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.88	0.88	1.00	1.00
Uniform Delay (d), s/veh	20.2	10.3	20.8	0.0	34.7	35.9
Incr Delay (d2), s/veh	11.2	0.0	5.5	0.8	0.1	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.6	0.2	2.4	0.3	0.7	7.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.4	10.3	26.3	0.8	34.8	41.8
LnGrp LOS	C	B	C	A	C	D
Approach Vol, veh/h	947			659	331	
Approach Delay, s/veh	31.0			7.4	41.1	
Approach LOS	C			A	D	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.7	65.3				78.0		27.0
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	7.9	54.6				69.0		23.0
Max Q Clear Time (g_c+I1), s	6.2	47.7				2.0		20.1
Green Ext Time (p_c), s	0.1	3.3				2.8		0.3

Intersection Summary			
HCM 6th Ctrl Delay			24.7
HCM 6th LOS			C

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	787	441	65	342	65	316
v/c Ratio	0.62	0.38	0.15	0.24	0.39	0.73
Control Delay	6.9	1.7	2.5	2.6	49.4	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	1.7	2.5	2.6	49.4	15.1
Queue Length 50th (ft)	149	15	3	14	42	0
Queue Length 95th (ft)	185	27	11	99	79	78
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1267	1161	437	1448	523	688
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.38	0.15	0.24	0.12	0.46

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	724	406	60	315	0	0	0	0	60	0	291
Future Volume (vph)	0	724	406	60	315	0	0	0	0	60	0	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1810	1538	1719	1810						1719	1538
Flt Permitted		1.00	1.00	0.25	1.00						0.95	1.00
Satd. Flow (perm)		1810	1538	450	1810						1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	787	441	65	342	0	0	0	0	65	0	316
RTOR Reduction (vph)	0	0	88	0	0	0	0	0	0	0	0	285
Lane Group Flow (vph)	0	787	353	65	342	0	0	0	0	0	65	31
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		72.2	72.2	84.0	84.0						10.3	10.3
Effective Green, g (s)		72.2	72.2	84.0	84.0						10.3	10.3
Actuated g/C Ratio		0.69	0.69	0.80	0.80						0.10	0.10
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1244	1057	424	1448						168	150
v/s Ratio Prot		c0.43		0.01	c0.19						c0.04	
v/s Ratio Perm			0.23	0.11								0.02
v/c Ratio		0.63	0.33	0.15	0.24						0.39	0.21
Uniform Delay, d1		9.1	6.6	5.6	2.6						44.4	43.6
Progression Factor		0.51	0.38	0.62	0.71						1.00	1.00
Incremental Delay, d2		1.6	0.6	0.2	0.4						1.5	0.7
Delay (s)		6.2	3.1	3.6	2.2						45.9	44.3
Level of Service		A	A	A	A						D	D
Approach Delay (s)		5.1			2.4			0.0			44.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	724	406	60	315	0	0	0	0	60	0	291
Future Volume (veh/h)	0	724	406	60	315	0	0	0	0	60	0	291
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1826	1826
Adj Flow Rate, veh/h	0	787	441	65	342	0				65	0	316
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	1038	880	391	1225	0				395	0	352
Arrive On Green	0.00	1.00	1.00	0.08	1.00	0.00				0.23	0.00	0.23
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1739	0	1547
Grp Volume(v), veh/h	0	787	441	65	342	0				65	0	316
Grp Sat Flow(s),veh/h/ln	0	1826	1547	1739	1826	0				1739	0	1547
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0				3.2	0.0	20.8
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.5	0.0	0.0				3.2	0.0	20.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1038	880	391	1225	0				395	0	352
V/C Ratio(X)	0.00	0.76	0.50	0.17	0.28	0.00				0.16	0.00	0.90
Avail Cap(c_a), veh/h	0	1038	880	403	1225	0				530	0	472
HCM Platoon Ratio	1.00	2.00	2.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.59	0.59	0.99	0.99	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	7.2	0.0	0.0				32.6	0.0	39.4
Incr Delay (d2), s/veh	0.0	3.1	1.2	0.2	0.6	0.0				0.2	0.0	16.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.9	0.3	0.5	0.2	0.0				1.3	0.0	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	3.1	1.2	7.4	0.6	0.0				32.8	0.0	55.6
LnGrp LOS	A	A	A	A	A	A				C	A	E
Approach Vol, veh/h		1228			407						381	
Approach Delay, s/veh		2.4			1.7						51.7	
Approach LOS		A			A						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	10.7	66.2		28.1		76.9						
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5						
Max Green Setting (Gmax), s	5.0	50.8		* 32		62.3						
Max Q Clear Time (g_c+I1), s	3.5	2.0		22.8		2.0						
Green Ext Time (p_c), s	0.0	7.7		1.0		1.8						

Intersection Summary			
HCM 6th Ctrl Delay			11.6
HCM 6th LOS			B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	532	332	163	33	256	87
v/c Ratio	0.61	0.26	0.20	0.04	0.74	0.22
Control Delay	6.2	3.2	22.6	0.1	51.9	5.7
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	3.2	22.6	0.1	51.9	5.7
Queue Length 50th (ft)	69	25	63	0	163	0
Queue Length 95th (ft)	40	27	148	0	229	28
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	939	1292	821	742	536	550
Starvation Cap Reductn	64	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.26	0.20	0.04	0.48	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	489	305	0	0	150	30	225	10	80	0	0	0
Future Volume (vph)	489	305	0	0	150	30	225	10	80	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1760	1568			
Flt Permitted	0.57	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1059	1845			1845	1568		1760	1568			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	532	332	0	0	163	33	245	11	87	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	70	0	0	0
Lane Group Flow (vph)	532	332	0	0	163	15	0	256	17	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	73.6	73.6			46.8	46.8		20.7	20.7			
Effective Green, g (s)	73.6	73.6			46.8	46.8		20.7	20.7			
Actuated g/C Ratio	0.70	0.70			0.45	0.45		0.20	0.20			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	876	1293			822	698		346	309			
v/s Ratio Prot	c0.12	0.18			0.09			c0.15				
v/s Ratio Perm	c0.31					0.01			0.01			
v/c Ratio	0.61	0.26			0.20	0.02		0.74	0.06			
Uniform Delay, d1	7.1	5.7			17.7	16.3		39.6	34.2			
Progression Factor	0.47	0.43			1.00	1.00		1.00	1.00			
Incremental Delay, d2	1.0	0.4			0.5	0.1		8.1	0.1			
Delay (s)	4.3	2.8			18.2	16.3		47.7	34.3			
Level of Service	A	A			B	B		D	C			
Approach Delay (s)		3.7			17.9			44.3			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	489	305	0	0	150	30	225	10	80	0	0	0
Future Volume (veh/h)	489	305	0	0	150	30	225	10	80	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	532	332	0	0	163	33	245	11	87			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	891	1344	0	0	915	775	294	13	273			
Arrive On Green	0.17	0.72	0.00	0.00	0.49	0.49	0.17	0.17	0.17			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1695	76	1572			
Grp Volume(v), veh/h	532	332	0	0	163	33	256	0	87			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1771	0	1572			
Q Serve(g_s), s	14.4	6.3	0.0	0.0	5.1	1.1	14.7	0.0	5.1			
Cycle Q Clear(g_c), s	14.4	6.3	0.0	0.0	5.1	1.1	14.7	0.0	5.1			
Prop In Lane	1.00		0.00	0.00		1.00	0.96		1.00			
Lane Grp Cap(c), veh/h	891	1344	0	0	915	775	308	0	273			
V/C Ratio(X)	0.60	0.25	0.00	0.00	0.18	0.04	0.83	0.00	0.32			
Avail Cap(c_a), veh/h	1088	1344	0	0	915	775	540	0	479			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.75	0.75	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	8.1	4.9	0.0	0.0	14.8	13.8	41.9	0.0	37.9			
Incr Delay (d2), s/veh	0.5	0.3	0.0	0.0	0.4	0.1	5.8	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.1	1.7	0.0	0.0	2.0	0.4	6.8	0.0	2.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	5.2	0.0	0.0	15.2	13.9	47.7	0.0	38.6			
LnGrp LOS	A	A	A	A	B	B	D	A	D			
Approach Vol, veh/h		864			196			343				
Approach Delay, s/veh		7.3			15.0			45.4				
Approach LOS		A			B			D				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		82.6			24.3	58.3		22.4				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		62.3			29.5	26.3		32.0				
Max Q Clear Time (g_c+I1), s		8.3			16.4	7.1		16.7				
Green Ext Time (p_c), s		1.8			1.4	0.7		1.6				

Intersection Summary			
HCM 6th Ctrl Delay			17.7
HCM 6th LOS			B

Intersection						
Int Delay, s/veh	6.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	48	338	126	320	230	34
Future Vol, veh/h	48	338	126	320	230	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	52	367	137	348	250	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	891	269	287	0	-	0
Stage 1	269	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	312	767	1269	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	278	767	1269	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	533	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1269	-	278	767	-	-
HCM Lane V/C Ratio	0.108	-	0.188	0.479	-	-
HCM Control Delay (s)	8.2	-	20.9	13.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.7	2.6	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	190	53	287	126	28	213
Future Vol, veh/h	190	53	287	126	28	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	207	58	312	137	30	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	604	312	0	0	449	0
Stage 1	312	-	-	-	-	-
Stage 2	292	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	461	728	-	-	1111	-
Stage 1	742	-	-	-	-	-
Stage 2	758	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	449	728	-	-	1111	-
Mov Cap-2 Maneuver	449	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.7	0	1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	449	728	1111	-
HCM Lane V/C Ratio	-	-	0.46	0.079	0.027	-
HCM Control Delay (s)	-	-	19.7	10.4	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2.4	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	235	446	478	215	183
v/c Ratio	0.53	0.27	0.47	0.72	0.44
Control Delay	16.5	14.5	22.7	44.0	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	14.5	22.7	44.0	8.6
Queue Length 50th (ft)	46	56	76	87	0
Queue Length 95th (ft)	77	140	172	195	55
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	849	1769	1106	457	545
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.28	0.25	0.43	0.47	0.34

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	216	410	320	120	198	168
Future Volume (vph)	216	410	320	120	198	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3395		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3395		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	446	348	130	215	183
RTOR Reduction (vph)	0	0	38	0	0	152
Lane Group Flow (vph)	235	446	440	0	215	31
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	17.7	33.1	20.6		12.2	12.2
Effective Green, g (s)	17.7	33.1	20.6		12.2	12.2
Actuated g/C Ratio	0.25	0.46	0.29		0.17	0.17
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	436	1633	975		301	269
v/s Ratio Prot	c0.13	0.13	c0.13			
v/s Ratio Perm					c0.12	0.02
v/c Ratio	0.54	0.27	0.45		0.71	0.12
Uniform Delay, d1	23.5	11.9	20.9		28.1	25.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.0	0.1		6.5	0.1
Delay (s)	24.1	11.9	21.0		34.6	25.3
Level of Service	C	B	C		C	C
Approach Delay (s)		16.1	21.0		30.3	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	71.7	Sum of lost time (s)	21.2
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	43	641	76	196	702	65	48	217	175	175
v/c Ratio	0.17	0.37	0.09	0.76	0.39	0.42	0.30	0.51	0.74	0.72
Control Delay	38.8	22.0	0.3	56.8	9.0	54.0	49.5	14.2	63.0	58.7
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	38.8	22.6	0.3	56.8	9.0	54.0	49.5	14.3	63.0	58.7
Queue Length 50th (ft)	24	146	0	138	61	45	33	48	126	118
Queue Length 95th (ft)	59	267	2	202	213	82	65	61	194	187
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	306	1724	822	354	1860	289	304	503	320	326
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	695	0	0	0	0	0	19	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.62	0.09	0.55	0.38	0.22	0.16	0.45	0.55	0.54

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	641	76	196	522	180	65	48	217	265	52	33
RTOR Reduction (vph)	0	0	41	0	25	0	0	0	78	0	8	0
Lane Group Flow (vph)	43	641	35	196	677	0	65	48	139	175	167	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Effective Green, g (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Actuated g/C Ratio	0.13	0.46	0.46	0.16	0.49		0.08	0.08	0.24	0.14	0.14	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	230	1631	710	289	1682		139	147	382	238	236	
v/s Ratio Prot	0.02	0.18		c0.11	c0.20		c0.04	0.03	0.06	c0.10	0.10	
v/s Ratio Perm			0.02						0.03			
v/c Ratio	0.19	0.39	0.05	0.68	0.40		0.47	0.33	0.36	0.74	0.71	
Uniform Delay, d1	42.7	19.5	16.4	43.3	17.5		48.4	47.9	34.6	45.2	45.0	
Progression Factor	1.00	1.00	1.00	0.88	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.7	0.1	4.5	0.7		0.9	0.5	0.2	9.7	7.7	
Delay (s)	42.8	20.2	16.5	42.6	7.9		49.3	48.4	34.8	54.9	52.7	
Level of Service	D	C	B	D	A		D	D	C	D	D	
Approach Delay (s)		21.1			15.5			39.6			53.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	641	76	196	522	180	65	48	217	175	178	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	748	1034	460	635	590	203	107	112	660	246	211	39
Arrive On Green	0.42	0.29	0.29	0.71	0.45	0.45	0.06	0.06	0.06	0.14	0.14	0.14
Sat Flow, veh/h	1781	3554	1580	1781	2596	891	1781	1870	1577	1781	1533	284
Grp Volume(v), veh/h	43	641	76	196	357	345	65	48	217	175	0	211
Grp Sat Flow(s),veh/h/ln	1781	1777	1580	1781	1777	1710	1781	1870	1577	1781	0	1817
Q Serve(g_s), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Cycle Q Clear(g_c), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	748	1034	460	635	404	389	107	112	660	246	0	251
V/C Ratio(X)	0.06	0.62	0.17	0.31	0.88	0.89	0.61	0.43	0.33	0.71	0.00	0.84
Avail Cap(c_a), veh/h	748	1034	460	635	678	653	291	306	823	340	0	347
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	33.7	29.1	10.8	28.6	28.7	50.4	49.9	21.7	45.3	0.0	46.2
Incr Delay (d2), s/veh	0.0	2.8	0.8	0.1	21.4	22.8	2.1	1.0	0.1	1.9	0.0	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.7	1.6	1.5	8.6	8.5	1.8	1.3	3.7	4.6	0.0	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	36.5	29.8	10.9	50.0	51.5	52.5	50.8	21.8	47.2	0.0	55.7
LnGrp LOS	B	D	C	B	D	D	D	D	C	D	A	E
Approach Vol, veh/h		760			898			330			386	
Approach Delay, s/veh		34.9			42.0			32.1			51.8	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	44.2	36.0		19.2	51.2	29.0		10.6				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	22.0	32.0		21.0	12.0	42.0		18.0				
Max Q Clear Time (g_c+I1), s	6.5	19.2		14.5	3.6	22.3		5.9				
Green Ext Time (p_c), s	0.1	2.5		0.6	0.0	2.7		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			39.9									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1342	217	772	598	310	98	278
v/c Ratio	1.10	1.23	0.45	1.32	1.38	0.12	0.37
Control Delay	89.4	182.2	6.9	191.4	232.7	19.1	12.1
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.8	182.2	6.9	191.4	232.7	19.1	12.1
Queue Length 50th (ft)	~576	~179	85	~546	~291	40	63
Queue Length 95th (ft)	#683	#334	93	#763	#465	74	128
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1217	177	1705	454	225	809	753
Starvation Cap Reductn	16	0	0	0	0	0	0
Spillback Cap Reductn	103	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.23	0.45	1.32	1.38	0.12	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1204	30	200	710	0	0	0	550	285	90	256
Future Volume (vph)	0	1204	30	200	710	0	0	0	550	285	90	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3524		1770	3539				1611	1770	1863	1562
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3524		1770	3539				1611	1770	1863	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1309	33	217	772	0	0	0	598	310	98	278
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	75
Lane Group Flow (vph)	0	1342	0	217	772	0	0	0	598	310	98	203
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Effective Green, g (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Actuated g/C Ratio		0.35		0.10	0.48				0.28	0.13	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1217		177	1705				454	225	809	678
v/s Ratio Prot		c0.38		c0.12	0.22				c0.37	c0.18	0.05	
v/s Ratio Perm												0.13
v/c Ratio		1.10		1.23	0.45				1.32	1.38	0.12	0.30
Uniform Delay, d1		36.0		49.5	18.9				39.5	48.0	18.6	20.2
Progression Factor		0.87		0.97	0.32				1.00	1.00	1.00	1.00
Incremental Delay, d2		58.2		140.6	0.8				157.6	195.4	0.3	1.1
Delay (s)		89.7		188.8	6.9				197.1	243.4	18.9	21.4
Level of Service		F		F	A				F	F	B	C
Approach Delay (s)		89.7			46.8			197.1			121.3	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	101.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	678	1147	935	396	158	157	228
v/c Ratio	0.90	0.42	0.69	0.48	0.67	0.67	0.71
Control Delay	29.7	3.7	32.4	4.8	58.4	57.8	33.4
Queue Delay	1.1	1.1	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	4.9	32.4	4.8	58.4	57.8	33.4
Queue Length 50th (ft)	298	84	285	0	113	112	74
Queue Length 95th (ft)	#592	161	399	68	173	173	149
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	755	2748	1364	831	397	399	463
Starvation Cap Reductn	14	1272	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.78	0.69	0.48	0.40	0.39	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	624	1055	0	0	860	364	280	10	210	0	0	0
Future Volume (vph)	624	1055	0	0	860	364	280	10	210	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (prot)	1770	3539			3539	1527	1681	1691	1583			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (perm)	307	3539			3539	1527	1681	1691	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	678	1147	0	0	935	396	304	11	228	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	243	0	0	101	0	0	0
Lane Group Flow (vph)	678	1147	0	0	935	153	158	157	127	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Effective Green, g (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Actuated g/C Ratio	0.78	0.78			0.39	0.39	0.14	0.14	0.14			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	755	2747			1364	588	235	236	221			
v/s Ratio Prot	c0.32	0.32			0.26		c0.09	0.09				
v/s Ratio Perm	c0.38					0.10			0.08			
v/c Ratio	0.90	0.42			0.69	0.26	0.67	0.67	0.58			
Uniform Delay, d1	22.1	4.1			28.2	23.1	44.9	44.9	44.2			
Progression Factor	0.68	0.75			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	8.8	0.3			2.8	1.1	6.7	6.2	3.0			
Delay (s)	23.8	3.4			31.1	24.2	51.6	51.1	47.2			
Level of Service	C	A			C	C	D	D	D			
Approach Delay (s)		10.9			29.0			49.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	624	1055	0	0	860	364	280	10	210	0	0	0
Future Volume (veh/h)	624	1055	0	0	860	364	280	10	210	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	678	1147	0	0	935	396	312	0	228			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	825	2658	0	0	1027	445	597	0	266			
Arrive On Green	0.42	0.75	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1781	3647	0	0	3647	1539	3563	0	1585			
Grp Volume(v), veh/h	678	1147	0	0	935	396	312	0	228			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1539	1781	0	1585			
Q Serve(g_s), s	31.8	13.2	0.0	0.0	27.9	27.1	8.8	0.0	15.4			
Cycle Q Clear(g_c), s	31.8	13.2	0.0	0.0	27.9	27.1	8.8	0.0	15.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	825	2658	0	0	1027	445	597	0	266			
V/C Ratio(X)	0.82	0.43	0.00	0.00	0.91	0.89	0.52	0.00	0.86			
Avail Cap(c_a), veh/h	825	2658	0	0	1027	445	842	0	375			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.54	0.54	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.8	5.2	0.0	0.0	37.7	37.4	41.8	0.0	44.5			
Incr Delay (d2), s/veh	3.5	0.3	0.0	0.0	13.3	22.5	0.5	0.0	11.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	15.4	4.0	0.0	0.0	13.7	12.7	3.9	0.0	13.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	5.4	0.0	0.0	51.1	60.0	42.3	0.0	56.4			
LnGrp LOS	C	A	A	A	D	E	D	A	E			
Approach Vol, veh/h		1825			1331			540				
Approach Delay, s/veh		14.3			53.7			48.2				
Approach LOS		B			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		86.4		23.6	50.6	35.8						
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0						
Max Green Setting (Gmax), s		* 75		* 26	38.9	31.8						
Max Q Clear Time (g_c+I1), s		15.2		17.4	33.8	29.9						
Green Ext Time (p_c), s		11.1		1.1	0.7	1.3						

Intersection Summary		
HCM 6th Ctrl Delay		33.5
HCM 6th LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2205	261	978
v/c Ratio	0.78	1.47	0.28
Control Delay	2.1	269.9	0.2
Queue Delay	0.2	0.0	0.1
Total Delay	2.4	269.9	0.3
Queue Length 50th (ft)	45	~244	0
Queue Length 95th (ft)	m0	#409	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2837	177	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	147	0	1023
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	1.47	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	1649	380	240	900	0	0
Future Volume (vph)	1649	380	240	900	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3422		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3422		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1792	413	261	978	0	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	2199	0	261	978	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	91.0		11.0	110.0		
Effective Green, g (s)	91.0		11.0	104.8		
Actuated g/C Ratio	0.83		0.10	0.95		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2830		177	3371		
v/s Ratio Prot	c0.64		c0.15	0.28		
v/s Ratio Perm						
v/c Ratio	0.78		1.47	0.29		
Uniform Delay, d1	4.6		49.5	0.2		
Progression Factor	0.40		0.90	1.00		
Incremental Delay, d2	0.1		236.1	0.2		
Delay (s)	2.0		280.6	0.3		
Level of Service	A		F	A		
Approach Delay (s)	2.0			59.4	0.0	
Approach LOS	A			E	A	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	7.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	96	176	230	88	228	220
Future Vol, veh/h	96	176	230	88	228	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	101	185	242	93	240	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1001	289	0	0	335	0
Stage 1	289	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	268	748	-	-	1219	-
Stage 1	758	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	215	748	-	-	1219	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	389	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	215	748	1219	-
HCM Lane V/C Ratio	-	-	0.47	0.248	0.197	-
HCM Control Delay (s)	-	-	35.8	11.4	8.7	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.3	1	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	534	128	87	476	39	115	65	65	30	87	22
v/c Ratio	0.24	0.66	0.16	0.46	0.52	0.05	0.52	0.18	0.15	0.24	0.35	0.06
Control Delay	48.6	27.6	1.5	50.2	20.9	0.1	50.1	34.2	0.8	49.5	43.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.6	27.6	1.5	50.2	20.9	0.1	50.1	34.2	0.8	49.5	43.0	0.3
Queue Length 50th (ft)	19	264	0	48	211	0	64	33	0	17	47	0
Queue Length 95th (ft)	53	411	13	107	333	0	133	75	0	50	100	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	142	991	926	211	1065	982	255	837	785	137	713	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.54	0.14	0.41	0.45	0.04	0.45	0.08	0.08	0.22	0.12	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	491	118	80	438	36	106	60	60	28	80	20
Future Volume (vph)	30	491	118	80	438	36	106	60	60	28	80	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	534	128	87	476	39	115	65	65	30	87	22
RTOR Reduction (vph)	0	0	74	0	0	21	0	0	53	0	0	20
Lane Group Flow (vph)	33	534	54	87	476	18	115	65	12	30	87	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	3.4	38.4	38.4	7.0	42.0	42.0	10.7	17.0	17.0	3.3	9.6	9.6
Effective Green, g (s)	3.4	38.4	38.4	7.0	42.0	42.0	10.7	17.0	17.0	3.3	9.6	9.6
Actuated g/C Ratio	0.04	0.43	0.43	0.08	0.47	0.47	0.12	0.19	0.19	0.04	0.11	0.11
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	66	793	673	137	867	737	209	351	298	64	198	164
v/s Ratio Prot	0.02	c0.29		c0.05	c0.26		c0.06	0.03		0.02	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.50	0.67	0.08	0.64	0.55	0.02	0.55	0.19	0.04	0.47	0.44	0.01
Uniform Delay, d1	42.6	20.9	15.4	40.4	17.3	13.0	37.5	30.8	29.9	42.6	37.8	36.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	3.0	0.1	9.7	1.3	0.0	1.8	0.4	0.1	2.0	2.7	0.1
Delay (s)	49.4	23.8	15.5	50.0	18.6	13.1	39.3	31.2	30.0	44.6	40.5	36.1
Level of Service	D	C	B	D	B	B	D	C	C	D	D	D
Approach Delay (s)		23.5			22.7			34.7			40.7	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	491	118	80	438	36	106	60	60	28	80	20
Future Volume (veh/h)	30	491	118	80	438	36	106	60	60	28	80	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	534	128	87	476	39	115	65	65	30	87	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	715	606	113	770	652	148	290	246	57	195	161
Arrive On Green	0.03	0.38	0.38	0.06	0.41	0.41	0.08	0.16	0.16	0.03	0.10	0.10
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Grp Volume(v), veh/h	33	534	128	87	476	39	115	65	65	30	87	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Q Serve(g_s), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Cycle Q Clear(g_c), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	61	715	606	113	770	652	148	290	246	57	195	161
V/C Ratio(X)	0.54	0.75	0.21	0.77	0.62	0.06	0.78	0.22	0.26	0.53	0.45	0.14
Avail Cap(c_a), veh/h	173	1208	1024	259	1297	1100	312	1020	864	168	869	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	17.8	13.8	30.8	15.5	11.8	30.0	24.7	24.8	31.8	28.1	27.2
Incr Delay (d2), s/veh	8.7	3.3	0.4	12.5	1.7	0.1	3.3	0.7	1.0	2.8	2.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.2	1.1	1.6	4.8	0.3	1.7	0.8	0.9	0.5	1.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.4	21.1	14.2	43.2	17.2	11.9	33.3	25.3	25.8	34.6	30.8	27.8
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		695			602			245			139	
Approach Delay, s/veh		20.8			20.6			29.2			31.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	32.6	10.8	13.8	7.6	34.6	7.4	17.2
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	9.7	* 43	11.7	* 31	6.5	* 46	6.3	* 36
Max Q Clear Time (g_c+I1), s	5.2	18.5	6.2	4.9	3.2	15.4	3.1	4.4
Green Ext Time (p_c), s	0.1	7.1	0.1	0.7	0.0	5.9	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	22.8
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	539	20	64	524	36	10	10	16	28	20	20
Future Vol, veh/h	20	539	20	64	524	36	10	10	16	28	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	556	21	66	540	37	10	10	16	29	21	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	577	0	0	577	0	0	1310	1307	556	1294	1291	540
Stage 1	-	-	-	-	-	-	598	598	-	672	672	-
Stage 2	-	-	-	-	-	-	712	709	-	622	619	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	992	-	-	992	-	-	135	159	529	139	162	540
Stage 1	-	-	-	-	-	-	487	489	-	444	453	-
Stage 2	-	-	-	-	-	-	422	436	-	473	479	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	992	-	-	109	145	529	119	148	540
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	145	-	119	148	-
Stage 1	-	-	-	-	-	-	477	479	-	435	423	-
Stage 2	-	-	-	-	-	-	360	407	-	439	469	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.9	25.6	31.7
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	109	145	529	992	-	-	992	-	-	119	148	540
HCM Lane V/C Ratio	0.095	0.071	0.031	0.021	-	-	0.067	-	-	0.243	0.139	0.038
HCM Control Delay (s)	41.4	31.7	12	8.7	-	-	8.9	-	-	44.7	33.2	11.9
HCM Lane LOS	E	D	B	A	-	-	A	-	-	E	D	B
HCM 95th %tile Q(veh)	0.3	0.2	0.1	0.1	-	-	0.2	-	-	0.9	0.5	0.1

Intersection						
Int Delay, s/veh	3.5					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	519	25	206	546	17	147
Future Vol, veh/h	519	25	206	546	17	147
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	564	27	224	593	18	160

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	591	0	1605	564
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	1041	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	985	-	116	525
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	340	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	985	-	90	525
Mov Cap-2 Maneuver	-	-	-	-	90	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	263	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	19
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	90	525	-	-	985	-
HCM Lane V/C Ratio	0.205	0.304	-	-	0.227	-
HCM Control Delay (s)	55.1	14.8	-	-	9.7	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	1.3	-	-	0.9	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	653	71	372	745	73	262
v/c Ratio	0.62	0.08	0.60	0.48	0.46	0.43
Control Delay	22.7	6.2	11.6	4.2	56.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.7	6.2	11.6	4.2	56.0	12.6
Queue Length 50th (ft)	309	5	49	133	50	58
Queue Length 95th (ft)	549	32	140	125	94	106
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1045	913	640	1540	370	626
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.08	0.58	0.48	0.20	0.42

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	601	65	342	685	67	241
Future Volume (vph)	601	65	342	685	67	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.24	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	449	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	653	71	372	745	73	262
RTOR Reduction (vph)	0	25	0	0	0	106
Lane Group Flow (vph)	653	46	372	745	73	156
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	60.4	60.4	88.3	88.3	8.7	30.1
Effective Green, g (s)	60.4	60.4	88.3	88.3	8.7	30.1
Actuated g/C Ratio	0.55	0.55	0.80	0.80	0.08	0.27
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1022	869	617	1495	139	526
v/s Ratio Prot	c0.35		c0.12	0.40	c0.04	0.06
v/s Ratio Perm		0.03	0.37			0.04
v/c Ratio	0.64	0.05	0.60	0.50	0.53	0.30
Uniform Delay, d1	17.2	11.5	9.7	3.6	48.7	31.6
Progression Factor	1.00	1.00	1.85	0.79	1.00	1.00
Incremental Delay, d2	3.1	0.1	1.4	1.0	3.6	0.3
Delay (s)	20.3	11.6	19.3	3.8	52.2	31.9
Level of Service	C	B	B	A	D	C
Approach Delay (s)	19.4			9.0	36.3	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	601	65	342	685	67	241
Future Volume (veh/h)	601	65	342	685	67	241
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	653	71	372	745	73	262
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1015	860	486	1340	295	444
Arrive On Green	0.54	0.54	0.15	0.95	0.17	0.17
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	653	71	372	745	73	262
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	27.0	2.4	9.9	4.4	3.9	15.7
Cycle Q Clear(g_c), s	27.0	2.4	9.9	4.4	3.9	15.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1015	860	486	1340	295	444
V/C Ratio(X)	0.64	0.08	0.76	0.56	0.25	0.59
Avail Cap(c_a), veh/h	1015	860	614	1340	372	513
HCM Platoon Ratio	1.00	1.00	1.33	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.72	0.72	1.00	1.00
Uniform Delay (d), s/veh	17.7	12.1	14.2	0.8	39.9	34.1
Incr Delay (d2), s/veh	3.1	0.2	3.2	1.2	0.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	0.8	3.2	1.1	1.8	6.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.8	12.2	17.4	2.1	40.4	35.5
LnGrp LOS	C	B	B	A	D	D
Approach Vol, veh/h	724			1117	335	
Approach Delay, s/veh	20.0			7.2	36.5	
Approach LOS	B			A	D	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	19.1	66.2	85.3	24.7
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	20.5	47.0	74.0	23.0
Max Q Clear Time (g_c+I1), s	11.9	29.0	6.4	17.7
Green Ext Time (p_c), s	0.7	3.7	5.1	0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	511	357	72	552	82	507
v/c Ratio	0.47	0.34	0.14	0.44	0.20	0.87
Control Delay	10.3	1.3	8.8	12.0	31.9	32.2
Queue Delay	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	10.3	1.3	8.8	13.5	31.9	32.2
Queue Length 50th (ft)	100	1	5	148	47	159
Queue Length 95th (ft)	207	13	m60	411	74	252
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1079	1045	502	1259	645	757
Starvation Cap Reductn	0	0	0	490	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.14	0.72	0.13	0.67

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	496	346	70	535	0	0	0	0	70	10	492
Future Volume (vph)	0	496	346	70	535	0	0	0	0	70	10	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1784	1583
Flt Permitted		1.00	1.00	0.35	1.00						0.96	1.00
Satd. Flow (perm)		1863	1583	643	1863						1784	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	511	357	72	552	0	0	0	0	72	10	507
RTOR Reduction (vph)	0	0	132	0	0	0	0	0	0	0	0	224
Lane Group Flow (vph)	0	511	225	72	552	0	0	0	0	0	82	283
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		62.4	62.4	74.4	74.4						24.9	24.9
Effective Green, g (s)		62.4	62.4	74.4	74.4						24.9	24.9
Actuated g/C Ratio		0.57	0.57	0.68	0.68						0.23	0.23
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1056	897	491	1260						403	358
v/s Ratio Prot		c0.27		0.01	c0.30						0.05	
v/s Ratio Perm			0.14	0.09								c0.18
v/c Ratio		0.48	0.25	0.15	0.44						0.20	0.79
Uniform Delay, d1		14.2	12.0	7.8	8.2						34.5	40.1
Progression Factor		0.52	0.16	0.96	1.05						1.00	1.00
Incremental Delay, d2		1.3	0.6	0.1	0.9						0.3	11.4
Delay (s)		8.7	2.5	7.5	9.6						34.8	51.5
Level of Service		A	A	A	A						C	D
Approach Delay (s)		6.1			9.3			0.0			49.1	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	496	346	70	535	0	0	0	0	70	10	492
Future Volume (veh/h)	0	496	346	70	535	0	0	0	0	70	10	492
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	511	357	72	552	0				72	10	507
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	870	738	272	1057	0				531	74	536
Arrive On Green	0.00	0.15	0.15	0.08	1.00	0.00				0.34	0.34	0.34
Sat Flow, veh/h	0	1870	1585	1781	1870	0				1573	219	1585
Grp Volume(v), veh/h	0	511	357	72	552	0				82	0	507
Grp Sat Flow(s),veh/h/ln	0	1870	1585	1781	1870	0				1792	0	1585
Q Serve(g_s), s	0.0	28.0	22.7	2.2	0.0	0.0				3.5	0.0	34.3
Cycle Q Clear(g_c), s	0.0	28.0	22.7	2.2	0.0	0.0				3.5	0.0	34.3
Prop In Lane	0.00		1.00	1.00		0.00				0.88		1.00
Lane Grp Cap(c), veh/h	0	870	738	272	1057	0				605	0	536
V/C Ratio(X)	0.00	0.59	0.48	0.26	0.52	0.00				0.14	0.00	0.95
Avail Cap(c_a), veh/h	0	870	738	289	1057	0				648	0	574
HCM Platoon Ratio	1.00	0.33	0.33	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.80	0.80	0.96	0.96	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	36.7	34.5	16.8	0.0	0.0				25.3	0.0	35.5
Incr Delay (d2), s/veh	0.0	2.3	1.8	0.5	1.8	0.0				0.1	0.0	24.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	14.4	9.9	0.8	0.5	0.0				1.5	0.0	16.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	39.0	36.3	17.3	1.8	0.0				25.4	0.0	59.7
LnGrp LOS	A	D	D	B	A	A				C	A	E
Approach Vol, veh/h		868			624						589	
Approach Delay, s/veh		37.9			3.6						55.0	
Approach LOS		D			A						D	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	10.9	57.7	41.4	68.6
Change Period (Y+Rc), s	6.5	6.5	* 4.2	6.5
Max Green Setting (Gmax), s	5.5	47.5	* 40	59.5
Max Q Clear Time (g_c+I1), s	4.2	30.0	36.3	2.0
Green Ext Time (p_c), s	0.0	3.8	0.9	3.3

Intersection Summary	
HCM 6th Ctrl Delay	32.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	391	224	220	22	438	65
v/c Ratio	0.57	0.20	0.32	0.03	0.82	0.12
Control Delay	9.1	4.9	30.0	0.1	48.4	2.1
Queue Delay	0.2	0.0	0.0	0.0	0.2	0.0
Total Delay	9.3	4.9	30.0	0.1	48.6	2.1
Queue Length 50th (ft)	50	14	110	0	285	0
Queue Length 95th (ft)	66	37	217	0	362	12
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	744	1113	697	640	658	648
Starvation Cap Reductn	48	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	22	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.20	0.32	0.03	0.69	0.10

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	360	206	0	0	202	20	393	10	60	0	0	0
Future Volume (vph)	360	206	0	0	202	20	393	10	60	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1759	1568			
Flt Permitted	0.50	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	916	1845			1845	1568		1759	1568			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	391	224	0	0	220	22	427	11	65	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	45	0	0	0
Lane Group Flow (vph)	391	224	0	0	220	8	0	438	20	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	66.1	66.1			41.3	41.3		33.2	33.2			
Effective Green, g (s)	66.1	66.1			41.3	41.3		33.2	33.2			
Actuated g/C Ratio	0.60	0.60			0.38	0.38		0.30	0.30			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	689	1108			692	588		530	473			
v/s Ratio Prot	c0.09	0.12			0.12			c0.25				
v/s Ratio Perm	c0.25					0.01			0.01			
v/c Ratio	0.57	0.20			0.32	0.01		0.83	0.04			
Uniform Delay, d1	11.9	10.0			24.4	21.6		35.7	27.2			
Progression Factor	0.46	0.39			1.00	1.00		1.00	1.00			
Incremental Delay, d2	1.0	0.4			1.2	0.0		10.2	0.0			
Delay (s)	6.5	4.3			25.6	21.6		45.9	27.2			
Level of Service	A	A			C	C		D	C			
Approach Delay (s)		5.7			25.2			43.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	360	206	0	0	202	20	393	10	60	0	0	0
Future Volume (veh/h)	360	206	0	0	202	20	393	10	60	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	391	224	0	0	220	22	427	11	65			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	713	1159	0	0	764	647	480	12	437			
Arrive On Green	0.26	1.00	0.00	0.00	0.41	0.41	0.28	0.28	0.28			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1725	44	1572			
Grp Volume(v), veh/h	391	224	0	0	220	22	438	0	65			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1769	0	1572			
Q Serve(g_s), s	14.1	0.0	0.0	0.0	8.7	0.9	26.1	0.0	3.4			
Cycle Q Clear(g_c), s	14.1	0.0	0.0	0.0	8.7	0.9	26.1	0.0	3.4			
Prop In Lane	1.00		0.00	0.00		1.00	0.97		1.00			
Lane Grp Cap(c), veh/h	713	1159	0	0	764	647	492	0	437			
V/C Ratio(X)	0.55	0.19	0.00	0.00	0.29	0.03	0.89	0.00	0.15			
Avail Cap(c_a), veh/h	850	1159	0	0	764	647	656	0	583			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.88	0.88	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.6	0.0	0.0	0.0	21.6	19.3	38.1	0.0	29.9			
Incr Delay (d2), s/veh	0.6	0.3	0.0	0.0	1.0	0.1	11.5	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.8	0.1	0.0	0.0	3.7	0.3	12.7	0.0	1.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	0.3	0.0	0.0	22.6	19.4	49.6	0.0	30.0			
LnGrp LOS	B	A	A	A	C	B	D	A	C			
Approach Vol, veh/h		615			242			503				
Approach Delay, s/veh		7.9			22.3			47.0				
Approach LOS		A			C			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		75.2			23.4	51.8		34.8				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		58.5			25.5	26.5		40.8				
Max Q Clear Time (g_c+I1), s		2.0			16.1	10.7		28.1				
Green Ext Time (p_c), s		1.1			0.8	0.9		2.5				

Intersection Summary			
HCM 6th Ctrl Delay			24.9
HCM 6th LOS			C

Intersection						
Int Delay, s/veh	5.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	220	174	230	260	68
Future Vol, veh/h	56	220	174	230	260	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	239	189	250	283	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	948	320	357	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	628	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	289	721	1202	-	-	-
Stage 1	736	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	244	721	1202	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	532	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	3.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1202	-	244	721	-	-
HCM Lane V/C Ratio	0.157	-	0.249	0.332	-	-
HCM Control Delay (s)	8.6	-	24.6	12.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.6	-	1	1.5	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	155	39	196	212	57	354
Future Vol, veh/h	155	39	196	212	57	354
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	42	213	230	62	385

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	722	213	0	0	443	0
Stage 1	213	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	394	827	-	-	1117	-
Stage 1	823	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	372	827	-	-	1117	-
Mov Cap-2 Maneuver	372	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	570	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.8	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	372	827	1117	-
HCM Lane V/C Ratio	-	-	0.453	0.051	0.055	-
HCM Control Delay (s)	-	-	22.4	9.6	8.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	2.3	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	225	432	749	229	211
v/c Ratio	0.55	0.26	0.69	0.72	0.48
Control Delay	20.0	14.7	25.8	44.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	14.7	25.8	44.2	10.8
Queue Length 50th (ft)	44	55	131	89	8
Queue Length 95th (ft)	94	136	276	218	75
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	794	1958	1377	479	567
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.28	0.22	0.54	0.48	0.37

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	214	410	490	221	218	200
Future Volume (vph)	214	410	490	221	218	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3384		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3384		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	225	432	516	233	229	211
RTOR Reduction (vph)	0	0	51	0	0	155
Lane Group Flow (vph)	225	432	698	0	229	56
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	16.5	33.7	22.5		13.1	13.1
Effective Green, g (s)	16.5	33.7	22.5		13.1	13.1
Actuated g/C Ratio	0.23	0.46	0.31		0.18	0.18
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	402	1643	1038		319	285
v/s Ratio Prot	c0.13	0.12	c0.21			
v/s Ratio Perm					c0.13	0.03
v/c Ratio	0.56	0.26	0.67		0.72	0.20
Uniform Delay, d1	25.2	12.2	22.2		28.4	25.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	0.0	1.4		6.3	0.1
Delay (s)	26.1	12.2	23.5		34.7	25.7
Level of Service	C	B	C		C	C
Approach Delay (s)		17.0	23.5		30.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	73.3	Sum of lost time (s)	21.2
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	102	633	92	276	1004	143	90	143	269	264
v/c Ratio	0.39	0.47	0.14	0.85	0.70	0.70	0.42	0.28	0.84	0.81
Control Delay	53.1	32.8	2.8	67.1	24.8	69.3	54.6	8.4	69.0	63.0
Queue Delay	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	34.9	2.8	67.1	25.2	69.3	54.6	8.5	69.0	63.1
Queue Length 50th (ft)	72	198	0	211	353	108	66	22	212	197
Queue Length 95th (ft)	137	303	20	300	454	172	115	38	302	287
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	263	1339	663	402	1429	268	282	577	396	401
Starvation Cap Reductn	0	0	0	0	123	0	0	0	0	0
Spillback Cap Reductn	0	533	0	0	0	0	0	11	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.79	0.14	0.69	0.77	0.53	0.32	0.25	0.68	0.66

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	102	633	92	276	816	188	143	90	143	384	88	61
RTOR Reduction (vph)	0	0	57	0	16	0	0	0	55	0	10	0
Lane Group Flow (vph)	102	633	35	276	988	0	143	90	88	269	254	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Effective Green, g (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Actuated g/C Ratio	0.15	0.38	0.38	0.18	0.41		0.11	0.11	0.29	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	263	1343	586	323	1415		202	213	467	319	316	
v/s Ratio Prot	0.06	0.18		c0.15	c0.29		c0.08	0.05	0.03	c0.16	0.15	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.39	0.47	0.06	0.85	0.70		0.71	0.42	0.19	0.84	0.80	
Uniform Delay, d1	46.3	28.4	23.9	47.6	29.3		51.3	49.5	31.6	47.0	46.6	
Progression Factor	1.00	1.00	1.00	1.00	0.76		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.2	0.2	15.4	2.3		8.9	0.5	0.1	17.3	13.1	
Delay (s)	46.6	29.6	24.1	63.2	24.5		60.2	50.0	31.7	64.3	59.7	
Level of Service	D	C	C	E	C		E	D	C	E	E	
Approach Delay (s)		31.1			32.8			46.9			62.0	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	102	633	92	276	816	188	143	90	143	266	252	61
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	472	895	390	566	874	201	181	190	663	345	281	68
Arrive On Green	0.26	0.25	0.25	0.63	0.60	0.60	0.10	0.10	0.10	0.19	0.19	0.19
Sat Flow, veh/h	1795	3582	1560	1795	2889	666	1795	1885	1583	1795	1464	354
Grp Volume(v), veh/h	102	633	92	276	506	498	143	90	143	266	0	313
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1764	1795	1885	1583	1795	0	1818
Q Serve(g_s), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Cycle Q Clear(g_c), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	472	895	390	566	542	533	181	190	663	345	0	349
V/C Ratio(X)	0.22	0.71	0.24	0.49	0.93	0.93	0.79	0.47	0.22	0.77	0.00	0.90
Avail Cap(c_a), veh/h	472	895	390	566	672	662	269	283	741	419	0	424
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.76	0.76	0.76	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.6	41.0	35.9	17.0	22.6	22.6	52.7	50.9	22.5	46.0	0.0	47.3
Incr Delay (d2), s/veh	0.1	4.7	1.4	0.2	21.0	21.2	4.9	0.7	0.1	5.5	0.0	16.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.0	2.3	3.2	11.2	11.1	4.4	2.6	2.6	8.0	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.6	45.7	37.3	17.2	43.6	43.8	57.6	51.6	22.5	51.4	0.0	64.2
LnGrp LOS	C	D	D	B	D	D	E	D	C	D	A	E
Approach Vol, veh/h		827			1280			376			579	
Approach Delay, s/veh		43.4			38.0			42.8			58.3	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	42.8	34.0		27.1	36.6	40.3		16.1				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	27.0	30.0		28.0	12.0	45.0		18.0				
Max Q Clear Time (g_c+I1), s	11.8	21.3		22.2	7.3	32.8		11.3				
Green Ext Time (p_c), s	0.2	2.1		0.9	0.0	3.5		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			43.9									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1198	309	947	500	387	245	526
v/c Ratio	1.12	1.22	0.56	1.25	1.25	0.29	0.69
Control Delay	99.1	169.5	10.0	171.5	178.8	21.5	27.5
Queue Delay	0.5	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	99.6	169.5	10.1	171.5	178.8	21.5	27.6
Queue Length 50th (ft)	~574	~284	146	~484	~374	116	273
Queue Length 95th (ft)	#676	#466	147	#695	#569	175	408
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1065	253	1691	399	309	858	761
Starvation Cap Reductn	1	0	0	0	0	0	0
Spillback Cap Reductn	109	0	137	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.22	0.61	1.25	1.25	0.29	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1086	40	290	890	0	0	0	470	364	230	494
Future Volume (vph)	0	1086	40	290	890	0	0	0	470	364	230	494
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		0.99		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3552		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3552		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1155	43	309	947	0	0	0	500	387	245	526
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	1198	0	309	947	0	0	0	500	387	245	485
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Effective Green, g (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Actuated g/C Ratio		0.30		0.14	0.47				0.25	0.17	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1065		253	1691				399	309	858	720
v/s Ratio Prot		c0.34		c0.17	0.26				c0.31	c0.22	0.13	
v/s Ratio Perm												0.31
v/c Ratio		1.12		1.22	0.56				1.25	1.25	0.29	0.67
Uniform Delay, d1		42.0		51.5	22.6				45.2	49.6	20.4	25.6
Progression Factor		0.77		0.92	0.38				1.00	1.00	1.00	1.00
Incremental Delay, d2		67.4		128.6	1.3				133.0	137.5	0.8	5.0
Delay (s)		99.6		176.0	9.9				178.3	187.1	21.2	30.6
Level of Service		F		F	A				F	F	C	C
Approach Delay (s)		99.6			50.7			178.3			80.9	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	89.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	417	1246	1084	378	242	243	274
v/c Ratio	0.72	0.46	0.64	0.41	0.78	0.78	0.72
Control Delay	22.6	5.1	27.7	4.2	63.0	63.0	38.1
Queue Delay	0.3	1.3	0.1	0.0	1.1	1.1	0.0
Total Delay	23.0	6.4	27.8	4.2	64.1	64.1	38.1
Queue Length 50th (ft)	125	142	340	5	188	189	123
Queue Length 95th (ft)	243	175	457	67	273	274	211
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	626	2695	1691	919	386	387	446
Starvation Cap Reductn	28	1158	0	0	0	0	0
Spillback Cap Reductn	0	0	66	0	37	37	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.81	0.67	0.41	0.69	0.69	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	396	1184	0	0	1030	359	450	10	260	0	0	0
Future Volume (vph)	396	1184	0	0	1030	359	450	10	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1787	3574			3574	1536	1698	1706	1599			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	297	3574			3574	1536	1698	1706	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	417	1246	0	0	1084	378	474	11	274	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	193	0	0	87	0	0	0
Lane Group Flow (vph)	417	1246	0	0	1084	185	242	243	187	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Effective Green, g (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Actuated g/C Ratio	0.75	0.75			0.47	0.47	0.18	0.18	0.18			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	580	2695			1691	727	312	314	294			
v/s Ratio Prot	c0.17	0.35			0.30		c0.14	0.14				
v/s Ratio Perm	c0.37					0.12			0.12			
v/c Ratio	0.72	0.46			0.64	0.25	0.78	0.77	0.64			
Uniform Delay, d1	23.6	5.6			23.9	18.9	46.6	46.6	45.2			
Progression Factor	0.66	0.77			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	2.4	0.4			1.9	0.8	11.0	10.9	3.9			
Delay (s)	18.0	4.7			25.8	19.8	57.6	57.4	49.1			
Level of Service	B	A			C	B	E	E	D			
Approach Delay (s)		8.0			24.2			54.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	1184	0	0	1030	359	450	10	260	0	0	0
Future Volume (veh/h)	396	1184	0	0	1030	359	450	10	260	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	417	1246	0	0	1084	378	482	0	274			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	645	2656	0	0	1445	627	695	0	309			
Arrive On Green	0.30	0.74	0.00	0.00	0.40	0.40	0.19	0.00	0.19			
Sat Flow, veh/h	1795	3676	0	0	3676	1554	3591	0	1598			
Grp Volume(v), veh/h	417	1246	0	0	1084	378	482	0	274			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1554	1795	0	1598			
Q Serve(g_s), s	16.1	16.5	0.0	0.0	31.1	23.0	15.0	0.0	20.0			
Cycle Q Clear(g_c), s	16.1	16.5	0.0	0.0	31.1	23.0	15.0	0.0	20.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	645	2656	0	0	1445	627	695	0	309			
V/C Ratio(X)	0.65	0.47	0.00	0.00	0.75	0.60	0.69	0.00	0.89			
Avail Cap(c_a), veh/h	645	2656	0	0	1445	627	817	0	363			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.58	0.58	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	32.1	6.1	0.0	0.0	30.6	28.2	45.1	0.0	47.1			
Incr Delay (d2), s/veh	1.0	0.3	0.0	0.0	3.6	4.3	1.8	0.0	19.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	10.1	5.4	0.0	0.0	13.8	9.1	6.8	0.0	18.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	6.5	0.0	0.0	34.3	32.5	46.9	0.0	66.5			
LnGrp LOS	C	A	A	A	C	C	D	A	E			
Approach Vol, veh/h		1663			1462			756				
Approach Delay, s/veh		13.2			33.8			54.0				
Approach LOS		B			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		93.1		26.9	40.1	53.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 85		27.3	31.9	48.4						
Max Q Clear Time (g_c+I1), s		18.5		22.0	18.1	33.1						
Green Ext Time (p_c), s		10.0		1.2	0.5	5.5						

Intersection Summary		
HCM 6th Ctrl Delay		28.9
HCM 6th LOS		C

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2053	255	1255
v/c Ratio	0.75	1.01	0.35
Control Delay	2.1	98.7	0.2
Queue Delay	0.1	30.7	0.1
Total Delay	2.2	129.4	0.3
Queue Length 50th (ft)	54	~180	0
Queue Length 95th (ft)	m0	#369	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2743	253	3574
Starvation Cap Reductn	0	28	0
Spillback Cap Reductn	46	0	598
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.76	1.13	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1520	410	240	1180	0	0
Future Volume (vph)	1520	410	240	1180	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3441		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3441		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1617	436	255	1255	0	0
RTOR Reduction (vph)	20	0	0	0	0	0
Lane Group Flow (vph)	2033	0	255	1255	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	94.8		17.0	120.0		
Effective Green, g (s)	94.8		17.0	111.5		
Actuated g/C Ratio	0.79		0.14	0.93		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2718		253	3320		
v/s Ratio Prot	c0.59		c0.14	0.35		
v/s Ratio Perm						
v/c Ratio	0.75		1.01	0.38		
Uniform Delay, d1	6.5		51.5	0.5		
Progression Factor	0.31		0.90	1.00		
Incremental Delay, d2	0.1		51.6	0.1		
Delay (s)	2.1		97.9	0.5		
Level of Service	A		F	A		
Approach Delay (s)	2.1			17.0	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Appendix C: Freeway Segment LOS Calculation Sheets

Existing

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2851	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1714
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.1
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2510	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1492
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.5
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2851	114
Peak Hour Factor (PHF)	0.94	0.91
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3427	129
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.76	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.463
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3427	Ramp Junction Speed (S), mi/h	57.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	29.6
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	32.3

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2510	193
Peak Hour Factor (PHF)	0.95	0.90
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	2985	223
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.66	0.12

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.471
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2985	Ramp Junction Speed (S), mi/h	57.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	25.9
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.5

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2737	337
Peak Hour Factor (PHF)	0.94	0.88
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3290	394
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.82	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.434
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3290	Ramp Junction Speed (S), mi/h	58.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3684	Average Density (D), pc/mi/ln	31.3
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.1

HCS7 Freeway Merge Report

Project Information			
Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	2317	172
Peak Hour Factor (PHF)	0.95	0.91
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	2756	196
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.65	0.10

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.353
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	61.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2756	Ramp Junction Speed (S), mi/h	61.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2952	Average Density (D), pc/mi/ln	24.1
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	24.5

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3074	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1848
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.82
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	60.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	30.5
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2489	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1480
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.2
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2172	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.84	Flow Rate (V_p), pc/h/ln	1461
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.9
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3317	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.91	Flow Rate (V_p), pc/h/ln	2060
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.92
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	37.3
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2172	157
Peak Hour Factor (PHF)	0.84	0.73
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	2922	239
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.65	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.473
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	2922	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	25.4
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3317	347
Peak Hour Factor (PHF)	0.91	0.91
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4119	385
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.91	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.486
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	4119	Ramp Junction Speed (S), mi/h	57.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	36.0
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	38.1

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2015	200
Peak Hour Factor (PHF)	0.84	0.75
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.885	0.901
Flow Rate (vi),pc/h	2711	296
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.67	0.16

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.357
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	71.6
Flow in Lanes 1 and 2 (v12), pc/h	2711	Ramp Junction Speed (S), mi/h	61.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	3007	Average Density (D), pc/mi/ln	24.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.8

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2970	216
Peak Hour Factor (PHF)	0.91	0.64
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	3688	341
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.89	0.18

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.497
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	56.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3688	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4029	Average Density (D), pc/mi/ln	35.4
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	32.7

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX AM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2215	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.84	Flow Rate (V_p), pc/h/ln	1490
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.4
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX PM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3186	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.91	Flow Rate (V_p), pc/h/ln	1978
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	57.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	34.4
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

Existing Plus Project

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2956	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1776
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.6
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2723	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1620
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.0
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2956	219
Peak Hour Factor (PHF)	0.94	0.91
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3553	248
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.79	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.474
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3553	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	33.4

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2723	406
Peak Hour Factor (PHF)	0.95	0.90
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	3239	469
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.72	0.25

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.494
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3239	Ramp Junction Speed (S), mi/h	57.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	28.4
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.7

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2737	506
Peak Hour Factor (PHF)	0.94	0.88
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3290	592
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.86	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.468
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3290	Ramp Junction Speed (S), mi/h	57.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3882	Average Density (D), pc/mi/ln	33.6
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	31.5

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2317	302
Peak Hour Factor (PHF)	0.95	0.91
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	2756	345
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.69	0.18

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.365
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2756	Ramp Junction Speed (S), mi/h	60.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3101	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.6

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3243	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1949
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.87
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	33.5
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2619	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1558
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.70
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.8
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2273	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.84	Flow Rate (V_p), pc/h/ln	1529
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.2
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3499	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.91	Flow Rate (V_p), pc/h/ln	2172
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.97
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	52.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	41.8
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2273	258
Peak Hour Factor (PHF)	0.84	0.73
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	3058	392
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.68	0.21

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.487
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3058	Ramp Junction Speed (S), mi/h	57.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	26.7
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.0

HCS7 Freeway Diverge Report

Project Information			
Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors		
Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	3499	529
Peak Hour Factor (PHF)	0.91	0.91
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4345	587
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.96	0.31

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.504
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	4345	Ramp Junction Speed (S), mi/h	56.7
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	38.3
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	40.1

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2015	396
Peak Hour Factor (PHF)	0.84	0.75
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	2711	586
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.73	0.31

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.383
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2711	Ramp Junction Speed (S), mi/h	60.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3297	Average Density (D), pc/mi/ln	27.3
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	26.9

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2970	362
Peak Hour Factor (PHF)	0.91	0.64
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.885	0.990
Flow Rate (vi),pc/h	3688	571
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.94	0.30

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.554
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.2
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	71.6
Flow in Lanes 1 and 2 (v12), pc/h	3688	Ramp Junction Speed (S), mi/h	55.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	4259	Average Density (D), pc/mi/ln	38.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	34.4

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	EX+P AM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2411	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.84	Flow Rate (V_p), pc/h/ln	1622
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.1
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	EX+P PM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3332	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.91	Flow Rate (V_p), pc/h/ln	2068
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.92
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	37.5
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

Cumulative

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3180	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1912
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	32.4
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2974	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1768
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.4
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3180	210
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3823	235
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.85	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.473
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3823	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	33.2
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	35.7

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3180	210
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3823	235
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.85	0.13

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.473
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.6
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3823	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	33.2
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	35.7

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2974	250
Peak Hour Factor (PHF)	0.95	0.92
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	3537	282
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.78	0.15

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.477
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3537	Ramp Junction Speed (S), mi/h	57.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	33.2

HCS7 Freeway Merge Report

Project Information			
Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	2970	360
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3570	403
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.88	0.21

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.486
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	57.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3570	Ramp Junction Speed (S), mi/h	57.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3973	Average Density (D), pc/mi/ln	34.7
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	32.3

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2724	260
Peak Hour Factor (PHF)	0.95	0.92
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	3240	294
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.78	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.412
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	59.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3240	Ramp Junction Speed (S), mi/h	59.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3534	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.0

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3330	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2002
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.89
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	56.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	35.2
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2984	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1774
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	28.6
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2531	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1521
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	66.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.0
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3904	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2346
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.05
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2531	250
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	3042	302
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.67	0.16

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.479
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.4
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3042	Ramp Junction Speed (S), mi/h	57.4
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	26.5
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	28.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3904	390
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4693	428
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	1.04	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	4693	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (D_R), pc/mi/ln	43.1

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2281	270
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	2742	326
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.68	0.17

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.362
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2742	Ramp Junction Speed (S), mi/h	60.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3068	Average Density (D), pc/mi/ln	25.2
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.3

HCS7 Freeway Merge Report

Project Information			
Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	3514	280
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4224	307
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	1.01	0.16

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	52.7
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	4224	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4531	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (D_R), pc/mi/ln	36.7

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM AM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2551	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1533
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.3
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM PM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3794	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2280
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.02
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

Cumulative Plus Project

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3285	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1974
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	57.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	34.3
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Mainline south of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3187	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1896
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	31.9
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3285	315
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3949	353
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.88	0.19

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.483
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3949	Ramp Junction Speed (S), mi/h	57.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	34.5
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	36.8

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Off Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	160
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3187	463
Peak Hour Factor (PHF)	0.95	0.92
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	3791	523
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.84	0.28

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.498
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	56.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3791	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	33.3
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	35.4

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2970	529
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.971
Flow Rate (v_i),pc/h	3570	592
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.92	0.32

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.529
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	55.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3570	Ramp Junction Speed (S), mi/h	55.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4162	Average Density (D), pc/mi/ln	37.2
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	33.7

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 On Ramp at Willow Road - NB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	640
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2724	390
Peak Hour Factor (PHF)	0.95	0.92
Total Trucks, %	13.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.962
Flow Rate (v_i),pc/h	3240	441
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.82	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.433
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	58.8
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	3240	Ramp Junction Speed (S), mi/h	58.8
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3681	Average Density (D), pc/mi/ln	31.3
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	30.0

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3499	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2103
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.94
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	54.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	38.9
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Mainline north of Willow Road - NB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3114	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.95	Flow Rate (V_p), pc/h/ln	1852
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.83
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	60.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	30.6
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2632	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1582
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	65.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	24.2
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Mainline north of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4086	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2456
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.10
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2632	351
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	3164	423
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.70	0.23

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.489
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	57.1
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	78.5
Flow in Lanes 1 and 2 (v_{12}), pc/h	3164	Ramp Junction Speed (S), mi/h	57.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	27.7
Level of Service (LOS)	D	Density in Ramp Influence Area (D_R), pc/mi/ln	29.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Off Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Deceleration Length (L_A),ft	1500	170
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	4086	572
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4912	628
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	1.09	0.33

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	4912	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (D_R), pc/mi/ln	-

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	2281	466
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.901
Flow Rate (v_i),pc/h	2742	562
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	0.73	0.30

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.384
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	60.2
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	71.6
Flow in Lanes 1 and 2 (v_{12}), pc/h	2742	Ramp Junction Speed (S), mi/h	60.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	3304	Average Density (D), pc/mi/ln	27.4
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	27.0

HCS7 Freeway Merge Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 On Ramp at Willow Road - SB	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	75.4	35.0
Segment Length (L) / Acceleration Length (L_A),ft	1500	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Balanced Mix	Balanced Mix
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.950	0.950
Final Capacity Adjustment Factor (CAF)	0.939	0.939
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	3514	426
Peak Hour Factor (PHF)	0.94	0.92
Total Trucks, %	13.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.885	0.990
Flow Rate (v_i),pc/h	4224	468
Capacity (c), pc/h	4507	1878
Volume-to-Capacity Ratio (v/c)	1.04	0.25

