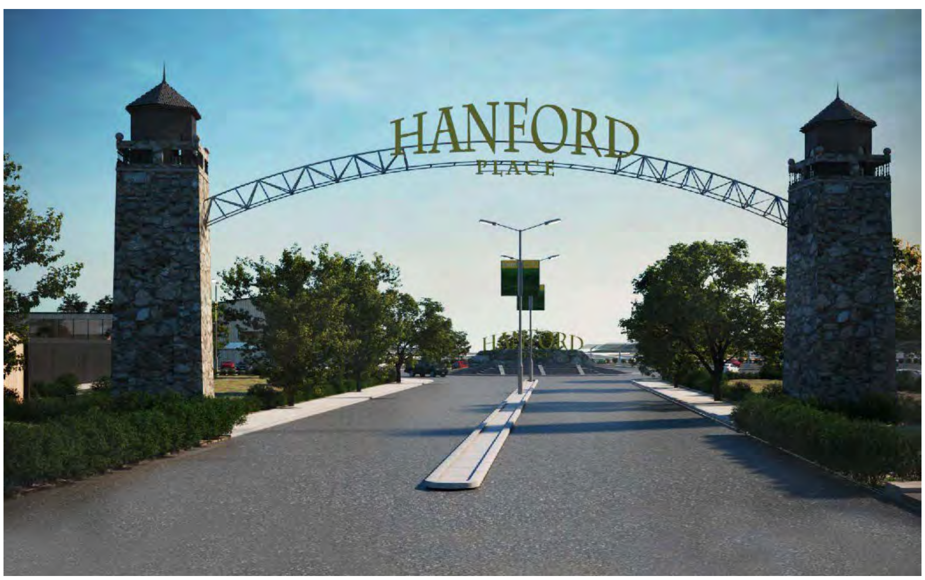
ADMINISTRATIVE DRAFT

INITIAL STUDY/
MITIGATED NEGATIVE DECLARATION

HANFORD PLACE PROJECT

CITY OF HANFORD, CALIFORNIA



LSA

March 2023

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INITIAL STUDY/ MITIGATED NEGATIVE DECLARATION

HANFORD PLACE PROJECT

CITY OF HANFORD, CALIFORNIA

Submitted to:

QK
907 East Main Street
Visalia, California 93292

Prepared for:

City of Hanford
317 N. Douty Street
Hanford, California 93230

Prepared by:

LSA
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Project No. 20230872

LSA

March 2023

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LIST OF ABBREVIATIONS AND ACRONYMS

AAQS	Ambient Air Quality Standard
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan
BMP	Best Management Practices
C-H	Highway Commercial
C-S	Service Commercial
CalEEMod	California Emissions Estimator Model
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resource Board
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
City	City of Hanford
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalents
County	Kings County
CRPR	California Rare Plant Rank
dB	decibel
DCP	Dust Control Plan
FHWA	Federal Highway Administration
GAMAQI	Guidance for Assessing and Mitigating Air Quality Impacts
GHG	Greenhouse gas
GWP	Global Warming Potential

HCM	Highway Capacity Manual
HFCs	Hydrofluorocarbons
IS/MND	Initial Study/Mitigated Negative Declaration
ITE	Institute of Transportation Engineers
L_{dn}	day-night average level
LEED	Leadership in Energy and Environmental Design
L_{eq}	equivalent continuous sound level
LOS	Level of Service
MLD	Most Likely Descendant
mpg	miles per gallon
N_2O	Nitrous oxide
NAAQS	National Air Quality Standards
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
O	Office Zoning
O_3	ozone
Pb	lead
PFCs	perfluorocarbons
PM_{10}	respirable particulate matter
$PM_{2.5}$	fine particulate matter
PPV	peak particle velocity
proposed project	Hanford Place Project
PUD	Planned Unit Development
R-H	High-Density Residential Zoning
ROG	reactive organic gases
RPS	State of California Renewable Portfolio Standards
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SF_6	sulfur hexafluoride

SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control
SO_2	sulfur dioxide
SR-198	State Route 198
SRA	State responsibility area
State	State of California
SWPPP	Storm Water Pollution Prevention Plan
TACs	toxic air contaminants
UCMP	University of California Museum of Paleontology
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled
ZE	zero emission

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1.0 PROJECT INFORMATION

1. **Project Title:**

   Hanford Place Project

2. **Lead Agency Name and Address:**

   City of Hanford
   317 N. Douty Street
   Hanford, CA 93230

3. **Contact Person and Phone Number:**

   Gabrielle Myers, Senior Planner
   City of Hanford Community Development, Planning Division
   (559) 585-2578

4. **Project Location:**

   The project site is located between State Route 198 (SR-198) and the San Joaquin Valley Railroad in the City of Hanford (City), in Kings County (County). 5th Street cuts through the project site in an east/west direction and Campus Drive cuts through the project in a north/south direction. In addition, the Peoples Ditch runs through the project site.

5. **Project Sponsor's Name and Address:**

   Steve Brandt
   QK
   901 East Main Street
   Visalia, CA 93292

6. **General Plan Designation:**

   Highway Commercial (C-H)

7. **Zoning:**

   Highway Commercial (C-H)

8. **Description of Project:**

   The proposed project would develop a medical and mixed-use development including the construction of 15 buildings consisting of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements.

9. Surrounding Land Uses and Setting:

The project site is located in an area with a mix of land uses, including residential, commercial, and medical uses. Adjacent parcels consist mostly of low-density residential and commercial uses, with several undeveloped lots located north of the project site.

10. Other Public Agencies Whose Approval is Required (e.g., permits, financial approval, or participation agreements):

The proposed project would include, but not be limited to, the following regulatory requirements:

- City (e.g., approval of General Plan Amendment, Zone Change, and building permits)
- Central Valley Regional Water Quality Control Board Storm Water Pollution Prevention Plan
- San Joaquin Valley Air Pollution Control District (e.g., Dust Control Plan Approval letter and compliance with Rule 9510 – Indirect Source Review)
- California Department of Fish and to Wildlife Notification of Streambed Alteration pursuant to Section 1602 of the California Fish and Game Code

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resource Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

California Native American tribes traditionally and culturally affiliated with the project site and area were notified of the proposed project on August 5, 2020. Follow-up contact by email and telephone was completed on August 13, 2020. No responses have