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	626.7	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	-
Downstream Equilibrium Distance (L_{EQ}), ft	0.0	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	-
Flow in Lanes 1 and 2 (v_{12}), pc/h	4224	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4692	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (D_R), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	AM
Project Description	CM+P AM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2747	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1651
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.74
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	64.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.7
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

HCS7 Basic Freeway Report

Project Information

Analyst	CCTC	Date	
Agency		Analysis Year	
Jurisdiction		Time Period Analyzed	PM
Project Description	CM+P PM US 101 Mainline south of Willow Road - SB	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	72.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Balanced Mix	Final Speed Adjustment Factor (SAF)	0.950
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.939
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3940	Heavy Vehicle Adjustment Factor (f_{HV})	0.885
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2368
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2386
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2240
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.06
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	3.2	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	68.6		

Appendix D: Traffic Signal Warrants

Central Coast Transportation Consulting
Traffic Engineering & Transportation Planning

Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Cumulative (#3)

Intersection Information			
Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	Hetrick Ave
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	2170 vehicles	Total Approach Volume	380 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	67 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

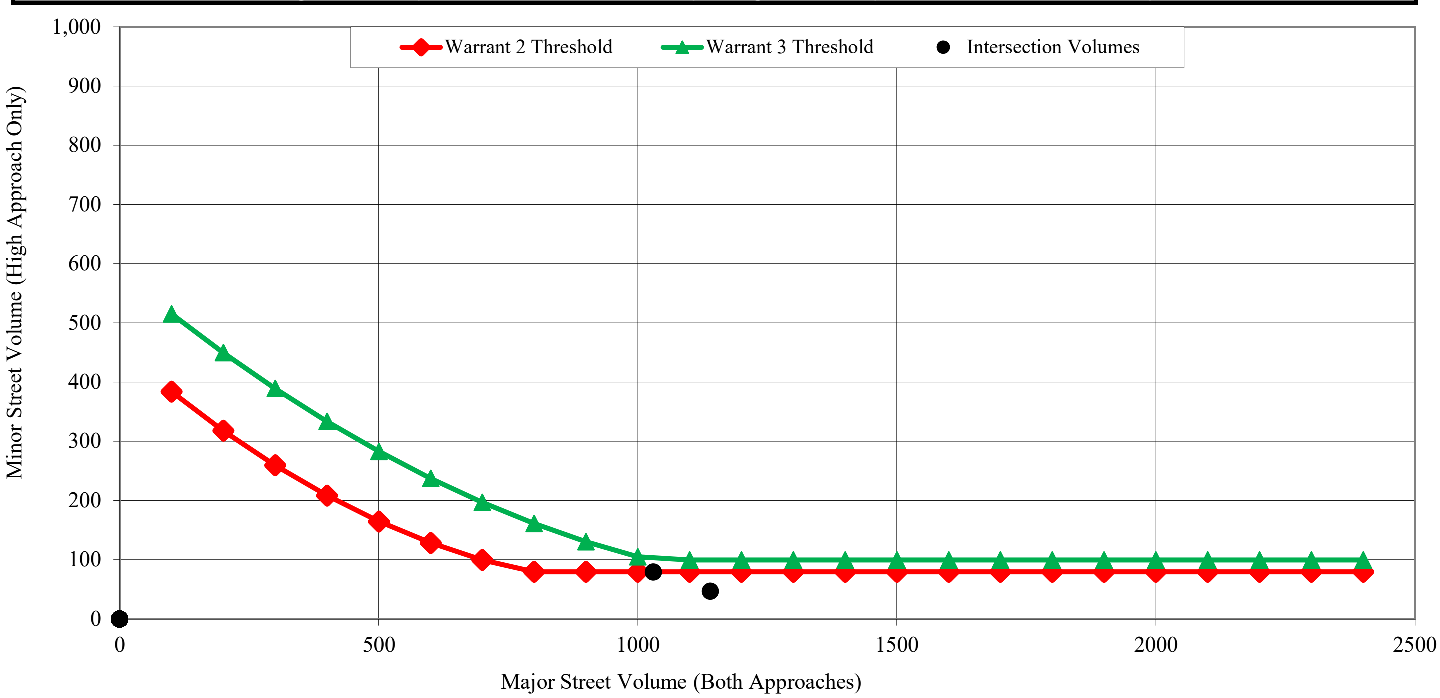
Warrant 1, Eight Hour Vehicular Volume	Condition A	Condition B	Condition A+B*
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	0 hours	1 hour	0 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	Not Satisfied
Required values reached for	0 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume	Condition A	Condition B
Condition Satisfied?	Not Satisfied	Not Satisfied
Required values reached for	1290 total, 200 minor, 1 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Cumulative Plus Project (#3)

Intersection Information			
Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	Hetrick Ave
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	2293 vehicles	Total Approach Volume	335 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	67 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

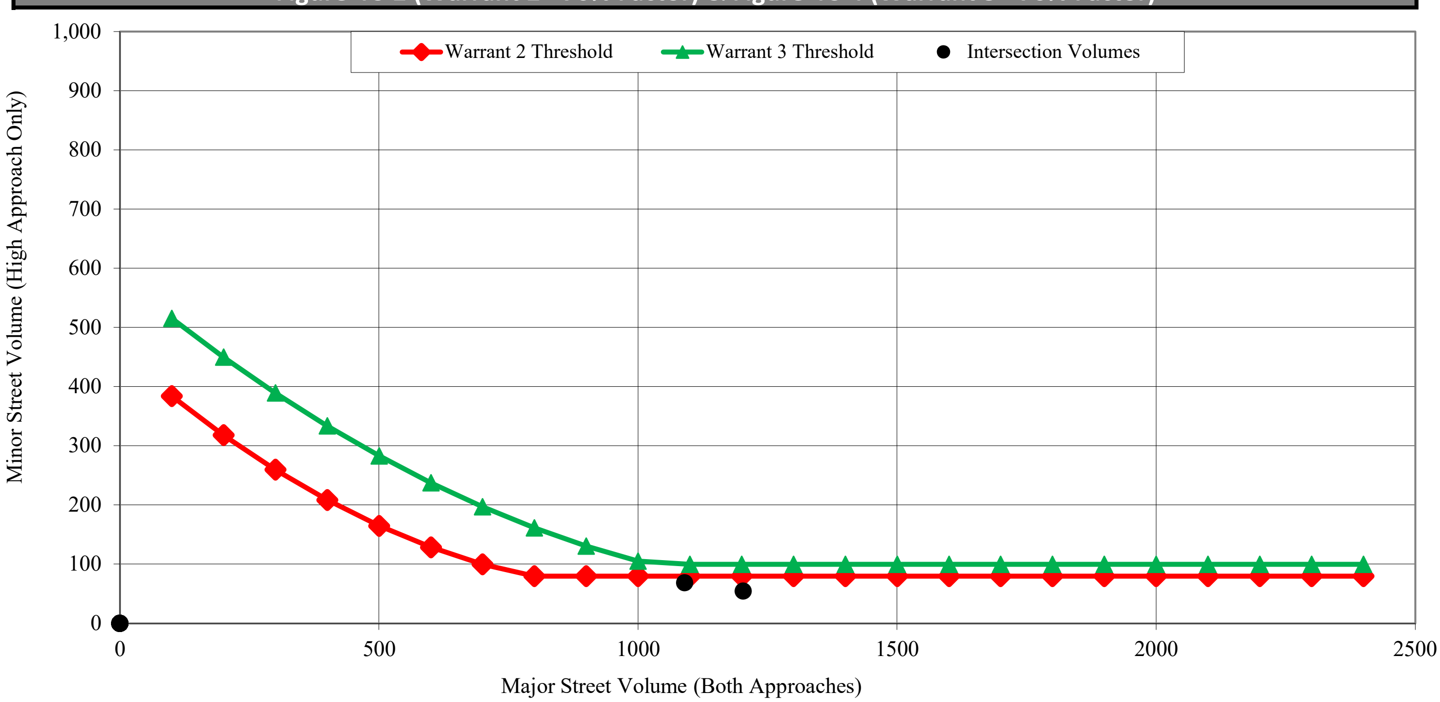
Warrant 1, Eight Hour Vehicular Volume	Condition A	Condition B	Condition A+B*
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	0 hours	0 hours	0 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	Not Satisfied
Required values reached for	0 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume	Condition A	Condition B
Condition Satisfied?	Not Satisfied	Not Satisfied
Required values reached for	1321 total, 167 minor, 1.8 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Existing Plus Project (#5)

Intersection Information			
Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	N Frontage Rd
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	2966 vehicles	Total Approach Volume	612 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	100 percent applied	Right turn reduction of	67 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

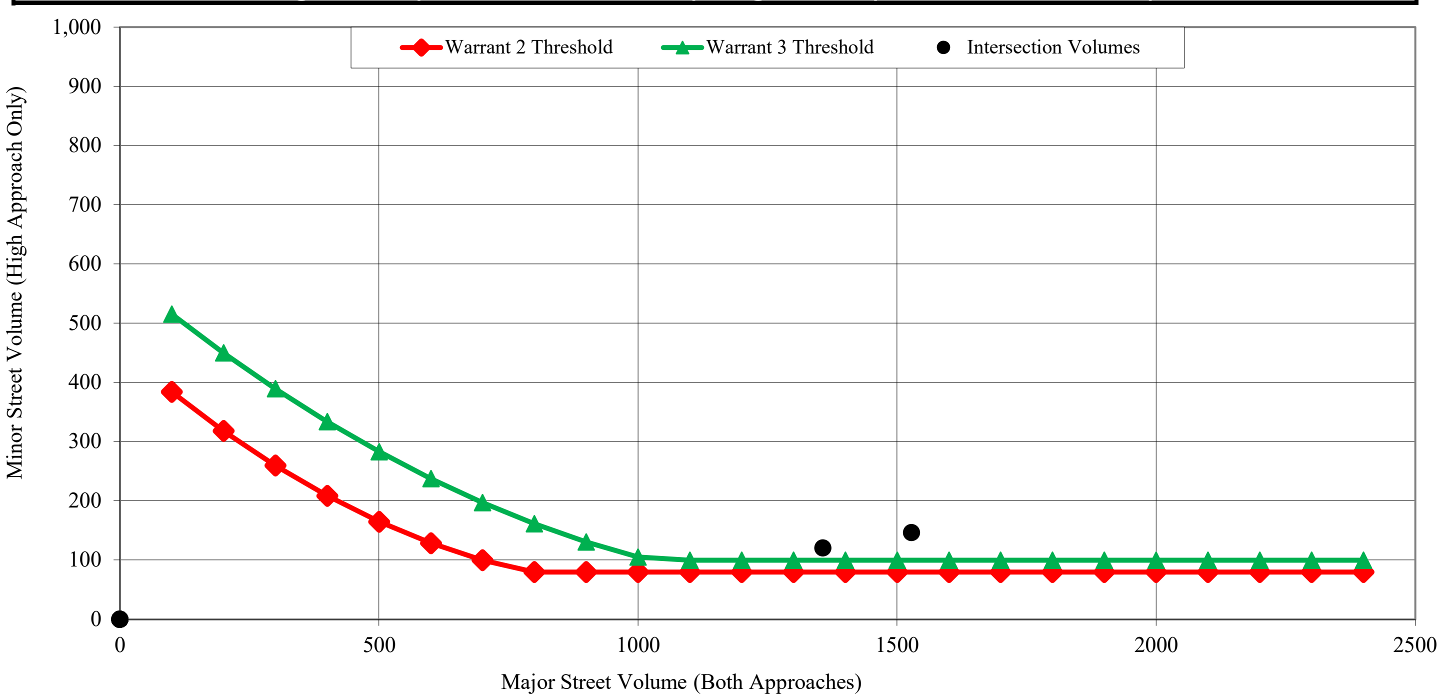
Warrant 1, Eight Hour Vehicular Volume			
	Condition A	**Condition B**	**Condition A+B***
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	1 hour	2 hours	2 (Cond. A) & 2 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	Not Satisfied
Required values reached for	2 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume		
	Condition A	**Condition B**
Condition Satisfied?	Not Satisfied	Satisfied
Required values reached for	1901 total, 308 minor, 0 delay	2 hours
Criteria - Total Approach Volume (veh in one hour)	650	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Existing Plus Project (#6)

Intersection Information

Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	US 101 SB Ramps
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	2720 vehicles	Total Approach Volume	787 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	100 percent applied	Right turn reduction of	0 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

Warrant 1, Eight Hour Vehicular Volume

	Condition A	Condition B	Condition A+B*
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	2 hours	2 hours	2 (Cond. A) & 2 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

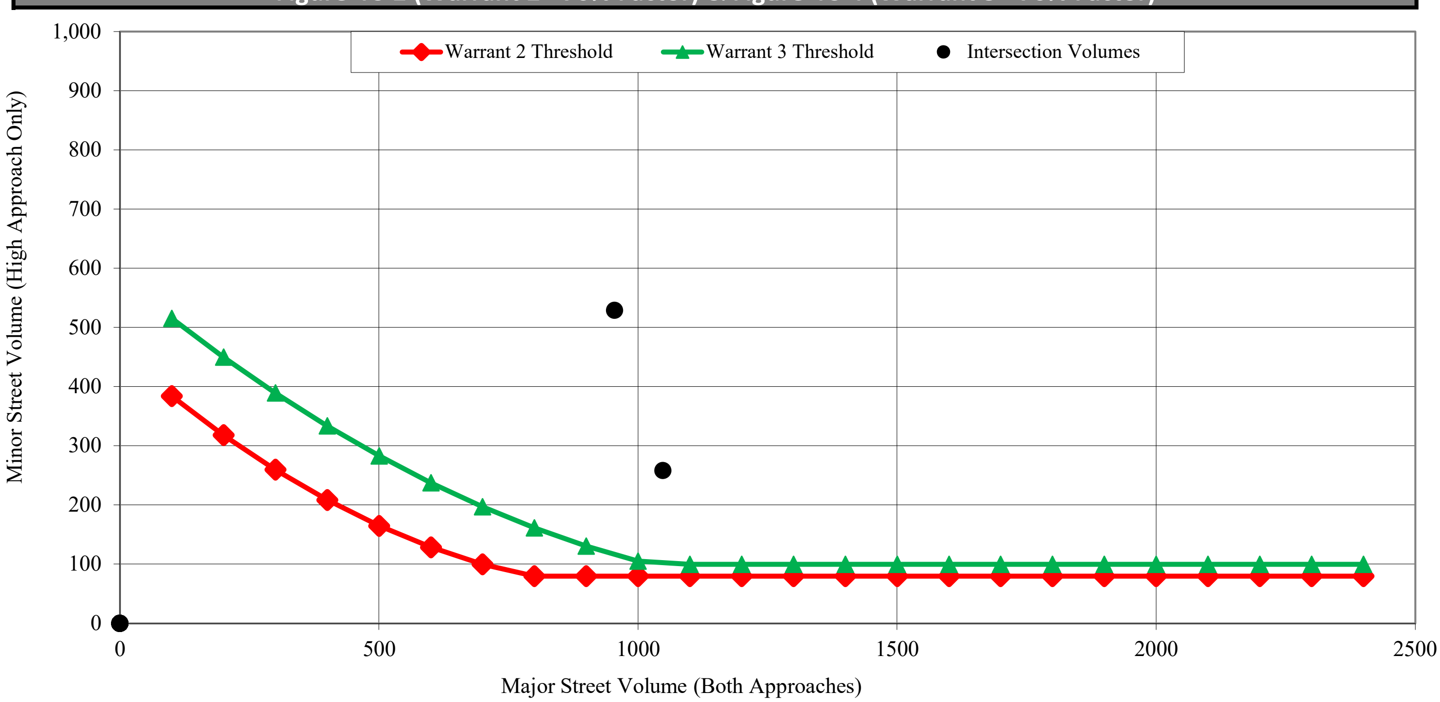
Warrant 2, Four Hour Vehicular Volume

Condition Satisfied?	Not Satisfied
Required values reached for	2 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume

	Condition A	Condition B
Condition Satisfied?	Satisfied	Satisfied
Required values reached for	1828 total, 529 minor, 7.5 delay	2 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Existing (#7)

Intersection Information			
Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	US 101 NB Ramps
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	984 vehicles	Total Approach Volume	307 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	100 percent applied	Right turn reduction of	0 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

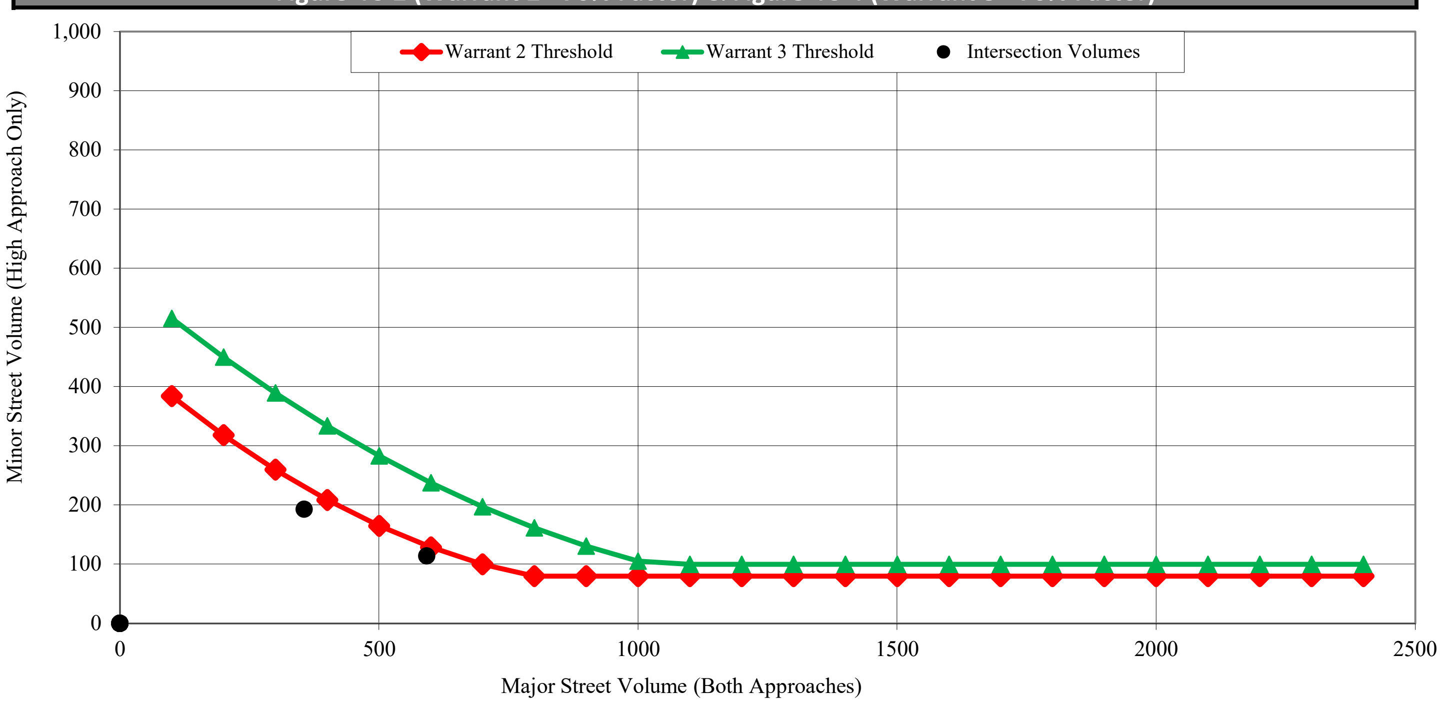
Warrant 1, Eight Hour Vehicular Volume	Condition A	Condition B	Condition A+B*
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	1 hour	1 hour	2 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	Not Satisfied
Required values reached for	0 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume	Condition A	Condition B
Condition Satisfied?	Not Satisfied	Not Satisfied
Required values reached for	728 total, 114 minor, 5.7 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Central Coast Transportation Consulting
Traffic Engineering & Transportation Planning

Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Dana Reserve
Project/File #	2018_83
Scenario	Existing Plus Project (#7)

Intersection Information			
Major Street (E/W Road)	Willow Rd	Minor Street (N/S Road)	US 101 NB Ramps
Analyzed with	1 approach lane	Analyzed with	2 or more approach lanes
Total Approach Volume	1536 vehicles	Total Approach Volume	625 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	100 percent applied	Right turn reduction of	0 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

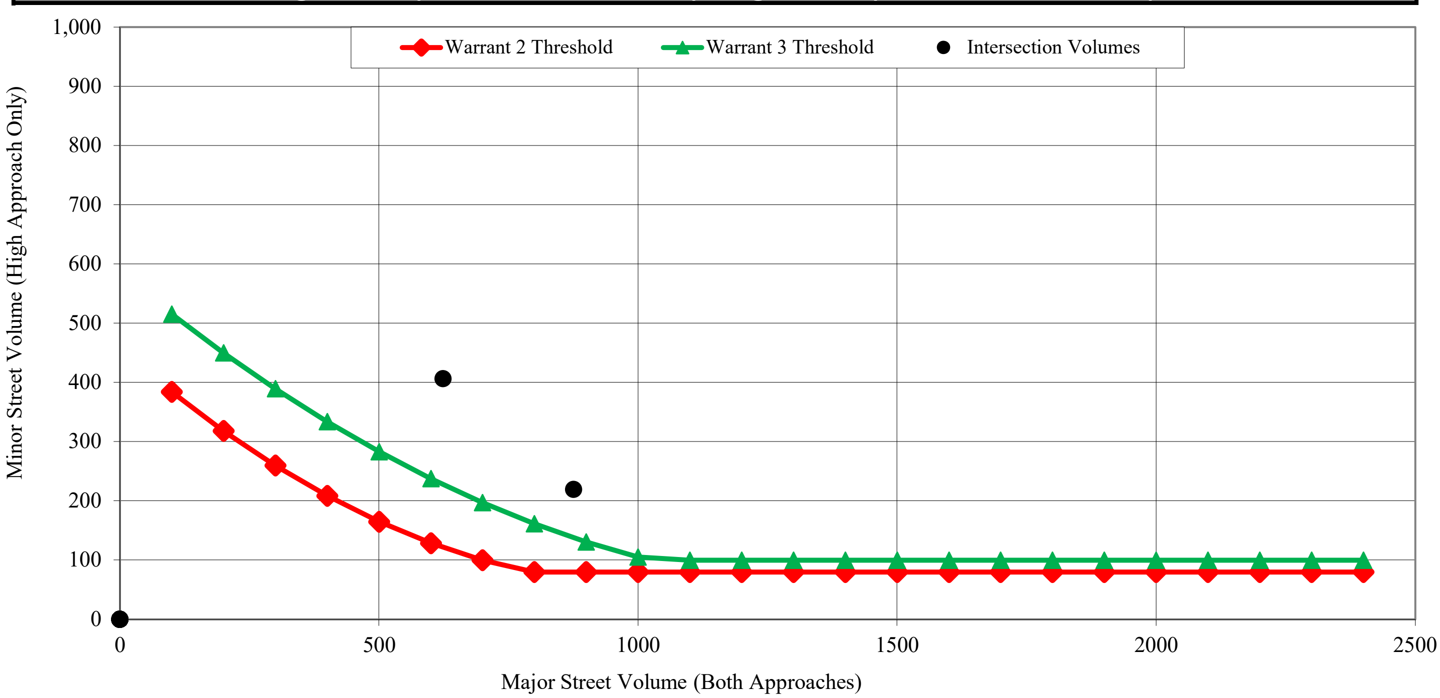
Warrant 1, Eight Hour Vehicular Volume			
	Condition A	**Condition B**	**Condition A+B***
Condition Satisfied?	Not Satisfied	Not Satisfied	Not Satisfied
Required values reached for	2 hours	2 hours	2 (Cond. A) & 2 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	140	70	112 (Cond. A) & 56 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	Not Satisfied
Required values reached for	2 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume		
	Condition A	**Condition B**
Condition Satisfied?	Satisfied	Satisfied
Required values reached for	1117 total, 219 minor, 224.8 delay	2 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	150	
Criteria - Minor Street High Side Delay (veh-hrs)	5	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Appendix E: SLO County SB743 Sketch VMT Tool Results

San Luis Obispo County SB743 Sketch VMT Tool 6/10/2021

Residential Only Land Use Projects

Residential Only uses appropriate for this category include any type of dwelling unit such as single or multifamily housing.
The analysis computes the VMT per capita and compares against the County thresholds

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SLOCOG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN
Geographic Screening: Not eligible for geographic screening for this location

Residential Project Inputs

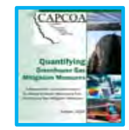
Housing Units <--- Choose type of Trip Generation input (Daily Trips or Housing Units)
1,443 <--- Enter Number of Housing Units

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies <--- Choose type of Mitigation
9.7% <-- Mitigation Percent
<--- Slider for Mitigation Reduction

Click for CAPCOA Reference



Notes:

1) Trip generation uses housing units
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 9.7%

Results

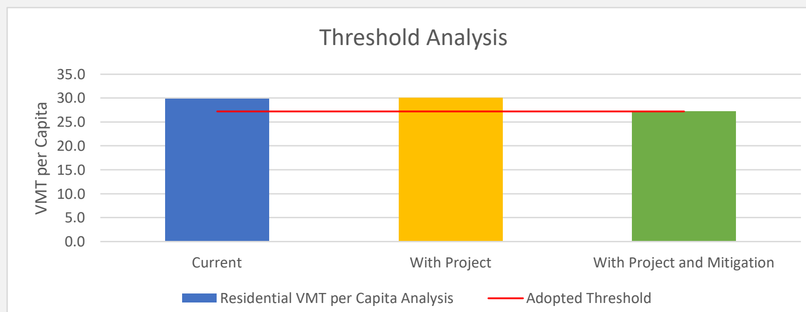
Not eligible for geographic screening for this location

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	1,443	3,766
New Total	9,648	23,656

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	30.1	27.2
With Project and Mitigation	27.19	27.2



Final Result:

Project Meets Threshold With Mitigation

San Luis Obispo County SB743 Sketch VMT Tool

6/10/2021

Mixed Use Land Use Projects

Mixed Use involves projects that have multiple uses, the VMT produced by each of the other uses is reported separately but adjusted for internal capture and other trip reducing characteristics of the project site.

This analysis will be computed on the basis of Net VMT for the County of San Luis Obispo

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SBCAG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN

Project Inputs

Retail Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
7,453	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

Non-Retail Employment Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
608	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

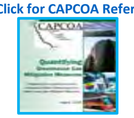
Residential Inputs	Trip Generation Input
Housing Units	<--- Choose input type (Housing Units, Daily Trips)
1,443	<--- Enter Number of Housing Units
14%	<---Pct. Of Trips Internal Capture

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies	<--- Choose type of Mitigation
25.0%	<-- Mitigation Percent
	<--- Slider for Mitigation Reduction

Click for CAPCOA Reference



Notes:

1) Retail trip generation takes user input in units of Daily Trips. Non-retail trip generation takes user input in units of Daily TripsResidential trip generation takes user input in units of Housing Units.
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 25%

Results

Overall VMT Impact		
San Luis Obispo County	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project	9,839,599	11.21
Net VMT	**26,861**	**(0)**
San Luis Obispo County with Mitigation	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project & Mitigation	9,821,550	11.19
Net VMT after Mitigation	**8,812**	**(0)**
County Pct. Change	**VMT**	**Avg. Trip Length**
Project	0.27%	-0.46%
Project with Mitigation	0.09%	-0.64%

Work Commute Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Employment
Current	791
Added	613
New Total	1,404

Commute VMT per Employee Analysis

VMT District: SOUTH COUNTY FEE_URBA	VMT per Employee	Adopted Threshold
Current	27.0	25.7
With Project	26.9	25.7
With Project and Mitigation	20.2	25.7

Residential Trip Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	1,443	3,512
New Total	9,648	23,402

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	30.0	27.2
With Project and Mitigation	22.5	27.2

Summary

1) Overall VMT Analysis: Does not meet Net VMT Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

2) Work Commute Component:

3) Residential Trip Component: Project Meets VMT per Capita Threshold with mitigation strategy

San Luis Obispo County SB743 Sketch VMT Tool

6/10/2021

Mixed Use Land Use Projects

Mixed Use involves projects that have multiple uses, the VMT produced by each of the other uses is reported separately but adjusted for internal capture and other trip reducing characteristics of the project site.

This analysis will be computed on the basis of Net VMT for the County of San Luis Obispo

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SBCAG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN

Project Inputs

Retail Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
7,453	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

Non-Retail Employment Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
608	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

Residential Inputs	Trip Generation Input
Housing Units	<--- Choose input type (Housing Units, Daily Trips)
1,443	<--- Enter Number of Housing Units
14%	<---Pct. Of Trips Internal Capture

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies <--- Choose type of Mitigation
4.8% <-- Mitigation Percent
<--- Slider for Mitigation Reduction

Click for CAPCOA Reference

Notes:

1) Retail trip generation takes user input in units of Daily Trips. Non-retail trip generation takes user input in units of Daily TripsResidential trip generation takes user input in units of Housing Units.
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 4.8%

Results

Overall VMT Impact

San Luis Obispo County	VMT	Miles per Vehicle Trip
Current VMT	9,812,738	11.26
New VMT with Project	9,839,599	11.21
Net VMT	**26,861**	**(0)**
San Luis Obispo County with Mitigation	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project & Mitigation	9,836,133	11.21
Net VMT after Mitigation	**23,396**	**(0)**
County Pct. Change	**VMT**	**Avg. Trip Length**
Project	0.27%	-0.46%
Project with Mitigation	0.24%	-0.49%

Work Commute Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Employment
Current	791
Added	613
New Total	1,404

Commute VMT per Employee Analysis

VMT District: SOUTH COUNTY FEE_URBA	VMT per Employee	Adopted Threshold
Current	27.0	25.7
With Project	26.9	25.7
With Project and Mitigation	25.6	25.7

Residential Trip Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	1,443	3,512
New Total	9,648	23,402

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	30.0	27.2
With Project and Mitigation	28.6	27.2

Summary

1) Overall VMT Analysis: Does not meet Net VMT Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

2) Work Commute Component:

3) Residential Trip Component: Does not meet VMT per Capita Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

San Luis Obispo County SB743 Sketch VMT Tool 6/10/2021

Mixed Use Land Use Projects

Mixed Use involves projects that have multiple uses, the VMT produced by each of the other uses is reported separately but adjusted for internal capture and other trip reducing characteristics of the project site.
This analysis will be computed on the basis of Net VMT for the County of San Luis Obispo

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SBCAG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN

Project Inputs

Retail Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
7,453	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

Non-Retail Employment Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
608	<--- Enter Number of Daily Trips
14%	<---Pct. Of Trips Internal Capture

Residential Inputs	Trip Generation Input
Housing Units	<--- Choose input type (Housing Units, Daily Trips)
1,443	<--- Enter Number of Housing Units
14%	<---Pct. Of Trips Internal Capture

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies	<--- Choose type of Mitigation
9.5%	<-- Mitigation Percent
	<--- Slider for Mitigation Reduction

Click for CAPCOA Reference

Notes:

1) Retail trip generation takes user input in units of Daily Trips. Non-retail trip generation takes user input in units of Daily TripsResidential trip generation takes user input in units of Housing Units.
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 9.5%

Results

Overall VMT Impact

San Luis Obispo County	VMT	Miles per Vehicle Trip
Current VMT	9,812,738	11.26
New VMT with Project	9,839,599	11.21
Net VMT	**26,861**	**(0)**
San Luis Obispo County with Mitigation	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project & Mitigation	9,832,740	11.20
Net VMT after Mitigation	**20,002**	**(0)**
County Pct. Change	**VMT**	**Avg. Trip Length**
Project	0.27%	-0.46%
Project with Mitigation	0.20%	-0.53%

Work Commute Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Employment
Current	791
Added	613
New Total	1,404

Commute VMT per Employee Analysis

VMT District: SOUTH COUNTY FEE_URBA	VMT per Employee	Adopted Threshold
Current	27.0	25.7
With Project	26.9	25.7
With Project and Mitigation	24.4	25.7

Residential Trip Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	1,443	3,512
New Total	9,648	23,402

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	30.0	27.2
With Project and Mitigation	27.2	27.2

Summary

1) Overall VMT Analysis: Does not meet Net VMT Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

2) Work Commute Component:

3) Residential Trip Component: Project Meets VMT per Capita Threshold with mitigation strategy

San Luis Obispo County SB743 Sketch VMT Tool

6/10/2021

Mixed Use Land Use Projects

Mixed Use involves projects that have multiple uses, the VMT produced by each of the other uses is reported separately but adjusted for internal capture and other trip reducing characteristics of the project site.

This analysis will be computed on the basis of Net VMT for the County of San Luis Obispo

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SBCAG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN

Project Inputs

Retail Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
7,453	<--- Enter Number of Daily Trips
3%	<---Pct. Of Trips Internal Capture

Non-Retail Employment Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
608	<--- Enter Number of Daily Trips
3%	<---Pct. Of Trips Internal Capture

Residential Inputs	Trip Generation Input
Daily Trips	<--- Choose input type (Housing Units, Daily Trips)
	<--- Enter Number of Housing Units
	<--- Enter Daily Trips
	<---Pct. Of Trips Internal Capture

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies	<--- Choose type of Mitigation
25.0%	<-- Mitigation Percent
	<--- Slider for Mitigation Reduction

Click for CAPCOA Reference

Notes:

1) Retail trip generation takes user input in units of Daily Trips. Non-retail trip generation takes user input in units of Daily TripsResidential trip generation takes user input in units of Daily Trips.
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 25%

Results

Overall VMT Impact

San Luis Obispo County	VMT	Miles per Vehicle Trip
Current VMT	9,812,738	11.26
New VMT with Project	9,842,931	11.21
Net VMT	**30,194**	**(0)**
San Luis Obispo County with Mitigation	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project & Mitigation	9,822,574	11.18
Net VMT after Mitigation	**9,836**	**(0)**
County Pct. Change	**VMT**	**Avg. Trip Length**
Project	0.31%	-0.52%
Project with Mitigation	0.10%	-0.72%

Work Commute Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Employment
Current	791
Added	613
New Total	1,404

Commute VMT per Employee Analysis

VMT District: SOUTH COUNTY FEE_URBA	VMT per Employee	Adopted Threshold
Current	27.0	25.7
With Project	**26.9**	**25.7**
With Project and Mitigation	**20.2**	**25.7**

Residential Trip Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	-	-
New Total	8,205	19,890

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	**n/a**	**27.2**
With Project and Mitigation	**n/a**	**27.2**

Summary

1) Overall VMT Analysis: Does not meet Net VMT Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

2) Work Commute Component:

3) No Residential Component included

San Luis Obispo County SB743 Sketch VMT Tool 6/10/2021

Mixed Use Land Use Projects

Mixed Use involves projects that have multiple uses, the VMT produced by each of the other uses is reported separately but adjusted for internal capture and other trip reducing characteristics of the project site.

This analysis will be computed on the basis of Net VMT for the County of San Luis Obispo

Project Information

Project Name: Sample Project
Address: CHEROKEE ARROYO GRANDE 00000
APN: 91301073
SBCAG TAZ: 1141

VMT District: 51 SOUTH COUNTY FEE_URBAN

Project Inputs

Retail Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
7,453	<--- Enter Number of Daily Trips
3%	<---Pct. Of Trips Internal Capture

Non-Retail Employment Inputs	Trip Generation Input
Daily Trips	<--- Choose type of input (Jobs, Sq.Ft., Daily Trips)
608	<--- Enter Number of Daily Trips
3%	<---Pct. Of Trips Internal Capture

Residential Inputs	Trip Generation Input
Daily Trips	<--- Choose input type (Housing Units, Daily Trips)
	<--- Enter Number of Housing Units
	<--- Enter Daily Trips
	<---Pct. Of Trips Internal Capture

Mitigation:

If needed, Mitigation Analysis must be conducted separately, entered here, and approved by County of San Luis Obispo

Combination of Strategies <--- Choose type of Mitigation
4.8% <-- Mitigation Percent
<--- Slider for Mitigation Reduction

Click for CAPCOA Reference

Notes:

1) Retail trip generation takes user input in units of Daily Trips. Non-retail trip generation takes user input in units of Daily TripsResidential trip generation takes user input in units of Daily Trips.
2) Default parameters used for VMT analysis
3) Mitigation Type = Combination of Strategies; for a total reduction of 4.8%

Results

Overall VMT Impact

San Luis Obispo County	VMT	Miles per Vehicle Trip
Current VMT	9,812,738	11.26
New VMT with Project	9,842,931	11.21
Net VMT	**30,194**	**(0)**
San Luis Obispo County with Mitigation	**VMT**	**Miles per Vehicle Trip**
Current VMT	9,812,738	11.26
New VMT with Project & Mitigation	9,839,023	11.20
Net VMT after Mitigation	**26,285**	**(0)**

County Pct. Change	VMT	Avg. Trip Length
Project	0.31%	-0.52%
Project with Mitigation	0.27%	-0.56%

Work Commute Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Employment
Current	791
Added	613
New Total	1,404

Commute VMT per Employee Analysis

VMT District: SOUTH COUNTY FEE_URBA	VMT per Employee	Adopted Threshold
Current	27.0	25.7
With Project	26.9	25.7
With Project and Mitigation	25.7	25.7

Summary

1) Overall VMT Analysis: Does not meet Net VMT Threshold. Refer to CAPCOA mitigation guidance to determine an alternative mitigation strategy.

2) Work Commute Component:

3) No Residential Component included

Residential Trip Component

Growth Assuptions

VMT District: SOUTH COUNTY FEE_URBAN	Housing Units	Population
Current	8,205	19,890
Added	-	-
New Total	8,205	19,890

Residential VMT per Capita Analysis

VMT District: SOUTH COUNTY FEE_URBAN	VMT per Capita	Adopted Threshold
Current	29.8	27.2
With Project	n/a	27.2
With Project and Mitigation	n/a	27.2

Appendix F: Comments/Responses on drafts

Central Coast Transportation Consulting
Traffic Engineering & Transportation Planning

COMMENT/RESPONSE SUMMARY

Date: July 9, 2021

From: Joe Fernandez and Michelle Matson, CCTC

Project: Dana Reserve Nipomo Traffic Impact Study and VMT Analysis – GHD Comments

The following table summarizes the comments received from GHD in April 2021 regarding the Dana Reserve Nipomo Traffic Impact Study ('TIS', February 2020) and VMT Analysis (September 2020).

ID	GHD Comment	GHD Recommendation	Response/Action
1.1	Plan and Policy Analysis a) The study does include some statements about consistency with County plan and policy. However, there does appear to be various conflicts or inconsistencies between the proposed plan and currently adopted County plan & policy that should be further assessed. Some Examples Include: • The planned alignment of Hetrick Ave. conflicts with NBD 8 of the proposed plan. • The Hwy 101 frontage road is planned to connect between Willow & Sandydale Dr., however this extension stops about 650' short. This is also inconsistent with the plan's proposed class IV connection to Sandydale, given the roadway is not shown to connect. • The County's Bicycle Transportation Plan & Caltrans defines preferred and minimum facility dimensions. However, the plan uses minimum throughout without justification why the preferred widths are not used. • Depending on Forecasted Future ADT, County Development Standards define typical roadway sections. Whereas the study has limited analysis of internal roadways, which is necessary to determine if the plan's cross sections are consistent with County Development Standards or if the traffic conditions of those roadways warrant the proposed classifications. • The plan calls for Class IV cycle tracks, whereas exhibits depict buffered Class II lanes.	Include a comprehensive section on Plan & Policy consistency. Where inconsistencies are found… recommend modifications of either the project description or amendment of the adopted Plan/Policy.	• See revised alignment of Hetrick Ave as shown in TTM.. • Applicant not planning to proceed without connection, recommend project be conditioned to complete section of Frontage Road if not done by adjacent development. • CCTC has reviewed the latest roadway cross sections in the TTM for conformance with County plans and standards. Recommendations are included in the report. • Additional discussion has been added to the On Site Circulation section. • Note that the traffic study did and does not reference Class IV cycle tracks.
1.2	Emergency Access b) No assessment provided of Emergency Access	Expand scope of traffic study to include section for emergency access.	• Emergency Access section has been added to the report.
1.3	Traffic Safety c) No assessment provided of Traffic Study. One example is Potential sight distance and spacing issues with intersection #9 Collector B and Hetrick @ Pomeroy	Expand scope of traffic study to include section for traffic safety. Its recommended that the section review access management, sight distance, speeding potential & neighborhood traffic management, uncontrolled & midblock pedestrian crossings, etc…	• See revised alignment of Hetrick Avenue. Sight distance on Pomeroy Road was checked in the field during preparation of the traffic study. New roads would be required to meet County Standards. See responses in 1.1.
1.4	Intersection Queuing a) Synchro output exhibits show locations where traffic queues exceed turn pocket storage capacity, potentially occluding thru lanes.	Include an intersection queuing report for all scenarios, identify where queues exceed turn pocket capacities and recommend measures to address.	• Queues have been added to the traffic study.
1.5	Induced Travel b) No assessment of Induced Travel. New roadway connections are being proposed, however it's not likely the project would not have an impact. A more frequent comment from CalTrans on EIR's and Traffic Studies is the lack of an induced travel assessment.	Include a section that responds to induced travel analysis under SB 743 / OPR Guidance.	• Induced Travel section has been added to the traffic study.

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ID	GHD Comment	GHD Recommendation	Response/Action
1.6	Cherokee Place Cherokee Place is an undeveloped roadway traversing sections of the project site. However, this roadway is excluded from the analysis. Trip generation and distribution estimates appear to show volumes exiting and re-entering the project site via Willow Rd as well as internal capture assumptions indicate that project traffic may utilize this roadway.	Add/activate Cherokee place in traffic model and re-run traffic distribution.	• No project traffic was assumed on Cherokee Place. Portions of Cherokee are unpaved. Use of Cherokee Place versus the western project entrance from Willow Road would add approximately a quarter mile and use of Cherokee Place from Pomeroy Road would add almost a quarter mile. • See response in 3.2 for additional discussion of Cherokee Place. • The County's request for a maintenance agreement has been added to the traffic study.
2.1	Int #1 Willow Road & SR 1 b) Coded PM Peak Hour Volumes, Peak Hour Factor, & Truck Percentages don't match Collected Traffic Counts.	Update coded volumes, peak hour factor, & truck percentages.	• The PM peak hour analysis used the highest hour between 4-6 PM for trip generation and cumulative compatibility. Note that intersection would also operate at LOS B under Existing Conditions with and without the project using the earlier PM peak hour. Findings would not change. Appendices have been updated clarifying the peak hour used.
2.2	Int #2 Willow Road & Pomeroy Road a) Signal timing appears to be optimized In lieu of using actual signal timing. In many cases signal timing is constrained from synchro optimization.	Verify signal timing is consistent with current programming. If not Verify signal timing parameters are constrained to current programming. If so revising signal timing to current programming.	• Signal timing was received from Public Works and analysis updated.
2.3	Int #7 Willow Road & Hwy 101 NB Ramps a) Coded PM Peak Hour Volumes, Peak Hour Factor, & Truck Percentages don't match Collected Traffic Counts.	Update coded volumes, peak hour factor, & truck percentages. Or document justification for using alternative values.	• The PM peak hour analysis used the highest hour between 4-6 PM for trip generation and cumulative compatibility. Note that intersection would also operate at LOS C under Existing Conditions without the project and LOS F under Existing Plus Project Conditions using the earlier PM peak hour. Findings would not change. Appendices have been updated clarifying the peak hour used.
2.4	#8 Willow Road & Thompson Avenue a) Coded PM Peak Hour Volumes & Peak Hour Factor don't match Collected Traffic Counts.	Update coded volumes, peak hour factor, & truck percentages. Or document justification for using alternative values.	• The PM peak hour analysis used the highest hour between 4-6 PM for trip generation and cumulative compatibility. Note that intersection would also operate at LOS B under Existing Conditions with and without the project using the earlier PM peak hour. Findings would not change. Appendices have been updated clarifying the peak hour used.
2.5	Int #10 West Tefft St / Pomeroy Road a) Signal timing appears to just be optimized In lieu of using actual signal timing.	Verify signal timing is consistent with current programming. If not Verify signal timing parameters are constrained to current programming. If so revising signal timing to current programming.	• Signal timing was received from Public Works and analysis updated.
2.6	Int #11 West Tefft St / Mary Avenue a) Signal timing appears to be optimized In lieu of using actual signal timing. In many cases signal timing is constrained from synchro optimization.	Verify signal timing is consistent with current programming. If not Verify signal timing parameters are constrained to current programming. If so revising signal timing to current programming.	• Signal timing was received from Public Works and analysis updated.

ID	GHD Comment	GHD Recommendation	Response/Action
2.7	Int #12 West Tefft St / Hwy 101 SB Ramp a) SB On Ramp omitted from network under all scenarios. b) SB Off Ramp Construction awarded and pending construction. c) Signal timing appears to just be optimized Inlieu of using actual signal timing.	a) Code SB on ramp into Networks for all scenarios. b) Update Existing Network to reflect imminent SB Ramp improvements. c) Verify signal timing is consistent with current programming. If not Verify signal timing parameters are constrained to current programming. If so revising signal timing to current programming.	• Signal timing was received from Public Works and analysis updated including SB ramp. The updated Existing Conditions includes analysis with and without the ramp improvements. Existing Plus Project Conditions assumes the ramp improvements.
2.8	Int. #13 West Tefft St / Hwy 101 NB Ramp a) No storage length was coded for Eastbound left turn pocket in both AM & PM. b) Signal timing appears to just be optimized Inlieu of using actual signal timing.	Code EB Left Turn Lane Pocket Lengths. Verify signal timing is consistent with current programming. If not Verify signal timing parameters are constrained to current programming. If so revising signal timing to current programming.	• Signal timing was received from Public Works and analysis updated including storage length.
3.1	Project Trip Generation a) The proposed project description defines a large range of allowed uses within the Village Commercial & Flex/Commercial, many are high trip generating uses such as Restaurants & Bars, Drive-In & Drive-Thru services. The traffic impact study assumes ITE Landuse #820 "Shopping Center" for all commercial square feet. This isn't necessarily the wrong approach, however in our experience, this approach has under forecasted traffic in many circumstances due to allowed higher intensity uses being realized. b) The proposed project covers a relatively large geographic area, with uses as much as half a mile from each other "as the crow flies". However, the traffic impact study appears to apply internal capture based on the totality of all uses. This may be an over representation of internal capture. c) Pass-by reduction is applied following ITE, however the commercial areas are along a relatively isolated commercial collector. For this particular application of pass-by should be considered as diverted trips. d) Intersection #14 missing from figures	a) Revise trip generation estimates to also include higher generating retail landuse types. Add Consider development patterns of nearby developments for estimating proportions. b) Revise to include Intersection #14 c) Revise Internal Capture rate to exclude NBD 7,8, & 9. d) Revise Pass-By trips to Diverted Trips.	• a) LU 820 is common practice for future commercial development and includes a variety of land uses. The fitted curve equations were used, note that use of the average trip rates would reduce the AM and PM peak hour trips by approximately 49% and 28%, respectively. Use of the average trip rate plus one standard deviation would result in less AM peak hour trips and 11% more PM peak hours trip compared to the fitted curve equations. The Willow Rd/N Frontage Rd (#5), Willow Rd/US 101 SB Ramps (#6), and Willow Rd/US 101 NB Ramps (#7) intersections would still operate acceptably in the PM peak hour using the average trip rate plus one standard deviation. • b) Intersection #14 was only analyzed under Sunday Conditions and is shown on Figure 4 and 5. Analysis of the intersection on a weekday was not requested by the County during the scoping phase. Using volumes in the Circulation Study for Cumulative Conditions and adding project traffic would result in LOS B and findings would not change. • c & d) ITE internal capture data ranged in size to roughly 300 acre sites. This site is 288 acres within the applicable range. Pass-by trips were only applied on Willow Road at Willow Rd/North Frontage Rd (#5). Trips could be diverted from US 101. However, per ITE it is common for a traffic impact assessment of site development to treat diverted trips as additional trips, which is conservative. See response in 3.2.

ID	GHD Comment	GHD Recommendation	Response/Action
3.2	Project Trip Distribution & Assignment a) The traffic study indicates project trip distribution and assignment are derived using a select zone procedure in the SLOCOG Travel Demand Model. This is an appropriate methodology. However, assignment between Intersections 4, 5, and 9 appears to show traffic leaving the project site and then re-entering the site. This also indicates that the internal capture method may be resulting in an underestimation of project trip generation. b) Total trips entering and exiting the project is about 10% higher than what's indicated on the project trip generation table for AM & PM. This discrepancy maybe accounted for due to trips exiting and re-entering or exiting traffic utilizing new routes thru the project site… however this should be verified. c) In the PM assignments at Intersections 4,5,& 6 show an imbalance, a loss of approximately 23 trips between intersections #4 & #5 and a gain of approximately 22 trips between intersections 5 & 6. This imbalance is not present in the AM Peak. Also there does not appear to be enough landuse between intersections to account for the imbalance. d) Based on study trip distribution & assignment it's likely some project traffic will route via Cherokee Place, possibly necessitating improvements to the undeveloped road.	a) Revise Internal Capture rate to exclude NBD 7,8, & 9. b) Verify excess entering & exiting volumes. c) Check potential miscoding of volumes at intersections 4,5, & 6. d) Add or activate Cherokee Place in the SLOCOG model and rerun selection zone analysis to determine magnitude of trip distribution to that roadway. Expand scope of study to include Cherokee as necessary.	• a-c) Note that Figure 5 includes diverted volumes from the construction of the project roads as well as project traffic. There are diversions from the Tefft Street Interchange to the Willow Road Interchange via the North Frontage Extension and diversions from Hetrick-Glenhaven-Ten Oaks to the W and SW Project Driveways. NBD 7, 8, & 9 would use internal street to assess facilities and size of development is compatible with ITE. • b) Some of the trips using the SE driveway (N Frontage n/o Sandydale) are distributed to the area south of the project site and never pass through a study intersection. For project trips, none were meant to exit and re-enter. The diversions enter and then exit. See response to a). • c) There was an error in the pass-by calculations at Willow Rd/North Frontage Rd (#5) and the volume will be updated in the traffic study. Findings did not change. • d) Cherokee Place is currently active in the model and is not a centroid connector to the project TAZ. Cherokee Place is un paved and would not provide the faster or more direct route versus project roadways. Do not recommend trip generation be modified.
4	GHD analyzed CCTC's traffic impact study for existing + project conditions and associated Synchro files for traffic volume, geometry, and operational characteristics. Issues under Existing conditions carried over to Existing + Project analysis, however one issue was identified. a) The study identifies an existing + project level of service deficiency at the intersection of US 101 SB Ramps at Tefft Street. No, recommendations are provided because "acceptable operations will result from near term improvements." If the project occupies before the near-term improvements are completed there will be a temporary deficiency. Study should be updated to assume ramp improvements as an existing improvement as construction is imminent. b) The study identifies an existing + project level of service deficiency at the intersection of US 101 SB Ramps at Tefft Street. No, recommendations are provided because "acceptable operations will result from near term improvements." If the project occupies before the near-term improvements are completed there will be a temporary deficiency. Study should be updated to assume ramp improvements as an existing improvement as construction is imminent. c) The Study assumes dedicated right and left turn pockets at intersections #4 & #5, however these turn lanes do not appear to be included in the project description. These lanes would require widening which is not depicted on tract maps or the specific plan.	a) Review analysis to reflect ramp improvements. b) Address recommendations identified in sections 1 – 4 c) Update analysis to reflect project description, provide a conceptual willow road street plan that includes the widening at these intersections to accommodate turn pockets Right of way acquisition may be required to accommodate turn pockets.	• a & b) See response in 2.7 and other sections. • c) Conceptual Willow Road widening exhibits have been provided by RRM (January 2021). Traffic study is consistent with latest exhibits.
5	GHD analyzed the CCTC's traffic impact study for cumulative and cumulative + project conditions and associated Synchro files for traffic volume, geometry, and operational characteristics. Issues under Existing conditions carried over to both cumulative scenarios, however no additional issues were identified.	a) Address recommendations identified in sections 1 – 4 b) Add / Activate Cherokee Place in SLOCOG Cumulative Network	• a & b) See previous responses which will apply to Cumulative Conditions.

ID	GHD Comment	GHD Recommendation	Response/Action
6.1	SLOCOG Travel Demand Model a) Due to the regional travel demand model using employees in lieu of square footage for forecasting purposes, the proposed project's square footage needs to be converted to number of employees for forecasting VMT. The study does provide justification & data supporting an education to employment conversion. Justification or data should also be provided for conversion ratios of Commercial & Hotel Uses. b) A new VMT sketch planning tool has been developed for VMT analysis in SLO County.	a) Document source for employee conversion factors. b) Use SLO County VMT sketch planning tool for estimating project VMT.	• Revised VMT analysis used SLO County tool as directed.
6.2	Analysis Metrics a) CCTC uses a combined service population that comingles employees, population, & college. This is inconsistent with Current Draft County Guidelines that establishes measurement thresholds of significance by VMT per Capita, VMT per Employee, and Net Change in VMT. A new VMT sketch planning tool has been developed for VMT analysis in SLO County.	a) Use SLOCOG VMT sketch planning tool for estimating project VMT. Report VMT based on a per capita rate, per employee rate, and a net change.	• a) CCTC to revise VMT analysis using SLO County tool as requested in 6.1. Per sketch planning tool, only use SLOCOG model when project trips exceed 50,000.
6.3	Potential Mitigation a) Identified measures to reduce VMT are primarily programmatic which is highly prone to lapses in on-going implementation by future occupants or are outside the controls of the project occupants. Its recommended that project based VMT reductions be utilized. b) VMT measures should include quantifiable reductions.	a) For programmatic mitigation measures identify means and methods for ensuring sustained implementation of the measures for the life of the project by future occupants. b) Consider project based VMT mitigation measures. Connection to Sandydale Dr. may provide VMT reductions by providing more direct routes. Also planned but unconstructed bikeways throughout the county may have VMT offsetting potential. NCHRP 552 methodology can be used to quantify. c) Provide quantifiable reductions associated with each specific measure.	• a-c) Note that project would not proceed without Sandydale connection. VMT mitigation measure strategies are included in revised traffic study.

Dana Reserve
Transportation Impact Study Addendum

MEMORANDUM

Date: October 20, 2021

To: San Luis Obispo County
Nick Tompkins and Claire Simoulis, NKT Nipomo Properties, LLC

From: Michelle Matson and Joe Fernandez, CCTC

Subject: Dana Reserve – Transportation Impact Study Addendum

This memorandum evaluates the transportation impacts of increasing commercial trip levels for the Dana Reserve project. CCTC prepared a Transportation Impact Study (TIS) dated July 14th, 2021, which evaluates the project as currently proposed. The County has requested an addendum analyzing 15 percent more commercial service trips than were analyzed in the TIS as a sensitivity test.

In summary, the traffic analysis with the additional trip generation does not change the July 2021 TIS findings under Existing or Cumulative conditions. All previous recommendations would apply, and no new recommendations are triggered by the increased trips. Results are detailed below.

TRIP GENERATION

The Institute of Transportation Engineers (ITE) *Trip Generation Manual* 10th Edition was used to estimate project trip generation. **Table 1** summarizes the trip generation from the July 2021 TIS.

Table 1: Project Trip Generation (July 2021 TIS)

Weekday and Sunday Vehicle Trip Generation													
			Weekday	AM Peak Hour			PM Peak Hour			Sunday	Sunday MID[6]		
Land Use	Size	Unit	Daily	In	Out	Total	In	Out	Total	Daily	In	Out	Total
Single Family Residential[1]	833	DU	7,310	149	447	596	490	287	777	7,324	355	314	669
Multi Family Residential[2]	610	DU	4,571	61	205	266	186	109	295	3,831	205	204	409
Commercial Services[3]	113,000	SF	6,533	129	79	208	286	309	595	2,384	154	161	315
Education[4]	30,000	SF	608	48	14	62	28	28	56	36	3	3	6
Hotel[5]	110	Rooms	920	31	21	52	34	32	66	655	29	33	62
Gross Trips			19,942	418	766	1,184	1,024	765	1,789	14,230	746	715	1,461
Internal Trips[7]			*1,240*	*14*	*14*	*28*	*124*	*124*	*248*	*1,020*	*102*	*102*	*204*
Pass-by Trips[8]			*810*	*0*	*0*	*0*	*81*	*81*	*162*	*280*	*28*	*28*	*56*
Net New Trips			**17,892**	**404**	**752**	**1,156**	**819**	**560**	**1,379**	**12,930**	**616**	**585**	**1,201**

DU=Dwelling Unit; SF= Square Feet

1) ITE Land Use Code #210, Single-Family Detached Housing. Fitted curve equations used for weekday and Sunday.

2) ITE Land Use Code #220, Multifamily Housing (Low-Rise). Fitted curve equation used for weekday; Average rate used for Sunday.

3) ITE Land Use Code #820, Shopping Center. Fitted curve equation used for weekday; Average rate used for Sunday.

4) ITE Land Use Code #540, Junior/Community College. Average rates used for weekday and Sunday.

5) ITE Land Use Code #310, Hotel. Average rate used for weekday and Sunday.

6) Sunday, Peak Hour of Generator rates and equations used for midday.

7) Internal trips calculated using *TripGen 10* software. Sunday mid-day internal capture assumed same as weekday PM. PM and mid-day internal trips multiplied by factor of 5 to determine daily internal trips.

8) Pass-by rates from ITE *Trip Generation Handbook*, 3rd Edition. PM peak hour and Sunday Mid-day volumes both multiplied by a factor of 5 to determine weekday and Sunday daily pass-by trips, respectively. Saturday Mid-day pass-by rates used for Sunday Mid-day.

Source: ITE *Trip Generation Manual*, 10th Edition; CCTC, 2021.

Trips from the Commercial Services component of the project were estimated using the Shopping Center Land Use (#820 in ITE's *Trip Generation Manual*). ITE's description of this land use notes that: *"Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied included peripheral buildings, it can be assumed that some of the data show their effect."*

As a sensitivity test, trips from a nearby commercial center with outparcels were estimated using the specific land use codes for the outparcels (e.g. gas station, fast-food restaurant) instead of the shopping center land use. The resultant proportional trip increase of 15 percent was applied to the Dana Reserve's commercial services area to determine if additional impacts would result from this scenario.

Including the 15 percent additional gross commercial service trips the project would generate a total of 18,662 net new daily trips, 1,185 net new AM peak hour trips, 1,426 net new PM peak hour trips, 13,208 net new Sunday daily trips, and 1,232 net new Sunday midday peak hour trips. This is an increase of 770 weekday daily trips, 29 weekday AM trips, 47 weekday PM trips, 278 Sunday daily trips, and 31 Sunday peak hour trips when compared to the July 2021 TIS. Internal capture and pass-by percentages were assumed to be the same.

EXISTING PLUS PROJECT CONDITIONS

The intersection levels of service (LOS) under Existing and Existing Plus Project conditions are summarized in **Table 2** and the queues are summarized in **Table 3**.

Table 2: Existing and Existing Plus Project Levels of Service

Existing and Existing Plus Project Intersection Levels of Service								
		Existing (EX)		EX + Project		EX + Project (15% more CS trips)		
Intersection	Peak Hour	Delay[1]	LOS	Delay[1]	LOS	Delay[1]	LOS	Warrant Met?
1. Willow Rd/SR 1	AM	4.9 (12.4)	- (B)	5.1 (12.6)	- (B)	5.1 (12.6)	- (B)	-
	PM	4.4 (13.4)	- (B)	4.6 (14.1)	- (B)	4.6 (14.1)	- (B)	-
2. Willow Rd/Pomeroy Rd	AM	20.8	C	21.3	C	21.3	C	-
	PM	21.2	C	22.1	C	22.1	C	-
3. Willow Rd/Hetrick Ave	AM	4.2 (31.2)	- (D)	3.3 (33.0)	- (D)	3.3 (33.2)	- (D)	-
	PM	1.8 (17.7)	- (C)	1.4 (18.7)	- (C)	1.4 (18.8)	- (C)	-
4. Willow Rd/W Project Entry	AM	*Future Intersection*		4.5 (21.4)	- (C)	4.6 (21.7)	- (C)	-
	PM			3.4 (16.6)	- (C)	3.5 (17.0)	- (C)	-
5. Willow Rd/N Frontage Rd	AM	*Future Intersection*		24.8	C	25.4	C	-
	PM			15.4	B	16.3	B	-
6. Willow Rd/US 101 SB Ramps	AM	2.2 (12.8)	- (B)	3.6 (22.4)	- (C)	3.7 (23.0)	- (C)	Yes (B)
	PM	4.5 (12.7)	- (B)	**14.8 (50.9)**	**- (F)**	**15.9 (54.9)**	**- (F)**	Yes (C)
7. Willow Rd/US 101 NB Ramps	AM	**32.1 (181.0)**	**- (F)**	**>200 (>200)**	**- (F)**	**>200 (>200)**	**- (F)**	Yes (B)
	PM	8.6 (18.9)	- (C)	**199.1 (>200)**	**- (F)**	**>200 (>200)**	**- (F)**	Yes (C)
8. Willow Rd/Thompson Ave	AM	5.4 (15.3)	- (C)	8.0 (20.2)	- (C)	8.1 (20.3)	- (C)	-
	PM	3.6 (11.0)	- (B)	4.9 (12.0)	- (B)	4.9 (12.0)	- (B)	-
9. SW Project Entry/Pomeroy Rd	AM	*Future Intersection*		4.9 (15.2)	- (C)	4.9 (15.4)	- (C)	-
	PM			4.2 (17.2)	- (C)	4.3 (17.6)	- (C)	-
10. W Tefft St/Pomeroy Rd	AM	15.0	B	18.1	B	18.2	B	-
	PM	15.8	B	19.5	B	19.8	B	-
11. W Tefft St/Mary Ave[2]	AM	38.9/34.7	D/C	34.4	C	34.4	C	-
	PM	47.1/36.8	D/D	36.2	D	36.2	D	-
12. W Tefft St/US 101 SB Ramps/S Frontage Rd[2]	AM	**59.3**/26.3	**E**/C	31.3	C	31.5	C	-
	PM	**42.0**/22.0	**D**/C	23.0	C	23.1	C	-
13. W Tefft St/US 101 NB Ramps[2]	AM	23.5/19.5	C/B	20.5	C	20.6	C	-
	PM	**39.7**/19.1	**D**/B	19.3	B	19.3	B	-

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

2. Values on left represent 2018 Existing Conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements which are currently under construction. EX+P results assume construction is complete.

Note: Unacceptable operations shown in **bold** text.

Table 3: Existing and Existing Plus Project Queues

Existing and Existing Plus Project Intersection Queues						
Intersection	**Movement**	**Storage Length (ft)**	**Peak Hour**	**EX**	**EX + P**	**EX + P (+15% CS)**
				95th Percentile Queue (ft)[1]		
2. Pomeroy Rd/Willow Rd	NBR	25	AM	**35**	**35**	**35**
			PM	0	0	0
3. Hetrick Ave/Willow Rd.	NBR	25	AM	**55**	**40**	**40**
			PM	5	3	3
11. Tefft St/Mary Ave.[2]	NBL	120	AM	62	62	62
			PM	**137**/117	117	117
	SBL	120	AM	**137**/110	102	102
			PM	**236**/**161**	**155**	**155**
13. 101 NB Ramps/Tefft St[2]	NBL	125/200	AM	**227**/131	131	131
			PM	**371**/182	182	182

1. Queue length that would not be exceeded 95 percent of the time. # indicates volume exceeds capacity, queue may be longer. **Bold** indicates queue length longer than storage length.

2. Values on left represent 2018 conditions when counts were collected. Values on right include the Tefft Street Ramp widening improvements currently under construction. EX+P results assume construction is complete.

All County intersections operate at LOS D or better under Existing and Existing Plus Project conditions. However, the following queue lengths are exceeded:

- Pomeroy Road/Willow Rd (#2): the northbound right exceeds the small storage length provided within the shoulder during the AM peak hour. However, the queue would not block the through movement during the signal phase and the project does not exacerbate the queue.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

- Hetrick Avenue/Willow Rd (#3): the northbound right exceeds the small storage length provided with a flared approach during the AM peak hour. There is a small number of northbound through vehicles and the northbound queue would be less than two vehicles without a northbound right turn lane. The project reduced the queue length on this approach.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

- Tefft Street/Mary Avenue (#11): the southbound left turn lane exceeds storage during the PM peak hour with the ramp widening improvements. However, additional storage is available in the approach and the queue would not block the through movement during the signal phase.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

Although the Mary Avenue/Juniper Street (#14) intersection was only evaluated under Sunday Conditions, the intersection would operate acceptably during the weekday peak hours with the addition of project traffic.

The following Caltrans intersections operate below the LOS C threshold:

- Willow Road/US 101 SB Ramps (#6): the southbound approach operates at LOS F during the PM peak hour with project traffic due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive phasing on the westbound Willow Road approach and the existing lane configurations would result in LOS C or better during both peak hours. This improvement is included in the South County Road

Improvement Fee Program and the peak hour signal warrant is met under the Existing Plus Project conditions.

Recommendation: Install traffic signal (Recommendation is consistent with July 2021 TIS).

- Willow Road/US 101 NB Ramps (#7): the northbound approach operates at LOS F during both peak hours due to long delays resulting from side street stop control and the high volumes along Willow Road. Installation of a coordinated traffic signal with protective/permissive on the eastbound Willow Road approach and the existing lane configurations would result in LOS C or better during both peak hours. This improvement is included in the South County Road Improvement Fee Program and the peak hour signal warrant is met under the Existing Plus Project conditions.

  Recommendation: Install traffic signal (Recommendation is consistent with July 2021 TIS).

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS E and LOS D during the AM and PM peak hours, respectively. Installation of the improvements under construction, including an additional turn lane on the northbound and southbound off-ramps and restricting northbound left turns on Frontage Road would result in LOS C or better during both peak hours. The improvement will also reduce queuing on Tefft Street near the Mary Avenue intersection.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

- West Tefft Street/US 101 NB Ramps (#13): operates at LOS D during the PM peak hours. Installation of the ramp improvements currently under construction would result in LOS C or better during both peak hours.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

CUMULATIVE PLUS PROJECT CONDITIONS

The intersection LOS under Cumulative and Cumulative Plus Project conditions are summarized in **Table 4** and the queues are summarized in **Table 5**.

Table 4: Cumulative and Cumulative Plus Project Levels of Service

Cumulative and Cumulative Plus Project Intersection Levels of Service								
Intersection	Peak Hour	Cumulative (CM) Delay[1]	Cumulative (CM) LOS	CM + Project Delay[1]	CM + Project LOS	CM + Project (25% more CS trips) Delay[1]	CM + Project (25% more CS trips) LOS	Warrant Met?
1. Willow Rd/SR 1	AM	5.7 (14.0)	- (B)	6.0 (14.5)	- (B)	6.0 (14.5)	- (B)	-
	PM	6.7 (18.6)	- (C)	7.1 (20.0)	- (C)	7.1 (20.0)	- (C)	-
2. Willow Rd/Pomeroy Rd	AM	22.0	C	22.4	C	22.4	C	-
	PM	22.3	C	22.8	C	22.8	C	-
3. Willow Rd/Hetrick Ave	AM	**5.2 (37.1)**	**- (E)**	**4.6 (38.8)**	**- (E)**	**4.6 (38.9)**	**- (E)**	No
	PM	3.1 (29.0)	- (D)	2.9 (31.7)	- (D)	2.9 (31.8)	- (D)	No
4. Willow Rd/W Project Entry	AM	*Future Intersection*		4.5 (23.7)	- (C)	4.6 (23.9)	- (C)	-
	PM			3.5 (19.0)	- (C)	3.7 (19.5)	- (C)	-
5. Willow Rd/N Frontage Rd	AM	*Future Intersection*		26.2	C	27.0	C	-
	PM			17.7	B	19.3	B	-
6. Willow Rd/US 101 SB Ramps	AM	3.4 (13.6)	- (B)	4.8 (23.3)	- (C)	4.9 (23.7)	- (C)	Yes (B)
	PM	5.1 (14.1)	- (B)	**16.3 (56.3)**	**- (F)**	**17.3 (60.2)**	**- (F)**	Yes (C)
7. Willow Rd/US 101 NB Ramps	AM	**14.5 (49.4)**	**- (E)**	**>200 (>200)**	**- (F)**	**>200 (>200)**	**- (F)**	Yes (B)
	PM	**13.8 (35.2)**	**- (E)**	**>200 (>200)**	**- (F)**	**>200 (>200)**	**- (F)**	Yes (C)
8. Willow Rd/Thompson Ave	AM	4.9 (13.2)	- (B)	6.1 (14.8)	- (B)	6.2 (14.9)	- (B)	-
	PM	4.3 (13.2)	- (B)	5.6 (15.0)	- (C)	5.6 (15.0)	- (C)	-
9. SW Project Entry/Pomeroy Rd	AM	*Future Intersection*		5.1 (17.7)	- (C)	5.1 (18.0)	- (C)	-
	PM			4.3 (19.8)	- (C)	4.5 (20.5)	- (C)	-
10. W Tefft St/Pomeroy Rd	AM	17.2	B	19.7	B	19.8	B	-
	PM	18.3	B	21.0	C	21.1	C	-
11. W Tefft St/Mary Ave	AM	40.3	D	39.9	D	39.9	D	-
	PM	44.0	D	43.9	D	43.9	D	-
12. W Tefft St/US 101 SB Ramps/S Frontage Rd	AM	**96.6**	**F**	**101.7**	**F**	**101.9**	**F**	N/A
	PM	**87.1**	**F**	**89.0**	**F**	**89.1**	**F**	N/A
13. W Tefft St/US 101 NB Ramps	AM	30.3	C	33.5	C	33.5	C	-
	PM	28.9	C	28.9	C	28.9	C	-

1. HCM 6th average control delay in seconds per vehicle (HCM 2000 used for Intersections 10 & 12). For side-street-stop controlled intersections the worst approach's delay is reported in parentheses next to the overall intersection delay.

Note: Unacceptable operations shown in **bold** text.

Table 5: Cumulative and Cumulative Plus Project Queues

Cumulative and Cumulative Plus Project Intersection Queues						
Intersection	**Movement**	**Storage Length (ft)**	**Peak Hour**	**CM**	**CM + P**	**CM + P (+15% CS)**
				95th Percentile Queue (ft)[1]		
2. Pomeroy Rd/Willow Rd	NBR	25	AM	**51**	**51**	**51**
			PM	0	0	0
3. Hetrick Ave/Willow Rd	NBR	25	AM	**48**	**38**	**38**
			PM	5	3	3
10. Tefft St/Pomeroy Rd	EBL	95	AM	63	77	78
			PM	69	**105**	**107**
11. Tefft St/Mary Ave	EBL	125	AM	59	59	59
			PM	**137**	**137**	**137**
	NBL	120	AM	82	82	82
			PM	**172**	**172**	**172**
	SBL	120	AM	**205**	**194**	**194**
			PM	**311**	**302**	**302**
12. Frontage Road/101 SB Off Ramp/Tefft St	WBL	280	AM	**#335**	**#334**	**#334**
			PM	**#466**	**#466**	**#466**
	SBL	250	AM	**#382**	**#465**	**#466**
			PM	**#505**	**#569**	**#571**
13. 101 NB Ramps/Tefft St	EBL	195	AM	**#636**	**#592**	**#592**
			PM	**279**	**243**	**243**
	NBL	200	AM	174	173	173
			PM	**273**	**273**	**273**
	NBR	200	AM	140	149	149
			PM	**204**	**211**	**211**

1. Queue length that would not be exceeded 95 percent of the time. # indicates volume exceeds capacity, queue may be longer. **Bold** indicates queue length longer than storage length.

The following County intersections operates below the LOS D threshold or queue lengths exceed storage:

- Pomeroy Road/Willow Rd (#2): the northbound right exceeds the small storage length provided within the shoulder during the AM peak hour. However, the queue would not block the through movement during the signal phase and the project does not exacerbate the queue.

  Recommendation: None (Recommendation is consistent with July 2021 TIS).

- Willow Road/Hetrick Avenue (#3): the southbound approach operates at LOS E during the AM peak hour under Cumulative conditions with and without the project. The peak hour signal warrant is not met and the proposed project improves operations at this location by providing two new parallel routes to Hetrick Avenue.

  Recommendation: None, traffic signal warrant not met (Recommendation is consistent with July 2021 TIS).

- Tefft Street/Pomeroy Road (#10): the eastbound left turn lane exceeds the storage length during the PM peak hour. However, additional storage is available in the bay taper.

  Recommendation: None(Recommendation is consistent with July 2021 TIS).

- Tefft Street/Mary Avenue (#11): the eastbound, northbound, and southbound left turn lane exceeds storage during one or more peak hours under Cumulative Conditions. However, the project does not exacerbate the queues. A ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street would be required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program. The additional interchange will also benefit Tefft Street/Mary Avenue.

Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements (Recommendation is consistent with July 2021 TIS).

The following Caltrans intersections operate below the LOS C threshold or queue lengths exceed storage:

- Willow Road/US 101 SB Ramps (#6): the southbound approach operates at LOS F in the PM peak hour under Cumulative Plus Project conditions. Installation of a coordinated traffic signal with protective/permissive on the westbound Willow Road approach and the existing lane configurations would result in LOS C during both peak hours. This improvement is consistent with the South County Road Improvement Fee Program and the traffic signal warrant is met.

  Recommendation: Install traffic signal (Recommendation is consistent with July 2021 TIS).

- Willow Road/US 101 NB Ramps (#7): the northbound approach operates at LOS F during both peak hours under Cumulative conditions and LOS F during both peak hours under Cumulative Plus Project conditions. Installation of a coordinated traffic signal with protective/permissive on the eastbound Willow Road approach and the existing lane configurations would result in LOS C or better during both peak hours. This improvement is consistent with the South County Road Improvement Fee Program and the traffic signal warrant is met.

  Recommendation: Install traffic signal (Recommendation is consistent with July 2021 TIS).

- West Tefft Street/US 101 SB Ramps/South Frontage Road (#12): operates at LOS F during both peak hours under Cumulative conditions with and without the project and the southbound and westbound left turn lanes exceed storage. A ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street is required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program.

  Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements (Recommendation is consistent with July 2021 TIS).

- West Tefft Street/US 101 NB Ramps (#13): the northbound left and right turn lanes and the eastbound left turn lane exceed storage during one or more peak hours under Cumulative Conditions. The ramp widening project is currently being constructed and was assumed to be in place. However, in addition to the North Frontage Road extension, construction of an additional interchange near Southland Street is required to divert traffic off Tefft Street and relieve congestion to an acceptable LOS. Construction of the additional interchange is included in the South County Road Improvement Fee Program.

  Recommendation: Project makes a fair share contribution through the County's impact fee program for cumulative roadway improvements (Recommendation is consistent with July 2021 TIS).

CONCLUSIONS

No new project impacts would occur if the commercial service trips were increased by 15 percent.

Please let us know if you have any questions.

Intersection						
Int Delay, s/veh	5.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	173	203	55	94	132
Future Vol, veh/h	58	173	203	55	94	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	67	201	236	64	109	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	639	268	0	0	300	0
Stage 1	268	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	431	756	-	-	1228	-
Stage 1	763	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	393	756	-	-	1228	-
Mov Cap-2 Maneuver	393	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	3.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	393	756	1228	-
HCM Lane V/C Ratio	-	-	0.172	0.266	0.089	-
HCM Control Delay (s)	-	-	16	11.5	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	1.1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	372	55	46	282	18	106	119	154	37	61	14
v/c Ratio	0.06	0.54	0.08	0.30	0.36	0.02	0.41	0.34	0.36	0.22	0.18	0.03
Control Delay	35.9	21.6	0.2	39.7	15.4	0.1	39.9	28.9	7.8	36.5	27.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	21.6	0.2	39.7	15.4	0.1	39.9	28.9	7.8	36.5	27.3	0.2
Queue Length 50th (ft)	4	133	0	19	71	0	44	45	0	15	22	0
Queue Length 95th (ft)	19	213	0	54	158	0	#130	94	35	45	55	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	155	1150	1014	155	1159	1041	259	1014	932	195	1014	932
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.32	0.05	0.30	0.24	0.02	0.41	0.12	0.17	0.19	0.06	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	309	46	38	234	15	88	99	128	31	51	12
Future Volume (vph)	8	309	46	38	234	15	88	99	128	31	51	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	10	372	55	46	282	18	106	119	154	37	61	14
RTOR Reduction (vph)	0	0	35	0	0	11	0	0	125	0	0	13
Lane Group Flow (vph)	10	372	20	46	282	7	106	119	29	37	61	1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.7	25.1	25.1	2.4	26.8	26.8	9.3	13.0	13.0	3.0	6.7	6.7
Effective Green, g (s)	0.7	25.1	25.1	2.4	26.8	26.8	9.3	13.0	13.0	3.0	6.7	6.7
Actuated g/C Ratio	0.01	0.37	0.37	0.04	0.39	0.39	0.14	0.19	0.19	0.04	0.10	0.10
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	17	668	555	60	713	606	235	346	294	75	178	151
v/s Ratio Prot	0.01	c0.21		c0.03	0.16		c0.06	c0.07		0.02	0.03	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.59	0.56	0.04	0.77	0.40	0.01	0.45	0.34	0.10	0.49	0.34	0.01
Uniform Delay, d1	33.5	17.0	13.7	32.5	14.8	12.5	27.0	23.8	22.7	31.8	28.6	27.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.2	1.7	0.1	44.6	0.8	0.0	0.5	1.0	0.3	1.9	2.0	0.0
Delay (s)	78.7	18.7	13.8	77.1	15.5	12.6	27.5	24.8	22.9	33.6	30.6	27.7
Level of Service	E	B	B	E	B	B	C	C	C	C	C	C
Approach Delay (s)		19.5			23.6			24.8			31.2	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	309	46	38	234	15	88	99	128	31	51	12
Future Volume (veh/h)	8	309	46	38	234	15	88	99	128	31	51	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	10	372	55	46	282	18	106	119	154	37	61	14
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	22	536	444	80	596	505	134	305	259	69	236	200
Arrive On Green	0.01	0.29	0.29	0.05	0.33	0.33	0.08	0.17	0.17	0.04	0.13	0.13
Sat Flow, veh/h	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	10	372	55	46	282	18	106	119	154	37	61	14
Grp Sat Flow(s),veh/h/ln	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.3	9.8	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Cycle Q Clear(g_c), s	0.3	9.8	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	22	536	444	80	596	505	134	305	259	69	236	200
V/C Ratio(X)	0.45	0.69	0.12	0.57	0.47	0.04	0.79	0.39	0.60	0.54	0.26	0.07
Avail Cap(c_a), veh/h	161	1123	932	161	1123	952	203	1049	889	203	1049	889
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	16.9	14.0	25.2	14.5	12.4	24.5	20.0	20.8	25.4	21.2	20.6
Incr Delay (d2), s/veh	15.8	3.4	0.3	7.6	1.2	0.1	5.7	1.4	3.7	2.4	1.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.6	0.4	0.7	2.2	0.1	1.3	1.2	1.7	0.4	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	20.4	14.3	32.8	15.7	12.4	30.2	21.4	24.5	27.9	22.1	20.9
LnGrp LOS	D	C	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		437			346			379			112	
Approach Delay, s/veh		20.1			17.8			25.1			23.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	22.9	9.5	13.8	6.0	24.7	7.4	15.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.0	* 33	6.3	* 31	5.0	* 33	6.3	* 31
Max Q Clear Time (g_c+I1), s	3.4	11.8	5.2	3.6	2.3	8.6	3.1	7.0
Green Ext Time (p_c), s	0.0	4.1	0.0	0.5	0.0	2.9	0.0	1.9

Intersection Summary			
HCM 6th Ctrl Delay			21.3
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	466	1	18	287	10	1	3	141	11	4	2
Future Vol, veh/h	4	466	1	18	287	10	1	3	141	11	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	597	1	23	368	13	1	4	181	14	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	381	0	0	598	0	0	1032	1034	597	1114	1022	368
Stage 1	-	-	-	-	-	-	607	607	-	414	414	-
Stage 2	-	-	-	-	-	-	425	427	-	700	608	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1161	-	-	964	-	-	208	229	497	183	233	671
Stage 1	-	-	-	-	-	-	478	482	-	610	588	-
Stage 2	-	-	-	-	-	-	601	580	-	425	481	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1161	-	-	964	-	-	199	223	497	112	226	671
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	223	-	112	226	-
Stage 1	-	-	-	-	-	-	476	480	-	608	574	-
Stage 2	-	-	-	-	-	-	579	566	-	267	479	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	16.5	33.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	199	223	497	1161	-	-	964	-	-	112	226	671
HCM Lane V/C Ratio	0.006	0.017	0.364	0.004	-	-	0.024	-	-	0.126	0.023	0.004
HCM Control Delay (s)	23.2	21.4	16.3	8.1	-	-	8.8	-	-	41.7	21.3	10.4
HCM Lane LOS	C	C	C	A	-	-	A	-	-	E	C	B
HCM 95th %tile Q(veh)	0	0.1	1.6	0	-	-	0.1	-	-	0.4	0.1	0

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	632	13	109	311	23	202
Future Vol, veh/h	632	13	109	311	23	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	687	14	118	338	25	220

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	701	0	1261	687
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	574	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	896	-	188	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	563	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	896	-	163	447
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	489	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	21.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	163	447	-	-	896	-
HCM Lane V/C Ratio	0.153	0.491	-	-	0.132	-
HCM Control Delay (s)	31	20.6	-	-	9.6	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	2.6	-	-	0.5	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	888	18	177	423	34	302
v/c Ratio	0.82	0.02	0.48	0.27	0.19	0.68
Control Delay	20.9	4.7	9.9	3.0	39.4	25.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	4.7	9.9	3.0	39.4	25.8
Queue Length 50th (ft)	343	1	19	54	17	84
Queue Length 95th (ft)	553	10	70	94	47	182
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1431	1219	375	1621	612	446
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.01	0.47	0.26	0.06	0.68

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	817	17	163	389	31	278
Future Volume (vph)	817	17	163	389	31	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	220	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	888	18	177	423	34	302
RTOR Reduction (vph)	0	6	0	0	0	92
Lane Group Flow (vph)	888	12	177	423	34	210
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	42.5	42.5	58.1	58.1	4.0	13.1
Effective Green, g (s)	42.5	42.5	58.1	58.1	4.0	13.1
Actuated g/C Ratio	0.57	0.57	0.77	0.77	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1054	895	358	1441	94	413
v/s Ratio Prot	c0.48		0.06	0.23	0.02	c0.06
v/s Ratio Perm		0.01	0.32			0.07
v/c Ratio	0.84	0.01	0.49	0.29	0.36	0.51
Uniform Delay, d1	13.5	7.1	11.5	2.5	34.3	28.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	0.0	1.1	0.1	2.4	1.0
Delay (s)	19.8	7.1	12.6	2.6	36.7	29.1
Level of Service	B	A	B	A	D	C
Approach Delay (s)	19.5			5.5	29.8	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	19.5
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	817	17	163	389	31	278
Future Volume (veh/h)	817	17	163	389	31	278
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	888	18	177	423	34	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	961	815	245	1222	358	424
Arrive On Green	0.51	0.51	0.07	0.65	0.20	0.20
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	888	18	177	423	34	302
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	39.2	0.5	3.9	9.1	1.4	15.4
Cycle Q Clear(g_c), s	39.2	0.5	3.9	9.1	1.4	15.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	961	815	245	1222	358	424
V/C Ratio(X)	0.92	0.02	0.72	0.35	0.09	0.71
Avail Cap(c_a), veh/h	1130	958	296	1444	459	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.1	10.7	19.8	6.9	29.1	29.6
Incr Delay (d2), s/veh	11.3	0.0	6.7	0.2	0.1	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.7	0.1	2.1	2.6	0.6	6.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.4	10.7	26.5	7.1	29.2	33.2
LnGrp LOS	C	B	C	A	C	C
Approach Vol, veh/h	906			600	336	
Approach Delay, s/veh	31.0			12.8	32.8	
Approach LOS	C			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.4	52.4				64.9		24.5
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	8.5	54.0				69.0		23.0
Max Q Clear Time (g_c+I1), s	5.9	41.2				11.1		17.4
Green Ext Time (p_c), s	0.1	4.7				2.3		0.6

Intersection Summary			
HCM 6th Ctrl Delay			25.4
HCM 6th LOS			C

Intersection												
Int Delay, s/veh	3.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	719	375	23	316	0	0	0	0	25	0	236
Future Vol, veh/h	0	719	375	23	316	0	0	0	0	25	0	236
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	999	521	32	439	0	0	0	0	35	0	328

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	1520	0	0				1763	2023	439
Stage 1	-	-	-	-	-	-				503	503	-
Stage 2	-	-	-	-	-	-				1260	1520	-
Critical Hdwy	-	-	-	4.15	-	-				6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-				5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-				3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	430	-	0				91	57	612
Stage 1	0	-	-	-	-	0				601	536	-
Stage 2	0	-	-	-	-	0				263	178	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	430	-	-				84	0	612
Mov Cap-2 Maneuver	-	-	-	-	-	-				84	0	-
Stage 1	-	-	-	-	-	-				601	0	-
Stage 2	-	-	-	-	-	-				244	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1	23
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	430	-	84	612
HCM Lane V/C Ratio	-	-	0.074	-	0.413	0.536
HCM Control Delay (s)	-	-	14	-	75.2	17.5
HCM Lane LOS	-	-	B	-	F	C
HCM 95th %tile Q(veh)	-	-	0.2	-	1.7	3.2

Intersection	
Int Delay, s/veh	760.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	485	270	0	0	126	22	200	1	23	0	0	0
Future Vol, veh/h	485	270	0	0	126	22	200	1	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	68	68	68	68	68	68	68	68	68	68	68	68
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	713	397	0	0	185	32	294	1	34	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	217	0	-	-	-	0	2024	2040	397
Stage 1	-	-	-	-	-	-	1823	1823	-
Stage 2	-	-	-	-	-	-	201	217	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1347	-	0	0	-	-	~ 63	56	650
Stage 1	-	-	0	0	-	-	~ 140	127	-
Stage 2	-	-	0	0	-	-	830	721	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1347	-	-	-	-	-	~ 30	0	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 30	0	-
Stage 1	-	-	-	-	-	-	~ 66	0	-
Stage 2	-	-	-	-	-	-	830	0	-

Approach	EB	WB	NB
HCM Control Delay, s	6.8	0	$ 3804.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	30	650	1347	-	-	-
HCM Lane V/C Ratio	9.853	0.052	0.529	-	-	-
HCM Control Delay (s)	$ 4238.2	10.8	10.6	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	36.3	0.2	3.2	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	271	124	259	170	22
Future Vol, veh/h	23	271	124	259	170	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	40	475	218	454	298	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1208	318	337	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	890	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	201	720	1217	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	165	720	1217	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	400	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.3	2.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1217	-	165	720	-	-
HCM Lane V/C Ratio	0.179	-	0.245	0.66	-	-
HCM Control Delay (s)	8.6	-	33.7	19.2	-	-
HCM Lane LOS	A	-	D	C	-	-
HCM 95th %tile Q(veh)	0.7	-	0.9	5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	191	53	272	131	30	134
Future Vol, veh/h	191	53	272	131	30	134
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	208	58	296	142	33	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	508	296	0	0	438	0
Stage 1	296	-	-	-	-	-
Stage 2	212	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	525	743	-	-	1122	-
Stage 1	755	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	510	743	-	-	1122	-
Mov Cap-2 Maneuver	510	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	510	743	1122	-
HCM Lane V/C Ratio	-	-	0.407	0.078	0.029	-
HCM Control Delay (s)	-	-	16.8	10.3	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	228	412	468	147	174
v/c Ratio	0.73	0.21	0.37	0.55	0.45
Control Delay	35.2	9.1	14.8	34.0	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	9.1	14.8	34.0	9.5
Queue Length 50th (ft)	~72	23	42	41	0
Queue Length 95th (ft)	75	114	144	#152	55
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	314	2119	1390	338	443
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.19	0.34	0.43	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	210	379	313	118	135	160
Future Volume (vph)	210	379	313	118	135	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3394		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3394		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	412	340	128	147	174
RTOR Reduction (vph)	0	0	41	0	0	149
Lane Group Flow (vph)	228	412	427	0	147	25
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	10.3	32.3	20.8		8.7	8.7
Effective Green, g (s)	10.3	32.3	20.8		8.7	8.7
Actuated g/C Ratio	0.17	0.53	0.34		0.14	0.14
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	298	1873	1157		252	225
v/s Ratio Prot	c0.13	0.12	c0.13			
v/s Ratio Perm					c0.08	0.02
v/c Ratio	0.77	0.22	0.37		0.58	0.11
Uniform Delay, d1	24.2	7.6	15.2		24.5	22.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.1	0.0	0.1		2.2	0.1
Delay (s)	34.3	7.7	15.2		26.7	22.9
Level of Service	C	A	B		C	C
Approach Delay (s)		17.1	15.2		24.6	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	493	68	43	206	116	115
v/c Ratio	0.19	0.31	0.09	0.68	0.26	0.36	0.22	0.42	0.54	0.51
Control Delay	35.4	18.7	1.1	43.9	6.7	38.5	34.8	4.4	42.7	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	18.7	1.1	43.9	6.7	38.5	34.8	4.4	42.7	36.8
Queue Length 50th (ft)	18	85	0	82	12	35	22	0	63	53
Queue Length 95th (ft)	41	174	5	140	87	62	44	18	102	93
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	267	1636	782	270	1926	374	394	534	375	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.31	0.09	0.54	0.26	0.18	0.11	0.39	0.31	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	62	68	43	206	168	40	23
RTOR Reduction (vph)	0	0	41	0	8	0	0	0	154	0	12	0
Lane Group Flow (vph)	34	505	29	147	485	0	68	43	52	116	103	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Effective Green, g (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Actuated g/C Ratio	0.07	0.42	0.42	0.16	0.51		0.10	0.10	0.25	0.13	0.13	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	118	1478	644	279	1764		170	179	400	215	214	
v/s Ratio Prot	0.02	c0.14		c0.08	0.14		c0.04	0.02	0.02	c0.07	0.06	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.29	0.34	0.05	0.53	0.27		0.40	0.24	0.13	0.54	0.48	
Uniform Delay, d1	37.7	16.8	14.7	32.9	11.9		36.1	35.5	24.5	34.7	34.4	
Progression Factor	1.00	1.00	1.00	0.80	0.43		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	0.4		0.6	0.3	0.1	1.3	0.6	
Delay (s)	38.2	17.4	14.8	27.1	5.5		36.7	35.8	24.5	36.0	35.0	
Level of Service	D	B	B	C	A		D	D	C	D	D	
Approach Delay (s)		18.3			10.4			28.6			35.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	62	68	43	206	116	113	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	822	753	334	740	516	74	121	127	765	187	158	32
Arrive On Green	0.46	0.21	0.21	0.83	0.33	0.33	0.07	0.07	0.07	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1578	1781	3121	446	1781	1870	1578	1781	1506	306
Grp Volume(v), veh/h	34	505	70	147	244	249	68	43	206	116	0	136
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1790	1781	1870	1578	1781	0	1812
Q Serve(g_s), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Cycle Q Clear(g_c), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	822	753	334	740	294	296	121	127	765	187	0	190
V/C Ratio(X)	0.04	0.67	0.21	0.20	0.83	0.84	0.56	0.34	0.27	0.62	0.00	0.71
Avail Cap(c_a), veh/h	822	753	334	740	397	400	377	396	992	398	0	405
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.6	30.8	27.6	4.3	27.3	27.4	38.4	37.8	13.0	36.4	0.0	36.8
Incr Delay (d2), s/veh	0.0	4.7	1.4	0.0	22.4	23.2	1.5	0.6	0.1	1.2	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.1	1.3	0.5	5.5	5.6	1.4	0.9	2.2	2.3	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.6	35.5	29.1	4.4	49.7	50.6	39.9	38.4	13.1	37.7	0.0	38.7
LnGrp LOS	B	D	C	A	D	D	D	D	B	D	A	D
Approach Vol, veh/h		609			640			317			252	
Approach Delay, s/veh		33.5			39.6			22.3			38.2	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	40.3	22.0		12.9	44.2	18.1		9.8				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	18.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.4	13.1		8.2	2.9	12.9		5.1				
Green Ext Time (p_c), s	0.1	1.1		0.4	0.0	1.0		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			34.4									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	973	81	515	460	138	72	237
v/c Ratio	0.81	0.65	0.32	0.87	1.11	0.09	0.29
Control Delay	25.8	56.2	10.5	45.7	154.5	14.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	56.2	10.5	45.7	154.5	14.7	3.2
Queue Length 50th (ft)	257	28	89	228	~85	22	0
Queue Length 95th (ft)	156	#104	89	#393	#194	46	38
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1204	124	1623	530	124	806	811
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.65	0.32	0.87	1.11	0.09	0.29

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	856	10	72	458	0	0	0	409	123	64	211
Future Volume (vph)	0	856	10	72	458	0	0	0	409	123	64	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3532		1770	3539				1611	1770	1863	1563
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3532		1770	3539				1611	1770	1863	1563
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	962	11	81	515	0	0	0	460	138	72	237
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	134
Lane Group Flow (vph)	0	973	0	81	515	0	0	0	460	138	72	103
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Effective Green, g (s)		29.0		6.0	39.0				28.0	6.0	36.8	36.8
Actuated g/C Ratio		0.34		0.07	0.46				0.33	0.07	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1205		124	1623				530	124	806	676
v/s Ratio Prot		c0.28		c0.05	0.15				c0.29	c0.08	0.04	
v/s Ratio Perm												0.07
v/c Ratio		0.81		0.65	0.32				0.87	1.11	0.09	0.15
Uniform Delay, d1		25.5		38.5	14.6				26.8	39.5	14.2	14.6
Progression Factor		0.77		0.78	0.68				1.00	1.00	1.00	1.00
Incremental Delay, d2		5.7		11.6	0.5				14.0	114.4	0.2	0.5
Delay (s)		25.2		41.6	10.4				40.8	153.9	14.4	15.1
Level of Service		C		D	B				D	F	B	B
Approach Delay (s)		25.2			14.6			40.8			57.8	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	600	547	396	254	147	149	142
v/c Ratio	0.63	0.21	0.30	0.35	0.60	0.61	0.40
Control Delay	8.5	2.7	21.1	4.6	43.6	43.9	9.2
Queue Delay	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	3.0	21.1	4.6	43.6	43.9	9.2
Queue Length 50th (ft)	80	29	79	0	77	80	0
Queue Length 95th (ft)	135	49	127	53	131	133	46
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	969	2639	1313	727	514	515	582
Starvation Cap Reductn	142	1393	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.44	0.30	0.35	0.29	0.29	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	546	498	0	0	360	231	268	1	129	0	0	0
Future Volume (vph)	546	498	0	0	360	231	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1765	3539			3539	1532	1681	1686	1583			
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	882	3539			3539	1532	1681	1686	1583			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	600	547	0	0	396	254	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	160	0	0	121	0	0	0
Lane Group Flow (vph)	600	547	0	0	396	94	147	149	21	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Effective Green, g (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Actuated g/C Ratio	0.75	0.75			0.37	0.37	0.15	0.15	0.15			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	946	2639			1311	567	245	245	230			
v/s Ratio Prot	c0.21	0.15			0.11		0.09	c0.09				
v/s Ratio Perm	c0.27					0.06			0.01			
v/c Ratio	0.63	0.21			0.30	0.17	0.60	0.61	0.09			
Uniform Delay, d1	8.5	3.2			19.0	17.9	34.0	34.0	31.4			
Progression Factor	0.58	0.70			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.9	0.2			0.6	0.6	3.3	3.6	0.1			
Delay (s)	5.8	2.4			19.6	18.6	37.3	37.6	31.5			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		4.2			19.2			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	546	498	0	0	360	231	268	1	129	0	0	0
Future Volume (veh/h)	546	498	0	0	360	231	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	600	547	0	0	396	254	296	0	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1075	2730	0	0	702	303	436	0	194			
Arrive On Green	0.87	1.00	0.00	0.00	0.20	0.20	0.12	0.00	0.12			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	3563	0	1585			
Grp Volume(v), veh/h	600	547	0	0	396	254	296	0	142			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.6	13.6	6.8	0.0	7.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.6	13.6	6.8	0.0	7.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1075	2730	0	0	702	303	436	0	194			
V/C Ratio(X)	0.56	0.20	0.00	0.00	0.56	0.84	0.68	0.00	0.73			
Avail Cap(c_a), veh/h	1075	2730	0	0	702	303	1090	0	485			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	2.2	0.0	0.0	0.0	30.8	32.8	35.7	0.0	36.0			
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	3.3	23.4	1.4	0.0	3.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.1	0.0	0.0	3.8	6.8	3.0	0.0	6.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.6	0.1	0.0	0.0	34.0	56.2	37.1	0.0	39.9			
LnGrp LOS	A	A	A	A	C	E	D	A	D			
Approach Vol, veh/h		1147			650			438				
Approach Delay, s/veh		1.4			42.7			38.0				
Approach LOS		A			D			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		69.4		15.6	48.6	20.8						
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0						
Max Green Setting (Gmax), s		* 50		* 26	28.9	16.8						
Max Q Clear Time (g_c+I1), s		2.0		9.3	2.0	15.6						
Green Ext Time (p_c), s		4.0		1.1	0.9	0.5						
Intersection Summary												
HCM 6th Ctrl Delay			20.6									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1560	96	596
v/c Ratio	0.55	0.77	0.17
Control Delay	0.7	66.2	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.7	66.2	0.2
Queue Length 50th (ft)	6	32	0
Queue Length 95th (ft)	m0	#119	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2858	124	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	11	0	492
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.55	0.77	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑↑		
Traffic Volume (vph)	1048	340	85	530	0	0
Future Volume (vph)	1048	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3388		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3388		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1178	382	96	596	0	0
RTOR Reduction (vph)	30	0	0	0	0	0
Lane Group Flow (vph)	1530	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	71.0		6.0	85.0		
Effective Green, g (s)	71.0		6.0	79.8		
Actuated g/C Ratio	0.84		0.07	0.94		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2829		124	3322		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.54		0.77	0.18		
Uniform Delay, d1	2.1		38.8	0.2		
Progression Factor	0.16		0.67	1.00		
Incremental Delay, d2	0.1		24.8	0.1		
Delay (s)	0.4		51.0	0.3		
Level of Service	A		D	A		
Approach Delay (s)	0.4			7.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection						
Int Delay, s/veh	5.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	173	203	55	94	132
Future Vol, veh/h	58	173	203	55	94	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	67	201	236	64	109	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	639	268	0	0	300	0
Stage 1	268	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	431	756	-	-	1228	-
Stage 1	763	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	393	756	-	-	1228	-
Mov Cap-2 Maneuver	393	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	12.6		0		3.4	
HCM LOS	B					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	393	756	1228	-
HCM Lane V/C Ratio	-	-	0.172	0.266	0.089	-
HCM Control Delay (s)	-	-	16	11.5	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	1.1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	372	55	46	282	18	106	119	154	37	61	14
v/c Ratio	0.06	0.56	0.08	0.26	0.36	0.02	0.39	0.33	0.36	0.21	0.20	0.04
Control Delay	36.8	22.5	0.3	38.2	15.5	0.1	35.2	29.2	8.4	36.9	30.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	22.5	0.3	38.2	15.5	0.1	35.2	29.2	8.4	36.9	30.4	0.2
Queue Length 50th (ft)	4	140	0	19	74	0	44	46	0	15	24	0
Queue Length 95th (ft)	20	217	0	54	159	0	97	95	39	46	59	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	156	1124	992	178	1153	1034	313	1124	1013	206	1021	934
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.33	0.06	0.26	0.24	0.02	0.34	0.11	0.15	0.18	0.06	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	309	46	38	234	15	88	99	128	31	51	12
Future Volume (vph)	8	309	46	38	234	15	88	99	128	31	51	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	10	372	55	46	282	18	106	119	154	37	61	14
RTOR Reduction (vph)	0	0	35	0	0	11	0	0	124	0	0	12
Lane Group Flow (vph)	10	372	20	46	282	7	106	119	30	37	61	2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.7	24.6	24.6	2.8	26.7	26.7	7.9	12.9	12.9	3.1	8.1	8.1
Effective Green, g (s)	0.7	24.6	24.6	2.8	26.7	26.7	7.9	12.9	12.9	3.1	8.1	8.1
Actuated g/C Ratio	0.01	0.36	0.36	0.04	0.39	0.39	0.12	0.19	0.19	0.05	0.12	0.12
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	17	655	545	70	711	604	200	343	292	78	215	183
v/s Ratio Prot	0.01	c0.21		c0.03	0.16		c0.06	c0.07		0.02	0.03	
v/s Ratio Perm			0.01			0.00			0.02			0.00
v/c Ratio	0.59	0.57	0.04	0.66	0.40	0.01	0.53	0.35	0.10	0.47	0.28	0.01
Uniform Delay, d1	33.5	17.4	14.0	32.1	14.8	12.6	28.3	23.8	22.7	31.6	27.3	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.2	1.9	0.1	20.8	0.8	0.0	1.4	1.1	0.3	1.7	1.3	0.0
Delay (s)	78.7	19.2	14.0	52.9	15.6	12.6	29.6	24.9	23.0	33.3	28.5	26.4
Level of Service	E	B	B	D	B	B	C	C	C	C	C	C
Approach Delay (s)		20.0			20.4			25.4			29.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	309	46	38	234	15	88	99	128	31	51	12
Future Volume (veh/h)	8	309	46	38	234	15	88	99	128	31	51	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	10	372	55	46	282	18	106	119	154	37	61	14
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	22	537	445	80	598	507	135	306	259	69	236	200
Arrive On Green	0.01	0.29	0.29	0.05	0.33	0.33	0.08	0.17	0.17	0.04	0.13	0.13
Sat Flow, veh/h	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	10	372	55	46	282	18	106	119	154	37	61	14
Grp Sat Flow(s),veh/h/ln	1739	1826	1514	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.3	9.8	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Cycle Q Clear(g_c), s	0.3	9.8	1.4	1.4	6.6	0.4	3.2	3.1	5.0	1.1	1.6	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	22	537	445	80	598	507	135	306	259	69	236	200
V/C Ratio(X)	0.45	0.69	0.12	0.57	0.47	0.04	0.78	0.39	0.59	0.54	0.26	0.07
Avail Cap(c_a), veh/h	161	1151	955	183	1175	996	312	1151	976	212	1047	887
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	16.9	14.0	25.3	14.5	12.4	24.5	20.1	20.8	25.5	21.2	20.7
Incr Delay (d2), s/veh	15.8	3.4	0.3	7.6	1.2	0.1	3.7	1.4	3.7	2.4	1.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.6	0.4	0.7	2.2	0.1	1.3	1.2	1.7	0.4	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	20.3	14.2	32.8	15.7	12.4	28.2	21.4	24.5	27.9	22.2	21.0
LnGrp LOS	D	C	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		437			346			379			112	
Approach Delay, s/veh		20.1			17.8			24.6			23.9	
Approach LOS		C			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.8	23.0	9.5	13.8	6.0	24.8	7.4	15.9				
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8				
Max Green Setting (Gmax), s	5.7	* 34	9.7	* 31	5.0	* 35	6.6	* 34				
Max Q Clear Time (g_c+I1), s	3.4	11.8	5.2	3.6	2.3	8.6	3.1	7.0				
Green Ext Time (p_c), s	0.0	4.1	0.0	0.5	0.0	3.0	0.0	1.9				
Intersection Summary												
HCM 6th Ctrl Delay			21.1									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	466	1	18	287	10	1	3	141	11	4	2
Future Vol, veh/h	4	466	1	18	287	10	1	3	141	11	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	597	1	23	368	13	1	4	181	14	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	381	0	0	598	0	0	1032	1034	597	1114	1022	368
Stage 1	-	-	-	-	-	-	607	607	-	414	414	-
Stage 2	-	-	-	-	-	-	425	427	-	700	608	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1161	-	-	964	-	-	208	229	497	183	233	671
Stage 1	-	-	-	-	-	-	478	482	-	610	588	-
Stage 2	-	-	-	-	-	-	601	580	-	425	481	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1161	-	-	964	-	-	199	223	497	112	226	671
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	223	-	112	226	-
Stage 1	-	-	-	-	-	-	476	480	-	608	574	-
Stage 2	-	-	-	-	-	-	579	566	-	267	479	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	16.5	33.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	199	223	497	1161	-	-	964	-	-	112	226	671
HCM Lane V/C Ratio	0.006	0.017	0.364	0.004	-	-	0.024	-	-	0.126	0.023	0.004
HCM Control Delay (s)	23.2	21.4	16.3	8.1	-	-	8.8	-	-	41.7	21.3	10.4
HCM Lane LOS	C	C	C	A	-	-	A	-	-	E	C	B
HCM 95th %tile Q(veh)	0	0.1	1.6	0	-	-	0.1	-	-	0.4	0.1	0

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	632	13	109	311	23	202
Future Vol, veh/h	632	13	109	311	23	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	687	14	118	338	25	220

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	701	0	1261	687
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	574	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	896	-	188	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	563	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	896	-	163	447
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	489	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	21.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	163	447	-	-	896	-
HCM Lane V/C Ratio	0.153	0.491	-	-	0.132	-
HCM Control Delay (s)	31	20.6	-	-	9.6	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	2.6	-	-	0.5	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	888	18	177	423	34	302
v/c Ratio	0.71	0.02	0.39	0.26	0.28	0.71
Control Delay	17.7	5.5	8.5	1.6	53.6	31.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	5.5	8.5	1.6	53.6	31.7
Queue Length 50th (ft)	387	1	22	80	23	115
Queue Length 95th (ft)	698	12	55	22	55	188
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1257	1072	458	1642	370	424
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.02	0.39	0.26	0.09	0.71

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	817	17	163	389	31	278
Future Volume (vph)	817	17	163	389	31	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.18	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	326	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	888	18	177	423	34	302
RTOR Reduction (vph)	0	5	0	0	0	101
Lane Group Flow (vph)	888	13	177	423	34	201
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	71.7	71.7	91.8	91.8	5.2	18.8
Effective Green, g (s)	71.7	71.7	91.8	91.8	5.2	18.8
Actuated g/C Ratio	0.65	0.65	0.83	0.83	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1214	1031	450	1554	83	364
v/s Ratio Prot	c0.48		0.05	0.23	0.02	c0.07
v/s Ratio Perm		0.01	0.28			0.06
v/c Ratio	0.73	0.01	0.39	0.27	0.41	0.55
Uniform Delay, d1	12.7	6.7	10.5	1.9	50.9	41.7
Progression Factor	1.00	1.00	3.16	0.58	1.00	1.00
Incremental Delay, d2	3.9	0.0	0.5	0.4	3.3	1.8
Delay (s)	16.7	6.7	33.8	1.5	54.2	43.6
Level of Service	B	A	C	A	D	D
Approach Delay (s)	16.5			11.0	44.6	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	817	17	163	389	31	278
Future Volume (veh/h)	817	17	163	389	31	278
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	888	18	177	423	34	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1061	899	281	1284	348	405
Arrive On Green	0.57	0.57	0.12	1.00	0.20	0.20
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	888	18	177	423	34	302
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	43.0	0.5	4.5	0.0	1.7	19.3
Cycle Q Clear(g_c), s	43.0	0.5	4.5	0.0	1.7	19.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1061	899	281	1284	348	405
V/C Ratio(X)	0.84	0.02	0.63	0.33	0.10	0.75
Avail Cap(c_a), veh/h	1061	899	312	1284	372	426
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.86	0.86	1.00	1.00
Uniform Delay (d), s/veh	19.6	10.4	19.0	0.0	36.3	37.7
Incr Delay (d2), s/veh	7.9	0.0	3.0	0.6	0.1	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.9	0.2	2.2	0.2	0.8	8.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.4	10.5	22.0	0.6	36.4	44.4
LnGrp LOS	C	B	C	A	D	D
Approach Vol, veh/h	906			600	336	
Approach Delay, s/veh	27.1			6.9	43.6	
Approach LOS	C			A	D	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	13.1	68.9	82.0	28.0
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.0	74.0	23.0
Max Q Clear Time (g_c+I1), s	6.5	45.0	2.0	21.3
Green Ext Time (p_c), s	0.1	4.9	2.4	0.2

Intersection Summary	
HCM 6th Ctrl Delay	23.5
HCM 6th LOS	C

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	999	521	32	439	35	328
v/c Ratio	0.74	0.43	0.10	0.30	0.23	0.76
Control Delay	12.2	2.8	4.7	6.5	48.0	16.7
Queue Delay	0.1	0.0	0.0	1.1	0.0	0.0
Total Delay	12.3	2.8	4.7	7.6	48.0	16.7
Queue Length 50th (ft)	495	3	1	14	24	0
Queue Length 95th (ft)	274	28	m16	258	41	19
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1349	1213	324	1475	500	680
Starvation Cap Reductn	0	0	0	771	0	0
Spillback Cap Reductn	13	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.43	0.10	0.62	0.07	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	719	375	23	316	0	0	0	0	25	0	236
Future Volume (vph)	0	719	375	23	316	0	0	0	0	25	0	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1810	1538	1719	1810						1719	1538
Flt Permitted		1.00	1.00	0.17	1.00						0.95	1.00
Satd. Flow (perm)		1810	1538	304	1810						1719	1538
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	0	999	521	32	439	0	0	0	0	35	0	328
RTOR Reduction (vph)	0	0	73	0	0	0	0	0	0	0	0	299
Lane Group Flow (vph)	0	999	448	32	439	0	0	0	0	0	35	29
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		79.5	79.5	89.7	89.7						9.6	9.6
Effective Green, g (s)		79.5	79.5	89.7	89.7						9.6	9.6
Actuated g/C Ratio		0.72	0.72	0.82	0.82						0.09	0.09
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1308	1111	295	1475						150	134
v/s Ratio Prot		c0.55		0.00	c0.24						c0.02	
v/s Ratio Perm			0.29	0.08								0.02
v/c Ratio		0.76	0.40	0.11	0.30						0.23	0.21
Uniform Delay, d1		9.4	6.0	8.9	2.5						46.8	46.7
Progression Factor		0.75	0.54	1.51	1.97						1.00	1.00
Incremental Delay, d2		3.6	0.9	0.1	0.5						0.8	0.8
Delay (s)		10.7	4.1	13.6	5.3						47.6	47.5
Level of Service		B	A	B	A						D	D
Approach Delay (s)		8.5			5.9			0.0			47.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	719	375	23	316	0	0	0	0	25	0	236
Future Volume (veh/h)	0	719	375	23	316	0	0	0	0	25	0	236
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1826	1826
Adj Flow Rate, veh/h	0	999	521	32	439	0				35	0	328
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72				0.72	0.72	0.72
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	1065	902	310	1224	0				404	0	359
Arrive On Green	0.00	1.00	1.00	0.06	1.00	0.00				0.23	0.00	0.23
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1739	0	1547
Grp Volume(v), veh/h	0	999	521	32	439	0				35	0	328
Grp Sat Flow(s),veh/h/ln	0	1826	1547	1739	1826	0				1739	0	1547
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0				1.7	0.0	22.7
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.8	0.0	0.0				1.7	0.0	22.7
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1065	902	310	1224	0				404	0	359
V/C Ratio(X)	0.00	0.94	0.58	0.10	0.36	0.00				0.09	0.00	0.91
Avail Cap(c_a), veh/h	0	1065	902	340	1224	0				506	0	450
HCM Platoon Ratio	1.00	2.00	2.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.64	0.64	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	7.5	0.0	0.0				33.1	0.0	41.1
Incr Delay (d2), s/veh	0.0	11.6	1.7	0.1	0.8	0.0				0.1	0.0	20.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	0.4	0.2	0.3	0.0				0.7	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	11.6	1.7	7.6	0.8	0.0				33.2	0.0	61.1
LnGrp LOS	A	B	A	A	A	A				C	A	E
Approach Vol, veh/h		1520			471						363	
Approach Delay, s/veh		8.2			1.3						58.4	
Approach LOS		A			A						E	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	9.6	70.6		29.7		80.3						
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5						
Max Green Setting (Gmax), s	5.0	55.8		* 32		67.3						
Max Q Clear Time (g_c+I1), s	2.8	2.0		24.7		2.0						
Green Ext Time (p_c), s	0.0	12.1		0.8		2.5						
Intersection Summary												
HCM 6th Ctrl Delay			14.6									
HCM 6th LOS			B									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	713	397	185	32	295	34
v/c Ratio	0.81	0.31	0.30	0.06	0.78	0.08
Control Delay	11.0	2.9	33.0	0.2	54.2	0.4
Queue Delay	0.4	0.4	0.0	0.0	0.3	0.0
Total Delay	11.4	3.4	33.0	0.2	54.5	0.4
Queue Length 50th (ft)	33	16	97	0	197	0
Queue Length 95th (ft)	101	39	137	0	189	0
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	921	1266	643	596	511	526
Starvation Cap Reductn	32	453	0	0	0	0
Spillback Cap Reductn	0	0	0	0	26	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.49	0.29	0.05	0.61	0.06

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	485	270	0	0	126	22	200	1	23	0	0	0
Future Volume (vph)	485	270	0	0	126	22	200	1	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1757	1568			
Flt Permitted	0.52	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	957	1845			1845	1568		1757	1568			
Peak-hour factor, PHF	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Adj. Flow (vph)	713	397	0	0	185	32	294	1	34	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	21	0	0	27	0	0	0
Lane Group Flow (vph)	713	397	0	0	185	11	0	295	7	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	75.5	75.5			37.3	37.3		23.8	23.8			
Effective Green, g (s)	75.5	75.5			37.3	37.3		23.8	23.8			
Actuated g/C Ratio	0.69	0.69			0.34	0.34		0.22	0.22			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	885	1266			625	531		380	339			
v/s Ratio Prot	c0.23	0.22			0.10			c0.17				
v/s Ratio Perm	c0.32					0.01			0.00			
v/c Ratio	0.81	0.31			0.30	0.02		0.78	0.02			
Uniform Delay, d1	9.9	6.9			26.7	24.2		40.6	33.9			
Progression Factor	0.43	0.31			1.00	1.00		1.00	1.00			
Incremental Delay, d2	4.0	0.5			1.2	0.1		9.6	0.0			
Delay (s)	8.3	2.6			27.9	24.3		50.2	34.0			
Level of Service	A	A			C	C		D	C			
Approach Delay (s)		6.3			27.4			48.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	485	270	0	0	126	22	200	1	23	0	0	0
Future Volume (veh/h)	485	270	0	0	126	22	200	1	23	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	713	397	0	0	185	32	294	1	34			
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	908	1317	0	0	686	582	340	1	304			
Arrive On Green	0.37	0.94	0.00	0.00	0.37	0.37	0.19	0.19	0.19			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1761	6	1572			
Grp Volume(v), veh/h	713	397	0	0	185	32	295	0	34			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1767	0	1572			
Q Serve(g_s), s	27.7	1.9	0.0	0.0	7.7	1.4	17.8	0.0	2.0			
Cycle Q Clear(g_c), s	27.7	1.9	0.0	0.0	7.7	1.4	17.8	0.0	2.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	908	1317	0	0	686	582	341	0	304			
V/C Ratio(X)	0.79	0.30	0.00	0.00	0.27	0.06	0.86	0.00	0.11			
Avail Cap(c_a), veh/h	966	1317	0	0	686	582	514	0	457			
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.59	0.59	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	10.1	1.0	0.0	0.0	24.3	22.3	43.0	0.0	36.6			
Incr Delay (d2), s/veh	2.5	0.3	0.0	0.0	1.0	0.2	9.6	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.5	0.5	0.0	0.0	3.3	0.5	8.6	0.0	0.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.5	1.3	0.0	0.0	25.2	22.5	52.6	0.0	36.8			
LnGrp LOS	B	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		1110			217			329				
Approach Delay, s/veh		8.5			24.8			50.9				
Approach LOS		A			C			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		84.5			37.4	47.2		25.5				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		67.3			34.5	26.3		32.0				
Max Q Clear Time (g_c+I1), s		3.9			29.7	9.7		19.8				
Green Ext Time (p_c), s		2.2			1.2	0.8		1.5				
Intersection Summary												
HCM 6th Ctrl Delay			19.1									
HCM 6th LOS			B									

Intersection						
Int Delay, s/veh	8.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	271	124	259	170	22
Future Vol, veh/h	23	271	124	259	170	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	40	475	218	454	298	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1208	318	337	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	890	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	201	720	1217	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	165	720	1217	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	400	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.3	2.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1217	-	165	720	-	-
HCM Lane V/C Ratio	0.179	-	0.245	0.66	-	-
HCM Control Delay (s)	8.6	-	33.7	19.2	-	-
HCM Lane LOS	A	-	D	C	-	-
HCM 95th %tile Q(veh)	0.7	-	0.9	5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	191	53	272	131	30	134
Future Vol, veh/h	191	53	272	131	30	134
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	208	58	296	142	33	146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	508	296	0	0	438	0
Stage 1	296	-	-	-	-	-
Stage 2	212	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	525	743	-	-	1122	-
Stage 1	755	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	510	743	-	-	1122	-
Mov Cap-2 Maneuver	510	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	510	743	1122	-
HCM Lane V/C Ratio	-	-	0.407	0.078	0.029	-
HCM Control Delay (s)	-	-	16.8	10.3	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	228	412	468	147	174
v/c Ratio	0.51	0.25	0.45	0.59	0.47
Control Delay	15.5	13.0	20.6	39.1	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	13.0	20.6	39.1	9.9
Queue Length 50th (ft)	44	45	67	56	0
Queue Length 95th (ft)	73	123	158	136	54
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	877	1764	1097	388	483
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.23	0.43	0.38	0.36

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	210	379	313	118	135	160
Future Volume (vph)	210	379	313	118	135	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3394		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3394		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	412	340	128	147	174
RTOR Reduction (vph)	0	0	40	0	0	149
Lane Group Flow (vph)	228	412	428	0	147	25
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	17.0	32.6	20.4		9.8	9.8
Effective Green, g (s)	17.0	32.6	20.4		9.8	9.8
Actuated g/C Ratio	0.25	0.48	0.30		0.14	0.14
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	439	1686	1012		253	226
v/s Ratio Prot	c0.13	0.12	c0.13			
v/s Ratio Perm					c0.08	0.02
v/c Ratio	0.52	0.24	0.42		0.58	0.11
Uniform Delay, d1	22.2	10.6	19.3		27.4	25.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.0	0.1		2.2	0.1
Delay (s)	22.6	10.6	19.4		29.6	25.6
Level of Service	C	B	B		C	C
Approach Delay (s)		14.9	19.4		27.4	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	21.2
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	505	70	147	493	68	43	206	116	115
v/c Ratio	0.19	0.31	0.09	0.68	0.26	0.36	0.22	0.42	0.54	0.51
Control Delay	35.4	18.7	1.1	41.2	6.5	38.5	34.8	4.4	42.7	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	18.7	1.1	41.2	6.5	38.5	34.8	4.4	42.7	36.8
Queue Length 50th (ft)	18	85	0	81	13	35	22	0	63	53
Queue Length 95th (ft)	41	174	5	139	57	62	44	18	102	93
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	267	1636	782	270	1926	374	394	534	375	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.31	0.09	0.54	0.26	0.18	0.11	0.39	0.31	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (vph)	30	439	61	128	375	54	59	37	179	146	35	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1770	3539	1544	1770	3472		1770	1863	1575	1681	1673	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	505	70	147	431	62	68	43	206	168	40	23
RTOR Reduction (vph)	0	0	41	0	8	0	0	0	154	0	12	0
Lane Group Flow (vph)	34	505	29	147	485	0	68	43	52	116	103	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Effective Green, g (s)	5.7	35.5	35.5	13.4	43.2		8.2	8.2	21.6	10.9	10.9	
Actuated g/C Ratio	0.07	0.42	0.42	0.16	0.51		0.10	0.10	0.25	0.13	0.13	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	118	1478	644	279	1764		170	179	400	215	214	
v/s Ratio Prot	0.02	c0.14		c0.08	0.14		c0.04	0.02	0.02	c0.07	0.06	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.29	0.34	0.05	0.53	0.27		0.40	0.24	0.13	0.54	0.48	
Uniform Delay, d1	37.7	16.8	14.7	32.9	11.9		36.1	35.5	24.5	34.7	34.4	
Progression Factor	1.00	1.00	1.00	0.72	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	0.4		0.6	0.3	0.1	1.3	0.6	
Delay (s)	38.2	17.4	14.8	24.5	5.3		36.7	35.8	24.5	36.0	35.0	
Level of Service	D	B	B	C	A		D	D	C	D	D	
Approach Delay (s)		18.3			9.7			28.6			35.5	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Future Volume (veh/h)	30	439	61	128	375	54	59	37	179	146	35	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	505	70	147	431	62	68	43	206	116	113	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	822	753	334	740	516	74	121	127	765	187	158	32
Arrive On Green	0.46	0.21	0.21	0.83	0.33	0.33	0.07	0.07	0.07	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1578	1781	3121	446	1781	1870	1578	1781	1506	306
Grp Volume(v), veh/h	34	505	70	147	244	249	68	43	206	116	0	136
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1790	1781	1870	1578	1781	0	1812
Q Serve(g_s), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Cycle Q Clear(g_c), s	0.9	11.1	3.1	1.4	10.8	10.9	3.1	1.9	0.0	5.3	0.0	6.2
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	822	753	334	740	294	296	121	127	765	187	0	190
V/C Ratio(X)	0.04	0.67	0.21	0.20	0.83	0.84	0.56	0.34	0.27	0.62	0.00	0.71
Avail Cap(c_a), veh/h	822	753	334	740	397	400	377	396	992	398	0	405
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.6	30.8	27.6	4.3	27.3	27.4	38.4	37.8	13.0	36.4	0.0	36.8
Incr Delay (d2), s/veh	0.0	4.7	1.4	0.0	22.4	23.2	1.5	0.6	0.1	1.2	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.1	1.3	0.5	5.5	5.6	1.4	0.9	2.2	2.3	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.6	35.5	29.1	4.4	49.7	50.6	39.9	38.4	13.1	37.7	0.0	38.7
LnGrp LOS	B	D	C	A	D	D	D	D	B	D	A	D
Approach Vol, veh/h		609			640			317			252	
Approach Delay, s/veh		33.5			39.6			22.3			38.2	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	40.3	22.0		12.9	44.2	18.1		9.8				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	18.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	3.4	13.1		8.2	2.9	12.9		5.1				
Green Ext Time (p_c), s	0.1	1.1		0.4	0.0	1.0		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			34.4									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	973	81	515	460	138	72	237
v/c Ratio	0.87	0.65	0.33	0.87	0.83	0.08	0.28
Control Delay	31.7	56.2	10.6	45.7	76.7	13.5	3.1
Queue Delay	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	56.2	10.6	45.7	76.7	13.5	3.1
Queue Length 50th (ft)	265	28	89	228	74	21	1
Queue Length 95th (ft)	#168	#104	90	#393	#171	44	38
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1121	124	1540	530	166	850	840
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	4	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.65	0.33	0.87	0.83	0.08	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	856	10	72	458	0	0	0	409	123	64	211
Future Volume (vph)	0	856	10	72	458	0	0	0	409	123	64	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3532		1770	3539				1611	1770	1863	1563
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3532		1770	3539				1611	1770	1863	1563
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	962	11	81	515	0	0	0	460	138	72	237
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	127
Lane Group Flow (vph)	0	973	0	81	515	0	0	0	460	138	72	110
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		27.0		6.0	37.0				28.0	8.0	38.8	38.8
Effective Green, g (s)		27.0		6.0	37.0				28.0	8.0	38.8	38.8
Actuated g/C Ratio		0.32		0.07	0.44				0.33	0.09	0.46	0.46
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1121		124	1540				530	166	850	713
v/s Ratio Prot		c0.28		c0.05	0.15				c0.29	c0.08	0.04	
v/s Ratio Perm												0.07
v/c Ratio		0.87		0.65	0.33				0.87	0.83	0.08	0.15
Uniform Delay, d1		27.3		38.5	15.9				26.8	37.8	13.1	13.5
Progression Factor		0.80		0.78	0.62				1.00	1.00	1.00	1.00
Incremental Delay, d2		8.9		11.6	0.6				14.0	36.2	0.2	0.5
Delay (s)		30.8		41.6	10.5				40.8	74.0	13.3	14.0
Level of Service		C		D	B				D	E	B	B
Approach Delay (s)		30.8			14.7			40.8			32.4	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	600	547	396	254	147	149	142
v/c Ratio	0.63	0.21	0.30	0.35	0.60	0.61	0.40
Control Delay	8.1	2.5	21.1	4.6	43.6	43.9	9.2
Queue Delay	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	2.8	21.1	4.6	43.6	43.9	9.2
Queue Length 50th (ft)	70	25	79	0	77	80	0
Queue Length 95th (ft)	133	48	127	53	131	133	46
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	969	2639	1313	727	514	515	582
Starvation Cap Reductn	142	1393	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.44	0.30	0.35	0.29	0.29	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	546	498	0	0	360	231	268	1	129	0	0	0
Future Volume (vph)	546	498	0	0	360	231	268	1	129	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1765	3539			3539	1532	1681	1686	1583			
Flt Permitted	0.47	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	882	3539			3539	1532	1681	1686	1583			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	600	547	0	0	396	254	295	1	142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	160	0	0	121	0	0	0
Lane Group Flow (vph)	600	547	0	0	396	94	147	149	21	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Effective Green, g (s)	63.4	63.4			31.5	31.5	12.4	12.4	12.4			
Actuated g/C Ratio	0.75	0.75			0.37	0.37	0.15	0.15	0.15			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	946	2639			1311	567	245	245	230			
v/s Ratio Prot	c0.21	0.15			0.11		0.09	c0.09				
v/s Ratio Perm	c0.27					0.06			0.01			
v/c Ratio	0.63	0.21			0.30	0.17	0.60	0.61	0.09			
Uniform Delay, d1	8.5	3.2			19.0	17.9	34.0	34.0	31.4			
Progression Factor	0.54	0.64			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.9	0.2			0.6	0.6	3.3	3.6	0.1			
Delay (s)	5.5	2.2			19.6	18.6	37.3	37.6	31.5			
Level of Service	A	A			B	B	D	D	C			
Approach Delay (s)		3.9			19.2			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	546	498	0	0	360	231	268	1	129	0	0	0
Future Volume (veh/h)	546	498	0	0	360	231	268	1	129	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	600	547	0	0	396	254	296	0	142			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1075	2730	0	0	702	303	436	0	194			
Arrive On Green	0.87	1.00	0.00	0.00	0.20	0.20	0.12	0.00	0.12			
Sat Flow, veh/h	1781	3647	0	0	3647	1532	3563	0	1585			
Grp Volume(v), veh/h	600	547	0	0	396	254	296	0	142			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1532	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	8.6	13.6	6.8	0.0	7.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	8.6	13.6	6.8	0.0	7.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1075	2730	0	0	702	303	436	0	194			
V/C Ratio(X)	0.56	0.20	0.00	0.00	0.56	0.84	0.68	0.00	0.73			
Avail Cap(c_a), veh/h	1075	2730	0	0	702	303	1090	0	485			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	2.2	0.0	0.0	0.0	30.8	32.8	35.7	0.0	36.0			
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	3.3	23.4	1.4	0.0	3.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.1	0.0	0.0	3.8	6.8	3.0	0.0	6.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.6	0.1	0.0	0.0	34.0	56.2	37.1	0.0	39.9			
LnGrp LOS	A	A	A	A	C	E	D	A	D			
Approach Vol, veh/h		1147			650			438				
Approach Delay, s/veh		1.4			42.7			38.0				
Approach LOS		A			D			D				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		69.4		15.6	48.6	20.8						
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0						
Max Green Setting (Gmax), s		* 50		* 26	28.9	16.8						
Max Q Clear Time (g_c+I1), s		2.0		9.3	2.0	15.6						
Green Ext Time (p_c), s		4.0		1.1	0.9	0.5						

Intersection Summary			
HCM 6th Ctrl Delay			20.6
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1560	96	596
v/c Ratio	0.55	0.77	0.17
Control Delay	0.8	66.2	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	66.2	0.2
Queue Length 50th (ft)	6	32	0
Queue Length 95th (ft)	3	#119	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2858	124	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	10	0	492
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.55	0.77	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1048	340	85	530	0	0
Future Volume (vph)	1048	340	85	530	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.96		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3388		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3388		1770	3539		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	1178	382	96	596	0	0
RTOR Reduction (vph)	30	0	0	0	0	0
Lane Group Flow (vph)	1530	0	96	596	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	71.0		6.0	85.0		
Effective Green, g (s)	71.0		6.0	79.8		
Actuated g/C Ratio	0.84		0.07	0.94		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2829		124	3322		
v/s Ratio Prot	c0.45		c0.05	0.17		
v/s Ratio Perm						
v/c Ratio	0.54		0.77	0.18		
Uniform Delay, d1	2.1		38.8	0.2		
Progression Factor	0.24		0.67	1.00		
Incremental Delay, d2	0.1		24.8	0.1		
Delay (s)	0.6		51.0	0.3		
Level of Service	A		D	A		
Approach Delay (s)	0.6			7.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	109	197	80	221	213
Future Vol, veh/h	43	109	197	80	221	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	45	115	207	84	233	224

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	939	249	0	0	291	0
Stage 1	249	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	292	787	-	-	1265	-
Stage 1	790	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	238	787	-	-	1265	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	790	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	4.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	238	787	1265	-
HCM Lane V/C Ratio	-	-	0.19	0.146	0.184	-
HCM Control Delay (s)	-	-	23.6	10.4	8.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	383	128	88	308	38	111	49	48	23	84	17
v/c Ratio	0.14	0.57	0.19	0.67	0.34	0.04	0.66	0.12	0.10	0.17	0.30	0.05
Control Delay	35.3	22.4	2.7	60.0	14.1	0.1	55.2	24.7	0.4	36.0	30.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	22.4	2.7	60.0	14.1	0.1	55.2	24.7	0.4	36.0	30.2	0.3
Queue Length 50th (ft)	7	131	0	35	74	0	45	14	0	9	31	0
Queue Length 95th (ft)	30	225	22	#123	177	0	#149	50	0	34	77	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	135	943	878	132	972	901	168	884	835	132	864	805
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.41	0.15	0.67	0.32	0.04	0.66	0.06	0.06	0.17	0.10	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	345	115	79	277	34	100	44	43	21	76	15
Future Volume (vph)	17	345	115	79	277	34	100	44	43	21	76	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	383	128	88	308	38	111	49	48	23	84	17
RTOR Reduction (vph)	0	0	79	0	0	21	0	0	38	0	0	15
Lane Group Flow (vph)	19	383	49	88	308	17	111	49	10	23	84	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.9	28.9	28.9	5.1	33.1	33.1	6.4	14.9	14.9	1.8	10.3	10.3
Effective Green, g (s)	0.9	28.9	28.9	5.1	33.1	33.1	6.4	14.9	14.9	1.8	10.3	10.3
Actuated g/C Ratio	0.01	0.38	0.38	0.07	0.44	0.44	0.09	0.20	0.20	0.02	0.14	0.14
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	21	715	608	120	820	696	150	369	313	42	255	211
v/s Ratio Prot	0.01	c0.21		c0.05	c0.17		c0.06	c0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.90	0.54	0.08	0.73	0.38	0.02	0.74	0.13	0.03	0.55	0.33	0.01
Uniform Delay, d1	37.1	17.9	14.7	34.4	14.1	11.9	33.6	24.8	24.3	36.3	29.3	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	153.1	1.4	0.1	21.1	0.6	0.0	15.1	0.3	0.1	7.6	1.3	0.0
Delay (s)	190.2	19.4	14.8	55.5	14.7	11.9	48.7	25.1	24.4	43.9	30.6	28.1
Level of Service	F	B	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		24.4			22.7			37.5			32.7	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	24.5
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	345	115	79	277	34	100	44	43	21	76	15
Future Volume (veh/h)	17	345	115	79	277	34	100	44	43	21	76	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	383	128	88	308	38	111	49	48	23	84	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	41	561	476	118	643	545	142	323	274	48	225	186
Arrive On Green	0.02	0.30	0.30	0.07	0.34	0.34	0.08	0.17	0.17	0.03	0.12	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Grp Volume(v), veh/h	19	383	128	88	308	38	111	49	48	23	84	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Q Serve(g_s), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Cycle Q Clear(g_c), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	41	561	476	118	643	545	142	323	274	48	225	186
V/C Ratio(X)	0.47	0.68	0.27	0.75	0.48	0.07	0.78	0.15	0.18	0.48	0.37	0.09
Avail Cap(c_a), veh/h	161	1119	949	158	1116	946	180	1050	890	158	1027	850
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	17.4	15.0	25.9	14.6	12.5	25.5	19.8	19.9	27.1	22.9	22.1
Incr Delay (d2), s/veh	9.7	3.1	0.6	13.8	1.2	0.1	12.0	0.4	0.5	2.8	1.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	1.1	1.4	2.5	0.3	1.7	0.5	0.5	0.3	1.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	20.5	15.7	39.7	15.8	12.6	37.5	20.2	20.4	29.9	24.7	22.5
LnGrp LOS	D	C	B	D	B	B	D	C	C	C	C	C
Approach Vol, veh/h		530			434			208			124	
Approach Delay, s/veh		19.9			20.3			29.5			25.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	24.1	9.8	13.6	6.6	26.5	6.8	16.6
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.0	* 34	5.7	* 31	5.1	* 34	5.0	* 32
Max Q Clear Time (g_c+I1), s	4.7	12.2	5.5	4.3	2.6	9.3	2.7	3.5
Green Ext Time (p_c), s	0.0	4.8	0.0	0.7	0.0	3.3	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	22.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	405	2	40	376	20	1	3	18	18	8	6
Future Vol, veh/h	6	405	2	40	376	20	1	3	18	18	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	418	2	41	388	21	1	3	19	19	8	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	409	0	0	420	0	0	918	921	418	912	902	388
Stage 1	-	-	-	-	-	-	430	430	-	470	470	-
Stage 2	-	-	-	-	-	-	488	491	-	442	432	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1144	-	-	1134	-	-	251	269	633	254	276	658
Stage 1	-	-	-	-	-	-	601	582	-	572	558	-
Stage 2	-	-	-	-	-	-	559	546	-	592	581	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1144	-	-	1134	-	-	235	258	633	237	265	658
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	258	-	237	265	-
Stage 1	-	-	-	-	-	-	598	579	-	569	538	-
Stage 2	-	-	-	-	-	-	526	526	-	569	578	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	12.5	18.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	235	258	633	1144	-	-	1134	-	-	237	265	658
HCM Lane V/C Ratio	0.004	0.012	0.029	0.005	-	-	0.036	-	-	0.078	0.031	0.009
HCM Control Delay (s)	20.4	19.1	10.9	8.2	-	-	8.3	-	-	21.5	19	10.5
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C	B
HCM 95th %tile Q(veh)	0	0	0.1	0	-	-	0.1	-	-	0.3	0.1	0

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	429	25	213	538	18	151
Future Vol, veh/h	429	25	213	538	18	151
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	466	27	232	585	20	164

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	493	0	1515	466
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	1049	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	132	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	337	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	103	597
Mov Cap-2 Maneuver	-	-	-	-	103	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	264	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	17
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	103	597	-	-	1071	-
HCM Lane V/C Ratio	0.19	0.275	-	-	0.216	-
HCM Control Delay (s)	48	13.3	-	-	9.3	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	1.1	-	-	0.8	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	552	78	387	735	82	277
v/c Ratio	0.75	0.12	0.67	0.52	0.33	0.39
Control Delay	26.7	4.8	14.0	7.0	35.1	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	4.8	14.0	7.0	35.1	8.9
Queue Length 50th (ft)	210	1	55	135	34	34
Queue Length 95th (ft)	361	26	164	248	81	94
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1072	943	698	1565	687	833
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.08	0.55	0.47	0.12	0.33

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	508	72	356	676	75	255
Future Volume (vph)	508	72	356	676	75	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.21	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	396	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	552	78	387	735	82	277
RTOR Reduction (vph)	0	46	0	0	0	102
Lane Group Flow (vph)	552	32	387	735	82	175
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	27.0	27.0	47.6	47.6	7.0	21.1
Effective Green, g (s)	27.0	27.0	47.6	47.6	7.0	21.1
Actuated g/C Ratio	0.40	0.40	0.70	0.70	0.10	0.31
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	744	632	565	1311	183	646
v/s Ratio Prot	0.30		c0.14	0.39	c0.05	0.06
v/s Ratio Perm		0.02	c0.34			0.05
v/c Ratio	0.74	0.05	0.68	0.56	0.45	0.27
Uniform Delay, d1	17.3	12.4	8.2	4.9	28.5	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.0	3.4	0.6	1.7	0.2
Delay (s)	21.3	12.5	11.6	5.4	30.2	17.7
Level of Service	C	B	B	A	C	B
Approach Delay (s)	20.2			7.6	20.6	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	19.5
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	508	72	356	676	75	255
Future Volume (veh/h)	508	72	356	676	75	255
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	552	78	387	735	82	277
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	651	552	470	1153	326	556
Arrive On Green	0.35	0.35	0.17	0.62	0.18	0.18
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	552	78	387	735	82	277
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	17.7	2.2	8.1	16.1	2.6	8.9
Cycle Q Clear(g_c), s	17.7	2.2	8.1	16.1	2.6	8.9
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	651	552	470	1153	326	556
V/C Ratio(X)	0.85	0.14	0.82	0.64	0.25	0.50
Avail Cap(c_a), veh/h	1000	847	664	1705	633	829
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.5	14.5	12.8	7.9	22.6	16.5
Incr Delay (d2), s/veh	4.3	0.1	5.8	0.6	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.6	2.8	3.7	1.0	3.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.8	14.6	18.5	8.4	23.0	17.2
LnGrp LOS	C	B	B	A	C	B
Approach Vol, veh/h	630			1122	359	
Approach Delay, s/veh	22.7			11.9	18.6	
Approach LOS	C			B	B	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	17.4	29.0				46.4		18.3
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	17.9	34.6				59.0		23.0
Max Q Clear Time (g_c+I1), s	10.1	19.7				18.1		10.9
Green Ext Time (p_c), s	0.7	2.9				4.9		1.0

Intersection Summary			
HCM 6th Ctrl Delay			16.3
HCM 6th LOS			B

Intersection												
Int Delay, s/veh	15.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	413	350	18	540	0	0	0	0	41	0	492
Future Vol, veh/h	0	413	350	18	540	0	0	0	0	41	0	492
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	426	361	19	557	0	0	0	0	42	0	507

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	787	0	0				1202	1382	557
Stage 1	-	-	-	-	-	-				595	595	-
Stage 2	-	-	-	-	-	-				607	787	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	832	-	0				204	144	530
Stage 1	0	-	-	-	-	0				551	492	-
Stage 2	0	-	-	-	-	0				544	403	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	832	-	-				199	0	530
Mov Cap-2 Maneuver	-	-	-	-	-	-				199	0	-
Stage 1	-	-	-	-	-	-				551	0	-
Stage 2	-	-	-	-	-	-				531	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.3	54.9
HCM LOS			F

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	832	-	199	530
HCM Lane V/C Ratio	-	-	0.022	-	0.212	0.957
HCM Control Delay (s)	-	-	9.4	-	27.9	57.1
HCM Lane LOS	-	-	A	-	D	F
HCM 95th %tile Q(veh)	-	-	0.1	-	0.8	12.4

Intersection	
Int Delay, s/veh	215.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	292	185	0	0	157	14	390	1	21	0	0	0
Future Vol, veh/h	292	185	0	0	157	14	390	1	21	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	321	203	0	0	173	15	429	1	23	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	188	0	-	-	-	0	1026	1033	203
Stage 1	-	-	-	-	-	-	845	845	-
Stage 2	-	-	-	-	-	-	181	188	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1380	-	0	0	-	-	~ 259	232	835
Stage 1	-	-	0	0	-	-	~ 420	377	-
Stage 2	-	-	0	0	-	-	848	743	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1380	-	-	-	-	-	~ 199	0	835
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 199	0	-
Stage 1	-	-	-	-	-	-	~ 322	0	-
Stage 2	-	-	-	-	-	-	848	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.1	0	$ 547.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	199	835	1380	-	-	-
HCM Lane V/C Ratio	2.159	0.028	0.233	-	-	-
HCM Control Delay (s)	$ 576.5	9.4	8.4	-	-	-
HCM Lane LOS	F	A	A	-	-	-
HCM 95th %tile Q(veh)	33.6	0.1	0.9	-	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	4.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	174	142	102	251	25
Future Vol, veh/h	21	174	142	102	251	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	193	158	113	279	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	722	293	307	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	394	746	1254	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	657	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	344	746	1254	-	-	-
Mov Cap-2 Maneuver	344	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	657	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1254	-	344	746	-	-
HCM Lane V/C Ratio	0.126	-	0.068	0.259	-	-
HCM Control Delay (s)	8.3	-	16.2	11.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	163	41	174	215	59	288
Future Vol, veh/h	163	41	174	215	59	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	177	45	189	234	64	313

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	630	189	0	0	423	0
Stage 1	189	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	446	853	-	-	1136	-
Stage 1	843	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	421	853	-	-	1136	-
Mov Cap-2 Maneuver	421	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.6	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	421	853	1136	-
HCM Lane V/C Ratio	-	-	0.421	0.052	0.056	-
HCM Control Delay (s)	-	-	19.6	9.5	8.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	2	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	222	426	728	171	207
v/c Ratio	0.80	0.21	0.55	0.58	0.47
Control Delay	46.7	9.4	16.9	34.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	9.4	16.9	34.0	9.0
Queue Length 50th (ft)	~82	25	73	47	0
Queue Length 95th (ft)	86	122	242	#173	60
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	276	2288	1593	429	541
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.19	0.46	0.40	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	211	405	485	206	162	197
Future Volume (vph)	211	405	485	206	162	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3393		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3393		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	222	426	511	217	171	207
RTOR Reduction (vph)	0	0	47	0	0	175
Lane Group Flow (vph)	222	426	681	0	171	32
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	9.2	32.4	21.8		9.6	9.6
Effective Green, g (s)	9.2	32.4	21.8		9.6	9.6
Actuated g/C Ratio	0.15	0.52	0.35		0.16	0.16
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	266	1873	1196		277	248
v/s Ratio Prot	c0.12	0.12	c0.20			
v/s Ratio Perm					c0.10	0.02
v/c Ratio	0.83	0.23	0.57		0.62	0.13
Uniform Delay, d1	25.6	7.9	16.2		24.4	22.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	18.9	0.0	0.4		2.9	0.1
Delay (s)	44.5	8.0	16.6		27.3	22.6
Level of Service	D	A	B		C	C
Approach Delay (s)		20.5	16.6		24.7	
Approach LOS		C	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	21.2
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	697	140	63	83	180	179
v/c Ratio	0.42	0.34	0.12	0.80	0.49	0.58	0.25	0.18	0.68	0.64
Control Delay	39.2	22.2	2.3	58.9	15.2	43.3	33.4	3.5	46.2	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	22.2	2.3	58.9	15.2	43.3	33.4	3.5	46.2	40.3
Queue Length 50th (ft)	47	92	0	103	72	72	31	0	96	85
Queue Length 95th (ft)	94	165	15	#199	#271	117	61	13	155	144
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	262	1357	672	252	1416	378	398	480	379	390
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.34	0.12	0.73	0.49	0.37	0.16	0.17	0.47	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (prot)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (perm)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	83	140	63	83	234	80	45
RTOR Reduction (vph)	0	0	53	0	10	0	0	0	60	0	15	0
Lane Group Flow (vph)	96	466	30	184	687	0	140	63	23	180	164	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Effective Green, g (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Actuated g/C Ratio	0.12	0.37	0.37	0.14	0.39		0.14	0.14	0.28	0.16	0.16	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	212	1311	573	252	1363		241	254	438	265	263	
v/s Ratio Prot	0.05	0.13		c0.10	c0.20		c0.08	0.03	0.01	c0.11	0.10	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.45	0.36	0.05	0.73	0.50		0.58	0.25	0.05	0.68	0.62	
Uniform Delay, d1	34.9	19.6	17.4	34.9	19.7		34.5	32.9	22.6	33.8	33.5	
Progression Factor	1.00	1.00	1.00	0.97	0.59		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	8.3	1.2		2.3	0.2	0.0	5.4	3.3	
Delay (s)	35.4	20.3	17.5	42.1	12.8		36.8	33.1	22.6	39.2	36.8	
Level of Service	D	C	B	D	B		D	C	C	D	D	
Approach Delay (s)		22.2			18.9			31.8			38.0	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	83	140	63	83	180	156	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	607	801	349	587	672	91	193	202	692	256	200	58
Arrive On Green	0.34	0.22	0.22	0.65	0.42	0.42	0.11	0.11	0.11	0.14	0.14	0.14
Sat Flow, veh/h	1795	3582	1560	1795	3170	428	1795	1885	1584	1795	1403	405
Grp Volume(v), veh/h	96	466	83	184	346	351	140	63	83	180	0	201
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1807	1795	1885	1584	1795	0	1807
Q Serve(g_s), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Cycle Q Clear(g_c), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	607	801	349	587	380	383	193	202	692	256	0	258
V/C Ratio(X)	0.16	0.58	0.24	0.31	0.91	0.92	0.73	0.31	0.12	0.70	0.00	0.78
Avail Cap(c_a), veh/h	607	801	349	587	400	404	380	399	857	401	0	404
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	29.5	27.1	10.6	23.7	23.8	36.7	35.0	14.4	34.7	0.0	35.2
Incr Delay (d2), s/veh	0.0	3.1	1.6	0.1	26.6	26.9	2.0	0.3	0.0	1.3	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.4	1.5	1.3	7.4	7.5	2.8	1.2	0.9	3.5	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	32.5	28.7	10.7	50.3	50.6	38.7	35.4	14.4	36.1	0.0	37.1
LnGrp LOS	B	C	C	B	D	D	D	D	B	D	A	D
Approach Vol, veh/h		645			881			286			381	
Approach Delay, s/veh		30.1			42.2			30.9			36.6	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	32.8	23.0		16.1	33.8	22.0		13.1				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	12.0	19.0		19.0	12.0	19.0		18.0				
Max Q Clear Time (g_c+I1), s	5.8	11.9		11.1	5.2	17.5		8.4				
Green Ext Time (p_c), s	0.1	1.3		0.6	0.0	0.5		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			36.2									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	892	146	707	284	155	203	386
v/c Ratio	0.74	0.68	0.39	0.72	0.84	0.27	0.53
Control Delay	22.1	47.6	8.8	42.0	74.2	18.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	47.6	8.8	42.0	74.2	18.5	13.3
Queue Length 50th (ft)	240	65	110	140	83	71	79
Queue Length 95th (ft)	156	141	127	#250	#187	121	162
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1203	252	1799	392	185	747	731
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.58	0.39	0.72	0.84	0.27	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	812	26	137	665	0	0	0	267	146	191	363
Future Volume (vph)	0	812	26	137	665	0	0	0	267	146	191	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3555		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3555		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	864	28	146	707	0	0	0	284	155	203	386
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	104
Lane Group Flow (vph)	0	892	0	146	707	0	0	0	284	155	203	282
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Effective Green, g (s)		28.8		10.2	42.8				20.5	8.8	33.8	33.8
Actuated g/C Ratio		0.34		0.12	0.50				0.24	0.10	0.40	0.40
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1204		214	1799				392	185	747	627
v/s Ratio Prot		c0.25		c0.08	0.20				c0.17	c0.09	0.11	
v/s Ratio Perm												0.18
v/c Ratio		0.74		0.68	0.39				0.72	0.84	0.27	0.45
Uniform Delay, d1		24.8		35.8	13.1				29.7	37.4	17.3	18.8
Progression Factor		0.70		0.89	0.62				1.00	1.00	1.00	1.00
Incremental Delay, d2		4.0		6.8	0.6				6.5	34.2	0.9	2.3
Delay (s)		21.4		38.6	8.7				36.2	71.6	18.2	21.1
Level of Service		C		D	A				D	E	B	C
Approach Delay (s)		21.4			13.8			36.2			30.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	338	528	467	155	239	235	186
v/c Ratio	0.43	0.21	0.29	0.20	0.67	0.66	0.39
Control Delay	6.9	4.0	17.9	4.4	39.6	39.0	6.4
Queue Delay	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	4.2	17.9	4.4	39.6	39.0	6.4
Queue Length 50th (ft)	51	40	84	0	124	122	0
Queue Length 95th (ft)	76	55	144	40	182	177	45
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	837	2514	1584	770	585	587	673
Starvation Cap Reductn	199	1186	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.40	0.29	0.20	0.41	0.40	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	502	0	0	444	147	446	5	177	0	0	0
Future Volume (vph)	321	502	0	0	444	147	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1782	3574			3574	1545	1698	1704	1599			
Flt Permitted	0.45	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	847	3574			3574	1545	1698	1704	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	338	528	0	0	467	155	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	86	0	0	147	0	0	0
Lane Group Flow (vph)	338	528	0	0	467	69	239	235	39	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	59.8	59.8			37.7	37.7	17.8	17.8	17.8			
Effective Green, g (s)	59.8	59.8			37.7	37.7	17.8	17.8	17.8			
Actuated g/C Ratio	0.70	0.70			0.44	0.44	0.21	0.21	0.21			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	783	2514			1585	685	355	356	334			
v/s Ratio Prot	c0.09	0.15			0.13		c0.14	0.14				
v/s Ratio Perm	c0.22					0.04			0.02			
v/c Ratio	0.43	0.21			0.29	0.10	0.67	0.66	0.12			
Uniform Delay, d1	7.4	4.4			15.1	13.8	30.9	30.8	27.2			
Progression Factor	0.60	0.74			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.2			0.5	0.3	4.5	4.1	0.1			
Delay (s)	4.6	3.4			15.6	14.1	35.4	34.9	27.3			
Level of Service	A	A			B	B	D	C	C			
Approach Delay (s)		3.9			15.2			33.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	321	502	0	0	444	147	446	5	177	0	0	0
Future Volume (veh/h)	321	502	0	0	444	147	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	338	528	0	0	467	155	473	0	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	935	2647	0	0	986	427	608	0	271			
Arrive On Green	0.82	1.00	0.00	0.00	0.28	0.28	0.17	0.00	0.17			
Sat Flow, veh/h	1795	3676	0	0	3676	1549	3591	0	1598			
Grp Volume(v), veh/h	338	528	0	0	467	155	473	0	186			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1549	1795	0	1598			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.2	6.8	10.7	0.0	9.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.2	6.8	10.7	0.0	9.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	935	2647	0	0	986	427	608	0	271			
V/C Ratio(X)	0.36	0.20	0.00	0.00	0.47	0.36	0.78	0.00	0.69			
Avail Cap(c_a), veh/h	935	2647	0	0	986	427	1238	0	551			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.0	0.0	0.0	0.0	25.7	24.8	33.8	0.0	33.2			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.6	2.4	1.6	0.0	2.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	0.1	0.0	0.0	4.0	2.7	4.7	0.0	8.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.1	0.1	0.0	0.0	27.3	27.2	35.4	0.0	35.5			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		866			622			659				
Approach Delay, s/veh		1.3			27.3			35.4				
Approach LOS		A			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		66.9		18.1	38.9	28.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 48		29.3	19.9	23.4						
Max Q Clear Time (g_c+I1), s		2.0		12.7	2.0	11.2						
Green Ext Time (p_c), s		3.1		1.7	0.4	1.9						
Intersection Summary												
HCM 6th Ctrl Delay			19.3									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1303	90	853
v/c Ratio	0.48	0.42	0.24
Control Delay	0.5	35.5	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	0.5	35.5	0.2
Queue Length 50th (ft)	4	35	0
Queue Length 95th (ft)	0	0	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2713	252	3574
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	469
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.48	0.36	0.27

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	822	403	85	802	0	0
Future Volume (vph)	822	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3370		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3370		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	874	429	90	853	0	0
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	1238	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	66.6		10.2	85.0		
Effective Green, g (s)	66.6		10.2	76.5		
Actuated g/C Ratio	0.78		0.12	0.90		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2640		214	3216		
v/s Ratio Prot	c0.37		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.47		0.42	0.27		
Uniform Delay, d1	3.1		34.7	0.6		
Progression Factor	0.06		0.87	1.00		
Incremental Delay, d2	0.1		0.5	0.0		
Delay (s)	0.3		30.6	0.6		
Level of Service	A		C	A		
Approach Delay (s)	0.3			3.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	109	197	80	221	213
Future Vol, veh/h	43	109	197	80	221	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	45	115	207	84	233	224

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	939	249	0	0	291	0
Stage 1	249	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	292	787	-	-	1265	-
Stage 1	790	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	238	787	-	-	1265	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	790	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	4.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	238	787	1265	-
HCM Lane V/C Ratio	-	-	0.19	0.146	0.184	-
HCM Control Delay (s)	-	-	23.6	10.4	8.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	383	128	88	308	38	111	49	48	23	84	17
v/c Ratio	0.12	0.45	0.16	0.38	0.30	0.04	0.48	0.10	0.09	0.15	0.29	0.05
Control Delay	41.1	24.3	3.7	40.6	16.7	0.1	42.9	26.8	0.4	41.3	35.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.1	24.3	3.7	40.6	16.7	0.1	42.9	26.8	0.4	41.3	35.7	0.3
Queue Length 50th (ft)	9	163	0	40	86	0	51	16	0	11	38	0
Queue Length 95th (ft)	34	269	30	99	194	0	118	55	0	38	89	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	152	1002	917	274	1081	979	302	1037	945	161	922	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.38	0.14	0.32	0.28	0.04	0.37	0.05	0.05	0.14	0.09	0.02

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	17	345	115	79	277	34	100	44	43	21	76	15
Future Volume (vph)	17	345	115	79	277	34	100	44	43	21	76	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1547
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	383	128	88	308	38	111	49	48	23	84	17
RTOR Reduction (vph)	0	0	77	0	0	21	0	0	39	0	0	15
Lane Group Flow (vph)	19	383	51	88	308	17	111	49	9	23	84	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.7	31.7	31.7	6.7	36.7	36.7	6.9	15.2	15.2	1.8	10.1	10.1
Effective Green, g (s)	1.7	31.7	31.7	6.7	36.7	36.7	6.9	15.2	15.2	1.8	10.1	10.1
Actuated g/C Ratio	0.02	0.40	0.40	0.08	0.46	0.46	0.09	0.19	0.19	0.02	0.13	0.13
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	37	739	628	148	855	727	152	354	301	39	235	195
v/s Ratio Prot	0.01	c0.21		c0.05	c0.17		c0.06	c0.03		0.01	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.51	0.52	0.08	0.59	0.36	0.02	0.73	0.14	0.03	0.59	0.36	0.01
Uniform Delay, d1	38.7	18.3	15.0	35.3	14.0	11.8	35.6	26.9	26.3	38.7	31.9	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	1.2	0.1	6.6	0.5	0.0	14.3	0.3	0.1	13.8	1.6	0.0
Delay (s)	52.0	19.5	15.1	41.9	14.5	11.8	49.9	27.2	26.4	52.5	33.5	30.6
Level of Service	D	B	B	D	B	B	D	C	C	D	C	C
Approach Delay (s)		19.6			19.9			39.2			36.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	79.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	345	115	79	277	34	100	44	43	21	76	15
Future Volume (veh/h)	17	345	115	79	277	34	100	44	43	21	76	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	19	383	128	88	308	38	111	49	48	23	84	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	41	562	476	118	643	545	143	324	275	48	224	186
Arrive On Green	0.02	0.30	0.30	0.07	0.34	0.34	0.08	0.17	0.17	0.03	0.12	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Grp Volume(v), veh/h	19	383	128	88	308	38	111	49	48	23	84	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1549
Q Serve(g_s), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Cycle Q Clear(g_c), s	0.6	10.2	3.5	2.7	7.3	0.9	3.5	1.3	1.5	0.7	2.3	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	41	562	476	118	643	545	143	324	275	48	224	186
V/C Ratio(X)	0.47	0.68	0.27	0.75	0.48	0.07	0.78	0.15	0.17	0.48	0.37	0.09
Avail Cap(c_a), veh/h	170	1128	956	306	1270	1076	337	1191	1009	180	1025	849
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	17.4	15.1	25.9	14.6	12.5	25.5	19.8	19.9	27.1	22.9	22.1
Incr Delay (d2), s/veh	9.7	3.1	0.6	10.7	1.2	0.1	3.4	0.4	0.5	2.8	1.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	1.1	1.3	2.5	0.3	1.4	0.5	0.5	0.3	1.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	20.5	15.7	36.6	15.8	12.6	28.9	20.2	20.4	29.9	24.7	22.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		530			434			208			124	
Approach Delay, s/veh		19.9			19.7			24.9			25.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	24.1	9.8	13.6	6.6	26.5	6.8	16.6
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	9.7	* 34	10.7	* 31	5.4	* 38	5.7	* 36
Max Q Clear Time (g_c+I1), s	4.7	12.2	5.5	4.3	2.6	9.3	2.7	3.5
Green Ext Time (p_c), s	0.1	4.8	0.0	0.7	0.0	3.5	0.0	0.6

Intersection Summary		
HCM 6th Ctrl Delay		21.2
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	405	2	40	376	20	1	3	18	18	8	6
Future Vol, veh/h	6	405	2	40	376	20	1	3	18	18	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	418	2	41	388	21	1	3	19	19	8	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	409	0	0	420	0	0	918	921	418	912	902	388
Stage 1	-	-	-	-	-	-	430	430	-	470	470	-
Stage 2	-	-	-	-	-	-	488	491	-	442	432	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1144	-	-	1134	-	-	251	269	633	254	276	658
Stage 1	-	-	-	-	-	-	601	582	-	572	558	-
Stage 2	-	-	-	-	-	-	559	546	-	592	581	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1144	-	-	1134	-	-	235	258	633	237	265	658
Mov Cap-2 Maneuver	-	-	-	-	-	-	235	258	-	237	265	-
Stage 1	-	-	-	-	-	-	598	579	-	569	538	-
Stage 2	-	-	-	-	-	-	526	526	-	569	578	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	12.5	18.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	235	258	633	1144	-	-	1134	-	-	237	265	658
HCM Lane V/C Ratio	0.004	0.012	0.029	0.005	-	-	0.036	-	-	0.078	0.031	0.009
HCM Control Delay (s)	20.4	19.1	10.9	8.2	-	-	8.3	-	-	21.5	19	10.5
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C	B
HCM 95th %tile Q(veh)	0	0	0.1	0	-	-	0.1	-	-	0.3	0.1	0

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	429	25	213	538	18	151
Future Vol, veh/h	429	25	213	538	18	151
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	466	27	232	585	20	164

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	493	0	1515	466
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	1049	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	132	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	337	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	103	597
Mov Cap-2 Maneuver	-	-	-	-	103	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	264	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	17
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	103	597	-	-	1071	-
HCM Lane V/C Ratio	0.19	0.275	-	-	0.216	-
HCM Control Delay (s)	48	13.3	-	-	9.3	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	1.1	-	-	0.8	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	552	78	387	735	82	277
v/c Ratio	0.51	0.08	0.57	0.48	0.49	0.45
Control Delay	18.7	4.5	6.9	2.8	56.4	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	4.5	6.9	2.8	56.4	10.2
Queue Length 50th (ft)	236	2	28	86	56	41
Queue Length 95th (ft)	409	28	106	151	102	95
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1077	946	716	1531	370	655
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.08	0.54	0.48	0.22	0.42

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	508	72	356	676	75	255
Future Volume (vph)	508	72	356	676	75	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.32	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	591	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	552	78	387	735	82	277
RTOR Reduction (vph)	0	31	0	0	0	144
Lane Group Flow (vph)	552	47	387	735	82	133
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	62.3	62.3	87.8	87.8	9.2	28.2
Effective Green, g (s)	62.3	62.3	87.8	87.8	9.2	28.2
Actuated g/C Ratio	0.57	0.57	0.80	0.80	0.08	0.26
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1055	896	675	1487	148	499
v/s Ratio Prot	0.30		c0.10	0.39	c0.05	0.05
v/s Ratio Perm		0.03	c0.36			0.04
v/c Ratio	0.52	0.05	0.57	0.49	0.55	0.27
Uniform Delay, d1	14.7	10.7	6.6	3.7	48.4	32.6
Progression Factor	1.00	1.00	1.19	0.43	1.00	1.00
Incremental Delay, d2	1.9	0.1	1.0	1.0	4.4	0.3
Delay (s)	16.6	10.8	8.8	2.6	52.9	32.9
Level of Service	B	B	A	A	D	C
Approach Delay (s)	15.8			4.8	37.5	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	508	72	356	676	75	255
Future Volume (veh/h)	508	72	356	676	75	255
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	552	78	387	735	82	277
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	972	824	555	1330	304	480
Arrive On Green	0.52	0.52	0.26	1.00	0.17	0.17
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	552	78	387	735	82	277
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	22.1	2.7	11.8	0.0	4.4	16.2
Cycle Q Clear(g_c), s	22.1	2.7	11.8	0.0	4.4	16.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	972	824	555	1330	304	480
V/C Ratio(X)	0.57	0.09	0.70	0.55	0.27	0.58
Avail Cap(c_a), veh/h	972	824	667	1330	372	541
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.71	0.71	1.00	1.00
Uniform Delay (d), s/veh	18.0	13.3	10.5	0.0	39.6	32.4
Incr Delay (d2), s/veh	2.4	0.2	1.8	1.2	0.5	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	0.9	2.7	0.4	2.0	6.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.4	13.6	12.3	1.2	40.1	33.6
LnGrp LOS	C	B	B	A	D	C
Approach Vol, veh/h	630			1122	359	
Approach Delay, s/veh	19.5			5.0	35.1	
Approach LOS	B			A	D	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	21.0	63.7				84.7		25.3
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	21.5	46.0				74.0		23.0
Max Q Clear Time (g_c+I1), s	13.8	24.1				2.0		18.2
Green Ext Time (p_c), s	0.7	3.2				5.0		0.5

Intersection Summary		
HCM 6th Ctrl Delay		14.5
HCM 6th LOS		B

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	426	361	19	557	42	507
v/c Ratio	0.38	0.33	0.03	0.46	0.10	0.87
Control Delay	11.0	1.5	5.6	7.9	27.4	34.0
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	11.0	1.5	5.6	8.3	27.4	34.0
Queue Length 50th (ft)	83	0	3	98	23	183
Queue Length 95th (ft)	172	16	m8	319	43	273
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1126	1093	548	1215	720	794
Starvation Cap Reductn	0	0	0	230	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.33	0.03	0.57	0.06	0.64

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	413	350	18	540	0	0	0	0	41	0	492
Future Volume (vph)	0	413	350	18	540	0	0	0	0	41	0	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1770	1583
Flt Permitted		1.00	1.00	0.40	1.00						0.95	1.00
Satd. Flow (perm)		1863	1583	754	1863						1770	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	426	361	19	557	0	0	0	0	42	0	507
RTOR Reduction (vph)	0	0	148	0	0	0	0	0	0	0	0	189
Lane Group Flow (vph)	0	426	213	19	557	0	0	0	0	0	42	318
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		62.6	62.6	71.8	71.8						27.5	27.5
Effective Green, g (s)		62.6	62.6	71.8	71.8						27.5	27.5
Actuated g/C Ratio		0.57	0.57	0.65	0.65						0.25	0.25
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1060	900	517	1216						442	395
v/s Ratio Prot		0.23		0.00	c0.30						0.02	
v/s Ratio Perm			0.13	0.02								c0.20
v/c Ratio		0.40	0.24	0.04	0.46						0.10	0.81
Uniform Delay, d1		13.2	11.8	7.7	9.5						31.7	38.7
Progression Factor		0.66	0.30	0.54	0.57						1.00	1.00
Incremental Delay, d2		1.0	0.6	0.0	1.1						0.1	11.3
Delay (s)		9.7	4.1	4.2	6.5						31.8	50.1
Level of Service		A	A	A	A						C	D
Approach Delay (s)		7.1			6.4			0.0			48.7	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	413	350	18	540	0	0	0	0	41	0	492
Future Volume (veh/h)	0	413	350	18	540	0	0	0	0	41	0	492
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	426	361	19	557	0				42	0	507
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	901	764	328	1049	0				609	0	542
Arrive On Green	0.00	0.48	0.48	0.04	1.00	0.00				0.34	0.00	0.34
Sat Flow, veh/h	0	1870	1585	1781	1870	0				1781	0	1585
Grp Volume(v), veh/h	0	426	361	19	557	0				42	0	507
Grp Sat Flow(s),veh/h/ln	0	1870	1585	1781	1870	0				1781	0	1585
Q Serve(g_s), s	0.0	16.8	16.8	0.6	0.0	0.0				1.7	0.0	34.1
Cycle Q Clear(g_c), s	0.0	16.8	16.8	0.6	0.0	0.0				1.7	0.0	34.1
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	901	764	328	1049	0				609	0	542
V/C Ratio(X)	0.00	0.47	0.47	0.06	0.53	0.00				0.07	0.00	0.94
Avail Cap(c_a), veh/h	0	901	764	381	1049	0				725	0	646
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.86	0.86	0.98	0.98	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	19.1	19.1	14.2	0.0	0.0				24.4	0.0	35.0
Incr Delay (d2), s/veh	0.0	1.5	1.8	0.1	1.9	0.0				0.0	0.0	19.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	6.9	5.9	0.2	0.5	0.0				0.7	0.0	15.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	20.6	20.9	14.2	1.9	0.0				24.5	0.0	54.4
LnGrp LOS	A	C	C	B	A	A				C	A	D
Approach Vol, veh/h		787			576						549	
Approach Delay, s/veh		20.8			2.3						52.1	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.7	59.5		41.8		68.2
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5
Max Green Setting (Gmax), s	5.5	42.5		* 45		54.5
Max Q Clear Time (g_c+I1), s	2.6	18.8		36.1		2.0
Green Ext Time (p_c), s	0.0	3.5		1.5		3.3

Intersection Summary	
HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	321	203	173	15	430	23
v/c Ratio	0.44	0.18	0.24	0.02	0.82	0.04
Control Delay	17.1	13.3	27.0	0.1	48.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	17.1	13.3	27.0	0.1	48.2	0.1
Queue Length 50th (ft)	134	79	79	0	281	0
Queue Length 95th (ft)	291	160	169	0	354	0
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	758	1112	743	676	699	683
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	15	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.18	0.23	0.02	0.63	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	185	0	0	157	14	390	1	21	0	0	0
Future Volume (vph)	292	185	0	0	157	14	390	1	21	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1757	1568			
Flt Permitted	0.56	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1028	1845			1845	1568		1757	1568			
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	321	203	0	0	173	15	429	1	23	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	0	16	0	0	0
Lane Group Flow (vph)	321	203	0	0	173	6	0	430	7	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	66.3	66.3			43.8	43.8		33.0	33.0			
Effective Green, g (s)	66.3	66.3			43.8	43.8		33.0	33.0			
Actuated g/C Ratio	0.60	0.60			0.40	0.40		0.30	0.30			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	724	1112			734	624		527	470			
v/s Ratio Prot	c0.06	0.11			0.09			c0.24				
v/s Ratio Perm	c0.20					0.00			0.00			
v/c Ratio	0.44	0.18			0.24	0.01		0.82	0.01			
Uniform Delay, d1	10.9	9.8			22.0	20.0		35.7	27.1			
Progression Factor	1.24	1.15			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.4	0.3			0.8	0.0		9.5	0.0			
Delay (s)	14.0	11.5			22.7	20.0		45.1	27.1			
Level of Service	B	B			C	C		D	C			
Approach Delay (s)		13.0			22.5			44.2			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	292	185	0	0	157	14	390	1	21	0	0	0
Future Volume (veh/h)	292	185	0	0	157	14	390	1	21	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	321	203	0	0	173	15	429	1	23			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	738	1165	0	0	851	721	484	1	432			
Arrive On Green	0.04	0.21	0.00	0.00	0.46	0.46	0.27	0.27	0.27			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1763	4	1572			
Grp Volume(v), veh/h	321	203	0	0	173	15	430	0	23			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1767	0	1572			
Q Serve(g_s), s	9.5	9.9	0.0	0.0	6.1	0.6	25.7	0.0	1.2			
Cycle Q Clear(g_c), s	9.5	9.9	0.0	0.0	6.1	0.6	25.7	0.0	1.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	738	1165	0	0	851	721	486	0	432			
V/C Ratio(X)	0.43	0.17	0.00	0.00	0.20	0.02	0.89	0.00	0.05			
Avail Cap(c_a), veh/h	873	1165	0	0	851	721	704	0	626			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.93	0.93	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	12.7	20.1	0.0	0.0	17.8	16.3	38.2	0.0	29.4			
Incr Delay (d2), s/veh	0.4	0.3	0.0	0.0	0.5	0.1	9.4	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.8	4.3	0.0	0.0	2.5	0.2	12.2	0.0	0.5			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.1	20.4	0.0	0.0	18.3	16.3	47.7	0.0	29.4			
LnGrp LOS	B	C	A	A	B	B	D	A	C			
Approach Vol, veh/h		524			188			453				
Approach Delay, s/veh		16.0			18.2			46.8				
Approach LOS		B			B			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		75.6			18.6	57.0		34.4				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		55.5			20.5	28.5		43.8				
Max Q Clear Time (g_c+I1), s		11.9			11.5	8.1		27.7				
Green Ext Time (p_c), s		1.0			0.6	0.7		2.6				
Intersection Summary												
HCM 6th Ctrl Delay			28.3									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	174	142	102	251	25
Future Vol, veh/h	21	174	142	102	251	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	193	158	113	279	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	722	293	307	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	394	746	1254	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	657	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	344	746	1254	-	-	-
Mov Cap-2 Maneuver	344	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	657	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	4.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1254	-	344	746	-	-
HCM Lane V/C Ratio	0.126	-	0.068	0.259	-	-
HCM Control Delay (s)	8.3	-	16.2	11.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	1	-	-

Intersection						
Int Delay, s/veh	4.3					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	163	41	174	215	59	288
Future Vol, veh/h	163	41	174	215	59	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	177	45	189	234	64	313

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	630	189	0	0	423	0
Stage 1	189	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	446	853	-	-	1136	-
Stage 1	843	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	421	853	-	-	1136	-
Mov Cap-2 Maneuver	421	-	-	-	-	-
Stage 1	843	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.6	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	421	853	1136	-
HCM Lane V/C Ratio	-	-	0.421	0.052	0.056	-
HCM Control Delay (s)	-	-	19.6	9.5	8.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	2	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	222	426	728	171	207
v/c Ratio	0.53	0.25	0.66	0.64	0.50
Control Delay	18.4	13.1	23.4	41.8	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	13.1	23.4	41.8	9.8
Queue Length 50th (ft)	43	48	116	64	0
Queue Length 95th (ft)	94	124	249	#172	62
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	835	2060	1447	373	497
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.21	0.50	0.46	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	211	405	485	206	162	197
Future Volume (vph)	211	405	485	206	162	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3392		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3392		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	222	426	511	217	171	207
RTOR Reduction (vph)	0	0	48	0	0	176
Lane Group Flow (vph)	222	426	680	0	171	31
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	16.1	33.0	21.8		10.4	10.4
Effective Green, g (s)	16.1	33.0	21.8		10.4	10.4
Actuated g/C Ratio	0.23	0.47	0.31		0.15	0.15
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	413	1697	1063		267	239
v/s Ratio Prot	c0.12	0.12	c0.20			
v/s Ratio Perm					c0.10	0.02
v/c Ratio	0.54	0.25	0.64		0.64	0.13
Uniform Delay, d1	23.4	10.9	20.5		27.8	25.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.0	0.9		3.9	0.1
Delay (s)	24.1	10.9	21.4		31.7	25.7
Level of Service	C	B	C		C	C
Approach Delay (s)		15.4	21.4		28.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	69.5	Sum of lost time (s)	21.2
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	466	83	184	697	140	63	83	180	179
v/c Ratio	0.42	0.34	0.12	0.80	0.49	0.58	0.25	0.18	0.68	0.64
Control Delay	39.2	22.2	2.3	58.4	15.2	43.3	33.4	3.5	46.2	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	22.2	2.3	58.4	15.2	43.3	33.4	3.5	46.2	40.3
Queue Length 50th (ft)	47	92	0	103	73	72	31	0	96	85
Queue Length 95th (ft)	94	165	15	#198	#270	117	61	13	155	144
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	262	1357	672	252	1416	378	398	480	379	390
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.34	0.12	0.73	0.49	0.37	0.16	0.17	0.47	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (vph)	94	457	81	180	602	81	137	62	81	229	78	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (prot)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.99	
Satd. Flow (perm)	1787	3574	1562	1787	3501		1787	1881	1586	1698	1686	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	96	466	83	184	614	83	140	63	83	234	80	45
RTOR Reduction (vph)	0	0	53	0	10	0	0	0	60	0	15	0
Lane Group Flow (vph)	96	466	30	184	687	0	140	63	23	180	164	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Effective Green, g (s)	10.1	31.2	31.2	12.0	33.1		11.5	11.5	23.5	13.3	13.3	
Actuated g/C Ratio	0.12	0.37	0.37	0.14	0.39		0.14	0.14	0.28	0.16	0.16	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	212	1311	573	252	1363		241	254	438	265	263	
v/s Ratio Prot	0.05	0.13		c0.10	c0.20		c0.08	0.03	0.01	c0.11	0.10	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.45	0.36	0.05	0.73	0.50		0.58	0.25	0.05	0.68	0.62	
Uniform Delay, d1	34.9	19.6	17.4	34.9	19.7		34.5	32.9	22.6	33.8	33.5	
Progression Factor	1.00	1.00	1.00	0.96	0.59		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.2	8.3	1.2		2.3	0.2	0.0	5.4	3.3	
Delay (s)	35.4	20.3	17.5	41.7	12.8		36.8	33.1	22.6	39.2	36.8	
Level of Service	D	C	B	D	B		D	C	C	D	D	
Approach Delay (s)		22.2			18.8			31.8			38.0	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Future Volume (veh/h)	94	457	81	180	602	81	137	62	81	229	78	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	96	466	83	184	614	83	140	63	83	180	156	45
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	607	801	349	587	672	91	193	202	692	256	200	58
Arrive On Green	0.34	0.22	0.22	0.65	0.42	0.42	0.11	0.11	0.11	0.14	0.14	0.14
Sat Flow, veh/h	1795	3582	1560	1795	3170	428	1795	1885	1584	1795	1403	405
Grp Volume(v), veh/h	96	466	83	184	346	351	140	63	83	180	0	201
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1807	1795	1885	1584	1795	0	1807
Q Serve(g_s), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Cycle Q Clear(g_c), s	3.2	9.9	3.7	3.8	15.4	15.5	6.4	2.6	0.0	8.1	0.0	9.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	607	801	349	587	380	383	193	202	692	256	0	258
V/C Ratio(X)	0.16	0.58	0.24	0.31	0.91	0.92	0.73	0.31	0.12	0.70	0.00	0.78
Avail Cap(c_a), veh/h	607	801	349	587	400	404	380	399	857	401	0	404
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	29.5	27.1	10.6	23.7	23.8	36.7	35.0	14.4	34.7	0.0	35.2
Incr Delay (d2), s/veh	0.0	3.1	1.6	0.1	26.6	26.9	2.0	0.3	0.0	1.3	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.4	1.5	1.3	7.4	7.5	2.8	1.2	0.9	3.5	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	32.5	28.7	10.7	50.3	50.6	38.7	35.4	14.4	36.1	0.0	37.1
LnGrp LOS	B	C	C	B	D	D	D	D	B	D	A	D
Approach Vol, veh/h		645			881			286			381	
Approach Delay, s/veh		30.1			42.2			30.9			36.6	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.8	23.0		16.1	33.8	22.0		13.1
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0
Max Green Setting (Gmax), s	12.0	19.0		19.0	12.0	19.0		18.0
Max Q Clear Time (g_c+I1), s	5.8	11.9		11.1	5.2	17.5		8.4
Green Ext Time (p_c), s	0.1	1.3		0.6	0.0	0.5		0.4

Intersection Summary			
HCM 6th Ctrl Delay			36.2
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	892	146	707	284	155	203	386
v/c Ratio	0.77	0.68	0.40	0.76	0.68	0.26	0.52
Control Delay	24.1	48.0	8.8	45.7	52.3	17.8	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	48.0	8.8	45.7	52.3	17.8	13.2
Queue Length 50th (ft)	243	68	111	142	80	70	81
Queue Length 95th (ft)	#158	141	129	#261	#164	118	162
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1162	252	1757	373	227	770	743
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.58	0.40	0.76	0.68	0.26	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	812	26	137	665	0	0	0	267	146	191	363
Future Volume (vph)	0	812	26	137	665	0	0	0	267	146	191	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3555		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3555		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	864	28	146	707	0	0	0	284	155	203	386
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	0	892	0	146	707	0	0	0	284	155	203	289
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		27.8		10.2	41.8				19.5	10.8	34.8	34.8
Effective Green, g (s)		27.8		10.2	41.8				19.5	10.8	34.8	34.8
Actuated g/C Ratio		0.33		0.12	0.49				0.23	0.13	0.41	0.41
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1162		214	1757				373	227	770	646
v/s Ratio Prot		c0.25		c0.08	0.20				c0.17	c0.09	0.11	
v/s Ratio Perm												0.18
v/c Ratio		0.77		0.68	0.40				0.76	0.68	0.26	0.45
Uniform Delay, d1		25.7		35.8	13.7				30.6	35.5	16.6	18.1
Progression Factor		0.71		0.90	0.59				1.00	1.00	1.00	1.00
Incremental Delay, d2		4.7		6.8	0.7				8.9	15.4	0.8	2.2
Delay (s)		23.1		39.0	8.7				39.5	50.9	17.5	20.4
Level of Service		C		D	A				D	D	B	C
Approach Delay (s)		23.1			13.9			39.5			25.9	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	338	528	467	155	239	235	186
v/c Ratio	0.44	0.21	0.29	0.20	0.67	0.66	0.39
Control Delay	6.5	3.6	17.4	4.3	39.6	39.0	6.4
Queue Delay	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	3.8	17.4	4.3	39.6	39.0	6.4
Queue Length 50th (ft)	45	34	84	0	124	122	0
Queue Length 95th (ft)	76	56	141	39	182	177	45
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	822	2514	1603	778	585	587	673
Starvation Cap Reductn	196	1178	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.40	0.29	0.20	0.41	0.40	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	502	0	0	444	147	446	5	177	0	0	0
Future Volume (vph)	321	502	0	0	444	147	446	5	177	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1782	3574			3574	1545	1698	1704	1599			
Flt Permitted	0.45	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	849	3574			3574	1545	1698	1704	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	338	528	0	0	467	155	469	5	186	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	86	0	0	147	0	0	0
Lane Group Flow (vph)	338	528	0	0	467	69	239	235	39	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	59.8	59.8			38.1	38.1	17.8	17.8	17.8			
Effective Green, g (s)	59.8	59.8			38.1	38.1	17.8	17.8	17.8			
Actuated g/C Ratio	0.70	0.70			0.45	0.45	0.21	0.21	0.21			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	780	2514			1601	692	355	356	334			
v/s Ratio Prot	c0.09	0.15			0.13		c0.14	0.14				
v/s Ratio Perm	c0.22					0.04			0.02			
v/c Ratio	0.43	0.21			0.29	0.10	0.67	0.66	0.12			
Uniform Delay, d1	7.4	4.4			14.9	13.5	30.9	30.8	27.2			
Progression Factor	0.55	0.67			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.2			0.5	0.3	4.5	4.1	0.1			
Delay (s)	4.2	3.1			15.3	13.8	35.4	34.9	27.3			
Level of Service	A	A			B	B	D	C	C			
Approach Delay (s)		3.5			15.0			33.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	321	502	0	0	444	147	446	5	177	0	0	0
Future Volume (veh/h)	321	502	0	0	444	147	446	5	177	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	338	528	0	0	467	155	473	0	186			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	925	2647	0	0	1028	445	608	0	271			
Arrive On Green	0.80	1.00	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1795	3676	0	0	3676	1550	3591	0	1598			
Grp Volume(v), veh/h	338	528	0	0	467	155	473	0	186			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1550	1795	0	1598			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.1	6.7	10.7	0.0	9.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.1	6.7	10.7	0.0	9.3			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	925	2647	0	0	1028	445	608	0	271			
V/C Ratio(X)	0.37	0.20	0.00	0.00	0.45	0.35	0.78	0.00	0.69			
Avail Cap(c_a), veh/h	925	2647	0	0	1028	445	1238	0	551			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.87	0.87	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.3	0.0	0.0	0.0	24.8	24.0	33.8	0.0	33.2			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	1.4	2.1	1.6	0.0	2.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.0	0.1	0.0	0.0	3.9	2.6	4.7	0.0	8.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.4	0.1	0.0	0.0	26.3	26.1	35.4	0.0	35.5			
LnGrp LOS	A	A	A	A	C	C	D	A	D			
Approach Vol, veh/h		866			622			659				
Approach Delay, s/veh		1.4			26.3			35.4				
Approach LOS		A			C			D				

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	66.9	18.1	37.9	29.0
Change Period (Y+Rc), s	* 4.1	3.7	4.1	4.6
Max Green Setting (Gmax), s	* 48	29.3	18.9	24.4
Max Q Clear Time (g_c+I1), s	2.0	12.7	2.0	11.1
Green Ext Time (p_c), s	3.1	1.7	0.4	1.9

Intersection Summary	
HCM 6th Ctrl Delay	19.1
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	1303	90	853
v/c Ratio	0.48	0.42	0.24
Control Delay	0.6	35.8	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	35.8	0.2
Queue Length 50th (ft)	3	37	0
Queue Length 95th (ft)	0	0	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2713	252	3574
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	755
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.48	0.36	0.30

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	822	403	85	802	0	0
Future Volume (vph)	822	403	85	802	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.95		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3370		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3370		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	874	429	90	853	0	0
RTOR Reduction (vph)	65	0	0	0	0	0
Lane Group Flow (vph)	1238	0	90	853	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	66.6		10.2	85.0		
Effective Green, g (s)	66.6		10.2	76.5		
Actuated g/C Ratio	0.78		0.12	0.90		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2640		214	3216		
v/s Ratio Prot	c0.37		c0.05	0.24		
v/s Ratio Perm						
v/c Ratio	0.47		0.42	0.27		
Uniform Delay, d1	3.1		34.7	0.6		
Progression Factor	0.09		0.88	1.00		
Incremental Delay, d2	0.1		0.5	0.0		
Delay (s)	0.4		31.0	0.6		
Level of Service	A		C	A		
Approach Delay (s)	0.4			3.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	88	188	210	74	144	160
Future Vol, veh/h	88	188	210	74	144	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8
Mvmt Flow	96	204	228	80	157	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	756	268	0	0	308	0
Stage 1	268	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Critical Hdwy	6.48	6.28	-	-	4.18	-
Critical Hdwy Stg 1	5.48	-	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-	-
Follow-up Hdwy	3.572	3.372	-	-	2.272	-
Pot Cap-1 Maneuver	367	756	-	-	1219	-
Stage 1	763	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	320	756	-	-	1219	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	527	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	14.5		0		4	
HCM LOS	B					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	320	756	1219	-
HCM Lane V/C Ratio	-	-	0.299	0.27	0.128	-
HCM Control Delay (s)	-	-	21	11.5	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	1.1	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	501	59	43	400	20	117	109	141	37	65	22
v/c Ratio	0.14	0.69	0.08	0.29	0.51	0.03	0.50	0.26	0.31	0.24	0.24	0.06
Control Delay	43.1	25.9	0.2	45.5	20.1	0.1	43.3	31.6	8.7	43.6	37.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	25.9	0.2	45.5	20.1	0.1	43.3	31.6	8.7	43.6	37.3	0.3
Queue Length 50th (ft)	11	216	0	21	120	0	57	50	1	18	31	0
Queue Length 95th (ft)	38	357	0	62	269	0	126	108	51	54	76	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	153	1104	992	150	1107	1013	336	1028	934	180	864	833
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.45	0.06	0.29	0.36	0.02	0.35	0.11	0.15	0.21	0.08	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	461	54	40	368	18	108	100	130	34	60	20
Future Volume (vph)	20	461	54	40	368	18	108	100	130	34	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	1810	1506	1719	1810	1538	1719	1810	1538	1719	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	501	59	43	400	20	117	109	141	37	65	22
RTOR Reduction (vph)	0	0	36	0	0	12	0	0	109	0	0	19
Lane Group Flow (vph)	22	501	23	43	400	8	117	109	32	37	65	3
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.8	30.6	30.6	2.8	31.6	31.6	7.9	16.7	16.7	3.3	12.1	12.1
Effective Green, g (s)	1.8	30.6	30.6	2.8	31.6	31.6	7.9	16.7	16.7	3.3	12.1	12.1
Actuated g/C Ratio	0.02	0.39	0.39	0.04	0.41	0.41	0.10	0.21	0.21	0.04	0.16	0.16
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	39	710	591	61	734	623	174	388	329	72	281	238
v/s Ratio Prot	0.01	c0.28		c0.03	0.22		c0.07	c0.06		0.02	0.04	
v/s Ratio Perm			0.02			0.01			0.02			0.00
v/c Ratio	0.56	0.71	0.04	0.70	0.54	0.01	0.67	0.28	0.10	0.51	0.23	0.01
Uniform Delay, d1	37.7	19.9	14.6	37.1	17.7	13.8	33.8	25.6	24.5	36.5	28.8	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.8	4.0	0.1	31.8	1.5	0.0	7.8	0.7	0.2	2.6	0.7	0.0
Delay (s)	56.4	23.9	14.6	69.0	19.1	13.8	41.5	26.3	24.8	39.1	29.6	27.9
Level of Service	E	C	B	E	B	B	D	C	C	D	C	C
Approach Delay (s)		24.2			23.5			30.6			32.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	77.9	Sum of lost time (s)	24.5
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	461	54	40	368	18	108	100	130	34	60	20
Future Volume (veh/h)	20	461	54	40	368	18	108	100	130	34	60	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	22	501	59	43	400	20	117	109	141	37	65	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	44	671	556	73	701	594	149	292	248	66	205	173
Arrive On Green	0.03	0.37	0.37	0.04	0.38	0.38	0.09	0.16	0.16	0.04	0.11	0.11
Sat Flow, veh/h	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Grp Volume(v), veh/h	22	501	59	43	400	20	117	109	141	37	65	22
Grp Sat Flow(s),veh/h/ln	1739	1826	1515	1739	1826	1547	1739	1826	1547	1739	1826	1547
Q Serve(g_s), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.3	1.3	2.0	0.8
Cycle Q Clear(g_c), s	0.8	14.9	1.6	1.5	10.8	0.5	4.1	3.3	5.3	1.3	2.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	671	556	73	701	594	149	292	248	66	205	173
V/C Ratio(X)	0.50	0.75	0.11	0.59	0.57	0.03	0.78	0.37	0.57	0.56	0.32	0.13
Avail Cap(c_a), veh/h	162	1203	998	159	1200	1017	354	1080	915	189	907	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	17.2	13.0	29.4	15.2	12.0	27.9	23.4	24.2	29.5	25.5	25.0
Incr Delay (d2), s/veh	10.1	3.6	0.2	8.7	1.6	0.0	3.4	1.4	3.5	2.8	1.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.4	0.5	0.7	3.7	0.1	1.6	1.3	1.9	0.5	0.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	20.8	13.2	38.1	16.7	12.0	31.3	24.8	27.7	32.3	27.0	25.5
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		582			463			367			124	
Approach Delay, s/veh		20.7			18.5			28.0			28.3	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	30.0	10.7	13.8	6.9	31.1	7.7	16.8
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	5.7	* 41	12.7	* 31	5.8	* 41	6.8	* 37
Max Q Clear Time (g_c+I1), s	3.5	16.9	6.1	4.0	2.8	12.8	3.3	7.3
Green Ext Time (p_c), s	0.0	6.0	0.1	0.5	0.0	4.6	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	585	20	43	396	28	10	10	147	24	20	20
Future Vol, veh/h	20	585	20	43	396	28	10	10	147	24	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	22	636	22	47	430	30	11	11	160	26	22	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	460	0	0	658	0	0	1241	1234	636	1301	1226	430
Stage 1	-	-	-	-	-	-	680	680	-	524	524	-
Stage 2	-	-	-	-	-	-	561	554	-	777	702	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1085	-	-	916	-	-	150	174	472	136	176	619
Stage 1	-	-	-	-	-	-	436	446	-	531	525	-
Stage 2	-	-	-	-	-	-	507	509	-	385	436	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1085	-	-	916	-	-	123	162	472	81	164	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	123	162	-	81	164	-
Stage 1	-	-	-	-	-	-	427	437	-	520	498	-
Stage 2	-	-	-	-	-	-	444	483	-	243	427	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	18.5	38.9
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	123	162	472	1085	-	-	916	-	-	81	164	619
HCM Lane V/C Ratio	0.088	0.067	0.339	0.02	-	-	0.051	-	-	0.322	0.133	0.035
HCM Control Delay (s)	37.1	28.8	16.5	8.4	-	-	9.1	-	-	69.3	30.3	11
HCM Lane LOS	E	D	C	A	-	-	A	-	-	F	D	B
HCM 95th %tile Q(veh)	0.3	0.2	1.5	0.1	-	-	0.2	-	-	1.2	0.4	0.1

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	674	13	110	374	23	201
Future Vol, veh/h	674	13	110	374	23	201
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	733	14	120	407	25	218

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	747	0	1380	733
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	647	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	861	-	159	421
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	521	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	861	-	137	421
Mov Cap-2 Maneuver	-	-	-	-	137	-
Stage 1	-	-	-	-	475	-
Stage 2	-	-	-	-	449	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	23.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	137	421	-	-	861	-
HCM Lane V/C Ratio	0.182	0.519	-	-	0.139	-
HCM Control Delay (s)	37.1	22.4	-	-	9.9	-
HCM Lane LOS	E	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	2.9	-	-	0.5	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	933	18	177	492	34	302
v/c Ratio	0.84	0.02	0.51	0.31	0.20	0.71
Control Delay	21.2	4.7	12.7	3.1	41.9	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	4.7	12.7	3.1	41.9	28.8
Queue Length 50th (ft)	379	1	20	66	18	93
Queue Length 95th (ft)	610	10	82	113	50	195
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1454	1238	351	1635	578	427
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.01	0.50	0.30	0.06	0.71

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	858	17	163	453	31	278
Future Volume (vph)	858	17	163	453	31	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.11	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	200	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	933	18	177	492	34	302
RTOR Reduction (vph)	0	5	0	0	0	91
Lane Group Flow (vph)	933	13	177	492	34	211
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	46.5	46.5	62.2	62.2	4.1	13.3
Effective Green, g (s)	46.5	46.5	62.2	62.2	4.1	13.3
Actuated g/C Ratio	0.59	0.59	0.78	0.78	0.05	0.17
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1092	928	339	1461	91	395
v/s Ratio Prot	c0.50		0.06	0.26	0.02	c0.06
v/s Ratio Perm		0.01	0.35			0.07
v/c Ratio	0.85	0.01	0.52	0.34	0.37	0.53
Uniform Delay, d1	13.6	6.8	13.2	2.5	36.4	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	0.0	1.5	0.1	2.6	1.4
Delay (s)	20.3	6.8	14.7	2.6	38.9	31.6
Level of Service	C	A	B	A	D	C
Approach Delay (s)	20.0			5.8	32.3	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	858	17	163	453	31	278
Future Volume (veh/h)	858	17	163	453	31	278
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	933	18	177	492	34	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1001	848	230	1245	355	416
Arrive On Green	0.53	0.53	0.06	0.67	0.20	0.20
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	933	18	177	492	34	302
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	44.6	0.5	4.0	11.5	1.5	16.7
Cycle Q Clear(g_c), s	44.6	0.5	4.0	11.5	1.5	16.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1001	848	230	1245	355	416
V/C Ratio(X)	0.93	0.02	0.77	0.40	0.10	0.73
Avail Cap(c_a), veh/h	1146	971	275	1437	425	479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.8	10.5	21.8	7.3	31.5	32.3
Incr Delay (d2), s/veh	12.5	0.0	10.5	0.2	0.1	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	0.2	2.6	3.4	0.7	6.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.3	10.5	32.3	7.5	31.6	37.0
LnGrp LOS	C	B	C	A	C	D
Approach Vol, veh/h	951			669	336	
Approach Delay, s/veh	32.8			14.1	36.4	
Approach LOS	C			B	D	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	12.6	58.0	70.6	25.7
Change Period (Y+Rc), s	6.5	6.5	6.5	6.5
Max Green Setting (Gmax), s	8.5	59.0	74.0	23.0
Max Q Clear Time (g_c+I1), s	6.0	46.6	13.5	18.7
Green Ext Time (p_c), s	0.1	4.9	2.8	0.5

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	727	408	60	322	0	0	0	0	60	0	294
Future Vol, veh/h	0	727	408	60	322	0	0	0	0	60	0	294
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	790	443	65	350	0	0	0	0	65	0	320

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	1233	0	0				1492	1713	350
Stage 1	-	-	-	-	-	-				480	480	-
Stage 2	-	-	-	-	-	-				1012	1233	-
Critical Hdwy	-	-	-	4.15	-	-				6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-				5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.45	5.55	-
Follow-up Hdwy	-	-	-	2.245	-	-				3.545	4.045	3.345
Pot Cap-1 Maneuver	0	-	-	555	-	0				134	89	687
Stage 1	0	-	-	-	-	0				616	549	-
Stage 2	0	-	-	-	-	0				347	246	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	555	-	-				118	0	687
Mov Cap-2 Maneuver	-	-	-	-	-	-				118	0	-
Stage 1	-	-	-	-	-	-				616	0	-
Stage 2	-	-	-	-	-	-				306	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.9	23.7
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	555	-	118	687
HCM Lane V/C Ratio	-	-	0.118	-	0.553	0.465
HCM Control Delay (s)	-	-	12.3	-	68	14.7
HCM Lane LOS	-	-	B	-	F	B
HCM 95th %tile Q(veh)	-	-	0.4	-	2.6	2.5

Intersection	
Int Delay, s/veh	240.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	491	306	0	0	152	30	230	10	80	0	0	0
Future Vol, veh/h	491	306	0	0	152	30	230	10	80	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	534	333	0	0	165	33	250	11	87	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	198	0	-	-	-	0	1583	1599	333
Stage 1	-	-	-	-	-	-	1401	1401	-
Stage 2	-	-	-	-	-	-	182	198	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1369	-	0	0	-	-	~ 119	106	706
Stage 1	-	-	0	0	-	-	~ 227	206	-
Stage 2	-	-	0	0	-	-	847	735	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1369	-	-	-	-	-	~ 73	0	706
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 73	0	-
Stage 1	-	-	-	-	-	-	~ 138	0	-
Stage 2	-	-	-	-	-	-	847	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.7	0	$ 960.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	73	706	1369	-	-	-
HCM Lane V/C Ratio	3.574	0.123	0.39	-	-	-
HCM Control Delay (s)	$ 1277.3	10.8	9.3	-	-	-
HCM Lane LOS	F	B	A	-	-	-
HCM 95th %tile Q(veh)	27.1	0.4	1.9	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	6.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	48	339	128	320	230	34
Future Vol, veh/h	48	339	128	320	230	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	52	368	139	348	250	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	895	269	287	0	-	0
Stage 1	269	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	310	767	1269	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	276	767	1269	-	-	-
Mov Cap-2 Maneuver	276	-	-	-	-	-
Stage 1	689	-	-	-	-	-
Stage 2	531	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.9	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1269	-	276	767	-	-
HCM Lane V/C Ratio	0.11	-	0.189	0.48	-	-
HCM Control Delay (s)	8.2	-	21.1	14	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.7	2.6	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	192	53	287	130	30	213
Future Vol, veh/h	192	53	287	130	30	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	209	58	312	141	33	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	610	312	0	0	453	0
Stage 1	312	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	458	728	-	-	1108	-
Stage 1	742	-	-	-	-	-
Stage 2	753	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	444	728	-	-	1108	-
Mov Cap-2 Maneuver	444	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18	0	1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	444	728	1108	-
HCM Lane V/C Ratio	-	-	0.47	0.079	0.029	-
HCM Control Delay (s)	-	-	20.1	10.4	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.3	0.1	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	237	446	480	215	184
v/c Ratio	0.70	0.23	0.40	0.67	0.42
Control Delay	31.7	10.4	17.7	36.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	10.4	17.7	36.8	8.2
Queue Length 50th (ft)	77	30	52	66	0
Queue Length 95th (ft)	78	140	172	195	55
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	348	2117	1314	547	616
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.68	0.21	0.37	0.39	0.30

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	218	410	320	121	198	169
Future Volume (vph)	218	410	320	121	198	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3393		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3393		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	237	446	348	132	215	184
RTOR Reduction (vph)	0	0	37	0	0	153
Lane Group Flow (vph)	237	446	443	0	215	31
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	12.1	34.6	21.2		11.2	11.2
Effective Green, g (s)	12.1	34.6	21.2		11.2	11.2
Actuated g/C Ratio	0.18	0.53	0.32		0.17	0.17
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	325	1863	1094		301	269
v/s Ratio Prot	c0.13	0.13	c0.13			
v/s Ratio Perm					c0.12	0.02
v/c Ratio	0.73	0.24	0.41		0.71	0.12
Uniform Delay, d1	25.3	8.4	17.3		25.7	23.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.8	0.0	0.1		6.5	0.1
Delay (s)	32.0	8.4	17.4		32.3	23.1
Level of Service	C	A	B		C	C
Approach Delay (s)		16.6	17.4		28.1	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	21.2
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	43	641	76	196	702	65	48	217	175	175
v/c Ratio	0.17	0.37	0.09	0.76	0.39	0.42	0.30	0.51	0.74	0.72
Control Delay	38.8	22.0	0.3	56.8	9.0	54.0	49.5	14.2	63.0	58.7
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	38.8	22.6	0.3	56.8	9.0	54.0	49.5	14.3	63.0	58.7
Queue Length 50th (ft)	24	146	0	138	61	45	33	48	126	118
Queue Length 95th (ft)	59	267	2	202	213	82	65	61	194	187
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	306	1724	822	354	1860	289	304	503	320	326
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	695	0	0	0	0	0	19	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.62	0.09	0.55	0.38	0.22	0.16	0.45	0.55	0.54

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (vph)	40	590	70	180	480	166	60	44	200	244	48	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.97	
Satd. Flow (perm)	1770	3539	1542	1770	3403		1770	1863	1576	1681	1671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	641	76	196	522	180	65	48	217	265	52	33
RTOR Reduction (vph)	0	0	41	0	25	0	0	0	78	0	8	0
Lane Group Flow (vph)	43	641	35	196	677	0	65	48	139	175	167	0
Confl. Peds. (#/hr)			2						1			3
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Effective Green, g (s)	14.3	50.7	50.7	18.0	54.4		8.7	8.7	26.7	15.6	15.6	
Actuated g/C Ratio	0.13	0.46	0.46	0.16	0.49		0.08	0.08	0.24	0.14	0.14	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	230	1631	710	289	1682		139	147	382	238	236	
v/s Ratio Prot	0.02	0.18		c0.11	c0.20		c0.04	0.03	0.06	c0.10	0.10	
v/s Ratio Perm			0.02						0.03			
v/c Ratio	0.19	0.39	0.05	0.68	0.40		0.47	0.33	0.36	0.74	0.71	
Uniform Delay, d1	42.7	19.5	16.4	43.3	17.5		48.4	47.9	34.6	45.2	45.0	
Progression Factor	1.00	1.00	1.00	0.88	0.41		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.7	0.1	4.5	0.7		0.9	0.5	0.2	9.7	7.7	
Delay (s)	42.8	20.2	16.5	42.6	7.9		49.3	48.4	34.8	54.9	52.7	
Level of Service	D	C	B	D	A		D	D	C	D	D	
Approach Delay (s)		21.1			15.5			39.6			53.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Future Volume (veh/h)	40	590	70	180	480	166	60	44	200	244	48	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	641	76	196	522	180	65	48	217	175	178	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	748	1034	460	635	590	203	107	112	660	246	211	39
Arrive On Green	0.42	0.29	0.29	0.71	0.45	0.45	0.06	0.06	0.06	0.14	0.14	0.14
Sat Flow, veh/h	1781	3554	1580	1781	2596	891	1781	1870	1577	1781	1533	284
Grp Volume(v), veh/h	43	641	76	196	357	345	65	48	217	175	0	211
Grp Sat Flow(s),veh/h/ln	1781	1777	1580	1781	1777	1710	1781	1870	1577	1781	0	1817
Q Serve(g_s), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Cycle Q Clear(g_c), s	1.6	17.2	3.9	4.5	20.1	20.3	3.9	2.7	0.0	10.3	0.0	12.5
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	748	1034	460	635	404	389	107	112	660	246	0	251
V/C Ratio(X)	0.06	0.62	0.17	0.31	0.88	0.89	0.61	0.43	0.33	0.71	0.00	0.84
Avail Cap(c_a), veh/h	748	1034	460	635	678	653	291	306	823	340	0	347
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	33.7	29.1	10.8	28.6	28.7	50.4	49.9	21.7	45.3	0.0	46.2
Incr Delay (d2), s/veh	0.0	2.8	0.8	0.1	21.4	22.8	2.1	1.0	0.1	1.9	0.0	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.7	1.6	1.5	8.6	8.5	1.8	1.3	3.7	4.6	0.0	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	36.5	29.8	10.9	50.0	51.5	52.5	50.8	21.8	47.2	0.0	55.7
LnGrp LOS	B	D	C	B	D	D	D	D	C	D	A	E
Approach Vol, veh/h		760			898			330			386	
Approach Delay, s/veh		34.9			42.0			32.1			51.8	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	44.2	36.0		19.2	51.2	29.0		10.6				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	22.0	32.0		21.0	12.0	42.0		18.0				
Max Q Clear Time (g_c+I1), s	6.5	19.2		14.5	3.6	22.3		5.9				
Green Ext Time (p_c), s	0.1	2.5		0.6	0.0	2.7		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			39.9									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1342	217	772	598	311	98	278
v/c Ratio	1.10	1.23	0.45	1.32	1.38	0.12	0.37
Control Delay	89.4	182.2	6.9	191.4	234.5	19.1	12.1
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.8	182.2	6.9	191.4	234.5	19.1	12.1
Queue Length 50th (ft)	~576	~179	85	~546	~292	40	63
Queue Length 95th (ft)	#683	#334	93	#763	#466	74	128
Internal Link Dist (ft)	421		23			407	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1217	177	1705	454	225	809	753
Starvation Cap Reductn	16	0	0	0	0	0	0
Spillback Cap Reductn	103	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.23	0.45	1.32	1.38	0.12	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1204	30	200	710	0	0	0	550	286	90	256
Future Volume (vph)	0	1204	30	200	710	0	0	0	550	286	90	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		1.00		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3524		1770	3539				1611	1770	1863	1562
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3524		1770	3539				1611	1770	1863	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1309	33	217	772	0	0	0	598	311	98	278
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	75
Lane Group Flow (vph)	0	1342	0	217	772	0	0	0	598	311	98	203
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)			2									
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Effective Green, g (s)		38.0		11.0	53.0				31.0	14.0	47.8	47.8
Actuated g/C Ratio		0.35		0.10	0.48				0.28	0.13	0.43	0.43
Clearance Time (s)		4.0		4.0	4.0				4.0	4.0	5.2	5.2
Vehicle Extension (s)		3.0		3.0	3.0				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1217		177	1705				454	225	809	678
v/s Ratio Prot		c0.38		c0.12	0.22				c0.37	c0.18	0.05	
v/s Ratio Perm												0.13
v/c Ratio		1.10		1.23	0.45				1.32	1.38	0.12	0.30
Uniform Delay, d1		36.0		49.5	18.9				39.5	48.0	18.6	20.2
Progression Factor		0.87		0.97	0.32				1.00	1.00	1.00	1.00
Incremental Delay, d2		58.2		140.6	0.8				157.6	197.2	0.3	1.1
Delay (s)		89.7		188.8	6.9				197.1	245.2	18.9	21.4
Level of Service		F		F	A				F	F	B	C
Approach Delay (s)		89.7			46.8			197.1			122.3	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	101.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	678	1148	935	397	158	157	228
v/c Ratio	0.90	0.42	0.69	0.48	0.67	0.67	0.71
Control Delay	29.6	3.7	32.4	4.8	58.4	57.8	33.4
Queue Delay	1.1	1.1	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	4.9	32.4	4.8	58.4	57.8	33.4
Queue Length 50th (ft)	299	84	285	0	113	112	74
Queue Length 95th (ft)	#592	161	399	69	173	173	149
Internal Link Dist (ft)		187	384			246	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	755	2748	1364	832	397	399	463
Starvation Cap Reductn	14	1271	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.78	0.69	0.48	0.40	0.39	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	624	1056	0	0	860	365	280	10	210	0	0	0
Future Volume (vph)	624	1056	0	0	860	365	280	10	210	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (prot)	1770	3539			3539	1527	1681	1691	1583			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.96	1.00			
Satd. Flow (perm)	307	3539			3539	1527	1681	1691	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	678	1148	0	0	935	397	304	11	228	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	244	0	0	101	0	0	0
Lane Group Flow (vph)	678	1148	0	0	935	153	158	157	127	0	0	0
Confl. Peds. (#/hr)	4					4						
Confl. Bikes (#/hr)						2						
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Effective Green, g (s)	85.4	85.4			42.4	42.4	15.4	15.4	15.4			
Actuated g/C Ratio	0.78	0.78			0.39	0.39	0.14	0.14	0.14			
Clearance Time (s)	4.1	4.0			4.0	4.0	5.2	5.2	5.2			
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	755	2747			1364	588	235	236	221			
v/s Ratio Prot	c0.32	0.32			0.26		c0.09	0.09				
v/s Ratio Perm	c0.38					0.10			0.08			
v/c Ratio	0.90	0.42			0.69	0.26	0.67	0.67	0.58			
Uniform Delay, d1	22.1	4.1			28.2	23.1	44.9	44.9	44.2			
Progression Factor	0.68	0.75			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	8.8	0.3			2.8	1.1	6.7	6.2	3.0			
Delay (s)	23.8	3.4			31.1	24.2	51.6	51.1	47.2			
Level of Service	C	A			C	C	D	D	D			
Approach Delay (s)		10.9			29.0			49.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	624	1056	0	0	860	365	280	10	210	0	0	0
Future Volume (veh/h)	624	1056	0	0	860	365	280	10	210	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	678	1148	0	0	935	397	312	0	228			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	825	2658	0	0	1027	445	597	0	266			
Arrive On Green	0.42	0.75	0.00	0.00	0.29	0.29	0.17	0.00	0.17			
Sat Flow, veh/h	1781	3647	0	0	3647	1539	3563	0	1585			
Grp Volume(v), veh/h	678	1148	0	0	935	397	312	0	228			
Grp Sat Flow(s),veh/h/ln	1781	1777	0	0	1777	1539	1781	0	1585			
Q Serve(g_s), s	31.8	13.2	0.0	0.0	27.9	27.2	8.8	0.0	15.4			
Cycle Q Clear(g_c), s	31.8	13.2	0.0	0.0	27.9	27.2	8.8	0.0	15.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	825	2658	0	0	1027	445	597	0	266			
V/C Ratio(X)	0.82	0.43	0.00	0.00	0.91	0.89	0.52	0.00	0.86			
Avail Cap(c_a), veh/h	825	2658	0	0	1027	445	842	0	375			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.54	0.54	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.8	5.2	0.0	0.0	37.7	37.5	41.8	0.0	44.5			
Incr Delay (d2), s/veh	3.5	0.3	0.0	0.0	13.3	22.8	0.5	0.0	11.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	15.4	4.0	0.0	0.0	13.7	12.8	3.9	0.0	13.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	5.4	0.0	0.0	51.1	60.3	42.3	0.0	56.4			
LnGrp LOS	C	A	A	A	D	E	D	A	E			
Approach Vol, veh/h		1826			1332			540				
Approach Delay, s/veh		14.3			53.8			48.2				
Approach LOS		B			D			D				

Timer - Assigned Phs		2		4	5	6			
Phs Duration (G+Y+Rc), s		86.4		23.6	50.6	35.8			
Change Period (Y+Rc), s		* 4.1		* 5.2	4.1	4.0			
Max Green Setting (Gmax), s		* 75		* 26	38.9	31.8			
Max Q Clear Time (g_c+I1), s		15.2		17.4	33.8	29.9			
Green Ext Time (p_c), s		11.2		1.1	0.7	1.3			

Intersection Summary	
HCM 6th Ctrl Delay	33.5
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2206	261	978
v/c Ratio	0.78	1.47	0.28
Control Delay	2.1	269.9	0.2
Queue Delay	0.2	0.0	0.1
Total Delay	2.4	269.9	0.3
Queue Length 50th (ft)	45	~244	0
Queue Length 95th (ft)	m0	#409	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2837	177	3539
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	148	0	1023
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.82	1.47	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1650	380	240	900	0	0
Future Volume (vph)	1650	380	240	900	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3422		1770	3539		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3422		1770	3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1793	413	261	978	0	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	2200	0	261	978	0	0
Confl. Peds. (#/hr)		2				
Confl. Bikes (#/hr)		2				
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 4 8		
Permitted Phases						
Actuated Green, G (s)	91.0		11.0	110.0		
Effective Green, g (s)	91.0		11.0	104.8		
Actuated g/C Ratio	0.83		0.10	0.95		
Clearance Time (s)			4.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)	2830		177	3371		
v/s Ratio Prot	c0.64		c0.15	0.28		
v/s Ratio Perm						
v/c Ratio	0.78		1.47	0.29		
Uniform Delay, d1	4.6		49.5	0.2		
Progression Factor	0.40		0.90	1.00		
Incremental Delay, d2	0.1		236.1	0.2		
Delay (s)	2.0		280.6	0.3		
Level of Service	A		F	A		
Approach Delay (s)	2.0			59.4	0.0	
Approach LOS	A			E	A	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	790	443	65	350	65	320
v/c Ratio	0.62	0.38	0.15	0.24	0.39	0.73
Control Delay	6.9	1.8	2.7	2.9	49.3	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	1.8	2.7	2.9	49.3	15.1
Queue Length 50th (ft)	149	15	3	15	42	0
Queue Length 95th (ft)	192	m28	14	136	79	79
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	1267	1161	434	1448	523	691
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.38	0.15	0.24	0.12	0.46

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	727	408	60	322	0	0	0	0	60	0	294
Future Volume (veh/h)	0	727	408	60	322	0	0	0	0	60	0	294
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1826	1826
Adj Flow Rate, veh/h	0	790	443	65	350	0				65	0	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	1034	876	389	1220	0				399	0	355
Arrive On Green	0.00	1.00	1.00	0.08	1.00	0.00				0.23	0.00	0.23
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1739	0	1547
Grp Volume(v), veh/h	0	790	443	65	350	0				65	0	320
Grp Sat Flow(s),veh/h/ln	0	1826	1547	1739	1826	0				1739	0	1547
Q Serve(g_s), s	0.0	0.0	0.0	1.5	0.0	0.0				3.1	0.0	21.1
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.5	0.0	0.0				3.1	0.0	21.1
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1034	876	389	1220	0				399	0	355
V/C Ratio(X)	0.00	0.76	0.51	0.17	0.29	0.00				0.16	0.00	0.90
Avail Cap(c_a), veh/h	0	1034	876	401	1220	0				530	0	472
HCM Platoon Ratio	1.00	2.00	2.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.58	0.58	0.99	0.99	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	7.3	0.0	0.0				32.4	0.0	39.3
Incr Delay (d2), s/veh	0.0	3.2	1.2	0.2	0.6	0.0				0.2	0.0	16.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.9	0.3	0.5	0.2	0.0				1.3	0.0	9.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	3.2	1.2	7.5	0.6	0.0				32.6	0.0	55.9
LnGrp LOS	A	A	A	A	A	A				C	A	E
Approach Vol, veh/h		1233			415						385	
Approach Delay, s/veh		2.5			1.7						51.9	
Approach LOS		A			A						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	10.7	65.9		28.3		76.7						
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5						
Max Green Setting (Gmax), s	5.0	50.8		* 32		62.3						
Max Q Clear Time (g_c+I1), s	3.5	2.0		23.1		2.0						
Green Ext Time (p_c), s	0.0	7.8		1.0		1.9						
Intersection Summary												
HCM 6th Ctrl Delay			11.7									
HCM 6th LOS			B									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	534	333	165	33	261	87
v/c Ratio	0.61	0.26	0.20	0.04	0.74	0.22
Control Delay	6.3	3.3	23.0	0.1	51.7	5.6
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	3.3	23.0	0.1	51.7	5.6
Queue Length 50th (ft)	76	27	65	0	166	0
Queue Length 95th (ft)	40	27	151	0	233	28
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	935	1287	812	734	536	550
Starvation Cap Reductn	64	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.26	0.20	0.04	0.49	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	491	306	0	0	152	30	230	10	80	0	0	0
Future Volume (veh/h)	491	306	0	0	152	30	230	10	80	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	534	333	0	0	165	33	250	11	87			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	887	1339	0	0	906	768	300	13	278			
Arrive On Green	0.17	0.72	0.00	0.00	0.49	0.49	0.18	0.18	0.18			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1696	75	1572			
Grp Volume(v), veh/h	534	333	0	0	165	33	261	0	87			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1771	0	1572			
Q Serve(g_s), s	14.6	6.4	0.0	0.0	5.2	1.2	14.9	0.0	5.1			
Cycle Q Clear(g_c), s	14.6	6.4	0.0	0.0	5.2	1.2	14.9	0.0	5.1			
Prop In Lane	1.00		0.00	0.00		1.00	0.96		1.00			
Lane Grp Cap(c), veh/h	887	1339	0	0	906	768	313	0	278			
V/C Ratio(X)	0.60	0.25	0.00	0.00	0.18	0.04	0.83	0.00	0.31			
Avail Cap(c_a), veh/h	1080	1339	0	0	906	768	540	0	479			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.74	0.74	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	8.2	5.0	0.0	0.0	15.1	14.0	41.7	0.0	37.7			
Incr Delay (d2), s/veh	0.5	0.3	0.0	0.0	0.4	0.1	5.8	0.0	0.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.2	1.8	0.0	0.0	2.1	0.4	7.0	0.0	2.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.7	5.3	0.0	0.0	15.5	14.2	47.6	0.0	38.3			
LnGrp LOS	A	A	A	A	B	B	D	A	D			
Approach Vol, veh/h		867			198			348				
Approach Delay, s/veh		7.4			15.3			45.3				
Approach LOS		A			B			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		82.3			24.5	57.8		22.7				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		62.3			29.5	26.3		32.0				
Max Q Clear Time (g_c+I1), s		8.4			16.6	7.2		16.9				
Green Ext Time (p_c), s		1.8			1.4	0.7		1.6				
Intersection Summary												
HCM 6th Ctrl Delay			17.8									
HCM 6th LOS			B									

Intersection						
Int Delay, s/veh	7.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	96	176	230	88	228	220
Future Vol, veh/h	96	176	230	88	228	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	120	0	-	-	415	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	101	185	242	93	240	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1001	289	0	0	335	0
Stage 1	289	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	268	748	-	-	1219	-
Stage 1	758	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	215	748	-	-	1219	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	389	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	215	748	1219	-
HCM Lane V/C Ratio	-	-	0.47	0.248	0.197	-
HCM Control Delay (s)	-	-	35.8	11.4	8.7	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.3	1	0.7	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	535	128	87	477	39	115	65	65	30	87	22
v/c Ratio	0.24	0.66	0.16	0.46	0.52	0.05	0.52	0.18	0.15	0.24	0.35	0.06
Control Delay	48.6	27.6	1.5	50.3	20.9	0.1	50.2	34.2	0.8	49.5	43.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.6	27.6	1.5	50.3	20.9	0.1	50.2	34.2	0.8	49.5	43.0	0.3
Queue Length 50th (ft)	19	264	0	48	212	0	64	33	0	17	47	0
Queue Length 95th (ft)	53	412	13	107	334	0	133	75	0	50	100	0
Internal Link Dist (ft)		703			1846			579			485	
Turn Bay Length (ft)	370		40	375		25	175		25	250		25
Base Capacity (vph)	141	990	925	211	1064	981	255	836	784	137	712	704
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.54	0.14	0.41	0.45	0.04	0.45	0.08	0.08	0.22	0.12	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	492	118	80	439	36	106	60	60	28	80	20
Future Volume (vph)	30	492	118	80	439	36	106	60	60	28	80	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	535	128	87	477	39	115	65	65	30	87	22
RTOR Reduction (vph)	0	0	73	0	0	21	0	0	53	0	0	20
Lane Group Flow (vph)	33	535	55	87	477	18	115	65	12	30	87	2
Confl. Bikes (#/hr)												1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	3.4	38.5	38.5	7.0	42.1	42.1	10.7	17.0	17.0	3.3	9.6	9.6
Effective Green, g (s)	3.4	38.5	38.5	7.0	42.1	42.1	10.7	17.0	17.0	3.3	9.6	9.6
Actuated g/C Ratio	0.04	0.43	0.43	0.08	0.47	0.47	0.12	0.19	0.19	0.04	0.11	0.11
Clearance Time (s)	5.3	7.1	7.1	5.3	7.1	7.1	5.3	6.8	6.8	5.3	6.8	6.8
Vehicle Extension (s)	3.5	5.0	5.0	3.5	5.0	5.0	2.0	4.5	4.5	2.0	4.5	4.5
Lane Grp Cap (vph)	66	794	674	137	868	738	209	350	298	64	198	164
v/s Ratio Prot	0.02	c0.29		c0.05	c0.26		c0.06	0.03		0.02	c0.05	
v/s Ratio Perm			0.03			0.01			0.01			0.00
v/c Ratio	0.50	0.67	0.08	0.64	0.55	0.02	0.55	0.19	0.04	0.47	0.44	0.01
Uniform Delay, d1	42.6	20.8	15.4	40.4	17.3	13.0	37.5	30.8	30.0	42.6	37.8	36.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	3.0	0.1	9.7	1.3	0.0	1.8	0.4	0.1	2.0	2.7	0.1
Delay (s)	49.5	23.8	15.5	50.1	18.6	13.0	39.3	31.3	30.1	44.6	40.5	36.2
Level of Service	D	C	B	D	B	B	D	C	C	D	D	D
Approach Delay (s)		23.5			22.7			34.7			40.7	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	24.5
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	492	118	80	439	36	106	60	60	28	80	20
Future Volume (veh/h)	30	492	118	80	439	36	106	60	60	28	80	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	535	128	87	477	39	115	65	65	30	87	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	716	607	113	771	653	148	290	246	57	195	161
Arrive On Green	0.03	0.38	0.38	0.06	0.41	0.41	0.08	0.15	0.15	0.03	0.10	0.10
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Grp Volume(v), veh/h	33	535	128	87	477	39	115	65	65	30	87	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1548
Q Serve(g_s), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Cycle Q Clear(g_c), s	1.2	16.5	3.6	3.2	13.4	1.0	4.2	2.0	2.4	1.1	2.9	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	61	716	607	113	771	653	148	290	246	57	195	161
V/C Ratio(X)	0.54	0.75	0.21	0.77	0.62	0.06	0.78	0.22	0.26	0.53	0.45	0.14
Avail Cap(c_a), veh/h	173	1207	1023	259	1296	1098	312	1019	864	168	868	718
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	17.8	13.8	30.8	15.5	11.8	30.0	24.7	24.9	31.8	28.1	27.2
Incr Delay (d2), s/veh	8.7	3.3	0.4	12.5	1.7	0.1	3.3	0.7	1.0	2.8	2.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	6.2	1.1	1.6	4.8	0.3	1.7	0.8	0.9	0.5	1.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.4	21.1	14.2	43.3	17.2	11.9	33.4	25.4	25.8	34.6	30.9	27.9
LnGrp LOS	D	C	B	D	B	B	C	C	C	C	C	C
Approach Vol, veh/h		696			603			245			139	
Approach Delay, s/veh		20.8			20.6			29.3			31.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	32.7	10.8	13.8	7.6	34.6	7.4	17.2
Change Period (Y+Rc), s	5.3	* 7.1	5.3	* 6.8	5.3	* 7.1	5.3	* 6.8
Max Green Setting (Gmax), s	9.7	* 43	11.7	* 31	6.5	* 46	6.3	* 36
Max Q Clear Time (g_c+I1), s	5.2	18.5	6.2	4.9	3.2	15.4	3.1	4.4
Green Ext Time (p_c), s	0.1	7.1	0.1	0.7	0.0	5.9	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	22.8
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	540	20	64	525	36	10	10	16	28	20	20
Future Vol, veh/h	20	540	20	64	525	36	10	10	16	28	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	475	-	25	280	-	25	170	-	25	140	-	25
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	557	21	66	541	37	10	10	16	29	21	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	578	0	0	578	0	0	1312	1309	557	1296	1293	541
Stage 1	-	-	-	-	-	-	599	599	-	673	673	-
Stage 2	-	-	-	-	-	-	713	710	-	623	620	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	991	-	-	991	-	-	135	158	528	138	162	539
Stage 1	-	-	-	-	-	-	487	489	-	443	452	-
Stage 2	-	-	-	-	-	-	421	435	-	472	478	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	991	-	-	991	-	-	109	144	528	118	148	539
Mov Cap-2 Maneuver	-	-	-	-	-	-	109	144	-	118	148	-
Stage 1	-	-	-	-	-	-	477	479	-	434	422	-
Stage 2	-	-	-	-	-	-	359	406	-	438	468	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.9	25.7	31.8
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	109	144	528	991	-	-	991	-	-	118	148	539
HCM Lane V/C Ratio	0.095	0.072	0.031	0.021	-	-	0.067	-	-	0.245	0.139	0.038
HCM Control Delay (s)	41.4	31.9	12	8.7	-	-	8.9	-	-	45.1	33.2	11.9
HCM Lane LOS	E	D	B	A	-	-	A	-	-	E	D	B
HCM 95th %tile Q(veh)	0.3	0.2	0.1	0.1	-	-	0.2	-	-	0.9	0.5	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	520	25	211	547	18	153
Future Vol, veh/h	520	25	211	547	18	153
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	275	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	565	27	229	595	20	166

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	592	0	1618	565
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	1053	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	984	-	114	524
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	336	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	984	-	87	524
Mov Cap-2 Maneuver	-	-	-	-	87	-
Stage 1	-	-	-	-	569	-
Stage 2	-	-	-	-	258	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	19.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	87	524	-	-	984	-
HCM Lane V/C Ratio	0.225	0.317	-	-	0.233	-
HCM Control Delay (s)	58	15	-	-	9.8	-
HCM Lane LOS	F	C	-	-	A	-
HCM 95th %tile Q(veh)	0.8	1.4	-	-	0.9	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	653	78	387	742	82	277
v/c Ratio	0.80	0.11	0.72	0.51	0.36	0.41
Control Delay	28.7	5.7	20.5	6.5	40.7	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	5.7	20.5	6.5	40.7	11.3
Queue Length 50th (ft)	290	4	86	142	40	44
Queue Length 95th (ft)	461	29	#240	254	91	116
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1148	999	628	1589	600	762
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.08	0.62	0.47	0.14	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	601	72	356	683	75	255
Future Volume (vph)	601	72	356	683	75	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.17	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	308	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	653	78	387	742	82	277
RTOR Reduction (vph)	0	35	0	0	0	97
Lane Group Flow (vph)	653	43	387	742	82	180
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	34.0	34.0	56.6	56.6	7.3	23.4
Effective Green, g (s)	34.0	34.0	56.6	56.6	7.3	23.4
Actuated g/C Ratio	0.44	0.44	0.74	0.74	0.09	0.30
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	823	699	532	1371	168	615
v/s Ratio Prot	c0.35		c0.15	0.40	c0.05	0.06
v/s Ratio Perm		0.03	0.38			0.05
v/c Ratio	0.79	0.06	0.73	0.54	0.49	0.29
Uniform Delay, d1	18.4	12.3	13.6	4.5	33.0	20.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	0.0	4.9	0.4	2.2	0.3
Delay (s)	23.7	12.3	18.6	4.9	35.3	20.7
Level of Service	C	B	B	A	D	C
Approach Delay (s)	22.5			9.6	24.0	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	601	72	356	683	75	255
Future Volume (veh/h)	601	72	356	683	75	255
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	653	78	387	742	82	277
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	747	633	437	1209	319	537
Arrive On Green	0.40	0.40	0.16	0.65	0.18	0.18
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	653	78	387	742	82	277
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	24.0	2.3	9.2	17.3	3.0	10.4
Cycle Q Clear(g_c), s	24.0	2.3	9.2	17.3	3.0	10.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	747	633	437	1209	319	537
V/C Ratio(X)	0.87	0.12	0.88	0.61	0.26	0.52
Avail Cap(c_a), veh/h	1105	936	595	1733	550	743
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	14.1	15.8	7.7	26.3	19.7
Incr Delay (d2), s/veh	5.5	0.1	11.6	0.5	0.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.7	4.0	4.2	1.2	3.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.1	14.2	27.4	8.2	26.7	20.5
LnGrp LOS	C	B	C	A	C	C
Approach Vol, veh/h	731			1129	359	
Approach Delay, s/veh	24.8			14.8	21.9	
Approach LOS	C			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	18.4	36.3				54.7		19.8
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	18.5	44.0				69.0		23.0
Max Q Clear Time (g_c+I1), s	11.2	26.0				19.3		12.4
Green Ext Time (p_c), s	0.7	3.8				5.1		0.9

Intersection Summary			
HCM 6th Ctrl Delay			19.3
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	17.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	504	352	70	543	0	0	0	0	70	10	496
Future Vol, veh/h	0	504	352	70	543	0	0	0	0	70	10	496
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	165	0	-	-	-	-	-	-	-	580
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	520	363	72	560	0	0	0	0	72	10	511

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	883	0	0				1406	1587	560
Stage 1	-	-	-	-	-	-				704	704	-
Stage 2	-	-	-	-	-	-				702	883	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	766	-	0				153	108	528
Stage 1	0	-	-	-	-	0				490	440	-
Stage 2	0	-	-	-	-	0				491	364	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	766	-	-				139	0	528
Mov Cap-2 Maneuver	-	-	-	-	-	-				139	0	-
Stage 1	-	-	-	-	-	-				490	0	-
Stage 2	-	-	-	-	-	-				445	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.2	60.2
HCM LOS			F

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	766	-	139	528
HCM Lane V/C Ratio	-	-	0.094	-	0.593	0.968
HCM Control Delay (s)	-	-	10.2	-	63	59.7
HCM Lane LOS	-	-	B	-	F	F
HCM 95th %tile Q(veh)	-	-	0.3	-	3.1	12.8

Intersection	
Int Delay, s/veh	369.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	365	209	0	0	204	20	399	10	60	0	0	0
Future Vol, veh/h	365	209	0	0	204	20	399	10	60	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	175	-	-	190	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	397	227	0	0	222	22	434	11	65	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	244	0	-	-	-	0	1254	1265	227
Stage 1	-	-	-	-	-	-	1021	1021	-
Stage 2	-	-	-	-	-	-	233	244	-
Critical Hdwy	4.13	-	-	-	-	-	6.43	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	5.43	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1316	-	0	0	-	-	~ 189	168	810
Stage 1	-	-	0	0	-	-	~ 346	312	-
Stage 2	-	-	0	0	-	-	803	702	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1316	-	-	-	-	-	~ 132	0	810
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 132	0	-
Stage 1	-	-	-	-	-	-	~ 242	0	-
Stage 2	-	-	-	-	-	-	803	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.7	0	$ 991.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	132	810	1316	-	-	-
HCM Lane V/C Ratio	3.368	0.081	0.301	-	-	-
HCM Control Delay (s)	$ 1135.3	9.8	8.9	-	-	-
HCM Lane LOS	F	A	A	-	-	-
HCM 95th %tile Q(veh)	43	0.3	1.3	-	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	223	176	230	260	68
Future Vol, veh/h	56	223	176	230	260	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	185	0	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	242	191	250	283	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	952	320	357	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	288	721	1202	-	-	-
Stage 1	736	-	-	-	-	-
Stage 2	530	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	242	721	1202	-	-	-
Mov Cap-2 Maneuver	242	-	-	-	-	-
Stage 1	619	-	-	-	-	-
Stage 2	530	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	3.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1202	-	242	721	-	-
HCM Lane V/C Ratio	0.159	-	0.252	0.336	-	-
HCM Control Delay (s)	8.6	-	24.8	12.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.6	-	1	1.5	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	161	41	196	217	59	354
Future Vol, veh/h	161	41	196	217	59	354
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	175	45	213	236	64	385

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	726	213	0	0	449	0
Stage 1	213	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	391	827	-	-	1111	-
Stage 1	823	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	368	827	-	-	1111	-
Mov Cap-2 Maneuver	368	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	566	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.5	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	368	827	1111	-
HCM Lane V/C Ratio	-	-	0.476	0.054	0.058	-
HCM Control Delay (s)	-	-	23.3	9.6	8.4	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.2	0.2	-

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	227	432	750	231	214
v/c Ratio	0.71	0.22	0.61	0.67	0.47
Control Delay	35.5	10.3	20.6	37.2	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	10.3	20.6	37.2	11.6
Queue Length 50th (ft)	76	31	95	71	11
Queue Length 95th (ft)	107	141	294	236	92
Internal Link Dist (ft)		455	3022	487	
Turn Bay Length (ft)	95				90
Base Capacity (vph)	328	2708	1872	650	693
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.69	0.16	0.40	0.36	0.31

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	216	410	490	222	219	203
Future Volume (vph)	216	410	490	222	219	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	5.8	5.8		5.8	5.8
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	3574	3384		1787	1599
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	3574	3384		1787	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	227	432	516	234	231	214
RTOR Reduction (vph)	0	0	45	0	0	143
Lane Group Flow (vph)	227	432	705	0	231	71
Confl. Peds. (#/hr)				1		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5 8	2	6			
Permitted Phases					7	7
Actuated Green, G (s)	12.3	37.1	23.2		12.8	12.8
Effective Green, g (s)	12.3	37.1	23.2		12.8	12.8
Actuated g/C Ratio	0.18	0.53	0.33		0.18	0.18
Clearance Time (s)		5.8	5.8		5.8	5.8
Vehicle Extension (s)		2.0	2.0		1.5	1.5
Lane Grp Cap (vph)	316	1907	1129		329	294
v/s Ratio Prot	c0.13	0.12	c0.21			
v/s Ratio Perm					c0.13	0.04
v/c Ratio	0.72	0.23	0.62		0.70	0.24
Uniform Delay, d1	27.0	8.6	19.5		26.6	24.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.4	0.0	0.8		5.5	0.2
Delay (s)	33.3	8.6	20.3		32.0	24.4
Level of Service	C	A	C		C	C
Approach Delay (s)		17.1	20.3		28.3	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	69.5	Sum of lost time (s)	21.2
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology expects strict NEMA phasing.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	102	633	92	276	1004	143	90	143	269	264
v/c Ratio	0.39	0.47	0.14	0.85	0.70	0.70	0.42	0.28	0.84	0.81
Control Delay	53.1	32.8	2.8	67.1	24.8	69.3	54.6	8.4	69.0	63.0
Queue Delay	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	34.9	2.8	67.1	25.2	69.3	54.6	8.5	69.0	63.1
Queue Length 50th (ft)	72	198	0	211	353	108	66	22	212	197
Queue Length 95th (ft)	137	303	20	300	454	172	115	38	302	287
Internal Link Dist (ft)		607			421		434			1296
Turn Bay Length (ft)	125		125	325		120		80	120	
Base Capacity (vph)	263	1339	663	402	1429	268	282	577	396	401
Starvation Cap Reductn	0	0	0	0	123	0	0	0	0	0
Spillback Cap Reductn	0	533	0	0	0	0	0	11	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.79	0.14	0.69	0.77	0.53	0.32	0.25	0.68	0.66

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (vph)	100	620	90	270	800	184	140	88	140	376	86	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (prot)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	0.98	
Satd. Flow (perm)	1787	3574	1560	1787	3459		1787	1881	1588	1698	1680	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	102	633	92	276	816	188	143	90	143	384	88	61
RTOR Reduction (vph)	0	0	57	0	16	0	0	0	55	0	10	0
Lane Group Flow (vph)	102	633	35	276	988	0	143	90	88	269	254	0
Confl. Peds. (#/hr)			1			1			3			5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2						8			
Actuated Green, G (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Effective Green, g (s)	17.7	45.1	45.1	21.7	49.1		13.6	13.6	35.3	22.6	22.6	
Actuated g/C Ratio	0.15	0.38	0.38	0.18	0.41		0.11	0.11	0.29	0.19	0.19	
Clearance Time (s)	5.0	4.0	4.0	5.0	4.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	1.5	2.0	2.0	1.5	2.0		2.0	2.0	1.5	2.0	2.0	
Lane Grp Cap (vph)	263	1343	586	323	1415		202	213	467	319	316	
v/s Ratio Prot	0.06	0.18		c0.15	c0.29		c0.08	0.05	0.03	c0.16	0.15	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.39	0.47	0.06	0.85	0.70		0.71	0.42	0.19	0.84	0.80	
Uniform Delay, d1	46.3	28.4	23.9	47.6	29.3		51.3	49.5	31.6	47.0	46.6	
Progression Factor	1.00	1.00	1.00	1.00	0.76		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.2	0.2	15.4	2.3		8.9	0.5	0.1	17.3	13.1	
Delay (s)	46.6	29.6	24.1	63.2	24.5		60.2	50.0	31.7	64.3	59.7	
Level of Service	D	C	C	E	C		E	D	C	E	E	
Approach Delay (s)		31.1			32.8			46.9			62.0	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Future Volume (veh/h)	100	620	90	270	800	184	140	88	140	376	86	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	102	633	92	276	816	188	143	90	143	266	252	61
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	472	895	390	566	874	201	181	190	663	345	281	68
Arrive On Green	0.26	0.25	0.25	0.63	0.60	0.60	0.10	0.10	0.10	0.19	0.19	0.19
Sat Flow, veh/h	1795	3582	1560	1795	2889	666	1795	1885	1583	1795	1464	354
Grp Volume(v), veh/h	102	633	92	276	506	498	143	90	143	266	0	313
Grp Sat Flow(s),veh/h/ln	1795	1791	1560	1795	1791	1764	1795	1885	1583	1795	0	1818
Q Serve(g_s), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Cycle Q Clear(g_c), s	5.3	19.3	5.6	9.8	30.8	30.8	9.3	5.4	0.0	16.9	0.0	20.2
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	472	895	390	566	542	533	181	190	663	345	0	349
V/C Ratio(X)	0.22	0.71	0.24	0.49	0.93	0.93	0.79	0.47	0.22	0.77	0.00	0.90
Avail Cap(c_a), veh/h	472	895	390	566	672	662	269	283	741	419	0	424
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.76	0.76	0.76	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.6	41.0	35.9	17.0	22.6	22.6	52.7	50.9	22.5	46.0	0.0	47.3
Incr Delay (d2), s/veh	0.1	4.7	1.4	0.2	21.0	21.2	4.9	0.7	0.1	5.5	0.0	16.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.0	2.3	3.2	11.2	11.1	4.4	2.6	2.6	8.0	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.6	45.7	37.3	17.2	43.6	43.8	57.6	51.6	22.5	51.4	0.0	64.2
LnGrp LOS	C	D	D	B	D	D	E	D	C	D	A	E
Approach Vol, veh/h		827			1280			376			579	
Approach Delay, s/veh		43.4			38.0			42.8			58.3	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	42.8	34.0		27.1	36.6	40.3		16.1				
Change Period (Y+Rc), s	5.0	4.0		4.0	5.0	4.0		4.0				
Max Green Setting (Gmax), s	27.0	30.0		28.0	12.0	45.0		18.0				
Max Q Clear Time (g_c+I1), s	11.8	21.3		22.2	7.3	32.8		11.3				
Green Ext Time (p_c), s	0.2	2.1		0.9	0.0	3.5		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			43.9									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	WBL	WBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1198	309	947	500	388	245	526
v/c Ratio	1.12	1.22	0.56	1.25	1.26	0.29	0.69
Control Delay	99.1	169.5	10.0	171.5	180.0	21.5	27.5
Queue Delay	0.5	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	99.6	169.5	10.1	171.5	180.0	21.5	27.6
Queue Length 50th (ft)	~574	~284	146	~484	~376	116	273
Queue Length 95th (ft)	#676	#466	147	#695	#571	175	408
Internal Link Dist (ft)	421		23			491	
Turn Bay Length (ft)					250		450
Base Capacity (vph)	1065	253	1691	399	309	858	761
Starvation Cap Reductn	1	0	0	0	0	0	0
Spillback Cap Reductn	109	0	137	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.22	0.61	1.25	1.26	0.29	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1086	40	290	890	0	0	0	470	365	230	494
Future Volume (vph)	0	1086	40	290	890	0	0	0	470	365	230	494
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Lane Util. Factor		0.95		1.00	0.95				1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00		1.00	1.00				1.00	1.00	1.00	1.00
Frt		0.99		1.00	1.00				0.86	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (prot)		3552		1787	3574				1627	1787	1881	1578
Flt Permitted		1.00		0.95	1.00				1.00	0.95	1.00	1.00
Satd. Flow (perm)		3552		1787	3574				1627	1787	1881	1578
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1155	43	309	947	0	0	0	500	388	245	526
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	1198	0	309	947	0	0	0	500	388	245	485
Confl. Peds. (#/hr)			2									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type		NA		Prot	NA				Prot	Prot	NA	Perm
Protected Phases		2		1	6				7	8	4	
Permitted Phases												4
Actuated Green, G (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Effective Green, g (s)		36.0		17.0	56.8				29.5	20.8	54.8	54.8
Actuated g/C Ratio		0.30		0.14	0.47				0.25	0.17	0.46	0.46
Clearance Time (s)		4.0		4.0	4.2				4.5	4.2	4.2	4.2
Vehicle Extension (s)		2.5		2.0	2.5				3.0	2.5	2.5	2.5
Lane Grp Cap (vph)		1065		253	1691				399	309	858	720
v/s Ratio Prot		c0.34		c0.17	0.26				c0.31	c0.22	0.13	
v/s Ratio Perm												0.31
v/c Ratio		1.12		1.22	0.56				1.25	1.26	0.29	0.67
Uniform Delay, d1		42.0		51.5	22.6				45.2	49.6	20.4	25.6
Progression Factor		0.77		0.92	0.38				1.00	1.00	1.00	1.00
Incremental Delay, d2		67.4		128.6	1.3				133.0	138.8	0.8	5.0
Delay (s)		99.6		176.0	9.9				178.3	188.4	21.2	30.6
Level of Service		F		F	A				F	F	C	C
Approach Delay (s)		99.6			50.7			178.3			81.4	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	89.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	417	1247	1084	379	242	243	274
v/c Ratio	0.72	0.46	0.64	0.41	0.78	0.78	0.72
Control Delay	22.6	5.1	27.7	4.2	63.0	63.0	38.1
Queue Delay	0.3	1.3	0.1	0.0	1.1	1.1	0.0
Total Delay	23.0	6.4	27.8	4.2	64.1	64.1	38.1
Queue Length 50th (ft)	124	142	340	5	188	189	123
Queue Length 95th (ft)	243	175	457	67	273	274	211
Internal Link Dist (ft)		187	384			486	
Turn Bay Length (ft)				250	200		200
Base Capacity (vph)	626	2695	1691	920	386	387	446
Starvation Cap Reductn	28	1159	0	0	0	0	0
Spillback Cap Reductn	0	0	66	0	37	37	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.81	0.67	0.41	0.69	0.69	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	396	1185	0	0	1030	360	450	10	260	0	0	0
Future Volume (vph)	396	1185	0	0	1030	360	450	10	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	1787	3574			3574	1536	1698	1706	1599			
Flt Permitted	0.16	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	297	3574			3574	1536	1698	1706	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	417	1247	0	0	1084	379	474	11	274	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	193	0	0	87	0	0	0
Lane Group Flow (vph)	417	1247	0	0	1084	186	242	243	187	0	0	0
Confl. Peds. (#/hr)	5					5						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		4	4				
Permitted Phases	2					6			4			
Actuated Green, G (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Effective Green, g (s)	90.5	90.5			56.8	56.8	22.1	22.1	22.1			
Actuated g/C Ratio	0.75	0.75			0.47	0.47	0.18	0.18	0.18			
Clearance Time (s)	4.1	3.7			4.6	4.6	3.7	3.7	3.7			
Vehicle Extension (s)	2.0	2.5			2.0	2.0	2.5	2.5	2.5			
Lane Grp Cap (vph)	580	2695			1691	727	312	314	294			
v/s Ratio Prot	c0.17	0.35			0.30		c0.14	0.14				
v/s Ratio Perm	c0.37					0.12			0.12			
v/c Ratio	0.72	0.46			0.64	0.26	0.78	0.77	0.64			
Uniform Delay, d1	23.6	5.6			23.9	18.9	46.6	46.6	45.2			
Progression Factor	0.66	0.77			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	2.4	0.4			1.9	0.8	11.0	10.9	3.9			
Delay (s)	18.0	4.7			25.8	19.8	57.6	57.4	49.1			
Level of Service	B	A			C	B	E	E	D			
Approach Delay (s)		8.0			24.2			54.5			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	110.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	1185	0	0	1030	360	450	10	260	0	0	0
Future Volume (veh/h)	396	1185	0	0	1030	360	450	10	260	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1885	1885	1885			
Adj Flow Rate, veh/h	417	1247	0	0	1084	379	482	0	274			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	645	2656	0	0	1445	627	695	0	309			
Arrive On Green	0.30	0.74	0.00	0.00	0.40	0.40	0.19	0.00	0.19			
Sat Flow, veh/h	1795	3676	0	0	3676	1554	3591	0	1598			
Grp Volume(v), veh/h	417	1247	0	0	1084	379	482	0	274			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1554	1795	0	1598			
Q Serve(g_s), s	16.1	16.6	0.0	0.0	31.1	23.1	15.0	0.0	20.0			
Cycle Q Clear(g_c), s	16.1	16.6	0.0	0.0	31.1	23.1	15.0	0.0	20.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	645	2656	0	0	1445	627	695	0	309			
V/C Ratio(X)	0.65	0.47	0.00	0.00	0.75	0.60	0.69	0.00	0.89			
Avail Cap(c_a), veh/h	645	2656	0	0	1445	627	817	0	363			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.58	0.58	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	32.1	6.1	0.0	0.0	30.6	28.2	45.1	0.0	47.1			
Incr Delay (d2), s/veh	1.0	0.3	0.0	0.0	3.6	4.3	1.8	0.0	19.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	10.1	5.4	0.0	0.0	13.8	9.1	6.8	0.0	18.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	6.5	0.0	0.0	34.3	32.5	46.9	0.0	66.5			
LnGrp LOS	C	A	A	A	C	C	D	A	E			
Approach Vol, veh/h		1664			1463			756				
Approach Delay, s/veh		13.2			33.8			54.0				
Approach LOS		B			C			D				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		93.1		26.9	40.1	53.0						
Change Period (Y+Rc), s		* 4.1		3.7	4.1	4.6						
Max Green Setting (Gmax), s		* 85		27.3	31.9	48.4						
Max Q Clear Time (g_c+I1), s		18.6		22.0	18.1	33.1						
Green Ext Time (p_c), s		10.0		1.2	0.5	5.5						
Intersection Summary												
HCM 6th Ctrl Delay			28.9									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	0
Intersection LOS	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	0	0	0
HCM LOS	-	-	-

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	0%	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	0	0	0	0	0
LT Vol	0	0	0	0	0
Through Vol	0	0	0	0	0
RT Vol	0	0	0	0	0
Lane Flow Rate	0	0	0	0	0
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0	0	0	0	0
Departure Headway (Hd)	4.534	4.534	4.334	4.534	4.534
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	0	0	0	0	0
Service Time	2.234	2.234	2.334	2.234	2.234
HCM Lane V/C Ratio	0	0	0	0	0
HCM Control Delay	7.2	7.2	7.3	7.2	7.2
HCM Lane LOS	N	N	N	N	N
HCM 95th-tile Q	0	0	0	0	0

Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	2054	255	1255
v/c Ratio	0.75	1.01	0.35
Control Delay	2.1	98.7	0.2
Queue Delay	0.1	30.7	0.1
Total Delay	2.2	129.4	0.3
Queue Length 50th (ft)	54	~180	0
Queue Length 95th (ft)	m0	#369	0
Internal Link Dist (ft)	23		187
Turn Bay Length (ft)			
Base Capacity (vph)	2743	253	3574
Starvation Cap Reductn	0	28	0
Spillback Cap Reductn	45	0	598
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.76	1.13	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1521	410	240	1180	0	0
Future Volume (vph)	1521	410	240	1180	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.2		
Lane Util. Factor	0.95		1.00	0.95		
Frpb, ped/bikes	0.99		1.00	1.00		
Flpb, ped/bikes	1.00		1.00	1.00		
Frt	0.97		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3441		1787	3574		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3441		1787	3574		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1618	436	255	1255	0	0
RTOR Reduction (vph)	20	0	0	0	0	0
Lane Group Flow (vph)	2034	0	255	1255	0	0
Confl. Peds. (#/hr)		2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA		Prot	NA		
Protected Phases	2 7 4 8		1	6 2 8 7		
Permitted Phases						
Actuated Green, G (s)	94.8		17.0	120.0		
Effective Green, g (s)	94.8		17.0	111.5		
Actuated g/C Ratio	0.79		0.14	0.93		
Clearance Time (s)			4.0			
Vehicle Extension (s)			2.0			
Lane Grp Cap (vph)	2718		253	3320		
v/s Ratio Prot	c0.59		c0.14	0.35		
v/s Ratio Perm						
v/c Ratio	0.75		1.01	0.38		
Uniform Delay, d1	6.5		51.5	0.5		
Progression Factor	0.31		0.90	1.00		
Incremental Delay, d2	0.1		51.6	0.1		
Delay (s)	2.1		97.9	0.5		
Level of Service	A		F	A		
Approach Delay (s)	2.1			17.0	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Edition methodology does not support clustered intersections.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	653	78	387	742	82	277
v/c Ratio	0.65	0.09	0.63	0.49	0.49	0.44
Control Delay	24.6	6.5	14.6	5.5	56.4	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	6.5	14.6	5.5	56.4	13.0
Queue Length 50th (ft)	323	6	103	93	56	65
Queue Length 95th (ft)	#604	35	197	321	102	114
Internal Link Dist (ft)	1518			887	815	
Turn Bay Length (ft)		200	275		150	
Base Capacity (vph)	1005	882	627	1516	366	636
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.09	0.62	0.49	0.22	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	601	72	356	683	75	255
Future Volume (vph)	601	72	356	683	75	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1845	1568	1752	1845	1752	1568
Flt Permitted	1.00	1.00	0.23	1.00	0.95	1.00
Satd. Flow (perm)	1845	1568	424	1845	1752	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	653	78	387	742	82	277
RTOR Reduction (vph)	0	28	0	0	0	104
Lane Group Flow (vph)	653	50	387	742	82	173
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Actuated Green, G (s)	58.7	58.7	87.8	87.8	9.2	31.8
Effective Green, g (s)	58.7	58.7	87.8	87.8	9.2	31.8
Actuated g/C Ratio	0.53	0.53	0.80	0.80	0.08	0.29
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	984	836	611	1472	146	545
v/s Ratio Prot	c0.35		c0.13	0.40	c0.05	0.07
v/s Ratio Perm		0.03	0.37			0.05
v/c Ratio	0.66	0.06	0.63	0.50	0.56	0.32
Uniform Delay, d1	18.5	12.4	10.7	3.7	48.5	30.6
Progression Factor	1.00	1.00	1.92	1.04	1.00	1.00
Incremental Delay, d2	3.5	0.1	1.7	1.0	4.9	0.3
Delay (s)	22.0	12.5	22.2	4.9	53.3	30.9
Level of Service	C	B	C	A	D	C
Approach Delay (s)	21.0			10.8	36.1	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	601	72	356	683	75	255
Future Volume (veh/h)	601	72	356	683	75	255
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	653	78	387	742	82	277
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	984	834	473	1313	308	460
Arrive On Green	0.53	0.53	0.12	0.71	0.17	0.17
Sat Flow, veh/h	1856	1572	1767	1856	1767	1572
Grp Volume(v), veh/h	653	78	387	742	82	277
Grp Sat Flow(s),veh/h/ln	1856	1572	1767	1856	1767	1572
Q Serve(g_s), s	28.1	2.7	10.3	21.4	4.4	16.6
Cycle Q Clear(g_c), s	28.1	2.7	10.3	21.4	4.4	16.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	984	834	473	1313	308	460
V/C Ratio(X)	0.66	0.09	0.82	0.57	0.27	0.60
Avail Cap(c_a), veh/h	984	834	593	1313	370	515
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.67	0.67	1.00	1.00
Uniform Delay (d), s/veh	18.7	12.8	16.6	7.8	39.3	33.4
Incr Delay (d2), s/veh	3.5	0.2	5.0	1.2	0.5	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.4	0.9	4.3	6.5	2.0	6.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.3	13.0	21.6	9.0	39.8	35.0
LnGrp LOS	C	B	C	A	D	D
Approach Vol, veh/h	731			1129	359	
Approach Delay, s/veh	21.3			13.3	36.1	
Approach LOS	C			B	D	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	19.5	64.8				84.3		25.7
Change Period (Y+Rc), s	6.5	6.5				6.5		6.5
Max Green Setting (Gmax), s	20.5	47.0				74.0		23.0
Max Q Clear Time (g_c+I1), s	12.3	30.1				23.4		18.6
Green Ext Time (p_c), s	0.7	3.7				5.1		0.5

Intersection Summary		
HCM 6th Ctrl Delay		19.6
HCM 6th LOS		B

Lane Group	EBT	EBR	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	548	383	76	590	87	539
v/c Ratio	0.55	0.39	0.18	0.50	0.19	0.89
Control Delay	17.8	6.0	19.0	23.2	29.0	36.7
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0
Total Delay	17.8	6.0	19.0	23.9	29.0	36.7
Queue Length 50th (ft)	303	95	37	291	47	204
Queue Length 95th (ft)	463	163	m50	301	76	310
Internal Link Dist (ft)	887			403	686	
Turn Bay Length (ft)		165				580
Base Capacity (vph)	994	984	422	1175	655	743
Starvation Cap Reductn	0	0	0	275	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.39	0.18	0.66	0.13	0.73

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	504	352	70	543	0	0	0	0	70	10	496
Future Volume (vph)	0	504	352	70	543	0	0	0	0	70	10	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1845	1568	1752	1845						1767	1568
Flt Permitted		1.00	1.00	0.30	1.00						0.96	1.00
Satd. Flow (perm)		1845	1568	549	1845						1767	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	548	383	76	590	0	0	0	0	76	11	539
RTOR Reduction (vph)	0	0	142	0	0	0	0	0	0	0	0	189
Lane Group Flow (vph)	0	548	241	76	590	0	0	0	0	0	87	350
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm	pm+pt	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2	6								4
Actuated Green, G (s)		58.1	58.1	70.1	70.1						29.2	29.2
Effective Green, g (s)		58.1	58.1	70.1	70.1						29.2	29.2
Actuated g/C Ratio		0.53	0.53	0.64	0.64						0.27	0.27
Clearance Time (s)		6.5	6.5	6.5	6.5						4.2	4.2
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		974	828	410	1175						469	416
v/s Ratio Prot		c0.30		0.01	c0.32						0.05	
v/s Ratio Perm			0.15	0.11								c0.22
v/c Ratio		0.56	0.29	0.19	0.50						0.19	0.84
Uniform Delay, d1		17.4	14.5	10.1	10.6						31.2	38.2
Progression Factor		0.77	1.05	1.80	1.69						1.00	1.00
Incremental Delay, d2		1.9	0.7	0.2	1.3						0.2	14.3
Delay (s)		15.4	15.9	18.5	19.3						31.4	52.5
Level of Service		B	B	B	B						C	D
Approach Delay (s)		15.6			19.2			0.0			49.6	
Approach LOS		B			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	504	352	70	543	0	0	0	0	70	10	496
Future Volume (veh/h)	0	504	352	70	543	0	0	0	0	70	10	496
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	1856	1856
Adj Flow Rate, veh/h	0	548	383	76	590	0				76	11	539
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	3	3	0				3	3	3
Cap, veh/h	0	824	699	264	1010	0				556	81	563
Arrive On Green	0.00	0.44	0.44	0.08	1.00	0.00				0.36	0.36	0.36
Sat Flow, veh/h	0	1856	1572	1767	1856	0				1553	225	1572
Grp Volume(v), veh/h	0	548	383	76	590	0				87	0	539
Grp Sat Flow(s),veh/h/ln	0	1856	1572	1767	1856	0				1778	0	1572
Q Serve(g_s), s	0.0	25.6	19.7	2.5	0.0	0.0				3.6	0.0	36.8
Cycle Q Clear(g_c), s	0.0	25.6	19.7	2.5	0.0	0.0				3.6	0.0	36.8
Prop In Lane	0.00		1.00	1.00		0.00				0.87		1.00
Lane Grp Cap(c), veh/h	0	824	699	264	1010	0				637	0	563
V/C Ratio(X)	0.00	0.66	0.55	0.29	0.58	0.00				0.14	0.00	0.96
Avail Cap(c_a), veh/h	0	824	699	280	1010	0				659	0	583
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.78	0.78	0.96	0.96	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	24.1	22.5	17.3	0.0	0.0				23.8	0.0	34.5
Incr Delay (d2), s/veh	0.0	3.3	2.4	0.6	2.4	0.0				0.1	0.0	26.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.9	7.0	0.9	0.7	0.0				1.5	0.0	17.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	27.4	24.9	17.9	2.4	0.0				23.9	0.0	60.9
LnGrp LOS	A	C	C	B	A	A				C	A	E
Approach Vol, veh/h		931			666						626	
Approach Delay, s/veh		26.4			4.1						55.7	
Approach LOS		C			A						E	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	11.0	55.4		43.6		66.4						
Change Period (Y+Rc), s	6.5	6.5		* 4.2		6.5						
Max Green Setting (Gmax), s	5.5	46.5		* 41		58.5						
Max Q Clear Time (g_c+I1), s	4.5	27.6		38.8		2.0						
Green Ext Time (p_c), s	0.0	4.2		0.6		3.6						

Intersection Summary			
HCM 6th Ctrl Delay			28.0
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	397	227	222	22	445	65
v/c Ratio	0.58	0.21	0.33	0.04	0.83	0.12
Control Delay	22.8	13.7	30.4	0.1	48.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	13.7	30.4	0.1	48.6	2.1
Queue Length 50th (ft)	72	39	112	0	289	0
Queue Length 95th (ft)	271	142	218	0	369	12
Internal Link Dist (ft)		403	1526		696	
Turn Bay Length (ft)				175		190
Base Capacity (vph)	737	1108	688	632	658	648
Starvation Cap Reductn	8	0	0	0	0	0
Spillback Cap Reductn	0	0	7	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.20	0.33	0.03	0.68	0.10

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	365	209	0	0	204	20	399	10	60	0	0	0
Future Volume (vph)	365	209	0	0	204	20	399	10	60	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1845			1845	1568		1759	1568			
Flt Permitted	0.49	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	906	1845			1845	1568		1759	1568			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	397	227	0	0	222	22	434	11	65	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	45	0	0	0
Lane Group Flow (vph)	397	227	0	0	222	8	0	445	20	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases	2					6			8			
Actuated Green, G (s)	65.7	65.7			40.6	40.6		33.6	33.6			
Effective Green, g (s)	65.7	65.7			40.6	40.6		33.6	33.6			
Actuated g/C Ratio	0.60	0.60			0.37	0.37		0.31	0.31			
Clearance Time (s)	6.5	6.5			6.5	6.5		4.2	4.2			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	684	1101			680	578		537	478			
v/s Ratio Prot	c0.10	0.12			0.12			c0.25				
v/s Ratio Perm	c0.25					0.01			0.01			
v/c Ratio	0.58	0.21			0.33	0.01		0.83	0.04			
Uniform Delay, d1	12.2	10.2			24.9	22.0		35.5	26.9			
Progression Factor	1.50	1.15			1.00	1.00		1.00	1.00			
Incremental Delay, d2	1.1	0.4			1.3	0.0		10.2	0.0			
Delay (s)	19.3	12.0			26.2	22.1		45.7	26.9			
Level of Service	B	B			C	C		D	C			
Approach Delay (s)		16.7			25.8			43.3			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	365	209	0	0	204	20	399	10	60	0	0	0
Future Volume (veh/h)	365	209	0	0	204	20	399	10	60	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	397	227	0	0	222	22	434	11	65			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	708	1152	0	0	750	635	487	12	443			
Arrive On Green	0.26	1.00	0.00	0.00	0.40	0.40	0.28	0.28	0.28			
Sat Flow, veh/h	1767	1856	0	0	1856	1572	1726	44	1572			
Grp Volume(v), veh/h	397	227	0	0	222	22	445	0	65			
Grp Sat Flow(s),veh/h/ln	1767	1856	0	0	1856	1572	1769	0	1572			
Q Serve(g_s), s	14.5	0.0	0.0	0.0	8.9	0.9	26.5	0.0	3.4			
Cycle Q Clear(g_c), s	14.5	0.0	0.0	0.0	8.9	0.9	26.5	0.0	3.4			
Prop In Lane	1.00		0.00	0.00		1.00	0.98		1.00			
Lane Grp Cap(c), veh/h	708	1152	0	0	750	635	499	0	443			
V/C Ratio(X)	0.56	0.20	0.00	0.00	0.30	0.03	0.89	0.00	0.15			
Avail Cap(c_a), veh/h	839	1152	0	0	750	635	656	0	583			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.8	0.0	0.0	0.0	22.2	19.8	37.9	0.0	29.6			
Incr Delay (d2), s/veh	0.6	0.3	0.0	0.0	1.0	0.1	11.9	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.9	0.1	0.0	0.0	3.8	0.3	13.0	0.0	1.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.3	0.0	0.0	23.2	19.9	49.7	0.0	29.7			
LnGrp LOS	B	A	A	A	C	B	D	A	C			
Approach Vol, veh/h		624			244			510				
Approach Delay, s/veh		8.0			22.9			47.2				
Approach LOS		A			C			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		74.8			23.8	50.9		35.2				
Change Period (Y+Rc), s		6.5			6.5	6.5		4.2				
Max Green Setting (Gmax), s		58.5			25.5	26.5		40.8				
Max Q Clear Time (g_c+I1), s		2.0			16.5	10.9		28.5				
Green Ext Time (p_c), s		1.2			0.8	0.9		2.5				
Intersection Summary												
HCM 6th Ctrl Delay			25.1									
HCM 6th LOS			C									

APPENDIX K

Wildfire Background Information

Dana Reserve
Fire Protection Plan

DANA
RESERVE

Fire Protection Plan

July 7, 2021

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Dana Reserve Fire Protection Plan

July 7, 2021

Prepared by

Resolute Associates LLC
FROM VISION TO ACTION

San Luis Obispo, CA

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Contents

Executive Summary

Resolute Associates performed an in-depth analysis of the fire protection factors related to Dana Reserve project. The purpose of this analysis was to assess the risks for this site and surrounding area, to identify prevention and mitigation methods to provide the highest level of fire risk mitigation possible to both the developed and open space areas within the project. The result of this in-depth analysis is contained in this Fire Protection Plan.

The project analysis that went into completing this Plan utilized the information within the Dana Reserve Specific Plan April 2021(DRSP), the San Luis Obispo County Strategic Community Wildfire Protection Plan (CWPP), the Strategic Plan for San Luis Obispo County Fire Department February 2021, applicable fire and building codes, accepted fire modeling principles and software and fire protection best management practices.

The key components of this Plan are creating fire protection at the community level, the neighborhood level and at the individual residence and business level.

Community Level Protection

- Adequate emergency ingress and egress
- Fire protection system requirements (e.g. hydrants)
- Community alerting
- Fire resistive construction requirements throughout the project
- Fire ignition prevention
- Community outreach and education
- Open space best management practices
- Master HOA fire protection requirements
- Access and egress

Neighborhood Level Protection

- Temporary refuge areas
- Fire resistive landscaping near open space areas
- Clear street and monument signage identifying building complexes

Individual Residence and Business Level

- Fire resistive construction
- Fire protection systems (e.g. fire sprinklers and alarms)
- Clear addressing
- Defensible space

Concept Master Plan from Dana Reserve Specific Plan (DRSP)April 2021

Introduction & Background

The Dana Reserve is a master-planned community on approximately 288 acres adjacent to the town of Nipomo, California. The Dana Reserve will consist of 1,291 single and multi-family residences, commercial and light commercial properties, a satellite education campus, recreation areas and a significant amount of open space lands within the interior of the project. (see table 2-1 of the DRSP)

The open space areas are approximately 49.8 total acres. Most of the area is part of a contiguous oak woodland environment with some chaparral and grassland interspersed. Other areas include islands of open space. The area has four large storm water basins.

The project also includes a 385-acre natural habitat and oak preserve located off-site that will be permanently maintained through a conservation easement with management and oversite by a local, non-profit conservation group. The site is referred to as Dana Ridge and is located along the Temettate Ridge about 2 miles to the east in the hills above Nipomo.

Open space area at Dana Reserve

General Information

Definitions

Community Wildfire Protection Plan (CWPP)- This Community Wildfire Protection Plan is a guide to provide a community that is prepared and resilient to the impacts of wildland urban interface fires.

Dead-end road- A road that has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

Defensible space- The area within the perimeter of a parcel, development, neighborhood or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires.

Fire Alarm System- A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals.

Fire Apparatus Access Road- A road that provides fire apparatus access from a fire station to a facility, building or portion thereof. This is a general term inclusive of all other terms such as fire lane, public street, private street, parking lot lane and access roadway.

Fire Protection Plan- A document prepared for a specific project or development proposed for a Wildland-Urban Interface Fire Area. It describes ways to minimize and mitigate potential for loss from wildfire exposure.

Fire Hazard Severity Zone- Geographical areas designated pursuant to California Public Resources Codes, Sections 4201 through 4204, and classified as Very High, High, or Moderate in State Responsibility Areas or as Local Agency Very High Fire Hazard Severity Zones designated pursuant to California Government Code, Sections 51175 through 51189.

Fuel modification or treatment area- An area where the configuration of flammable vegetation has been reduced or modified, providing reduced fire intensity and duration.

Greenbelts- A facility or land-use, designed for a use other than fire protection, which will slow or resist the spread of a wildfire. It includes parking lots, irrigated or landscaped areas, golf courses, parks, playgrounds, maintained vineyards, orchards or annual crops that do not cure in the field.

Hydrant- A valved connection on a water supply or storage system, having either a two and a half (2 ½) inch or a four and a half (4 ½) inch outlet, with male American National Fire Hose Screw Threads (NH) used to supply fire apparatus and hoses with water.

Ignition Resistant Materials- A type of building material that resists ignition or sustained flaming combustion sufficiently to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames.

Occupancy- The purpose for which a building, or part thereof, is used or intended to be used.

State Responsibility Area- Lands that are classified by the Board of Forestry and Fire Protection pursuant to Public Resources Code Section 4125, where the financial responsibility of preventing and suppressing forest fires is primarily the responsibility of the state (CAL FIRE).

Turnaround- A road or driveway, unobstructed by parking, which allows for a safe opposite change of direction for emergency equipment. Design of such area may be a hammerhead/T or terminus bulb.

Turnouts- A widening in a road or driveway to allow vehicles to pass.

Vertical Clearance- The minimum specified height of a bridge or overhead projection above the road or driveway.

Wildfire- Any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property or resources as defined in Public Resources Code, Sections 4103 and 4104.

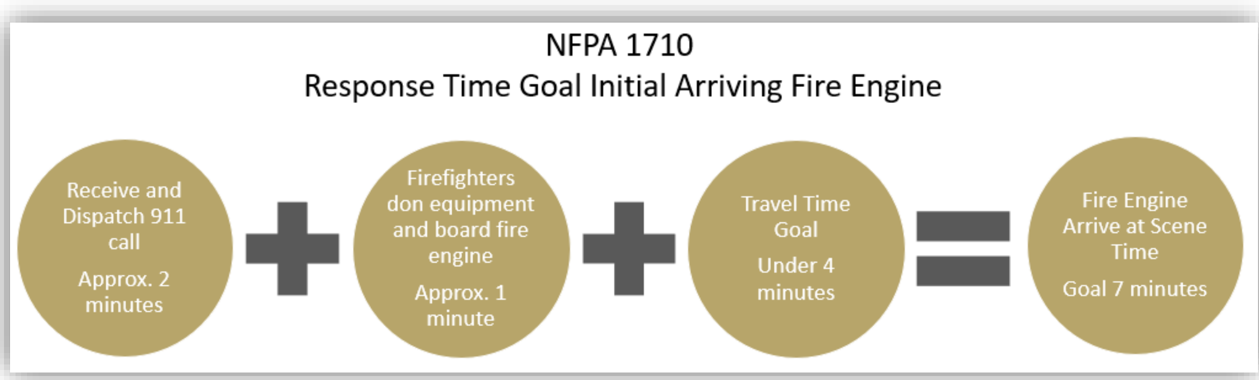
Wildfire Exposure- One or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.

Wildland-Urban Interface (WUI) Fire Area- A geographical area identified by the state as a "Fire Hazard Severity Zone" in accordance with the Public Resources Code, Sections 4201 through 4204, and Government Code, Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires.

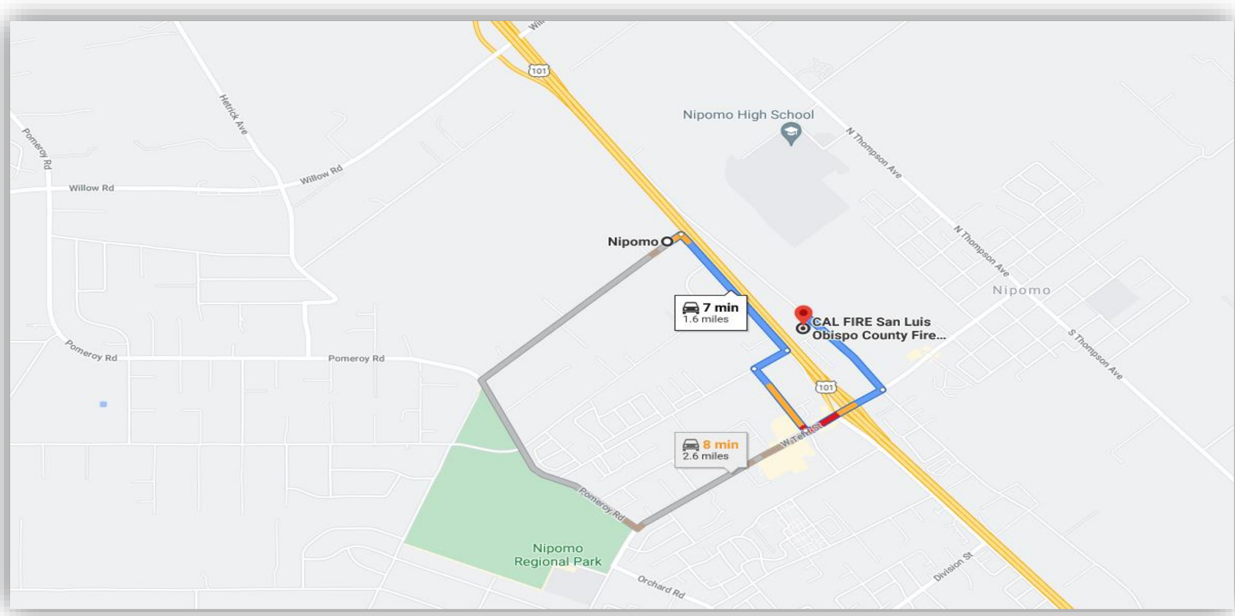
First Response Agencies Capabilities

Fire Department Response Time

The National Fire Protection Association (NFPA) 1710 recommends that the first fire engine arrive within 7 minutes or less of a 911 call.[1] The response time goals for San Luis Obispo County Fire for community service levels identified in Title 22 Land Use Plan is 7 minutes for urban areas and 8 minutes for Suburban areas 90% of the time. This includes the dispatch processing and time it takes the firefighters to board the fire engine, 3 minutes. Added on to 3 minutes is the travel time to the scene, which must be under 4 minutes to achieve the total goal of 7minutes.



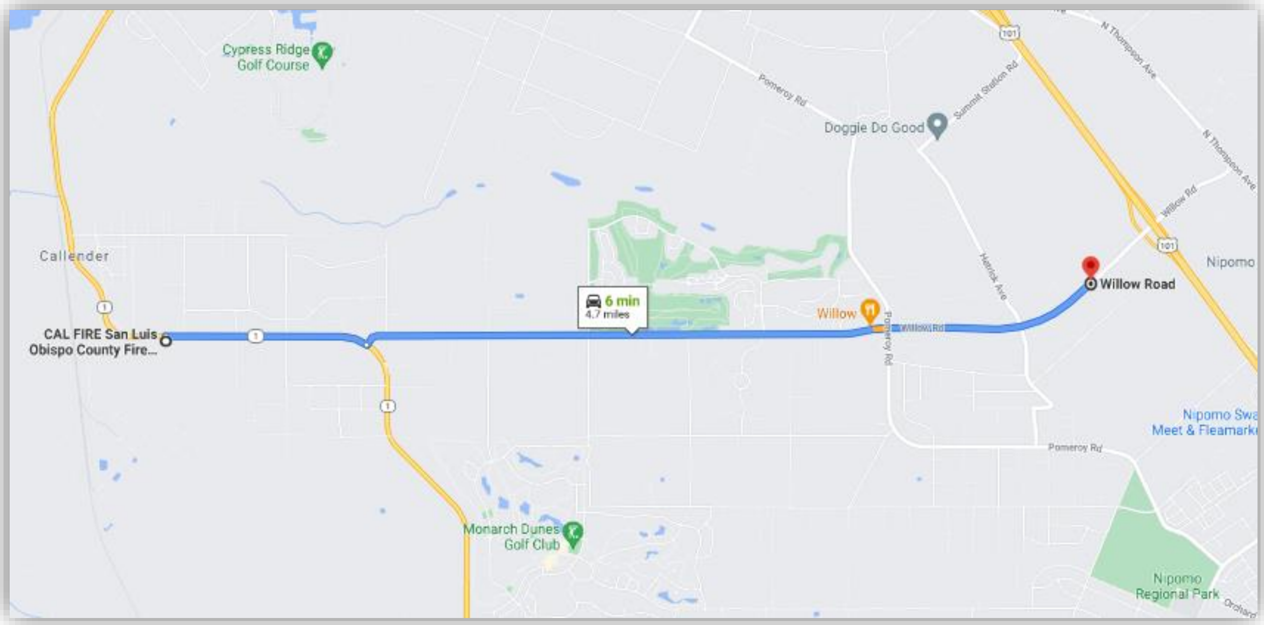
The travel time from the Nipomo Fire Station 20 to the current end of Frontage Rd (the closest entry point to the Dana Reserve southern entrance from the fire station) according to Google Maps is 7



Nipomo Station 20 to Dana Reserve travel time 7 minutes

[1] https://www.iaff.org/wp-content/uploads/Departments/Fire_EMS_Department/30541_Summary_Sheet_NFPA_1710_standard.pdf

minutes. This exceeds the recommended response time of NFPA by 3 minutes. The travel time from the Mesa Fire Station 22 to Willow Rd (the closest entry point to the north Dana Reserve entrance from the fire station) according to Google Maps is 6 minutes, exceeding the NFPA recommended response by 2 minutes. Further time will be required to get to areas within the Dana Reserve.



Mesa Station 22 to Dana Reserve entrance - travel time 6 minutes

Fire Department ISO Rating

Insurance Services Office (ISO) is an independent, for-profit organization. The ISO scores fire departments on fire prevention and fire suppression capabilities of individual communities or fire protection areas. The scores are on a point scale of 1 to 10 score with the lower number indicating the highest level of community fire protection. Some insurance companies utilize this scoring system to determine insurance rates. ISO rating system score includes the assessment of the four key areas:

- Emergency communications
  - A fire department's ability to receive and dispatch fire alarms.
- Fire department
  - A fire department's capability of response, including personnel, training and equipment.
- Water supply
  - A community's fire suppression water supply and hydrant system.
- Community risk reduction
  - A community's fire prevention, fire safety education and fire investigation programs.

The current ISO rating for the Dana Reserve area is a 4X. The X indicates that the hydrant system is not available within 1000 feet of properties. When the Dana Reserve fire hydrant system is completed, the score will then become an ISO rating of 4.

Emergency Medical Services

The California State Emergency Medical Services Authority (CAEMSA) response time goals are to have the first Basic Life Support, CPR and defibrillation capable responder arrive to the scene within 6 minutes and Advanced Life Support (paramedics) arrive in 8 minutes 90% of the time. The County Local Emergency Medical Services Agency (LEMSA) requirement for areas identified as "urban," which includes Nipomo, states that an ambulance must arrive within 10 minutes 90% of the time. San Luis Ambulance Service, Inc. is the designated ambulance provider for the South Zone including Nipomo. The two County Nipomo Fire Stations (20 & 22) both have paramedic fire engines.

It is assumed that San Luis Ambulance is currently meeting the local County EMSA requirements of an ambulance at the scene within 10 minutes 90% of the time and will continue to meet that requirement when the Dana Reserve is completed. The fire and ambulance services are not currently meeting the State CAEMSA response goals.

Law Enforcement

Primary law enforcement responsibility for the properties in the Dana Reserve rests with the San Luis Obispo County Sheriff's Office. The South Station, located on Front Street in Oceano, patrols all areas south of Avila Beach including Nipomo. The Sheriff's office has plans to build a new sub-station in Nipomo on Tefft Street. Additional funding is necessary to build the new sub-station. The Dana Reserve project will generate additional development impact Public Facility Fees that may support this plan.

New Fire Station

By ordinance, new development projects in San Luis Obispo County pay into a Public Facility Fee Program (PFF)[2]. The PFF is a special fund established by the Board of Supervisors to mitigate the impact of development in unincorporated areas, including Nipomo. With some exceptions, all new construction is required to pay a fee per unit for residential development and a fee per square footage for commercial development into the PFF to offset the impact on fire, law and other public services. The funds are generally used for construction or expansions of

Effective 1/1/2021 – Public Facilities Fees will be as follows:

PUBLIC FACILITIES FEES FOR 2021					
ADJUSTED	RESIDENTIAL (per unit)		NON-RESIDENTIAL (per 1000 Sq ')		
Fee Category	Single Family	Multi-Family	Commercial	Office	Industrial
Parks	$2,517	$1,769	-	-	-
Sheriff	$705	$490	$248	$551	$177
General Gov't	$1,055	$735	$372	$825	$265
Fire	$2,059	$1,432	$726	$1,610	$518
Library	$708	$507	$72	$160	$52
Admin Fee 2.0%	$141	$99	$28	$63	$20
Total Fees	**$7,185**	**$5,032**	**$1,446**	**$3,209**	**$1,032**

[2] https://library.municode.com/ca/san_luis_obispo_county/codes/county_code?nodeId=TIT18PUFAFE

facilities and would apply to building a new fire station.

The Strategic Plan for San Luis Obispo County Fire Department identifies the need for an additional fire station on the west side of Highway 101 in Nipomo. This is due to extended response times and the current and expected call volume. The County owns an undeveloped property for a future fire station at the Black Lake Golf Course, however this property may no longer be the best strategic location. The Strategic Plan estimates the cost of a new fire station in Nipomo at $10 million. [3]

The PFF ordinance does allow for developer-built facilities on County property. This practice has occurred previously in San Luis Obispo County. One example of the use of developer-built facilities is the Avila Valley Fire Station on San Luis Bay Drive. The Dana Reserve and the County should consider discussing how best to establish a fire station or a public safety facility at an agreed upon location in lieu of some or all PFF fees.

Fire Safe Codes and Ordinances

Fire laws are in place to protect life and property. Some codes exist to extinguish a hostile fire and others are to alert and provide time for occupants to escape. Full application of the California Building Code, California Fire Code will apply to this project. NFPA standards called out in these codes will be required. This includes residential, commercial and light industry development that is part of the Dana Reserve.

The Dana Reserve is located in a State Responsibility Area in a [High Fire Severity Zone] necessitating compliance with:

- California Building Code Chapter 7A Materials and Construction Methods for Exterior Wildfire Exposure
- California Residential Code Chapter R337 Fire-Resistant Construction
- Chapter 49 Requirements for Wildland-Urban Interface Fire (WUI) Areas.
- Public Resources Code 4290
- Public Resources Code 4291

The purpose of these codes is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

The basic requirement is that the exterior of the structure be ignition-resistant and be able to resist the entry of flying embers and fire radiation during a wildfire. Various building components addressed in WUI are[4]:

- Defensible Space
- Class A Roofing
- Closed Eaves

[3] San Luis Obispo County Fire Strategic Plan - Financial Summary page 52
[4] http://www.readyforwildfire.org/wp-content/uploads/Wildfire_Home_Retrfit_Guide-1.26.21.pdf

- Protected attic and crawl space vents
- Non-combustible siding
- Glass skylights
- Tempered multi-pane windows on fire exposed sides
- Non-combustible decking
- Non-combustible fencing near or attached to homes

Fire Protection Requirements

Residential

Chapter 7A of the California Building Code (CBC) and Chapter R337 of the California Residential Code (CRC) contain standards associated with the construction of buildings in wildfire prone areas as identified as either a State Responsibility Area Fire Hazard Severity Zone (Moderate, High, or Very High) or a Local Area Very High Fire Hazard Severity Zone. The Dana Reserve project is located in a State Responsibility Area High Fire Severity Zone, thus requiring all residences comply with these codes.

Roofs and roof edges. CBC 705A / CRC R337.5

A fire-retardant Class 'B' minimum roofing assembly is required for the Dana Reserve.

Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to resist the intrusion of flames and embers, be firestopped with approved materials or have one layer of minimum 72 pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

Exterior Walls/siding. CBC 707A.3 /CRC R337.7.3

Noncombustible, listed ignition-resistant materials, heavy timber, 5/8" Type X gypsum sheathing behind exterior covering, exterior portion of 1-hr assembly or log wall construction is allowed.

Eaves and porch ceilings CBC 707A.4, A.6 / CRC 337.7.4. R337.7.6

The exposed roof deck under unenclosed eaves and underside of porch ceilings shall be noncombustible, listed ignition-resistant materials, or 5/8" Type X gypsum sheathing behind exterior covering.

Solid wood rafter tails on the exposed underside of roof eaves having a minimum 2" nominal dimension may be unprotected.

Vents. CBC 706A / CRC R337.6

Attic vents and underfloor vent openings must resist the intrusion of flame and embers or shall be a minimum of 1/16" and maximum 1/8" corrosion-resistant, noncombustible wire mesh or equivalent. Combustible vents on top of roofs may be covered with this material to comply. Ventilation openings on the underside of eaves are not permitted, unless a State Fire Marshal (SFM) approved vent is installed, or eaves are fire sprinklered, or vent is 12 feet above a walking surface or grade below.

Windows and exterior doors. CBC 708A / CRC R337.8

Windows must be insulated glass with a minimum of 1 tempered pane or 20 min rated or glass block. Exterior doors must be noncombustible or ignition resistant material or 1 3/8" solid core, or have a 20 min fire-resistance rating.

Exterior decking and stairs. CBC 709A / CRC R337.9

Walking surfaces of decks, porches. balconies and stairs within 10 feet of the building must be constructed of noncombustible, fire-retardant treated or heavy-timber construction. Alternate materials can be used if they are ignition-resistant and pass performance requirements specified by the SFM.

Underfloor and appendages. CBC 707A.8 / CRC R337.7.8

Exposed underfloor, underside of cantilevered and overhanging decks, balconies and similar appendages shall be non-combustible, ignition resistant, 5/8" Type X gypsum sheathing behind exterior covering, exterior portion of 1-hr assembly, meet performance criteria SFM Standard 12-7A-3 or be enclosed to grade.

Residential Sprinklers. CFC 903.3.1.3 / CRC R313.2

NFPA 13D Automatic sprinkler systems installed in one- and two-family dwellings, Group R-3, and townhouses shall be permitted to be installed throughout in accordance with NFPA 13D as amended in Chapter 35.

Commercial

All new commercial buildings over 1000 sq ft. are required to have automatic fire sprinklers installed in compliance with the California Fire Code 903 as amended by the County in County Ordinance Title 16. The sprinklers will be designed in compliance with NFPA 13. The builder applicant will need to identify what Hazard Class each commercial project is for review by the fire department (exp. Ordinary Hazard Class II). The fire department connection (FDC) supporting the sprinkler systems must be located in a location approved by the Fire Department as required by CFC 912.1. A Fire Alarm System is required as outlined in CFC 907.2 and NFPA 72. Alarm systems shall be monitored by an approved supervising station listed by Underwriters Laboratory for receiving fire alarms in accordance with the County amended CFC 907.6.6 and NFPA 72. Fire Protection Systems

As required by the County Fire Marshal, a fire protection engineer will need to review, approve, and stamp commercial fire protection system designs.

Portable fire extinguishers shall be installed in all the occupancies in compliance with the CFC 1002 and Standards 10-1. The contractor shall be licensed by the SFM. Fire hose boxes will be required in certain areas of the site for fire protection.

Building material and construction must comply with Chapter 7A of the California Building Code as required for new buildings located in Fire Hazard Severity Zones. [5]

[5] https://up.codes/viewer/california/ca-building-code-2016/chapter/7A/sfm-materials-and-construction-methods-for-exterior-wildfire-exposure#7A

KNOX® Box

All commercial properties and gates are required to have a KNOX® Box installed at or near the front entrance in a location approved by County Fire. Access keys will be installed in the KNOX® Box by County Fire.

Education Facility

If a state-owned and state leased education buildings is included in the Dana Reserve project, it must be in compliance with fire and life safety requirements of the Division of State Architect (DSA) design standard requirements and review.

The County Fire Department will be responsible for approval of:

- Fire department access roads, fire lane markings, pavers and gate entrances
- Fire hydrant locations and distribution
- Water supply requirements for fire flow
- Automatic fire sprinkler systems, locations of post indicator valves and fire department connections

Addressing

All homes and businesses must have clear address identification in compliance with Fire Code 505.1 and County Fire Standard #2 Addressing. Addressing must be clearly legible and easily visible from the street or road fronting the property. Additional locations of identification may be required by the Fire Code Official to facilitate emergency response. Address numbers will be Arabic numerals or alphabet letters that contrast with their background and be a minimum width of 0.5 inches. The height will be 6 inches for single family residences and 8 inches for multi-family residences and commercial properties.

Directory signage and building numbers will be installed at multi-family building complexes when the location of individual units is difficult to locate. Directional signs may also be used. The specification for the signage will comply with the County Fire Standard #2.

Hydrant and Water Storage

The Dana Reserve domestic and fire water storage and delivery will be provided by the Nipomo Community Service District (NCSD).

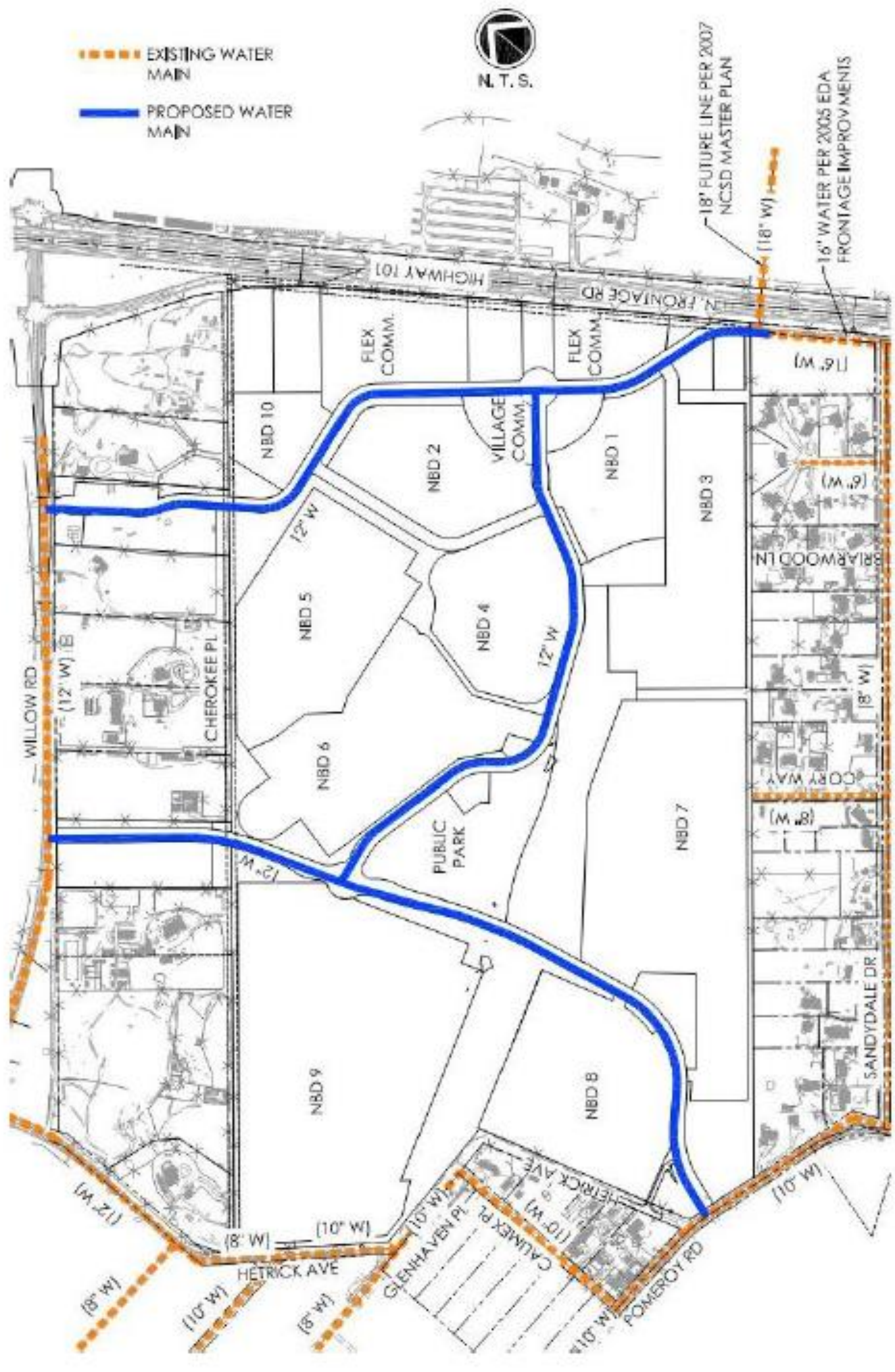
The water system is proposed to be comprised of a 12” main line extension from the stub in North Frontage Road, at the southeast corner of the property, to Willow Road and will also include an internally looped 8” public water main lines which will provide fire suppression to the development areas. These will be routed within the public roads. The main trunk lines will be owned and operated by NCSD. The private main line system for the commercial areas will be protected at each connection point to the public system with a double detector check assembly.

The DRSP states that fire hydrants will be located adjacent to roadways and spacing will be no greater than 500 feet, except on dead end streets it shall be no more than 400 feet. The maximum distance from any point on the street frontage to a hydrant shall be 250 feet. For commercial or light industrial areas, the maximum spacing will be no greater than 250 feet or less, as required by the Fire Official. Hydrants or tie-ins for future hydrants may be required by the fire official and shall typically limit the distance from any point on the exterior of any building to 150 feet. This design meets the requirements of the California Fire Code Appendix C.

Fire-flow requirements must comply with Appendix B of the California Fire Code. The system must be designed to meet or exceed the following:

- **Residential one- and two-family areas** will have a minimum fire-flow requirement of 500 gallons per minute(gpm) for ½-hour at 20 psi residual pressure. (CFC Table B105.1(1))
- **Residential areas with buildings other than residential one- and two-family dwellings such as townhouses and apartments** will have a minimum fire-flow of 1000 gpm for 1-hour duration at 20 psi residual pressure. (CFC Table 105.2)
- **Commercial light industrial areas** will have a minimum fire-flow to meet or exceed the single largest buildings square footage with fire sprinklers. This will meet the minimum requirements in Table B105.1(2). It is anticipated that the largest commercial building will be 32,000 sq.ft., the Neighborhood Market with a Type II construction, thus requiring 2500 gpm for a 2-hour duration at a minimum of 20 psi residual pressure.

Exhibit 5-1: Proposed Water Backbone Infrastructure



Fire Resistive Landscaping

The landscaping in the public areas of the Dana Reserve must be designed to include fire-resistant plants that are strategically placed to resist the spread of fire to nearby homes. Consideration should always be made to ensure these plants are drought tolerant. Hardscaping should use limited combustible materials in or near structures.

The following landscape principles should be utilized in the landscape design:

- Use of stone or other non-combustible walls, patios, decks and roadways that will act as barriers, defensible space and flame deflectors
- Selection of high-moisture plants that grow close to the ground and have a low sap or resin content
- Selection of fire-resistant plant species that resist ignition
- Use of noncombustible rock, gravel, concrete and pavers in areas less than five feet away from structures
- Plants should be non-invasive

A list of fire resistive and non-invasive plants should be identified as part of the overall landscape design for public areas. Homeowners should be encouraged to utilize this list in their landscaping. This list could be similar to those identified on the Sustainable Defensible Space webpage.[6]

[6] https://defensiblespace.org/plants/

Open Space Areas

The overall geography of the approximate 49.8 acres of open space in the Dana Reserve consists of four large storm water basins and rolling hills covered in the oak woodland and chaparral. Flat grassland areas with sandy soils are dispersed in open space areas. There are no watercourses or riparian areas. The open space harbors eight sensitive plants and nine special status animals. The open space areas can be defined by their characteristics into the following categories:

- Contiguous Space
- Pocket Space

There will be several foot, bicycle and equestrian trails that either go through the open space areas or are along the perimeter of the open space.

There are approximately 100 parcels that are arranged along the perimeter of the open space areas. Some of these parcels have their backyards up against the open space and others are separated from the open space by a road or trail.

When the project is complete each neighborhood within the community will each have a Homeowners Association with a master Homeowners Association in place that will be responsible for maintenance of the open space areas.

Environment

The environment of the entire developed and open space area in the Dana Reserve are discussed in the Biological Report for Dana Reserve, Nipomo, San Luis Obispo County (Althouse and Meade, 2020) and in the Dana Reserve Specific Plan (DRSP) submitted to the County of San Luis Obispo. Part of the focus of the Fire Protection Plan is to discuss the wildfire hazard identified by the DRSP on the open space (see next section; Wildfire Environment) and to discuss how wildfire minimization measures in open spaces here may affect habitats and special status species described in the DRSP and by Althouse and Meade (2020) and potential mitigation to those impacts (see the Fuel and Vegetation Management section below).

Habitats as identified in the DRSP open space by Althouse and Meade (2020) consist primarily of coast live oak with approximately a 50% canopy cover, interspersed with chamise-black sage chaparral alliance and a small amount of California perennial grassland habitat near the edges. It is notable that there are no watercourses or riparian habitats, and no serpentine soils here, all of which support many special status species. Nonetheless, eight special status plant species and nine special status wildlife species were found on site and the potential exists for more to occur here.

Typical coast live oak and grasslands in the Dana Reserve Open Space

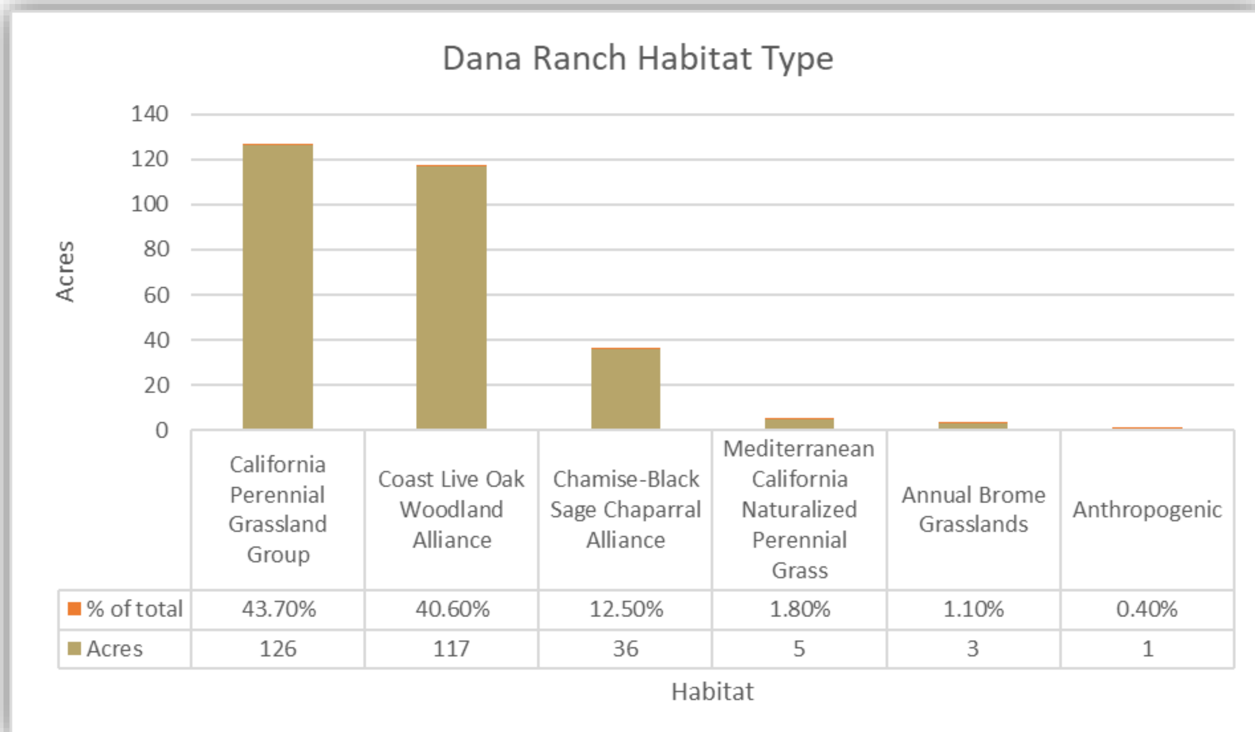
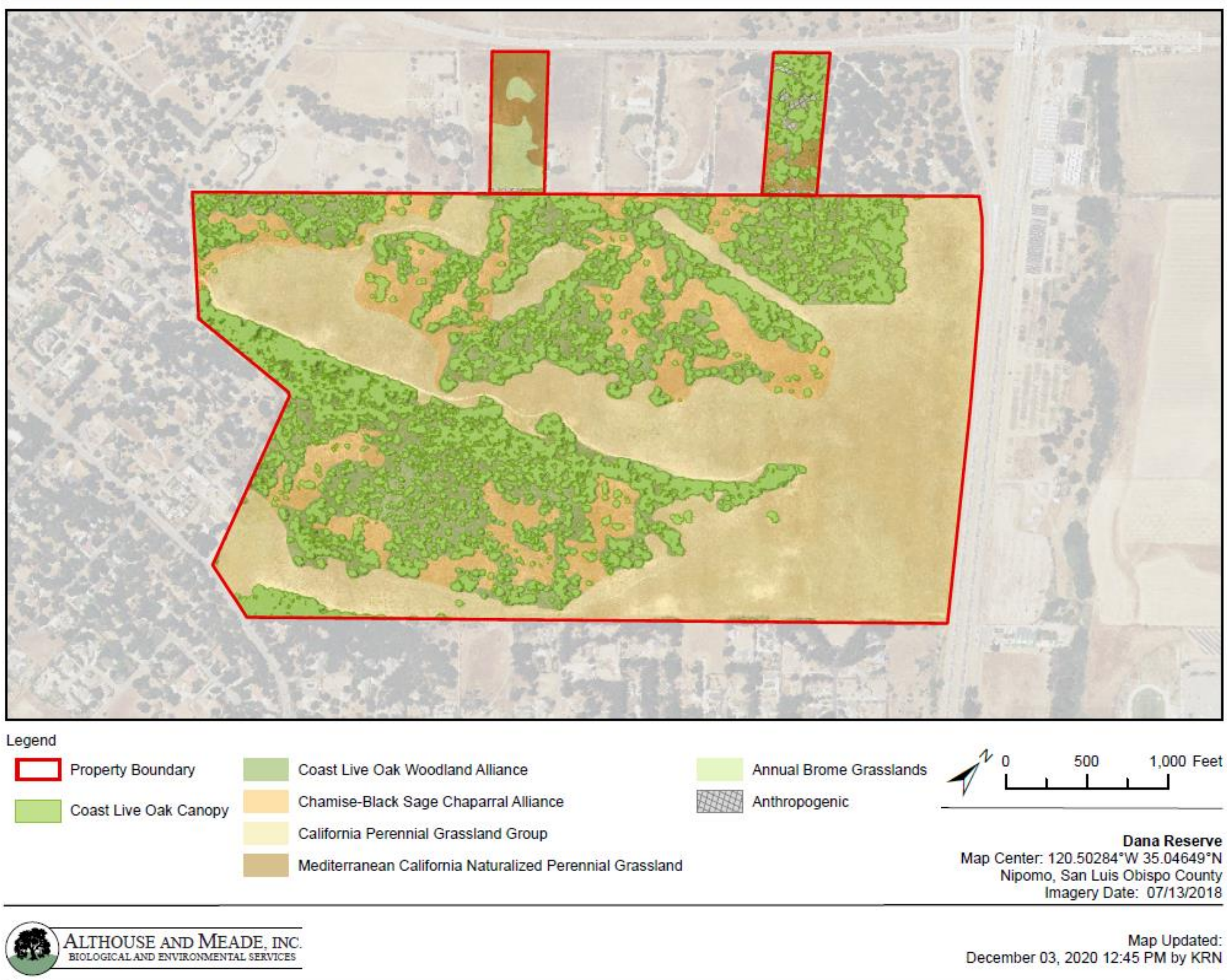


Chart showing total acreage and percent of each habitat type in the Dana Reserve

Habitat	Acres	% of total
California Perennial Grassland Group	126	43.7%
Coast Live Oak Woodland Alliance	117	40.6%
Chamise-Black Sage Chaparral Alliance	36	12.5%
Mediterranean California Naturalized Perennial Grass	5	1.8%
Annual Brome Grasslands	3	1.1%
Anthropogenic	1	0.4%
Total:	288	100.0%

Table showing total acreage and percent of each habitat type in the Dana Reserve

Figure 4. Habitats



The open space includes 40.6 percent coast live oak woodland alliance which integrates with disturbed chamise and black sage chaparral.[7] These integrated areas are considered a sensitive community and all of the special status plant species found in the project area occur in the live oak woodland alliance or along its edges, particularly within the chaparral integration zone. Wildfire can burn quickly through light fuels here such as annual grasses in the oak understory and although flame lengths may not be as high as in chaparral, the speed of fire spread and the rapid regrowth of grasses each year makes this habitat dangerous when in juxtaposition to urban areas. Where there is chaparral mixed in with oaks flame lengths can reach into the crowns of the oaks. Fire typically does not kill live oaks because of their insulating bark and ability to sprout from the trunk, so this habitat is relatively resilient to recurring low intensity fire. In order to preserve this habitat and keep fuel levels manageable, it will be necessary to maintain the current level of chaparral growth, trim low hanging oak branches, and to reduce the grass length around the periphery of the open space near the homes and, to a lesser degree, within the oak grassland habitat in the interior of the open space. This can be accomplished without losing biodiversity or significantly harming special status plants and animals if done with conservation of species in mind.

The open space includes 12.5% of the open space is covered by the chamise-black sage chaparral alliance and is in most cases closely intermixed with the coast live oak woodland alliance. This intermixed habitat is considered a sensitive habitat, although most of this chaparral component has been regularly grazed or cut to reduce fuel loading and does not support the diversity normally seen in a mature version of this habitat. This vegetation type is very flammable and can burn under very high intensity and generate significant flying embers if the fuel loading is high. If a fire were to burn through the open space as it exists now, these patches of chaparral would increase the fire intensity when it burned but because these patches are small, the overall fire intensity would be lower in the predominantly grass understory. This vegetation alliance is adapted to fire and recovers in 3-5 years. Without fuels reduction, this habitat type is likely to expand into existing open areas in the oak woodland and increase fuel loading which will greatly increase the fire hazard. Reducing fuels while protecting sensitive resources will require regular but light brush trimming by crews trained to recognize and reduce impact to sensitive species while still obtaining fuel reduction goals.

The open space includes 46.6% of the open space is covered by three kinds of grassland groups or alliance and occur around the margins of oak and chaparral habitats and large open areas on the eastern side of the property. Very few native grass species are seen here despite the classification, and most grasses are non-native or invasive. Despite the preponderance of non-native vegetation several special status plants and animals are found in this habitat. Fuels here are light and flashy and burn readily, but recovery quickly after winter rains. General fuel control options in this type of habitat include annual mowing, grazing, and prescribed fire.

There are several options for fuel management in the habitats found in the open space area. If done with proper timing and technique, and monitored, sustainable fuel management can be accomplished while maintaining native habitats. Known fuel reduction techniques are described below in the fuels and vegetation management section. Planning for fuels management can follow the programmatic

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[7] Woodlands Conservation Act (Fish & Game Code, § 1360 et seq.) Section 1361, subdivision (h), defines "oak woodland" as "an oak stand with a greater than 10 percent canopy cover or that may have historically supported greater than 10 percent canopy cover."

coverage of the California Board of Forestry and Fire Protection's California Vegetation Treatment Program, Final Environmental Impact Report, State Clearinghouse #2019012052, Volume II: Program Environmental Impact Report (PEIR), as Revised (CBFFP 2019). The PEIR provides guidelines for impact assessment under California Environmental Quality Act, including biological resources.

Noxious Weeds and Invasive

Noxious and invasive weeds have the potential to exacerbate wildfire conditions if not controlled, decrease the native biodiversity of the area, and may become an economic burden to local agriculture. Potential fuels management activities can help reduce the spread of these weeds if done intentionally or worsen the problem by introducing weeds through crews and equipment or helping spread weeds already onsite. Althouse and Meade (2020) report many non-native species in their list of observed plants in the project area but many of these have been ubiquitous throughout the Central Coast for decades and are unlikely to be eradicated there, but further spread can be prevented by routine inspection and by following best management practices to prevent the spread of weeds. Some of the more aggressive invasive plants to watch for in this habitat include the expansion of the nearby eucalyptus trees, the establishment of yellow star thistle, purple star thistle, or the expansion of existing Italian or milk thistle, especially under the oak trees where cattle tend to congregate for shade. The existing veldt grass is well established in the Central Coast area so control of it on the Dana Reserve will require ongoing annual treatment and possibly re-introduction of native perennial grass to help reduce veldt grass incursion.

Best Management Practices for minimizing the introduction of noxious weeds include preventing landscaping with species such as pampas grass or iceplant that could move into the open space, monitoring equestrian and foot paths for weed introduction, and cleaning maintenance, fuel control, and fire suppression equipment before working in the open space. Vehicles and heavy equipment should be thoroughly washed before entering this area, especially the tires and undercarriage. Minimizing soil disturbance during any maintenance activities will also help prevent the establishment of undesirable plants.

Livestock used to control fuels can be a source of invasive plants propagules through their digestive track unless fed a weed free diet before entering the open space to purge noxious weed seeds from their system. Prior to entering the open space, livestock used for vegetation management should also be corralled in areas free of known noxious weed seeds of that may adhere to their fur.

Livestock used for vegetation management can also be managed to reduce noxious weeds in the open space by using electric fencing to concentrate the livestock over infested areas and thereby encouraging consumption of undesirable plants.

More information about noxious weeds and their control can be found at the California Invasive Plant Council (CAL-IPC): https://www.cal-ipc.org/

Oak Woodland Protection

Coast live oak (*Quercus agrifolia*) is a supremely adapted plant to fire as it features a thick and mostly live bark, evergreen leaves, and vigorous resprouting from both basal and epicormic buds. Even roots are protected by a corky layer. As such, mature oaks can survive even crown fires, though they may delay resprouting for a year or more. Lightning in the project area is not a common occurrence, but aboriginal burning to manage acorns and other food plants occurred commonly with the fire return interval dependent on the palatability of the local acorns and other species requiring intermittent fire to reduce insect predation upon and to allow for an easier harvest. Van de Water and Safford (2011) summarized pre-contact fire histories and suggest that California oak woodlands had a mean minimum of 5 years and mean maximum of 45 years with a median of 12 years between fires.[8]

Seedling and saplings tend to survive low-to-moderate fire intensity, even if the crown is damaged or lost. Sprouting from the root crown is a common feature in top-killed immature coast live oak. Mature trees of an average diameter at breast height of at least 18 inches withstand even high fire intensity very well and will often resprout from both the root crown and trunk if the crown is damaged. Surface fires of low to moderate severity will scorch and kill the lower canopy of coast live oak, these leaves tend to persist of the stem for some time, adding protection to the scorched soil surface when they do release.

This property has previously been managed with cattle grazing, to the extent that the oak understory is patchy, with varying vertical continuity and low oak regeneration. The overstory is approximately 50% continuous horizontally, but since coast live oak leaves do not ignite readily, canopy thinning is not recommended. Understory vegetation includes Frangula californica, Arctostaphylos rubris, Toxicodendron divirsilobum, some large woody debris, and a continuous bed of grasses. The oak woodland is punctuated with pockets dominated by chamise, poison oak, black sage and other chaparral, all fire-adapted species. Historic harvesting of oaks in the open area is also evident from cut stumps, many which have resprouted. Live oak has been used historically for uses including charcoal production, firewood, and structural wood.

Fire mitigation in the oak woodland should consist of an initial removal and de-densification of understory ladder fuels. Native species that are fire-adapted will be retained. Treatments could occur before construction to enable access. Such treatments could include: mowing, masticating where applicable, and pruning smaller lower limbs from individual oak trees. A prescribed light, broadcast burn would be ideal, while pile burning debris is a secondary option. Low severity understory fires have multitudes of benefits to oak woodlands, namely in insect and disease mitigation, as well as soil fertilization.

Annual management of the oak woodland understory is crucial; the goal of which is to interrupt a continuous fuel bed of lighter fuels such as dried grasses that have the potential to carry even a low intensity fire into the canopy. Mowing and weed whacking are necessary immediately adjacent to structures and will complement grazing animals in more open spaces away from structures.

A majority of the centrally located oak woodland is to be maintained as part of the Dana Reserve Specific Plan. Where development is to occur adjacent to coast live oaks, County oak tree protection measures include on-site tree protection measures where oaks can preserve, and off-site mitigation to offset necessary oak tree removal.

Fire safe management of the oak woodland areas in open spaces on the Dana Reserve will not require removal of healthy trees. Areas outside of the 100-foot defensible space will require good forest

[8] * (Van de Water, K.M.; Safford, H.D. 2011. A Summary of fire frequency estimates for California vegetation before Euro-American settlement. Fire Ecology 7(3): 26–58.)

practices, such as grazing, handcrew trimming and limited prescribe burning. Within the 100-foot defensible space zone, the concept of a shaded fuel break will be utilized by:

- Removing non-native species
- Separating native chaparral species so there is not a contiguous fuel bed
- Using mechanical, animal or hand crew efforts underneath the trees to reduce heavier fuels
- Limbing the lower branches of the trees up to 6 feet to prevent a ladder fuels that could spread fire from the ground into the trees canopy

Cut vegetation should generally be chipped on site or may be piled for winter burning.

Oak Trees – Conservation & Preservation

A majority of the centrally, located oak woodland on the Dana Reserve property is to be maintained as part of the 64.1-acre open space areas or 22.3% of the total site acreage. Where development is to occur adjacent to coast live oaks, County oak tree protection measures will be implemented.

Off-site 385-acre natural habitat and oak preserve

A combination of both on-site mitigation and off-site mitigation will be used to offset the live oak trees. Dana Reserve has purchased the Dana Ridge property that was part of the original Dana Rancho Nipomo for the off-site mitigation featuring a similar in character and quality of the coast live oaks within the Dana Reserve. This 385-acre Dana Ridge natural habitat and oak preserve is planned to be permanently maintained through a conservation easement with management and oversite by a local, non-profit conservation group.

Biological Mitigation Site - DRSP Exhibit 3-2

As part of the agreement with the non-profit conservation group a requirement should be required that forest management practices are maintained that include reducing fuel loading that could create an elevated fire threat. This may include prescribe fire, mechanical treatments, hand crew and the use of animal grazing.

Wildfire Environment

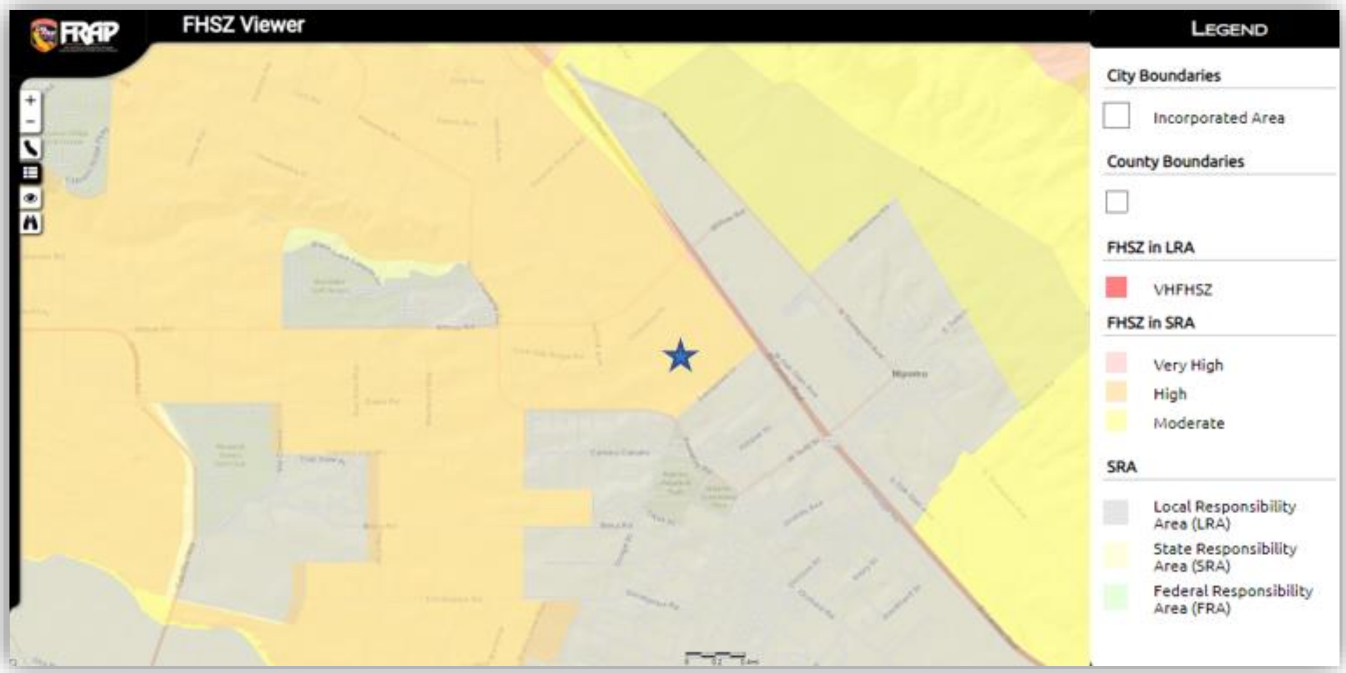
Fire Hazard Severity Zone

The Dana Reserve development is located in State Responsibility Area as a High Fire Hazard Severity Zone. The Fire Hazard Severity Zone map[9] is developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. They were last updated in 2007. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high and very high. Urban and wildland areas are treated differently in the model, but the model does recognize the influence of burning embers traveling into urban areas, which is a major cause of fire spread. They do not take into account modifications such as fuel reduction efforts.

CAL FIRE has begun the long process of updating the map. While a change to the Dana Reserve area as a State Responsibility Area High Fire Hazard Severity Zone prior to development is unlikely, after the project is fully developed, the area, exclusive of the open space areas, may well be converted to a Local Responsibility Areas, like the Black Lake development nearby, and not considered a fire hazard severity zone. The open space, even after the surrounding areas are developed, will likely be designated either a State Responsibility Fire Hazard Severity Zone, or become a Local Responsibility Area Fire Hazard Severity Zone.

While FHSZs do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern. FHSZs are meant to help limit wildfire damage to structures through planning, prevention, and mitigation activities/requirements that reduce risk. The FHSZs serve several purposes: they are used to designate areas where California's wildland urban interface building codes (Chapter 7A) apply to new buildings; they can be a factor in real estate disclosure; and the County considers fire hazard severity in the safety elements of the general plan.

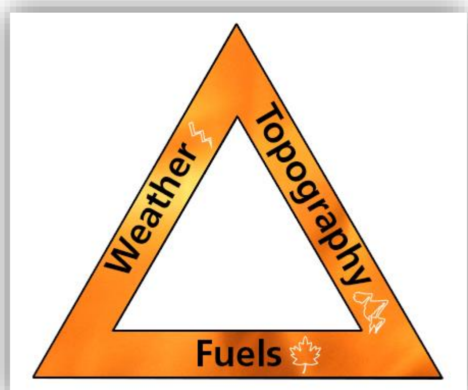
[9] https://www.arcgis.com/home/item.html?id=789d5286736248f69c4515c04f58f414



Fuel Weather & Topography

There are three factors that influence fire behavior: fuel, weather, and topography.

Fuel



A fuel's composition, including moisture level, chemical makeup, and density, determines its degree of flammability. Moisture level is the variable factor and changes daily, even hourly. Live trees usually contain a great deal of moisture and dead logs contain very little. The moisture content and distribution of these fuels define how quickly a fire can spread and how intense or hot a fire may become. High moisture content will slow the burning process, because heat from the fire must first eliminate moisture.

In addition to moisture, a fuel's chemical makeup determines how readily it will burn. Some plants, shrubs, and trees contain oils or resins that promote combustion, causing them to burn more easily, quickly, or intensely than those without such oils. Finally, density of a fuel influences its flammability. If fuel particles are close together, they will ignite each other, causing the fuel to burn readily. But if fuel particles are so close that air cannot circulate easily, the fuel will not burn freely.

Soil types also must be considered because fire affects the environment above and below the surface. Soil moisture content, the amount of organic matter present, and the duration of the fire determine to what extent fire will affect soil.

Mixture of vegetation types in open space area

Weather

Weather conditions such as wind, temperature, and humidity also contribute to fire behavior. Wind is one of the most important factors because it can bring a fresh supply of oxygen to the fire and push the fire toward a new fuel source.

Temperature of fuels is determined by the ambient temperature because fuels attain their heat by absorbing surrounding solar radiation. The temperature of a fuel influences its susceptibility to ignition. In general, fuels will ignite more readily at high temperatures than at low temperatures.

Humidity, the amount of water vapor in the air, affects the moisture level of a fuel. At low humidity levels, fuels become dry and, therefore, catch fire more easily and burn more quickly than when humidity levels are high.

The weather in Nipomo is a typical of a coastal valley climate that is influenced by its proximity to the Pacific Ocean. Nipomo has an average annual precipitation of approximately 17 inches. While record temperatures are over 100 degrees, seasonal highs are around 80 degrees and lows around 43 degrees. Historic average humidity is in the low 60s. Outside of winter storms, wind conditions in Nipomo peak in both springtime and early autumn, often fresh and most often from the northwest to west-northwest. Due to the property's topography, winds from this direction can push a fire uphill into the slopes of the oak woodland complex.

Maximum wind speeds do not generally exceed 23 mph with the average wind speeds about 10.4 mph.[10]

Anthropogenic climate disruption is resulting in more variable and potentially extreme weather conditions. An increase in wind and temperature plus a decrease in precipitation effectively dries vegetation at a faster rate, making even our fire-adapted plant species more able to ignite.

Topography

Topography describes land shape. It can include descriptions of elevation with the height above sea level; slope, the steepness of the land; aspect, the direction a slope faces (e.g., the south side of a canyon will have a north-facing slope); features, such as canyons, valleys, rivers, etc.

Slope can determine how quickly a fire will move up or down hills. For example, if a fire ignites at the bottom of a steep slope, it will spread much more quickly upwards because it can pre-heat the upcoming fuels with rising hot air, and upward drafts are more likely to create spot fires.

The topography of the open space areas of the Dana Reserve are minimally sloping and will only have a minimal effect on fire behavior.

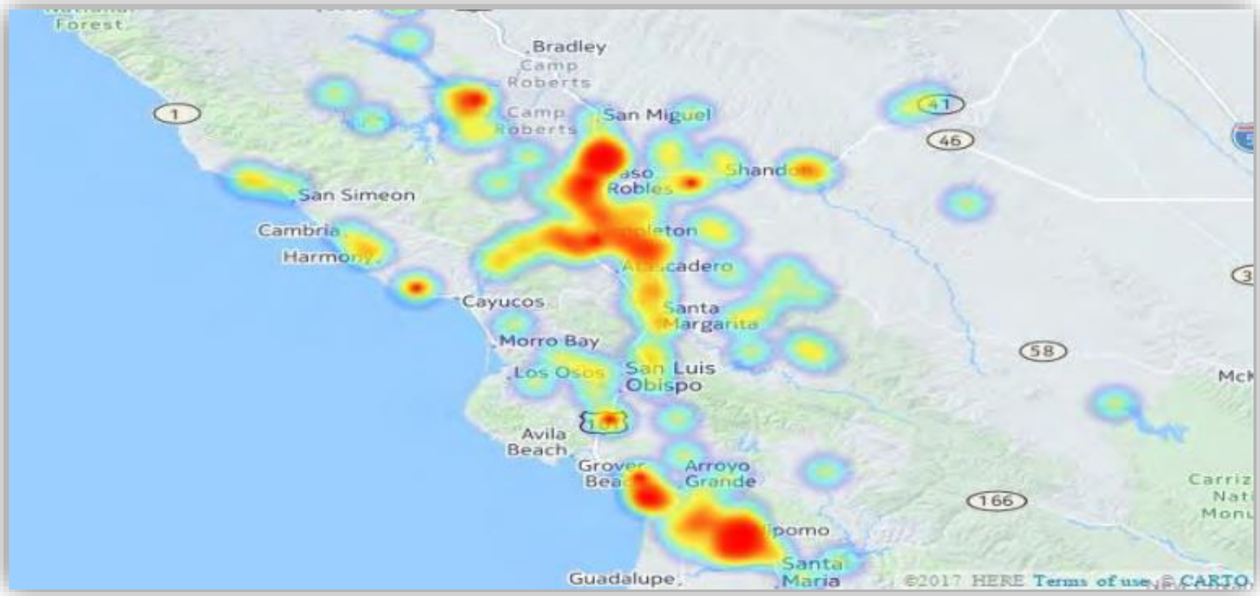
Nearly the entirety of the Dana Reserve property and surrounding area is approximately 374 feet above sea level. The property features a predominantly southwest-northeast ridge that supports the oak woodland complex on all aspects. The steeper, north- and west-facing slope of the ridge is short, about 350 feet in length at the longest, and involves slopes to a maximum of about 30%.[11] The milder, south- and east-facing side of this hill features a mix of oak woodland and chamise-black sage chaparral and has an average slope of about 6% and maximum of about 20%.

Ignitions

CAL FIRE Ignition data for San Luis Obispo County was analyzed for a 5-year period (2013-2017) to evaluate ignition trends and problems within the County.[12]

Ignition Cause	Number	Percentage
Arson	31	4%
Campfire	35	4%
Debris Burning	46	6%
Powerline/Vehicle/Equipment Use	319	41%
Lightning	10	1%
Playing w/ Fire	7	1%
Unknown/Undetermined	326	42%
Smoking	9	1%

[10] https://www.worldweatheronline.com/nipomo-weather-averages/california/us.aspx
[11] USDA Soil Survey reported in Althouse and Meade Biological Report Figure 3
[12] 2019 Community Wildfire Protection Plan



Ignition Data 2013-2017 source 2019 CWPP

The majority of known ignitions in the County, 41%, were from powerline/vehicle/equipment classification. Most often fire ignitions are starting along transportation corridors. Fires along Highway 101 are the most common. Considering this, the project will develop mitigation strategies that will prevent a fire that starts along the Highway 101 from burning into the development. These strategies can be a barrier such as a non-combustible wall, a greenbelt, or annual maintenance of vegetation so it will not support fire spread.

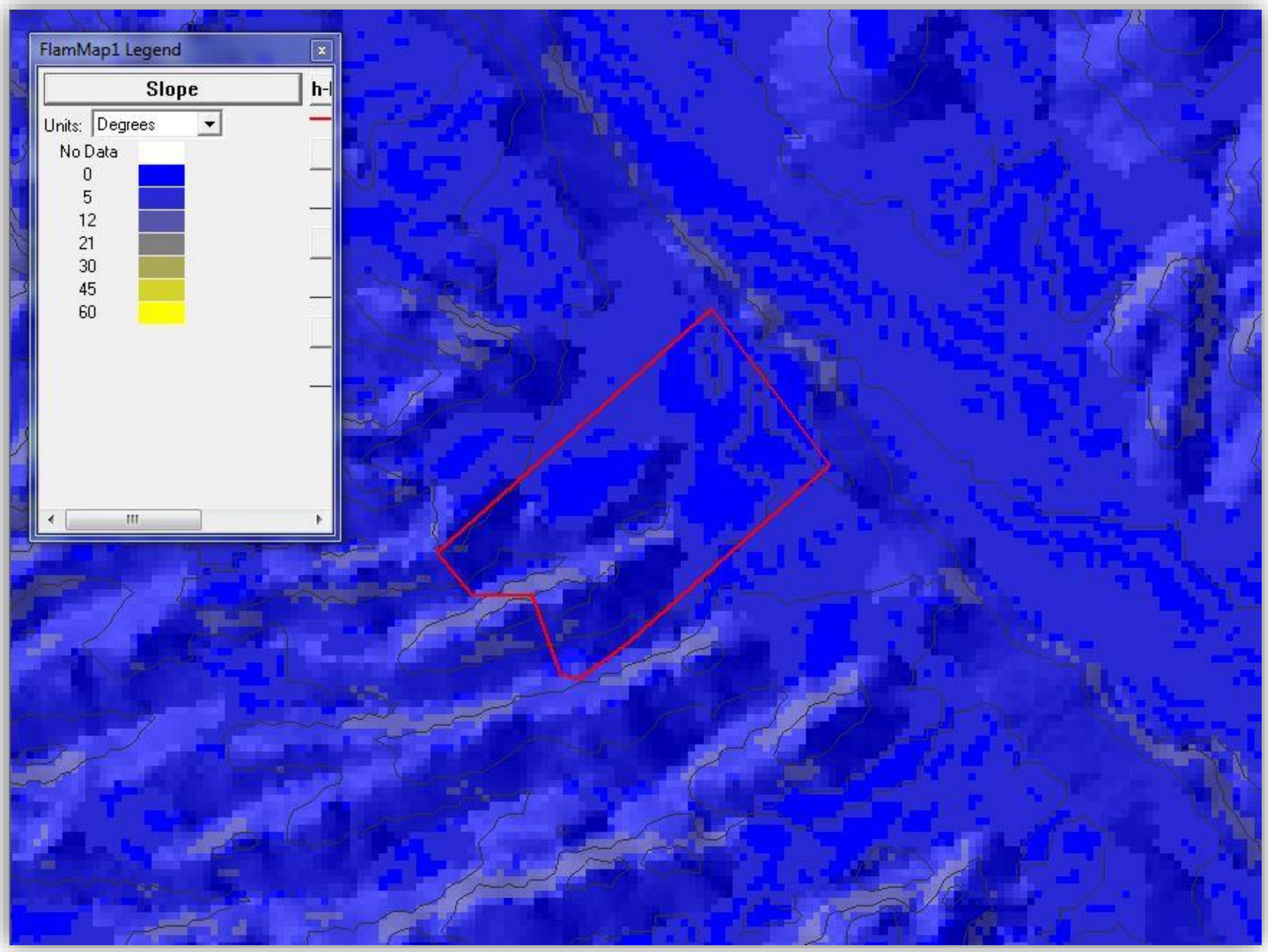
Other prevention methods will also be used to reduce or eliminate ignition sources. These include undergrounding of all new electrical lines. Fire prevention signs located on trails will include fire safety messages such as no smoking, no cooking devices, no camping, prevent wildfires and be fire safe.

Wildfire Threat Analysis

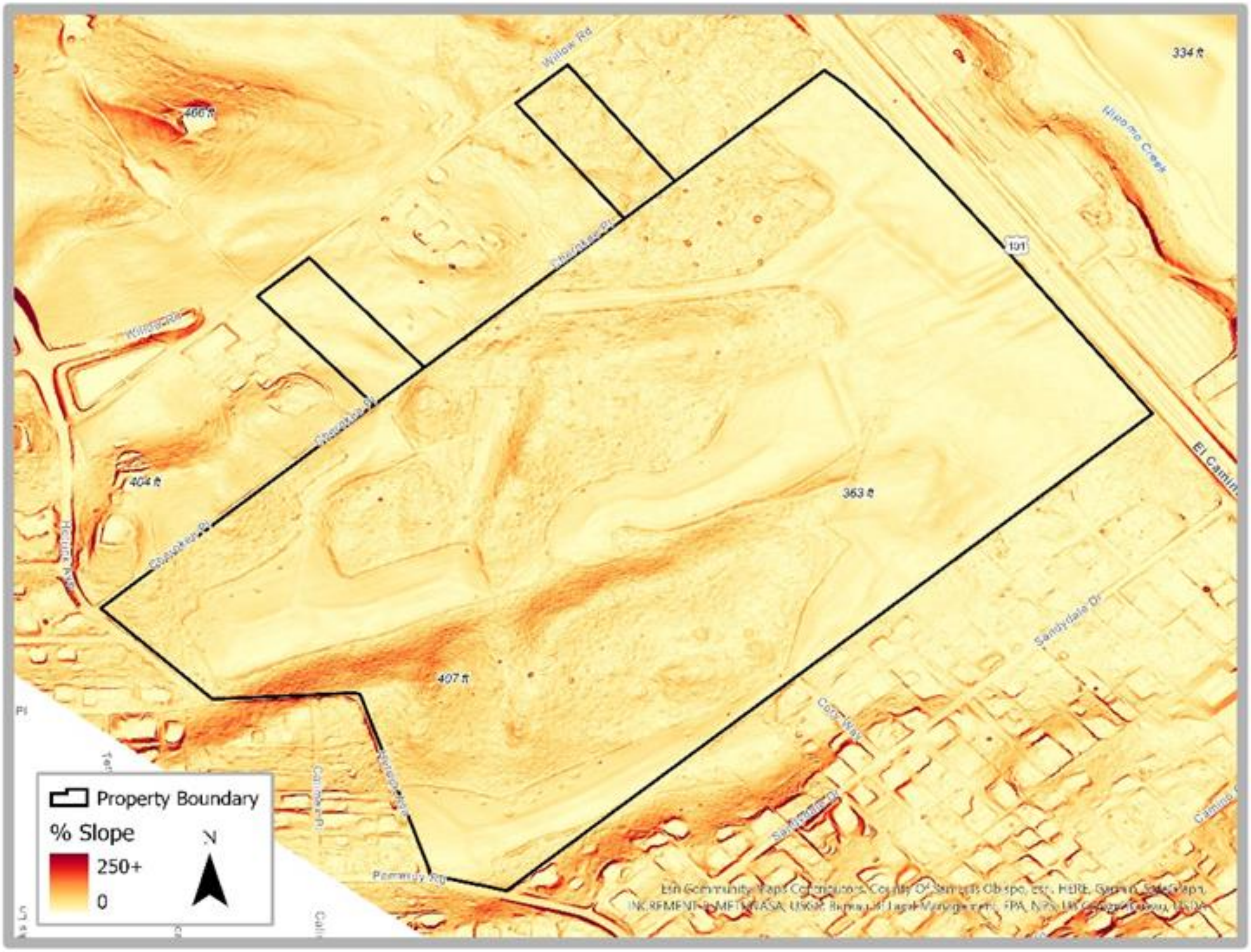
The wildfire threat analysis is based on the current conditions of the Dana Reserve property. With full development of the project, the fire spread models will change and fire spread will be reduced. This threat analysis validates the fire protection requirements for this project and with proper maintenance and fuel treatments, will be effective in mitigating a flaming front from spreading into the development and reduce the ability for embers to ignite beyond the flaming front.

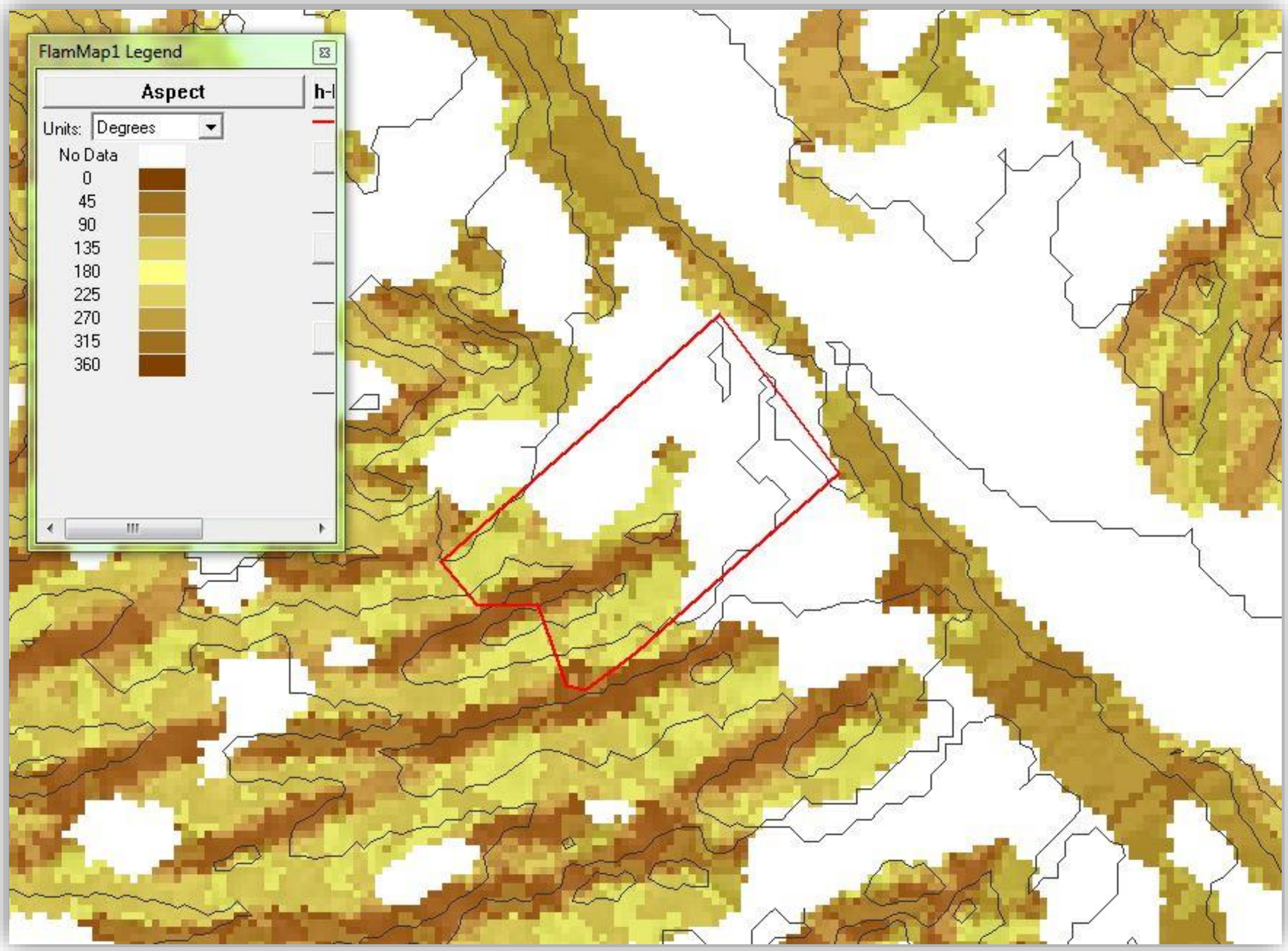
Topography

The project area consists of gently rolling terrain with slope percentages ranging from flat to 25 to 30% slope steepness. Fires can be slope driven, the steeper the slope the faster the fire may spread.

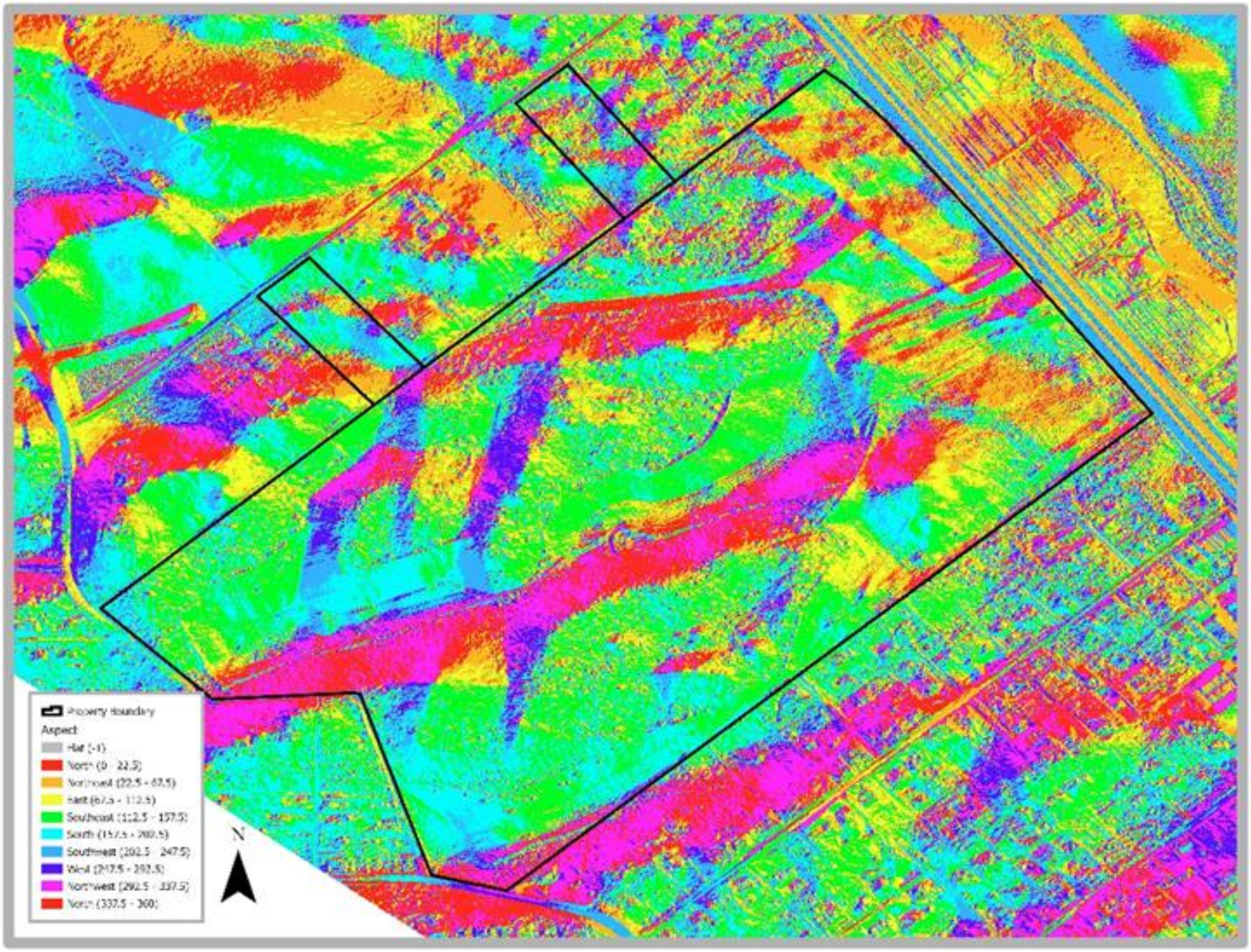


FlamMap slope map in degrees


Property Boundary
% Slope
250+
0
N
334 ft
466 ft
404 ft
363 ft
407 ft
Willow Rd
Nipomo Creek
El Camino
Sandydale Dr



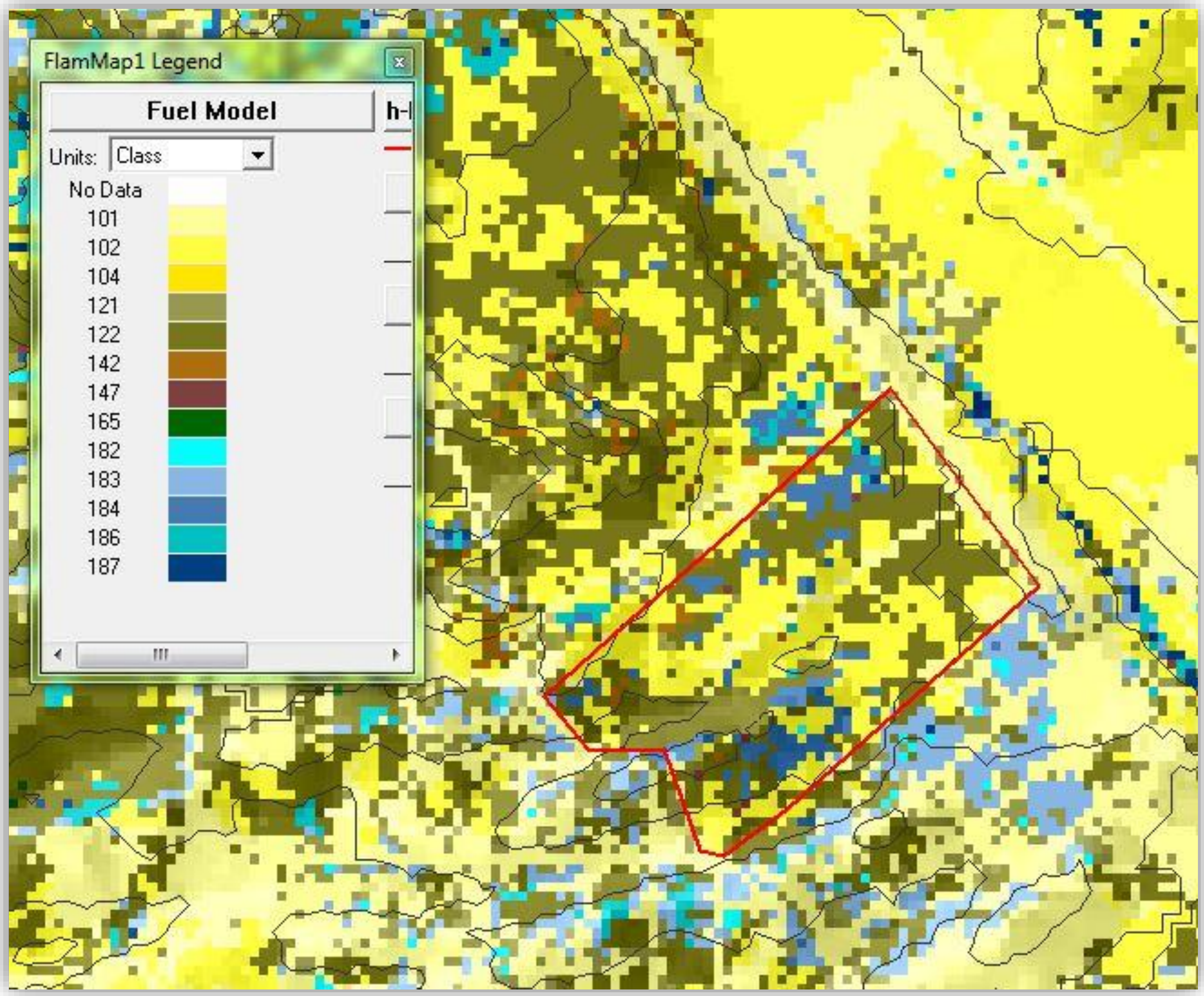
FlamMap Aspect. The aspect, or the way the slopes face, range from mostly northeast to southwest facing slopes in the project area.


Property Boundary
Aspect
Flat (-1)
North (0 - 22.5)
Northeast (22.5 - 67.5)
East (67.5 - 112.5)
Southeast (112.5 - 157.5)
South (157.5 - 202.5)
Southwest (202.5 - 247.5)
West (247.5 - 292.5)
Northwest (292.5 - 337.5)
North (337.5 - 360)
N

Aspect map

Fuels

Fuels in the project area were determined from site visits, aerial photo analysis and using the U.S. Geological Survey LANDFIRE database. Results are shown below:



FlamMap Fuel (vegetation)

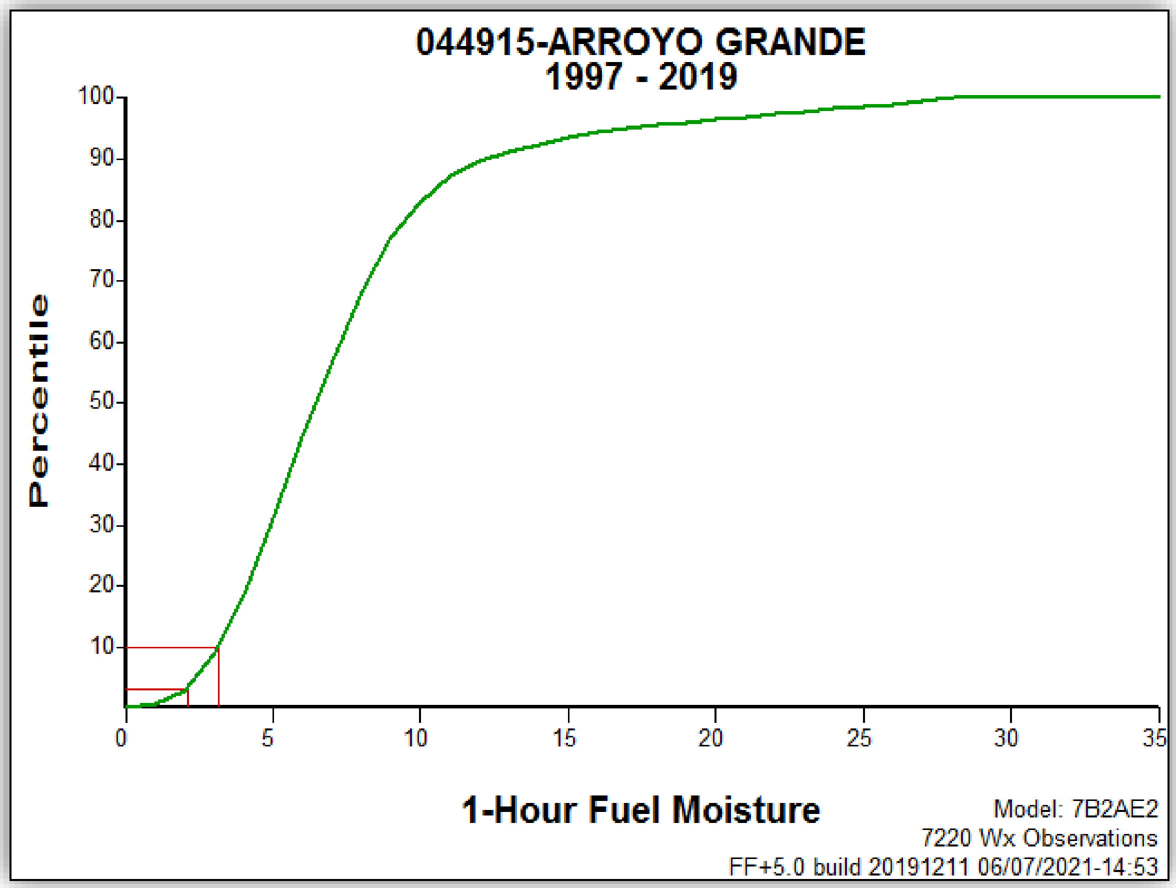
Fuel models (the classification of vegetation) are stylized representations of fuel composition and structure that are used for fire behavior analysis. (Scott and Burgan 2005). The majority of the fuels in the project are represented by the following fuel models:

- 101-104 Grass of varying characteristics (yellow colors)
- 121-122 Grass shrub mix of varying characteristics (olive colors)
- 142-147 Brush fuels (very little) (brown colors)
- 165 Heavy timber/shrub combination (very little) (dark green)
- 182-187 Tree litter and understory branches and logs (blue colors)

Weather

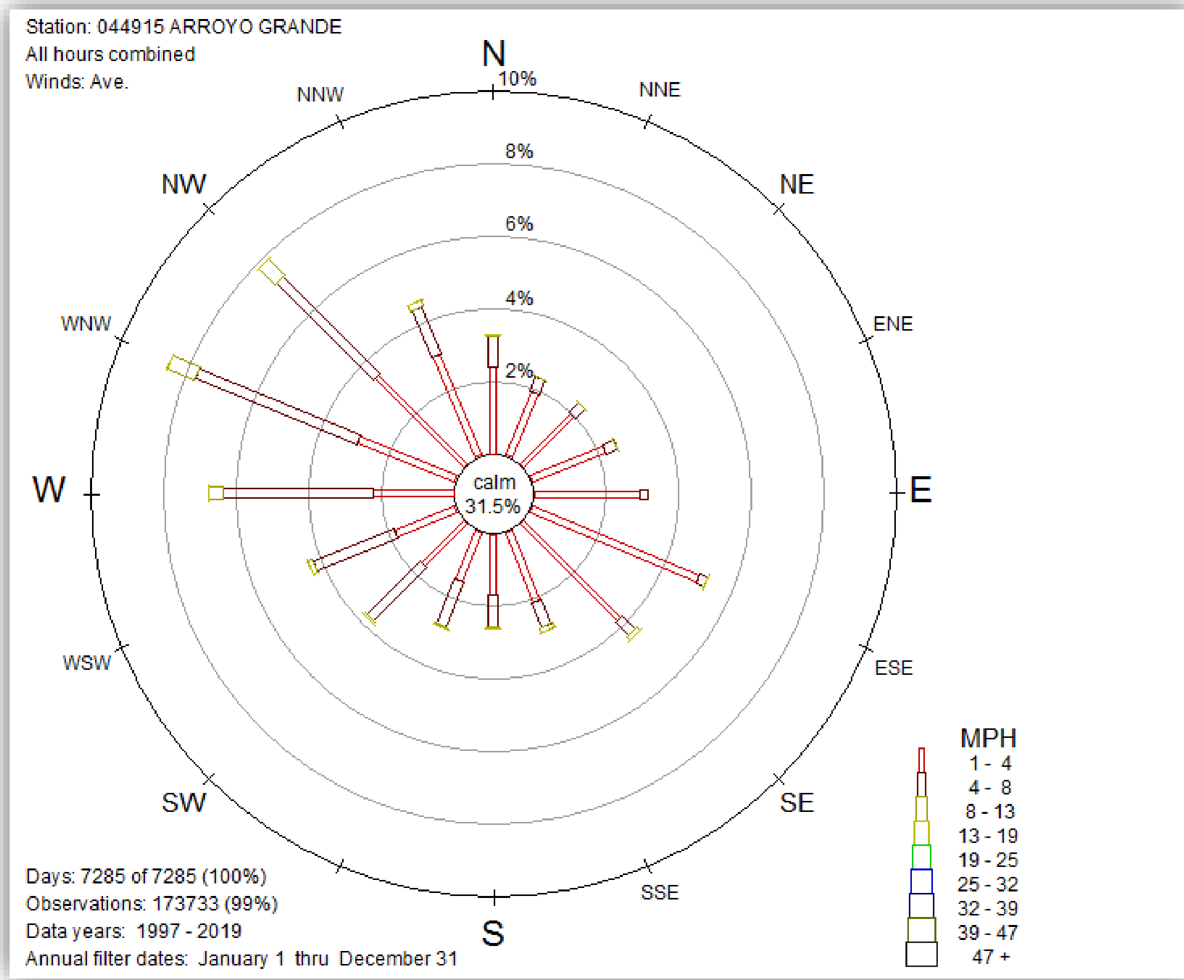
The weather data from the Arroyo Grande Remote Automatic Weather Station, 8 miles to the northwest of the project was analyzed using the software FireFamily Plus version 5 to statistically determine "average" and "worst case" fire weather. The data from the RAWS covers the period 1997-2019. Two elements of fire weather most important to estimating threat are the fine dead fuel moisture content, and the wind speed. Fine dead fuel moisture responds to the changes in humidity in the air.

The fine dead fuel moisture content for the area was distributed as shown in the graph below:



The 50th percentile of the distribution of the fine dead fuel moisture was 6%. This represents frequent conditions. A 6% fuel moisture in 1-hour fuels is fully capable of carrying fire. The extreme conditions are represented by the 10th percentile value of 3%. Under these fuel moisture conditions fire behavior and the ability to ignite significantly increases.

Wind direction and speed for the area are represented by the analysis in the wind rose graphic below:



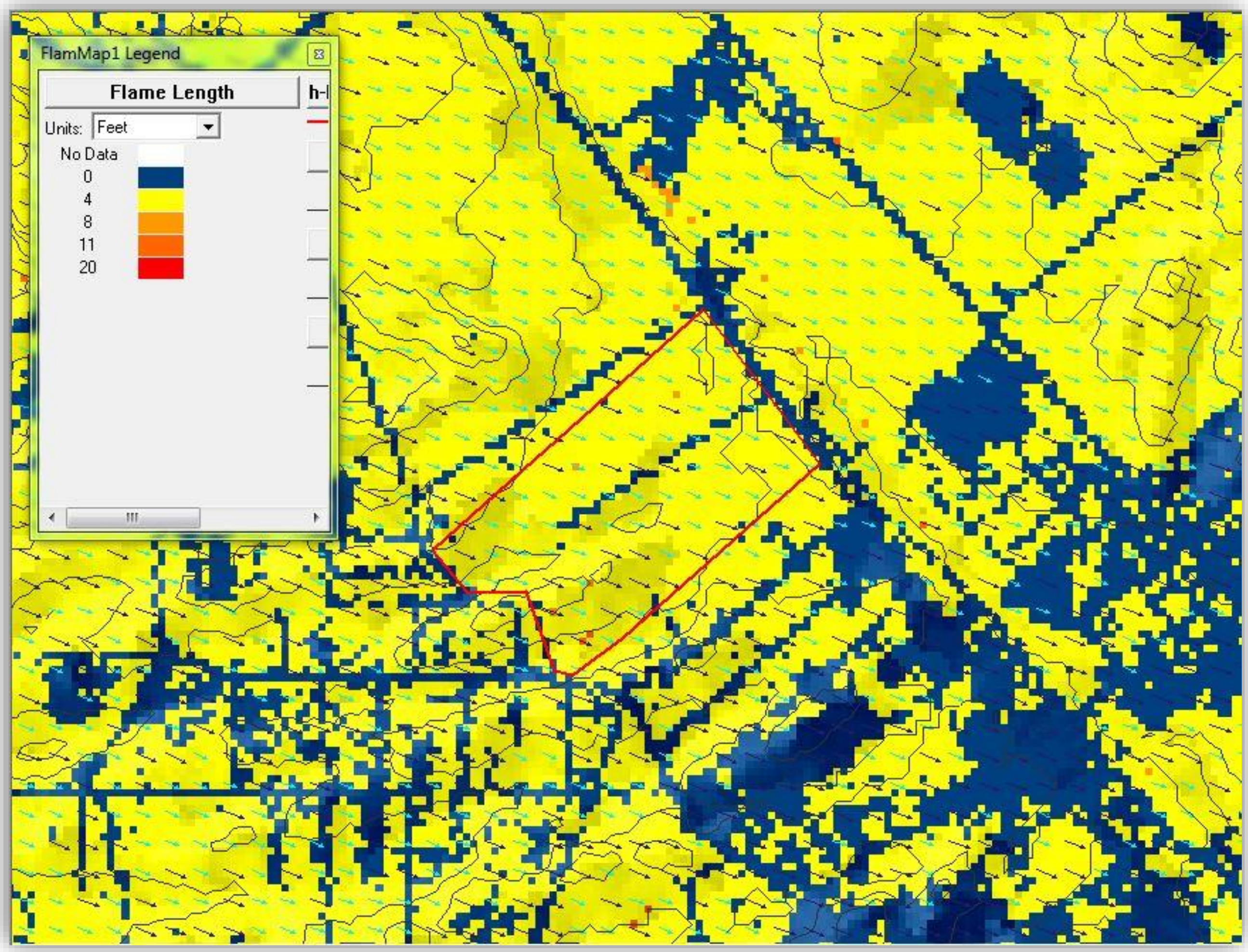
This shows that the predominant wind direction for the area is in the range of west to northwest and wind speed ranges most of the time from 0-19 mph. Statistically the wind speed at the 50th percentile is 4 mph and 7 mph at the 90th percentile. The maximum gust recorded was SE 39 mph on October 19, 2004. Higher wind rates can dominate the other factors, driving fires down slope and moving fire through fuels with higher moisture content. The wind speed rates in this location are moderate compared to conditions that exist such as Sundowner winds in Santa Barbara, Santa Lucia winds near Cuesta Grade and the famous Santa Ana winds.

Fire Behavior

Using the data above, two fire behavior simulations using FLAMMAP version 6.0 using the following factors was conducted to show the potential flame length under these scenarios:

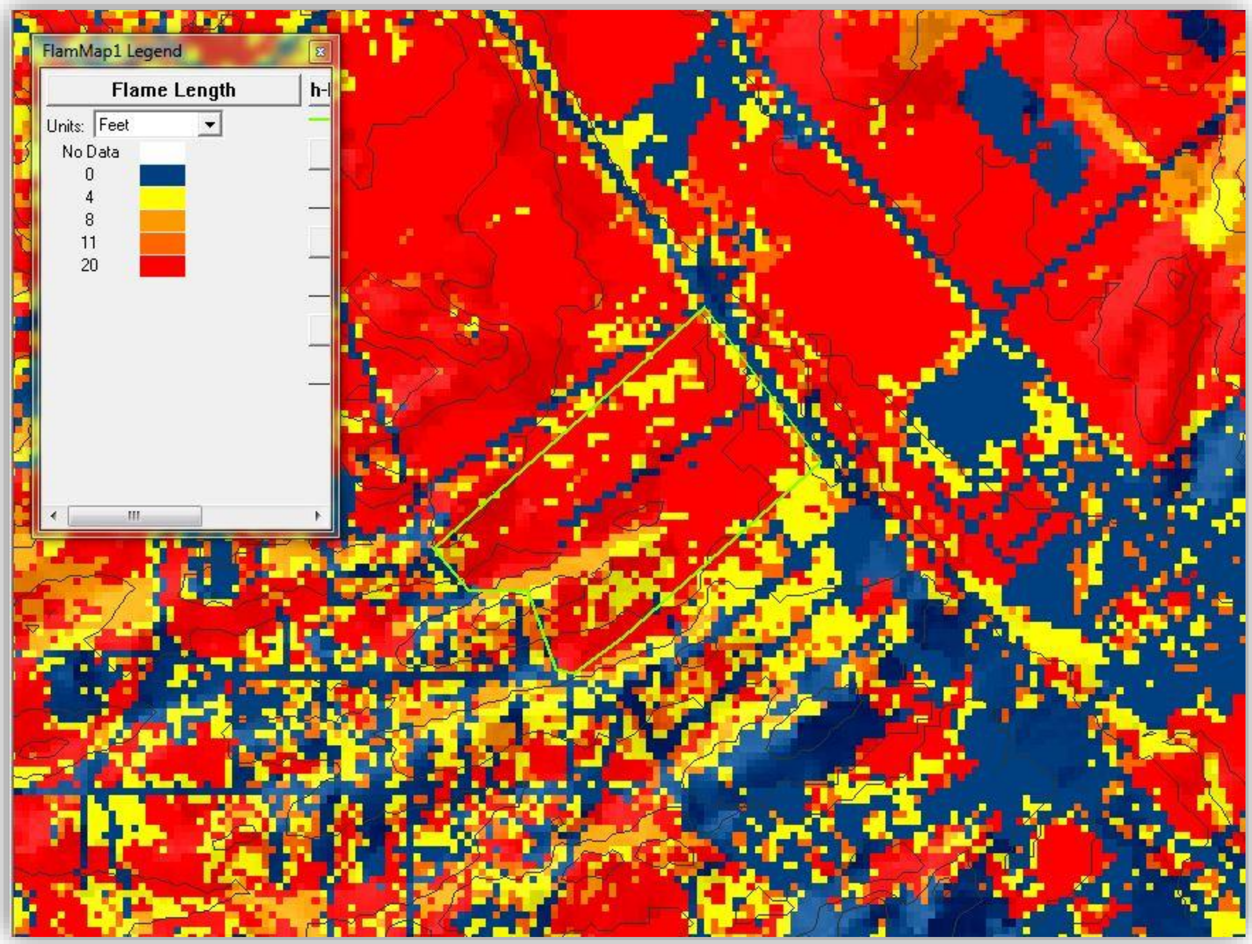
Conditions	Wind Speed	Fine Dead Fuel Moisture	Flame Length Results
Average	4 mph NW	6%	4 feet - Fire can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the line.
Extreme (Above 90th percentile)	39 mph SE	3%	8 to 11 feet - Fires may present serious control problems-torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.

Average Scenario



FlamMap - Average scenario flame lengths 0 to 4 feet

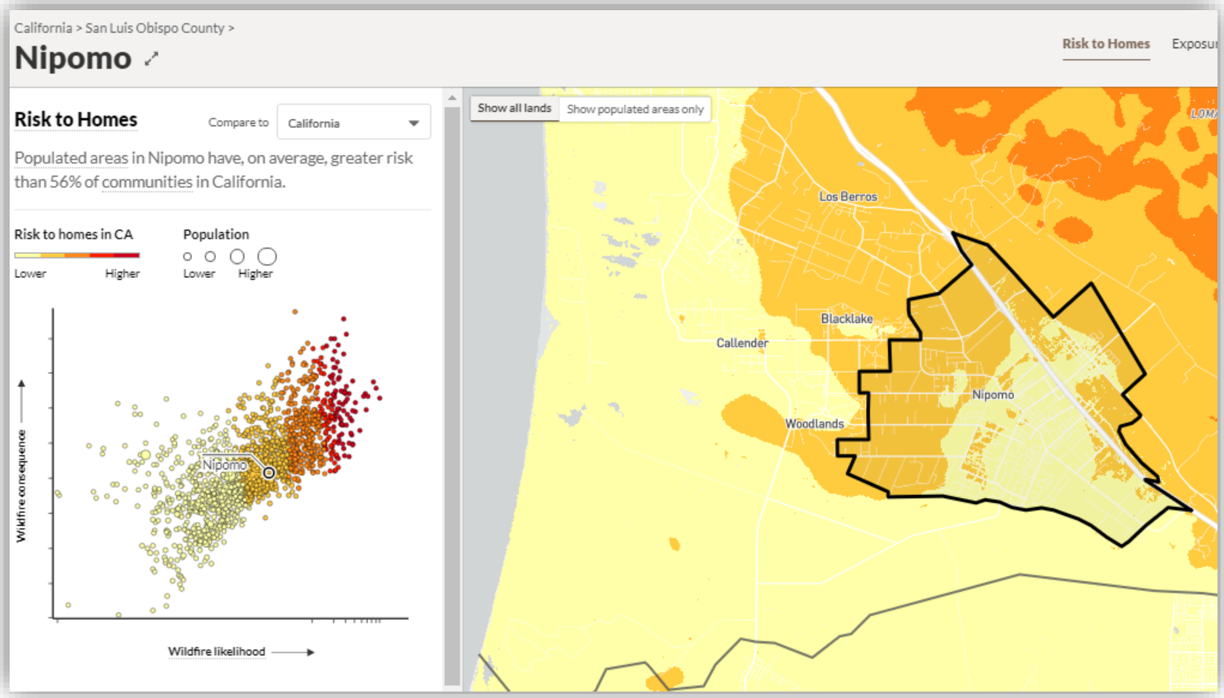
Extreme Scenario

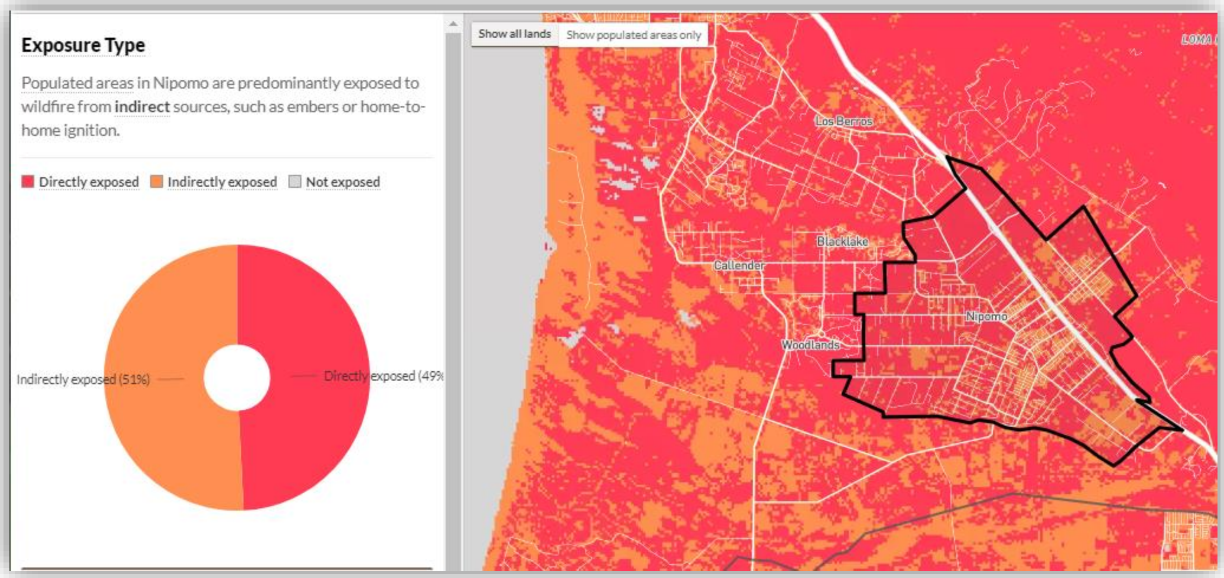


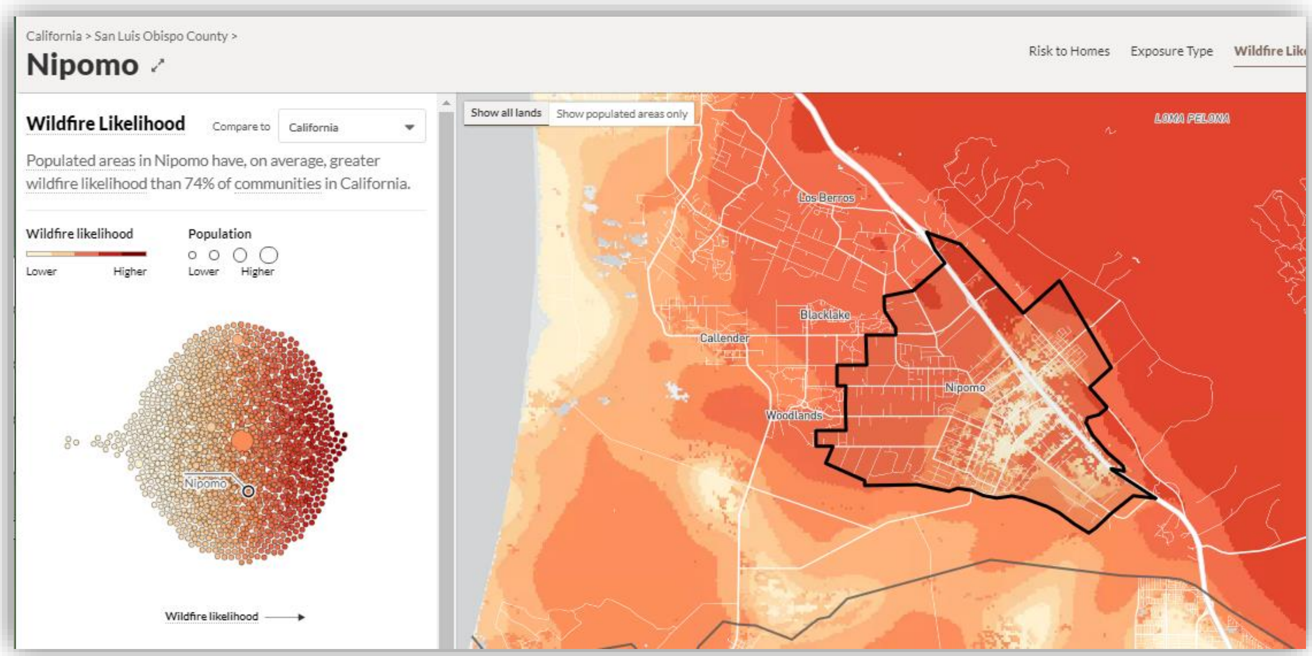
FlamMap - Extreme scenario flame lengths 11 to 20 feet

Generally, the potential fire burning conditions (90% of the days), is low to moderate with flame lengths from 0-4'. This type of burning conditions can be extinguished using direct fire suppression tactics. Even under extreme conditions (10% of the days) with flame lengths 11 to 20 feet, direct flame impingement on developed areas can be minimized through defensible space and fire safe mitigations. Spotting is possible and therefore hardening structures to prevent ignition from embers is critical.

The above analysis is corroborated by the analysis in the Wildfire Risk to Communities project available at http://www.wildfirerisk.org/ excerpts are shown below:


California > San Luis Obispo County >
Nipomo
Risk to Homes
Exposu
Risk to Homes
Compare to
California
Populated areas in Nipomo have, on average, greater risk than 56% of communities in California.
Risk to homes in CA
Lower
Higher
Population
Lower
Higher
Nipomo
Wildfire consequence
Wildfire likelihood
Show all lands
Show populated areas only
Los Berros
Blacklake
Callender
Nipomo
Woodlands


Exposure Type
Populated areas in Nipomo are predominantly exposed to wildfire from **indirect** sources, such as embers or home-to-home ignition.
Directly exposed
Indirectly exposed
Not exposed
Indirectly exposed (51%)
Directly exposed (49%
Show all lands
Show populated areas only
Los Berros
Blacklake
Callender
Nipomo
Woodlands



References used for threat analysis:

Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

Finney, M. A. 2006. An overview of FlamMap fire modeling capabilities. In: Fuels management—how to measure success: conference proceedings. 2006 March 28-30; Portland, Oregon. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 213-220. (647 KB; 13 pages)

Bradshaw, Larry; McCormick, Erin 2000. FireFamily Plus user's guide, Version 2.0. Gen. Tech. Rep. RMRS-GTR-67WWW. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

LANDFIRE, 2021, Existing Vegetation Type Layer, LANDFIRE 1.1.0, U.S. Department of the Interior, Geological Survey. Accessed 07 June 2021 at http://landfire.cr.usgs.gov/viewer/

Fuel & Vegetation Management

California's native vegetation are adaptive species who thrive in a climate where each summer there are many months of drought. Eons of evolution have chosen for the ecologically diverse and resilient Central Coast plants and animals. The Dana Ranch's historic oak woodland and associated chamise-black sage chaparral are home to native wildlife and humans. Oak trees are long-lived with complex rooting systems that not only retain soil moisture and structure, but continually contribute to soil carbon storage. Neighborhoods adjacent and mixed within oaks benefit greatly from the oak's ability to absorb storm runoff, provide home cooling savings, bank atmospheric carbon, and provide a sense of respite and habitat for both humans and wildlife.

California's oak woodlands and all chaparral species are adapted to fire to such an extent that many species are fire dependent. This dependence to fire serves the plant community well: disturbance functions to refresh the ecosystem, encourage plant vigor and seed germination, and support animal species that are adapted to a location's fire regime.

California, among other western states, was largely successful in suppressing destructive wildfire for well over 100 years, all while the human population has grown exponentially. The challenge today is to manage these habitats within the reality of anthropogenic climate change.

Mitigation Methods to Reduce Wildfire Threat

Naturally growing and combustible ornamental vegetation is considered fuel for wildland fires. Some vegetation species will burn faster, while others will burn with more heat and spotting. Selecting the right combination of fuel treatment methods is important and is based on topography, type of vegetation, sensitive species protection and cost. Combining periodic prescribed fire, with occasional grazing and annual mechanical maintenance for defensible space will achieve the ideal combination.

Grazing has been used successfully to reduce fine fuels in areas where other techniques are too obtrusive. Cattle and sheep (grazers) concentrate on grasses while goats (browsers) can be used to reduce woody shrubs. All livestock need to be controlled in small managed pastures to reduce the vegetation where needed rather than where livestock prefer, so water, temporary fencing (electric), protection (trained dogs), and close oversight are needed for success. Fencing may be to be repositioned several times a year. Grazing has the benefit of usually being acceptable near housing developments, is quiet and does not disturb wildlife as much as mechanical means and may provide a benefit of producing marketable commodity. Grazing can help control annual grasses and cattle or sheep have traditionally been used.

Cattle tend to focus on and overgraze moist or shady areas, but this could be controlled by intensive management. Goats are also used locally and can reduce the fuel loading from shrubs when fuel beds are low density, such as the current conditions at the Dana Reserve, but are less successful in thinning large patches of heavy and decadent brush. Water sources needed for livestock can also supply water for wildlife species and increase their abundance if this water is reliable and consistent. For instance, bats, birds, and many large and small mammals will drink from livestock troughs if a wildlife-friendly design is used that allows access and escape. Water and salt needed for livestock health can cause overuse near these resources, so they should be placed away from sensitive plant habitats.

Hand crews can be used to selectively thin brush and limbs with chainsaws and then lop and scatter the fuel, pile it for wildlife habitat or burning, or run it through a chipper. Sensitive species can be identified in advance and avoided or selectively pruned while still quickly and significantly reducing fuel loading. Hand crews can cut low hanging branches of trees that can catch on fire from grasses burning underneath them to height of about 6 feet. Brush density can be easily reduced. For instance, from homes out to 30 feet away from buildings all brush can be cut, and from 30 feet out to 100 feet away 50% of the brush can be cut. Hand crews offer the finite control needed to follow a detailed pattern that may need to avoid sensitive areas.

Mechanical reduction of fuel consists of using machinery, such as a masticator head on the arm of a tracked vehicle or an excavator or skid steer to shred or chop woody brush and small branches or trees and for scattering the chips throughout the worksite. This technique quickly puts the fuel down onto the soil, reducing the flammability and protecting the soil from rain caused erosion. Although fast and effective, the ability to selectively cut particular species of brush is limited, flagging sensitive areas by a qualified individual for exclusion is necessary and so it is more complex to carry out detailed work around sensitive plants and habitats. The larger masticators may cause compaction of the soil and soil disturbance down where the tracks are turning, exposing soil to invasive plants that could be carried in on the equipment or crews. Masticators are also loud and throw chips hundreds of feet, and so could disturb residents and breeding animals. If large amounts of material need to be removed quickly and efficiently masticators are very effective, such as during the construction phase, fire suppression or heavy fuel reduction. The condition of the

chaparral and oaks in the Dana Reserve open space presently would not require a masticator to control, but after 3-5 years of growth this could change.

A **chipper** is a tracked vehicle or a wheeled vehicle pulled by a truck that feeds branches and brush and ejects the chips out of a chute onto the ground. These are used in conjunction with hand crews who cut vegetation with chain saws and manually and feed the vegetation into the chipper, then spread out the chips so they are not so thick as to smother grasses and herbaceous vegetation. The advantage of a chipper is that the fuel is not left in piles which can create wildlife habitat but also create pockets of heavy fuel. Chippers are useful in areas where much brush needs to be reduced. This equipment has the same impacts on soil as a masticator but to a lesser degree because it is usually much lighter and smaller than a masticator. At the present time, a chipper would not be necessary to control the lighter fuels that predominate the open space, and chaparral brush species that needed trimming or cutting could be done by hand and not create large piles that needed chipping.

Other **mechanical means** of fuel control include brush crushing by pulling a heavy cylinder behind a dozer or by dragging a chain between dozers, but these techniques are best suited to clearing large areas of chaparral brush. A simple mower can be used annually in areas that are relatively level and accessible. There best use is for annual maintenance in the 0 to 30 foot area of the defensible space. Desired oak seedlings should be identified and marked prior to mowing to prevent damage.

There are no fire or smoke concerns. Although the use of heavy equipment may spark a fire, this threat can be controlled by concurrent fire suppression presence. A minimum requirement for operating equipment to reduce ignitions from sparks is for the operator to:

- Mow before 10 AM
- Equipment must have a spark arrestor
- Do not drive hot exhaust into standing grass
- Have a shovel and fire extinguisher onsite
- If doing hot work like welding, have a minimum of 10 feet clearance
- Have a phone to call 911

Prescribed burning may be used to burn standing brush or piles during times when fire hazards are lower or conduct a broadcast burn to reduce fine fuels and brush over a larger landscape. These techniques most closely mimic the mechanisms of natural fire and recovery but also create the risk of escaped fire or higher intensity of fire than anticipated so require careful planning to minimize these dangers and will require fire suppression equipment in place to protect nearby residences. In a development such as the Dana Reserve, broadcast burning will be exceptionally challenging to accomplish. Winter burning of piles after green-up is relatively safe with minimal threat of spread. Smoke is an issue and would need to be managed.

All or part of these techniques can be employed to create the fuel density and structure needed to minimize wildfire risk but still provide for natural habitats and protect sensitive species. The details of such a plan will need to be finalized under the California Vegetation Treatment Program PEIR.

Treatment Type	Benefits	Risks	Frequency	Cost per Acres	Notes
Hand Crew	Light on the land. Selective cutting. Can leave roots- low soil disturbance/invasive introduction	Poison oak Slower than mechanical for heavy fuels. A chipper may be required concurrently.	7 to 10 years for heavier fuels.	$5,000 - $6,000 per acres	If done for grasslands needs to be annually.

Treatment Type	Benefits	Risks	Frequency	Cost per Acres	Notes
Mechanical – Mower, Mastication, Crushing and Chippers	Can cover a large area quickly at lower costs. Does not remove roots. Can select lighter machines if soil compaction is an issue.	Heavy equipment can cause soil compaction, disturbance and introduce weeds. Masticator heads loud and fling debris.	Grass mowing annually in area near homes to create defensible space. 5 to 10 years for heavier fuels.	$500-1,000 per acre	Chip piles need to be less than 6 inches deep to allow plant emergence. Need to work within CalVTP EIR to minimize impacts to sensitive species (see Appendix A).
Prescribe burning	• Broadcast burning simulates a natural burn. Little impact on sensitive species • Pile burning can be done after hand cutting and piling and can be burned in the winter.	Higher risk of escape Smoke can impact neighborhoods. Limited number of days to broadcast burn which may cause delays into the next year.	10 to 20 years	$500-1,000 per acre	Need coordination with local fire agencies to undertake safely. Spring burning may be harmful to breeding animals and germinating plants. Liability insurance for prescribed burning is limited
Long Term Fire Retardant (e.g. Phos-Chek Fortify ©)	• Prevents ignition of vegetation • Protects fuels for the duration of fire season (up to approx. 2inches of rain) • Easily applied to road corridors.	May increase weeds through fertilization. May have harmful effects to surface water (not an issue in open space)	Annual application on fuels adjacent to high-risk roads	$1,000-2,000 per acre	https://www.perimeter-solutions.com/wp-content/uploads/2021/05/PERI_PC-LTR_Datasheet_VF.pdf NEPA-approved

Treatment Type	Benefits	Risks	Frequency	Cost per Acres	Notes
Goats	Will consume most species. They are browsers so they will eat the lower leaves of oak trees. They leave the roots. Some market for goat meat. Not affected by poison oak.	Goats need to be monitored by electric fence and dogs to prevent escape and guard against predators. Limited success with heavy brush; they do not consume larger woody stems	3 to 5 years.	$600-750 per acre	Contractor s who specializes in “fire goats” are located on the Central Coast. They will generally charge by the acre. Water /salt will need to be provided in each rotational pasture.
Cows	Will consume the grasses and trample brush but will not consume woody material. Can be contained by good fencing. Not affected by poison oak. Good market for beef	Need to keep gates closed which may affect ability for recreational use. Tend to overuse wet and/or shady areas.	Annually in spring to reduce grasses prior to peak fire season.	If good fencing, may have no costs if nearby rancher can move cows onto property.	Water/salt will need to be provided in each rotational pasture.
Sheep	Will consume the grasses and trample brush but will not consume woody material. Can be contained by good fencing. Not affected by poison oak. Good market for lamb	Sheep need to be monitored by electric fence and dogs to prevent escape and guard against predators. Limited success with heavy brush; they do not consume larger woody stems	Annually in spring to reduce grasses prior to peak fire season.	$600-750 per acre	Water/salt will need to be provided in each rotational pasture.

Appendix A & B have tables that show the effects of different types of fuel treatments on specific sensitive species. Appendix A - Effects of Fuel Treatments on Sensitive Plant Species and Appendix B - Effects of Fuel Treatments on Sensitive Animal Species at the Dana Reserve.

Community Education and Participation

While there are many avenues for community education and buy-in, one model that has been increasingly successful is active participation in the Firewise Community. HOAs are particularly effective in implementing and maintaining Firewise Community status. Communities in San Luis Obispo that are designated Firewise include; Cabrillo Estates, Cambria, Heritage Ranch HOA, Lake Nacimiento, Las Ventanas Ranch, Oakshores, Ranchita Estates.

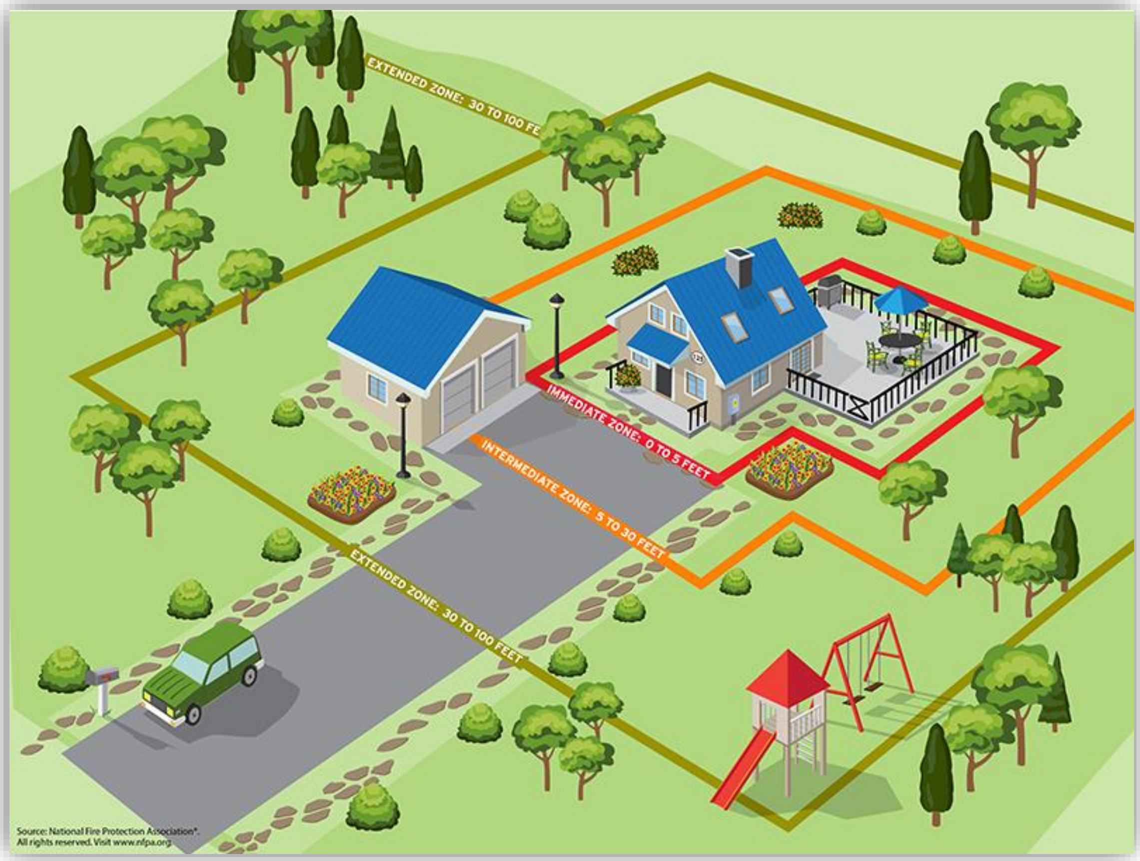
HOA’s provide an excellent path for outreach and coordination for improving understanding of fire safety and community preparedness.

Management of the open space could be enhanced by inviting a community college or university to use the open space as a training area to help students learn about ecological monitoring, land management near urban areas, and fire and fuels management.

100 Foot Defensible Space

Public Resources Code 4291 requires 100 feet of defensible space around all structures. This **does not** require that all 100 feet be cleared of all vegetation, but that as you move closer to the structures there is an increasing reduction of combustible vegetation and materials. The area directly around the structure (0 to 5 feet) should be ember-resistant.

Because the open space areas are in proximity to developed areas with the individual homeowners only capable of providing defensible space in the immediate zone to their property line, the design requirements of the Dana Reserve and the maintenance conducted annually by the HOA will achieve the additional defensible space out to 100 feet. This will include the use of non-combustible fencing, roads and trails strategically located to act as buffers. Mechanical, animal, hand and methods of vegetation will all be employed in the open spaces areas as identified in other sections of this Plan. Prescribe fire may periodically be utilized. This could include broadcast burning and pile burning.



Immediate Zone - 0 to 5 feet

This zone includes the area under and around all homes and requires the most stringent wildfire fuel reduction. The ember-resistant zone is designed to keep fire or embers from igniting materials that can spread the fire to homes. The following provides guidance for this zone:

- Use hardscape like gravel, pavers, concrete and other noncombustible mulch materials (No combustible bark or mulch)
- Remove all dead and dying weeds, grass, plants, shrubs, trees, branches and vegetative debris (leaves, needles, cones, bark, etc.); Check your roofs, gutters, decks, porches, stairways, etc.
- Remove all branches within 10 feet of any chimney or stovepipe outlet
- Limit plants in this area to low growing, nonwoody, properly watered and maintained plants
- Limit combustible items (outdoor furniture, planters, etc.) on top of decks
- Relocate firewood and lumber
- Use noncombustible fencing, gates, and arbors attach to the home
- Keep garbage and recycling containers outside this zone or inside garage
- Consider relocating boats, RVs, vehicles and other combustible items outside this zone

Embers can spread fire to combustible material inside and outside homes

Intermediate Zone - 5 to 30 Feet

5-30’ from the furthest exterior point of the home. Landscaping/hardscaping- employing careful landscaping or creating breaks that can help influence and decrease fire behavior.

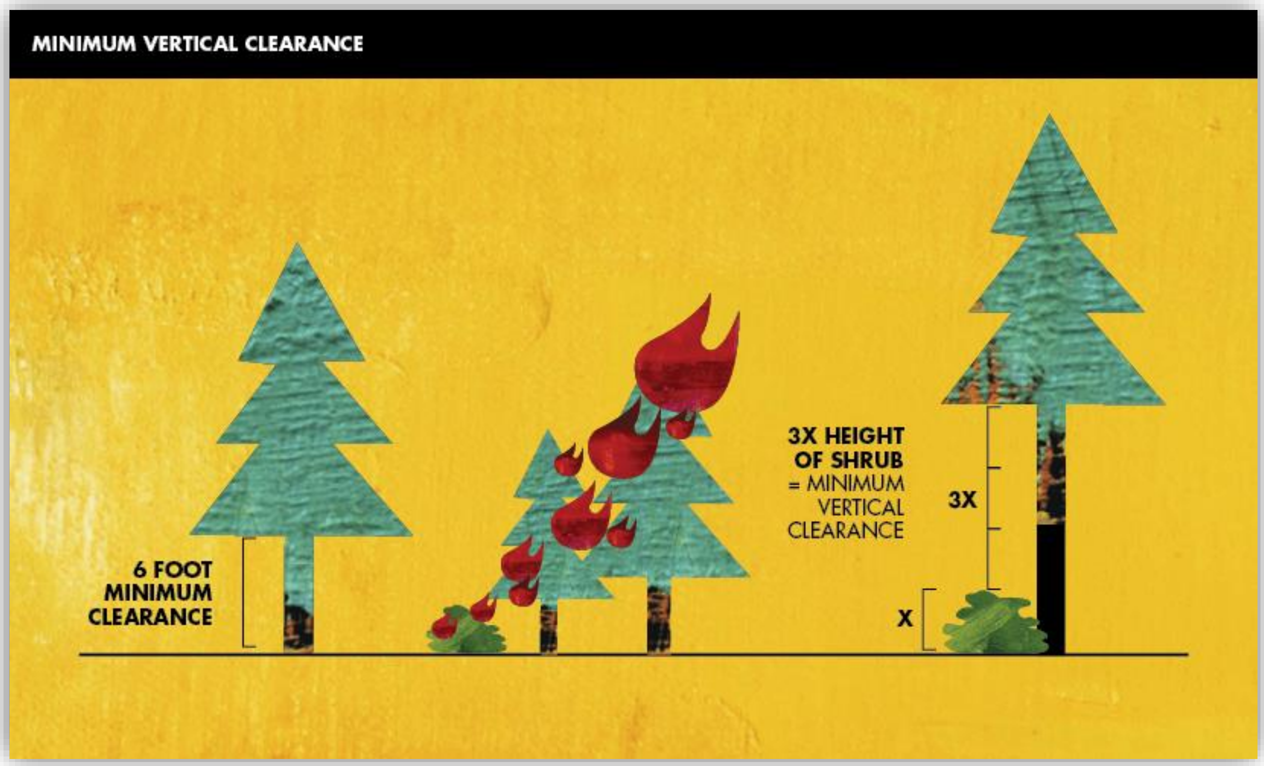
- Remove all dead plants, grass and weeds (vegetation)
- Trim trees regularly to keep branches a minimum of 10 feet from other trees
- Relocate wood piles
- Remove vegetation and items that could catch fire from around and under decks, balconies and stairs
- Create a separation between trees, shrubs and items that could catch fire, such as patio furniture, wood piles, swing sets, etc.

Extended Zone - 30 to 100 Feet

30-100 feet, out to 100 feet. Landscaping – the goal here is not to eliminate fire but to interrupt fire’s path and keep flames smaller and on the ground.

- Dispose of heavy accumulations of ground litter/debris
- Remove dead plant and tree material
- Remove vegetation adjacent to storage sheds or other outbuildings within this area
- Brush should be separated from each other 2 times the height of the brush

- Trees should be kept free of dead material
- The lower branches of the tree up to 6 feet should be pruned to prevent a ground fire from igniting the tree (Brush underneath trees should be maintained to prevent spread of a fire from the brush to the tree.)



Fire Safety During Construction

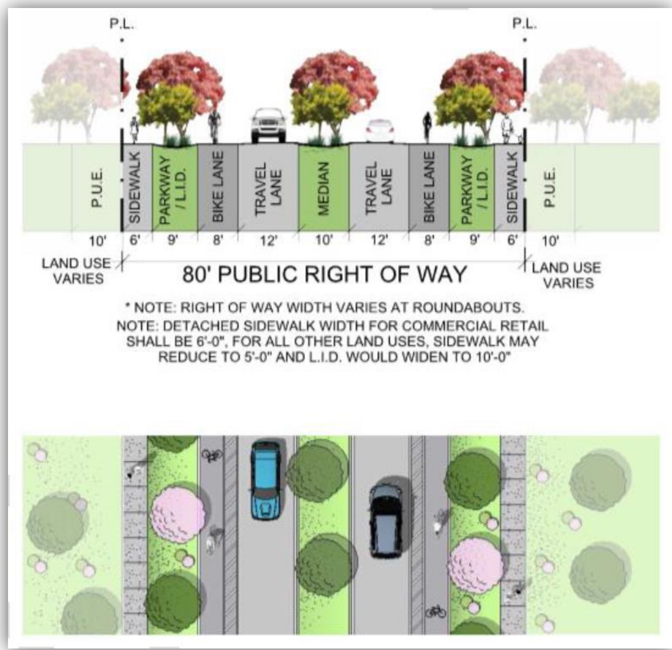
To ensure compliance with the Fire Code section 3312, a temporary or permanent water supply system for fire protection will be available prior to combustible materials arriving at the site. A limited number of all-weather access roads will be available during construction to allow fire and ambulance access to construction areas.

During construction all applicable Public Resources Codes must be complied with to prevent a wildfire. These will include spark arresters, clearance around welding operations, smoking restrictions and extinguishers on site. The Industrial Operations Fire Prevention Field Guide will assist the applicant.

Ingress & Egress

Access Roads

There are four unimpeded access points into the Dana Reserve. There are an additional two emergency access points that also serve as pedestrian and bike routes. All of these points provide both ingress by emergency responders and egress by residents and guests who may have to evacuate. All collector road lane widths are two 12-foot travel lanes. The streets that serve the single-family residences and private motorcourt roads have two 10-foot lanes. All neighborhoods are designed to have two ingress and egress points. All dead-end roads will have required turnarounds. Vertical clearance will be a minimum of 13 feet 6 inches. All roads will meet County Road standards and Public Resources Code 4290.



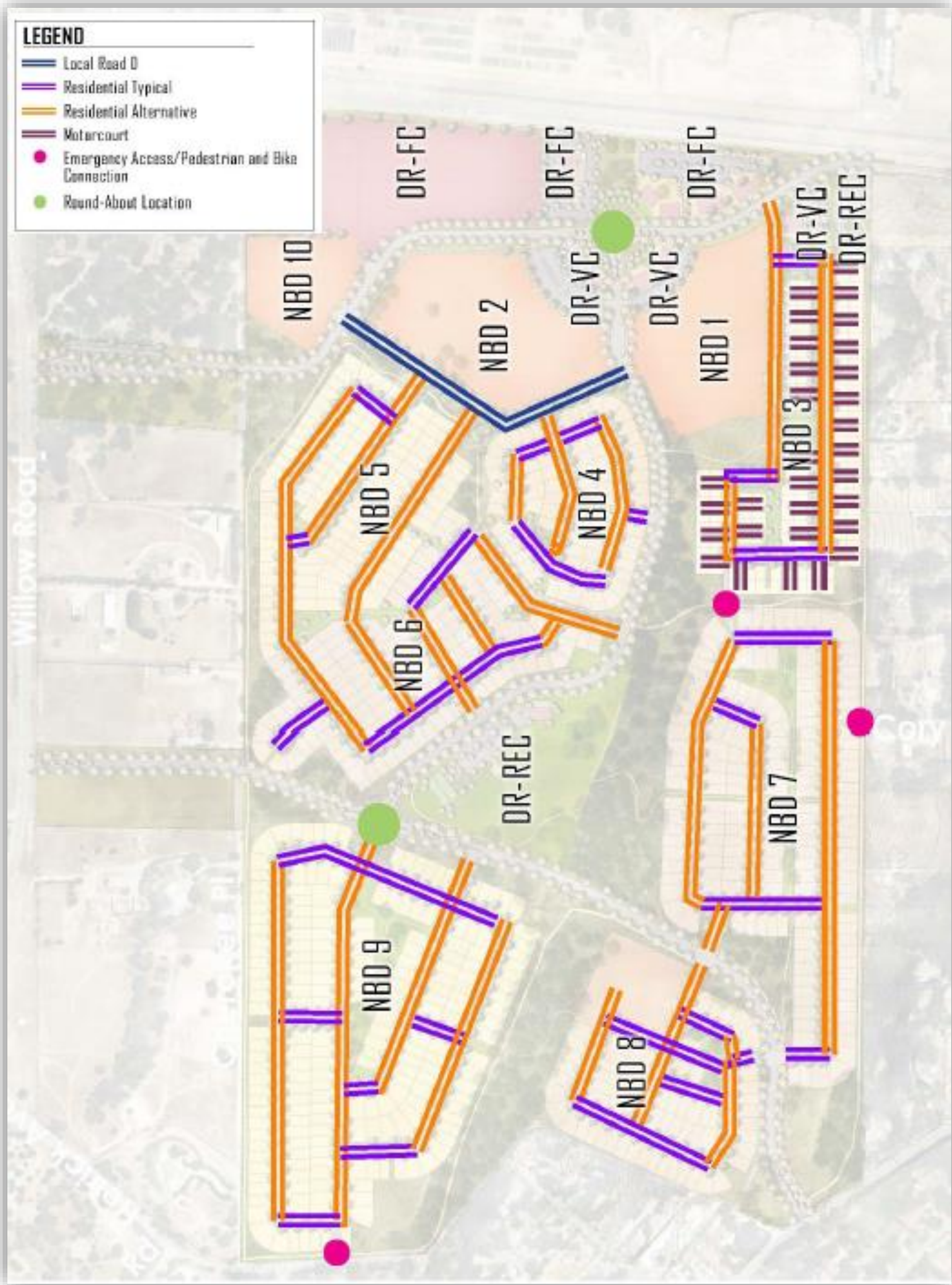
Collector Roads

The larger intersections on the main collector roads have a total of 54 feet available width and are designed to allow emergency vehicles to crossover or straddle medians or utilize bike lanes if necessary when operating with lights and siren.

Emergency Access Roads

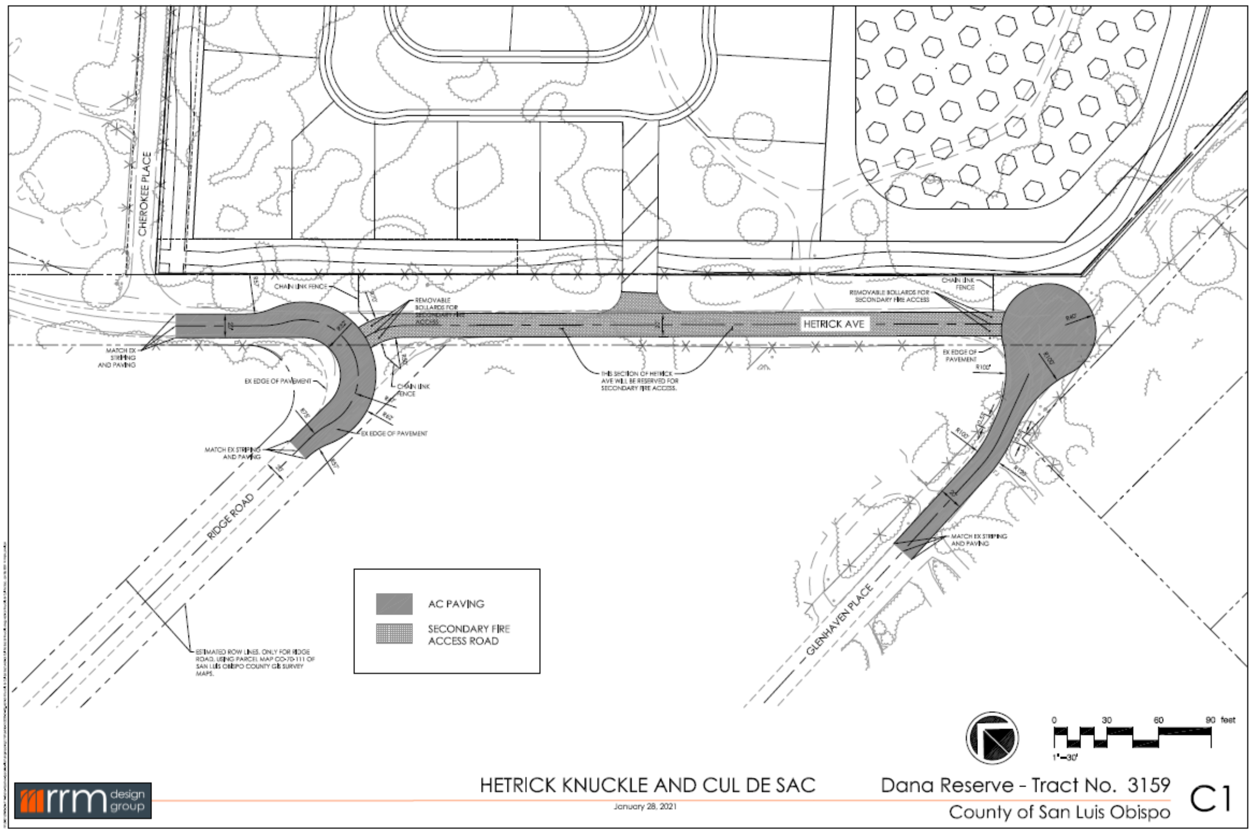
Two emergency access points are proposed. Emergency access points are proposed within Neighborhood 9, adjacent to Hetrick Road, and within Neighborhood 7, as a continuation of Cory Way. Gates or bollards will be installed that must meet the requirements of the County Fire Department. The access points provide additional routes into and out of the Dana Reserve during an emergency.

The emergency access points are designed to be constructed with adequate width to accommodate fire/safety vehicles and be gated per County Fire standards. The emergency access points will be designed to include pedestrian, bicycle, and equestrian access. This use of the emergency access road for these uses will ensure the community has awareness of the existence of these egress route. Bollards or some other type of impediment will prevent regular use of these two emergency access roads by vehicles. To open them will require the physical removal or opening. Signage should be included to ensure that the public is aware that during an emergency, these roads may be utilized for egress.


LEGEND
Local Road D
Residential Typical
Residential Alternative
Motorcourt
Emergency Access/Pedestrian and Bike Connection
Round-About Location
DR-FC
DR-FC
DR-FC
DR-VC
DR-REC
NBD 10
NBD 2
DR-VC
DR-VC
NBD 1
NBD 3
NBD 5
NBD 4
NBD 6
DR-REC
NBD 7
NBD 9
NBD 8
Willow Road

Hetrick Avenue

It is proposed that Hetrick Avenue be converted into an emergency access road to allow for emergency access and egress into Neighborhood 9. This emergency access point is intended to be used during non-emergencies as a pedestrian, bicycles, and equestrian path. Removable bollards are proposed to prevent vehicle traffic. The access road is designed to meet the minimum County Fire standards including the turnaround on Glenhaven Place to accommodate a fire engine and meet County Fire standards. No parking signs and red curbing will be needed within the turnaround if the radius is less than 48 feet and in front of the bollards. The turning radius into the access road into neighborhood 9 will need to be able to accommodate a fire engine.



HOA, CC&Rs Open Space Protection

While each neighborhood will have its own Declaration of Covenants, Conditions and Restrictions (CC&Rs) for its HOA. The entire development will be under a master HOA with its own CC&R. The master HOA will be responsible for the maintenance and protection of the open space areas including the 49.8 acres of native oak woodland, the retention basins and the common trails. This will require that the CC&Rs include language to ensure that these spaces are maintained in perpetuity. HOA open space management concerns include prevention and protection from fire, maintaining and enhancing native vegetation and biodiversity, providing security and liability coverage, trail access and maintenance, and securing maintenance funding and staff.

The CC&Rs should have language that is similar to:

1. Smoking, use of cooking equipment or any other ignition source is prohibited in the open space areas.
2. Safety precautions are required when using equipment capable of creating a spark, this includes spark arrestors.
3. All fireworks or other device that could cause an ignition of a fire are prohibited throughout the Dana Reserve.
4. Overnight camping is prohibited.
5. Motorized vehicles are not permitted in the open space areas. (except emergency vehicles, vehicles permitted by the HOA to conduct official business and single-rider motorized vehicles adapted for recreational use by people with disabilities).
6. Collecting, removing, destroying, or defacing any natural or humanmade objects within the open space is not permitted.
7. Discharging or carrying firearms, crossbows, fireworks, or projectile weapons of any kind is not permitted (except law enforcement officials) in the Dana Reserve.
8. Feeding, disturbing, trapping, hunting, or killing wildlife is not permitted (except under the direction of Department of Fish & Wildlife or like agency).
9. All dogs or other domestic animals shall be restrained by a leash, cord, rope or chain and under physical control of a person when in the open space areas. (except grazing and browsing animals such as, sheep and goats)
10. Trail use shall be limited to officially designated trails and roads only.
11. Open space areas are closed from sunset to sunrise unless permitted by the HOA.
12. Activities that unduly interfere with the health, safety, and welfare of the users or the neighbors in the open space area, or that create a nuisance or hazard to the use and safety or persons using or neighboring such areas are prohibited. Disorderly conduct (including amplified sound) shall be prohibited.
13. Swimming, diving, wading in any retention basin or other body of water is prohibited.
14. The HOA will maintain fire prevention signage in fire prone areas near or on trails.
15. The HOA will conduct vegetation management in the open spaces, retention basins, trails and near Highway 101 that prevent or reduce the ability for a wildfire to spread to other properties in proximity. Methods used will provide for the protection of the open space environment.
16. Fencing or barriers adjoining the open space areas, whether privately owned or by the HOA, will be constructed of a fire resistive material so that it will not convey or contribute to the spread of fire from or to the open space areas (exception may include an open type fence such as a split rail fence). Combustible fence material will not be used within 5 feet of structures.
17. Vegetation management will be consistent with Dana Reserve's County-approved oak woodland habitat management plan.
18. The HOA is authorized to enter into contracts and agreements for vegetation management in and near the open space areas that includes hand, mechanical, animal, prescribe fire, herbicide and other methods consistent with accepted vegetation management practices.
19. The HOA is authorized to increase assessment and fines necessary to protect and maintain the open space areas. This may include funds for the hiring of staff and contracts.
20. The HOA is authorized to enter into agreements with agencies, land conservancies and other organizations who also have a mutual concern for the protection of the open space areas.

Emergency Planning

There are a variety of threats that could cause a community to evacuate or shelter in place. These could include wildfire, hazardous material spill, gas leak, power outage, hazardous air quality, storms or an active shooter. The County has several methods that are used to alert the public to take action. This includes:

- Emergency Alerts System (EAS) – broadcast over radio and television
- Wireless Emergency Alert (WEA)- send a text alert to cell phones
- Reverse 911- a recorded message to landlines and cell phones that are signed up
- Social media – Twitter, Facebook, Nextdoor
- Route alerting – Sheriff and fire department driving through neighborhoods announcing action to take over loudspeaker
- Door to door notification – Sheriff going to each property to alert people

The HOAs of Dana Reserve annually in cooperation with the County should provide residents information on emergency preparedness including:

- Family emergency planning
- Emergency alerting
- Emergency supply kit
- Care for animals in an emergency

Evacuation & Temporary Refuge Areas

Emergency responders make a determination on how best to protect the residents and guests of a community. Their first strategic choice is to go offensively after the threat to prevent it from spreading and causing more harm. Sometimes that effort is not possible, and they take a defensive strategy and utilize the following actions:

- **Evacuation Order**
  Movement of community members out of a defined area due to an immediate threat to life and property from an emergency incident. An Evacuation Order should be used when there is potential or actual threat to civilian life within 1 to 2 hours or when the Incident Commander deems it necessary to protect civilians.
- **Evacuation Warning**
  Alerting of community members in a defined area of a potential threat to life and property from an emergency incident. An Evacuation Warning may be issued when the potential or actual threat to civilian life is more than 2 hours away.
- **Shelter in Place**
  Directing community members to stay secured inside their current location. Used if evacuation will cause higher potential of loss of life.
- **Temporary Refuge Area**
  A temporary location to hold evacuees until safe evacuation is possible.
- **Safe Points**
  Temporary area outside of affected area to stage evacuees until emergency is over or a shelter can be opened.

An evacuation takes time. It requires that first responders analyze the situation and determine the need for an evacuation. An evacuation alert is then issued electronically and by neighborhood route alerting. This all takes time. Public outreach before any emergency occurs is part of the County effort to encourage the public to leave early or shelter in place whenever there is a threat. The Dana Reserve HOA should commit to annual public outreach in coordination with the County.

Working with the County Fire Department, emergency temporary refuge areas should be identified throughout the community and the public educated about their locations. These could include:

- Parking lot in commercial and multi-family residence areas
- Neighborhood parks
- Public Park
- Neighborhood pocket parks

Examples of possible Temporary Refuge Areas

Diablo Canyon Power Plant

The Dana Reserve is located outside the Diablo Canyon Power Plant (DCPP) 12 Public Action Zones (PAZ). It is located in the Public Education Zone 13 (PEZ). Therefore, the Nuclear Regulatory Commission has determined that residents in these areas, including the Dana Reserve, are not likely to be affected by an emergency at DCPP. However, since residents in the PEZ (zones 13 through 15) are near the PAZ, general information about Diablo Canyon Power Plant (DCPP) is also provided to them.

Conclusion

In general, the Dana Reserve project is designed with fire risk mitigation in mind. Fire resistant design and construction standards, open space management, community outreach and education, master HOA management practices, access and egress routes, fire defensible space, fire protection hydrants and sprinkler systems, and ignition prevention will all be necessary to provide a high level of protection for the community.

The County and the Dana Reserve are encouraged to enter into discussions on the best use of public facility fees. It may be advantageous for both parties to develop a fire station, a sheriff sub-station or both in-lieu of full fees.

Continuous and proper vegetation management of the open spaces will be essential to make sure the community is fire safe long into the future. To ensure this, the HOAs should include language in their CC&Rs that will ensure regular maintenance and projects that are both fire defensive and environmentally sound.

Design, construction and maintenance of the Dana Reserve project are required to comply with fire, building and public resource codes specifically for areas that have a wildland fire threat. These combined with best management practices will provide a high level of fire safety to the community.

Appendix A - Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve

(Species list from Althouse and Meade 2020)

Scientific Name	**Common Name**	**Fed/ State**	**Global/ State**	**CA Rare Plant**	**Blooming**	**Habitat Preference**	**Potential to Occur**	**Grazing**	**Browsing**	**Mastication**	**Hand Crew**	**Chipping**	**Mowing**	**Pile Burning**	**Broadcast Burning**
Detected On Site															
Arctostaphylos rudis	Sand Mesa Manzanitia	-/-		1B.2	Nov-Feb	Chaparral. Sandy soils. <380 m.	**Present**. Suitable sandy chaparral habitat is present in the Study Area and species was observed during surveys.	Little to no effect	Minor browsing expected	Partial/temporary with trimming. Excessively low trimming could eliminate, otherwise will resprout.	Partial/temporary trimming most likely.	None	No effect	Could scarify patches of soil	Manzanitas will resprout if burning is not excessively hot
Ceanothus cuneatus var. *fascicularis*	Lompoc Ceanothus	-/-	G5T4/ S4	4.2	Feb-Apr	Coastal chaparral. Sandy substrates. <275 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Little to no effect	Minor browsing expected	Partial/temporary with trimming. Excessively low trimming could eliminate	Partial/temporary trimming most likely.	None	No effect	Could scarify patches of soil	Ceanothus will re-seed if burning is not excessively hot

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Ceanothus impressus var. *nipomensis*	Nipomo Mesa Ceanothus	-/-	G3T2/S2	1B.2	Feb-Apr	Chaparral. Canyons, flats. Sandy substrates. <200 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Little to no effect	Minor browsing expected	Partial/temporary with trimming. Excessively low trimming could eliminate	Partial/temporary trimming most likely.	None	No effect	Could scarify patches of soil	Ceanothus will re-seed if burning is not excessively hot
Clarkia speciosa ssp. *Immaculata*	Pismo Clarkia	FE/SR	G4T1/S1	1B.1	May-Jul	Woodland edges, chaparral, disturbed grassland. Openings in sandy soil. <100m	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Annual herb blooms May-July. Grazing in this period detrimental, otherwise insignificant unless overgrazed.	Less impact than grazers during blooming period May-Jul but some impact. Insignificant if outside of blooming	Mastication would not affect species except where tracks disturb soil.	Little to no effect but possible from trampling in blooming.	Could impact regen if chipping is too deep along edge habitats	Will remove plant if done Feburary-July. Otherwise, insignificant effect.	Excessive heat in soil under piles could kill seeds.	Little effect if done outside of blooming season, or it could promote Clarkia by removing grass competition. Burning during bloom would kill adult plants.

DANA RESERVE

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Horkelia cuneata var.*puberula*	Mesa Horkelia	-/-	G4T1/S1	1B.1	Feb-Jul	Coastal chaparral, woodland. Dry, sandy or gravelly sites. 70-870 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Perennial herb. Palatability unknown. Occurs in denser habitat than preferred by cattle to graze. Could be trampling in bedding areas under oaks.	Palatability unknown. Can be minimized by limiting grazing period.	Mastication would not affect species except where tracks disturb soil.	Little to no effect but possible from trampling in blooming. Chipper could crush plants.	Could impact regen if chipping is too deep along edge habitats	Will remove plant if done May-June. Otherwise, insignificant effect. Set mower to 4 inches, this perennial hugs the ground.	Excessive heat in soil under piles could kill seeds.	Light burning would reduce plant cover but allow some resprouting . Less impact if burned outside of blooming period.
Mucronea californica	California Spineflower	-/-	G3/S3	4.2	Mar-Aug	Chaparral, woodland, coastal scrub, grassland. Sandy soil. <1000 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Annual herb Mar-Jul. Not likely grazed but chance of trampling. Could avoid impacts by avoiding blooming period.	Not likely to be affected by browsers.	Not likely to occur in areas needing mastication as it prefers open areas	Not likely to impact. Some trampling/cutting if hand crews are cutting grass with whips. Impacts avoided by working outside of blooming.	Not likely unless chipper accessed work area over plants during blooming.	Possible impact of mowing if done in blooming period.	Only impacted if piles constructed in open areas over Mucronea. Avoid by flagging.	Not likely affected if burned outside of blooming.

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Piperia michaelii	Michael's Rein-Orchid	-/-	G3/S3	4.2	April-Aug	Coastal scrub, woodland, chaparral. Generally on dry sites. <700 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Perennial found along woodland edges. Susceptible to overgrazing. Consider fencing out livestock from known pops.	Less impact than grazers since browsers focus on woody material but still sensitive to trampling.	Machinery tracks or wheels could crush plants while accessing areas to masticate.	Minimal impact from hand crew but tracks from chipper could crush if working with crews.	Possible crushing by chipper, could affect growth if chips too deep.	Mowing during flower/seed production could kill plant or reduce seeding	Only impacted if piles constructed in open areas over orchid. Avoid by flagging.	Deleterious if done during blooming period, unknown effect outside of blooming, but not likely significant if plant is dried for the season.
Prunus fasciculata var. *punmctata*	Sand Almond	-/-	G5T4/S4	4.3	Mar-April	Coastal scrub, chaparral, woodland. Sandy flats. <200 m.	**Present**. Suitable habitat is present in the Study Area and species was observed during surveys.	Little to no effect	Palatability unknown. Can be minimized by limiting grazing period. Monitor if browsed.	Could be reduced in size or killed if masticated. Flag and avoid few plants in place.	Could be reduced in size or killed if chainsawed . Flag and avoid few plants in place.	No effect	No effect	No effect unless pile on or close to individuals	Unknown effect from burning

DANA RESERVE

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Agrostis hooveri	Hoover's Bent Grass	-/-	G2/S2	1B.2	Apr-Jul	Open chaparral, oak woodland. Dry sandy soils. <600 m.	High. Suitable habitat is present in the Study Area. CNDDB #8 (1988) located 3.8 miles west of Study Area.	Perennial. Heavy grazing could reduce vigor or allow annuals to outcompete. Monitor grazing effects if found.	Little to no effect	Track may affect plants but will not likely be done in this species' habitat	No effect	No effect unless species chipping covers known plants.	Could affect if done before seed set, but otherwise little effect.	No effect unless pile on or close to individuals	Low intensity burning not likely to affect unless done too often.
Calandrinia breweri	Brewer's Calandrinia	-/-	G4/S4	4.2	Mar-Jun	Chaparral, coastal scrub. Disturbed sites, burns. Sandy to loamy soil. <1200 m.	Moderate. Suitable habitat is present in the Study Area. CCH record (1948) located 9.5 miles to the northwest.	Annual, disturbance follower. Could be impacted by grazing during blooming period. Monitor if found.	Little or no effect but should be monitored if found.	Only impact from soil disturbance from machinery.	No effect	No effect unless species chipping covers known plants.	May affect through cutting. Flag and avoid if found.	No effect unless pile on or close to individuals	If burned outside of blooming period it may respond positively.

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Chorizanthe rectispina	Straight-Awned Spineflower	-/-	G2/S2	1B.3	Apr-Jul	Chaparral, cismontane woodland, coastal scrub. In disintegrating shale, often on granite. 200-600 m.	Low. Marginal suitable habitat is present in the Study Area. CNDDB #20 (2003) located 7.3 miles to the northwest.	Annual. Buckwheat family-not likely grazed but may be trampled.	Little or no effect but should be monitored if found.	Only impact from soil disturbance from machinery.	No effect	No effect unless species chipping covers known plants.	Low enough growing to not likely be impacted	No effect unless pile on or close to individuals	If burned outside of blooming period it may respond positively.
Deinandra paniculata	Paniculate Tarplant	-/-	G4/S4	4.2	Mar-Dec	Grassland, open chaparral and woodland. Disturbed areas, often in sandy soils in mesic sites. <1320 m.	Low. Marginal suitable habitat is present in the Study Area and CCH record (RSA699628; 1935) is located ~5 miles to the west.	Annual, not likely grazed.	Little or no effect but should be monitored if found.	Only impact from soil disturbance from machinery.	No effect	Only impact from soil disturbance from machinery.	Could be cut if found. Flag and avoid	No effect unless pile on or close to individuals	If burned outside of blooming period it may respond positively.

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Delphinium parryi ssp. *blochmaniae*	Dune Larkspur	-/-	G4T2/S2	1B.2	April-Jun	Coastal chaparral and dunes. Sandy soils. <200 m.	High. Suitable habitat is present in the Study Area. CNDDB #23 (1936) located 1.5 miles to the east. Multiple CNDDB occurrences within near vicinity.	Perennial, not likely grazed.	Little or no effect but should be monitored if found.	Little or no effect but should be monitored if found.	No effect	Only impact from soil disturbance from machinery.	Could be cut if found. Flag and avoid	No effect unless pile on or close to individuals	Can survive fire during non-blooming period but uncertain. Flag and avoid if found.
Erysimum suffrutescens	Suffrutescent Wallflower	-/-	G3/S3	4.2	Jan-/Aug	Stabilized coastal sand dunes, coastal scrub. Coastal dunes and bluffs. <150 m.	Low. Study Area is inland of species known range and marginal suitable habitat present in the Study Area. CCH Record (UCSB041306; 1988) located >5 miles to west.	Perennial, not likely grazed.	Little or no effect but should be monitored if found.	Little or no effect but should be monitored if found.	No effect	Only impact from soil disturbance from machinery.	Could be cut if found. Flag and avoid	No effect unless pile on or close to individuals	Can survive fire during non-blooming period but uncertain. Flag and avoid if found.

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Horkelia cuneata var. *sericea*	Kellog's Horkelia	-/-	G4T1?/S1?	1B.1	Apr-Sep	Coastal scrub and dunes, coniferous forest, chaparral. Old dunes, coastal sandhills, openings in sand. <200 m.	High. Suitable habitat is present in the Study Area. CNDDB #4 (1969) located 1.8 miles to the west.	Perennial herb. Palatability unknown. Occurs in denser habitat than preferred by cattle to graze. Could be trampling in bedding areas under oaks.	Palatability unknown. Can be minimized by limiting grazing period.	Mastication would not affect species except where tracks disturb soil.	Little to no effect but possible from trampling in blooming. Chipper could crush plants.	Could impact regen if chipping is too deep along edge habitats	Will remove plant if done May-June. Otherwise, insignificant effect.	Excessive heat in soil under piles could kill seeds.	Light burning would reduce plant cover but allow some resprouting. Less impact if burned outside of blooming period.
Monardella sinuata ssp. *sinuata*	Southern Curly-Leaved Monardella	-/-	G3T2/S2	1B.2	Apr-Sep	Chaparral, woodland, coastal sage scrub and dunes. Sandy soils, coastal strand, dune. <300 m	High. Suitable sandy chaparral and woodland habitats are present in the Study Area. CNDDB #28 (1948) located 2.7 miles to west.	Annual herb in the mint family; probably not grazed. Could be trampled if found. No effect if done after blooming over in July.	Unknown palatability to browsers. No effect if done after blooming in July	Mastication would not affect species except where tracks disturb soil.	Little to no effect but possible from trampling in blooming. Chipper could crush plants.	Could impact regen if chipping is too deep along edge habitats	Will remove plant if done May-June. Otherwise, insignificant effect.	Excessive heat in soil under piles could kill seeds.	Light burning would reduce plant cover but promote seed germination. Less impact if burned outside of blooming period.

Effects of Fuel Treatments on Sensitive Plant Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CA Rare Plant	Blooming	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Chipping	Mowing	Pile Burning	Broadcast Burning
Monardella undulata ssp. *undulata*	San Luis Obispo Monardella	-/-	G2/S2	1B.2	May-Sep	Coastal scrub, stabilized dunes. Stabilized sandy soils. <200 m.	High. Suitable habitat (stabilized sandy soil) is present in the Study Area. A portion of CNDDB #37 (1979) occurs within the Study Area to the south. Additional CCH records in the near vicinity.	Annual herb in the mint family; probably not grazed. Could be trampled if found. No effect if done after blooming over in July.	Unknown palatability to browsers. No effect if done after blooming in July	Mastication would not affect species except where tracks disturb soil.	Little to no effect but possible from trampling in blooming. Chipper could crush plants.	Could impact regen if chipping is too deep along edge habitats	Will remove plant if done May-June. Otherwise, insignificant effect.	Excessive heat in soil under piles could kill seeds.	Light burning would reduce plant cover but promote seed germination. Less impact if burned outside of blooming period.
Scrophularia atrata	Black-flowered Figwort	-/-	G2?/S2?	1B.2	Mar-Jul	Coniferous forest, chaparral, coastal scrub, riparian scrub. Sand, calcium-diatom-rich soils, around swales. <400 m.	High. Suitable sandy coastal habitats are present in the Study Area. CNDDB #63 (2005) located 2.75 miles to northwest.	Perennial, not likely grazed. Possible trampling if too much stock.	Not likely grazed but should be monitored if found.	Could be cut or crushed by machinery. Flag and avoid if found.	Likely no effect.	Could impact regen if chipping is too deep along edge habitats	Could cut plant - flag and avoid if found.	Excessive heat in soil under piles could kill seeds. Avoid burning in habitat.	Response to burning unknown but seeds would likely sprout after.

Appendix B - Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve

(Species list from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
Accipiter cooperii	Cooper's Hawk	-/-	G5/S4	WL (nesting)	Oak woodland, riparian, open fields, Nests in dense trees, especially coast live oak.	Present. This species was observed during 2020 surveys foraging in the Coast live oak woodland habitat.	Little effect. May reduce bird prey base that uses annual grass.	Little effect. May reduce bird prey base that uses shrubs.	Avoid during the nesting season - Feb-August, or conduct nest survey	No effect	May reduce prey base of bird prey nesting in grasses.	Do not burn during nesting period or conduct nest surveys near piles beforehand.	Avoid during breeding season or conduct nest surveys
Antrozous pallidus	Pallid Bat	-/-	G5/S3	SSC	Rock crevices, caves, tree hollows, mines, old buildings, and bridges.	Present. Limited roosting habitat (no structures and few tree cavities) in the Study Area. Vocalizations detected during 2020 acoustic surveys	Little or no effect but may provide water through more troughs.	Little effect. May reduce bird prey base that uses shrubs. May provide water through more troughs.	Little to no effect	No effect	Little or no effect	Little or no effect	Could temporarily displace bat species by reducing prey base in burned area until next green-up.
Baeolophus inornatus	Oak titmouse	-/-	G4/S4	USFWS BCC: WL (nesting)	Nests in cavities in oak woodland habitat. Non-migratory.	Present. Numerous oak titmice were observed during 2017, 2018, 2019, and 2020 surveys.	No effect	No effect	No effect	No effect	No effect	No effect unless directly under nesting area. Conduct nest surveys prior if breeding season.	Little effect unless done during breeding season. Conduct nest survey prior if breeding season.

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
Lasiurus nocrivagans	Silver-haired Bat	-/-	G3G4/S3S4	SSC	Coastal and montane forests, often feeds over water. Roosts in hollow trees, loose bark, woodpecker cavities, rarely in rocks.	Present. Suitable roosting and foraging habitat are available in the Study Area. Vocalizations detected during 2020 acoustic surveys	Little or no effect but may provide water through more troughs.	Little effect. May reduce bird prey base that uses shrubs. May provide water through more troughs.	Little to no effect	No affect	Little or no effect	Little or no effect	Could temporarily displace bat species by reducing prey base in burned area until next green-up.
Lasiurus cinerius	Hoary Bat	-/-	G5/S5	SA	Forages in open habitats or habitat mosaics with trees. Roosts in dense foliage of medium to large trees. Feeds on moths. Requires water.	Present. Suitable habitat is available in the Study Area. Vocalizations detected during 2020 acoustic surveys	Little or no effect but may provide water through more troughs.	Little effect. May reduce bird prey base that uses shrubs. May provide water through more troughs.	Little to no effect	No effect	Little or no effect	Little or no effect	Could temporarily displace bat species by reducing prey base in burned area until next green-up.
Myotis yumanensis	Yuma myotis	-/-	G5/S5	SSC	Caves, mines, buildings, tree cavities, rock crevices, or under bridges. Feeds near open water	**Present**. SPresent. Suitable habitat is available in the Study Area. Vocalizations detected during 2020	Little or no effect but may provide water through more troughs.	Little effect. May reduce bird prey base that uses shrubs. May provide water through more troughs.	Little to no effect	No effect	Little or no effect	Little or no effect	Could temporarily displace bat species by reducing prey base in burned area until next green-up.

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
						acoustic surveys.							
Phrynosoma blainvillii	Blainville's (Coast) Horned Lizard	-/-	G3G4/S3S4	SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes.	Present. Two observations; suitable habitat is available in the Study Area.	Possible but not significant effect of trampling. Some grazing may open habitat for lizard movement and prey.	Could be loss of cover in brush habitat if overgrazed, otherwise little effect.	May affect horned lizard through loss of cover and crushing. Survey and remove individuals prior.	No effect	May affect if done too short, but otherwise low chance of trampling.	Little effect. May displace individuals in piles	Could temporarily displace but horned lizards could hide in a burrow away from direct effects.
Picoides nuttallii	Nutall's Woodpecker	-/-	G4G5/USFWS BCC		Oak, riparian woodlands	Present. Nuttall's woodpecker is a year-round resident of oak woodland habitat onsite and was observed during 2017, 2018, 2019, and 2020 surveys.	No effect	No effect.	No effect	No effect	No effect	No effect.	Could affect nesting if done in breeding season or if snags used as granaries burned. Survey and avoid.
Taxidea taxus	American Badger	-/-	G5/S3	SSC	Needs friable soils in open ground with abundant food source such as	Present. Several dens observed: suitable grassland habitat and	Little effect. Some grazing may promote small mammal activity and	No effect.	May affect badger through loss of cover and crushing of dens. Flag	No effect	May affect - avoid den sites.	No effect.	Temporary - may displace some prey species dependent on

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
					California ground squirrels.	ground squirrels in the Study Area.	keep area open for badgers		den sites prior				annual grass seed.
Accipiter striatus	Sharp-Shinned Hawk	-/-	G5/S4	WL	Riparian, coniferous, and deciduous woodlands near water.	**Moderate**. Suitable prey (passerines) is available in the Study Area.	Little effect. May reduce bird prey base that uses annual grass.	Little effect. May reduce bird prey base that uses shrubs.	Avoid during the nesting season - Feb-August, or conduct nest survey	No effect	May reduce prey base of bird prey nesting in grasses.	Do not burn during nesting period or conduct nest surveys near piles beforehand.	Avoid during breeding season or conduct nest surveys
Anniella pulchra	Northern California Legless Lizard	-/-	G3/S3	SSC	Sandy or loose loamy soils under coastal scrub or oak trees. Soil moisture essential.	**High.** Suitable habitat is available in the Study Area.	May affect through trampling.	May affect through trampling	Mechanical disturbance could crush individuals.	Monitor effect from some walking on foot.	Cutting usually high enough to avoid direct impact. Some disturbance from walking.	May affect some individuals around piles.	Direct effects mostly avoided by finding burrows, but temporary ground cover/duff habitat loss.
Athene cunicularia	Burrowing Owl	-/-	G4/S3	SSC	Burrows in squirrel burrow complexes in open habitats with low vegetation.	**Low.** Suitable habitat (grazed grassland and squirrel burrows) available in the Study Area.	May promote more open vegetation	Has some impact on lowering grass veg but not much.	No effect	No effect	May promote open habitat but should be avoided during nesting. Survey prior to work.	No effect	No effect if grasslands avoided.

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
Bombus caliginosus	Obscure Bumble Bee	-/-	G4?/S1S2	SA	Open coastal grasslands and meadows. Food plant genera include Baccharis, Cirsium, Lupinus, Lotus, Grindelia and Phacelia.	**Low.** Habitat and nectar sources potentially suitable. Sensitive invertebrate surveys provided negative results for this species.	Minor effect on food species.	Browsers may reduce some of the food plant species but impact can be mitigated by controlling browsing pressure	May reduce some of the food plant species.	May reduce some food plant species but could be mitigated easier through individual plant avoidance than mastication.	May reduce some food plant species.	No effect	Could temporarily affect food species during one growing season. May displace bumble bees but Less impact if done in the fall after burrowing.
Bombus occidentalis	Western Bumble Bee	-/CCE	G2G3/S1	SA	Wide variety of natural, agricultural, urban, and rural habitats. Flower-rich meadows of forests and subalpine zones.	**Low.** Suitable habitat is available in the Study Area. Closest known historical occurrence is located 14 miles northwest (CNDDB #279). Focused sensitive invertebrate surveys provided negative results for this species.	Minor effect on food species.	Browsers may reduce some of the food plant species but impact can be mitigated by controlling browsing pressure	May reduce some of the food plant species.	May reduce some food plant species but could be mitigated easier through individual plant avoidance than mastication.	May reduce some food plant species.	No effect	Could temporarily affect food species during one growing season. May displace bumble bees but Less impact if done in the fall after burrowing.

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
Danaus plexippus pop. 1	Western Bumble Bee	-/-	G4T2T3/S2S3	SA	Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	**Low.** Suitable habitat is not available in the Study Area, eucalyptus adjacent to property may be suitable.	No effect	No effect	No effect	Possible if monarchs wintered in open space. Avoid work in overwintering areas if found.	Possible if native milkweed found in mowed areas. Avoid cutting milkweed.	Avoid burning over existing milkweed. Otherwise, no effect	Temporary impact through loss milkweed and pupae, but long-term effects may include increased milkweed.
Elanus leucurus	White-tailed Kite	-/-	G5/S3S4	FP	Nests in dense tree canopy near open foraging areas	**Low.** Suitable nesting and foraging habitat are available in the Study Area.	Little effect. May reduce bird prey base that uses annual grass.	Little effect. May reduce bird prey base that uses shrubs.	Avoid during the nesting season - Feb-August, or conduct nest survey	No effect	May reduce prey base of bird prey nesting in grasses.	Do not burn during nesting period or conduct nest surveys near piles beforehand.	Avoid during breeding season or conduct nest survyes
Lasiurus blossevillii	Western Red Bat	-/-	G5/S3	SSC	Roosts primarily in trees, from sea level up through mixed conifer forests.	**High**. Suitable habitat is available in the Study Area. Not detected during 2020 acoustic surveys.	Little or no effect, but may provide water through more troughs.	Little effect. May reduce bird prey base that uses shrubs. May provide water through more troughs.	Little to no effect	No effect	Little or no effect	Little or no effect	Could temporarily displace bat species by reducing prey base in burned area until next green-up.

Effects of Fuel Treatments on Sensitive Animal Species -Dana Reserve
(Species list and notes taken from Althouse and Meade 2020)

Scientific Name	Common Name	Fed/ State	Global/ State	CDFW	Habitat Preference	Potential to Occur	Grazing	Browsing	Mastication	Hand Crew	Mowing	Pile Burning	Broadcast Burning
Spinus lawrencei	Lawrence's Goldfinch (nesting)	-/-	G3G4/S3S4	SA, BBC	Arid and open woodlands within near vicinity of chaparral or other brushy areas; tall annual weed fields; and a water source such as a stream, small lake, or farm pond. Live oaks (Quercus spp.) and blue oaks (Q. douglasii) are predominant trees where this species nests	High. Suitable habitat (stabilized sandy soil) is present in the Study Area. A portion of CNDDB #37 (1979) occurs within the Study Area to the south. Additional CCH records in the near vicinity.	Could potentially reduce some seed sources.	No effect	May affect feeding areas by reducing cover/feeding areas	May affect feeding areas by reducing cover/feeding areas	Could potentially reduce some seed sources.	No effect	Could affect nesting. Temporary reduction in food sources.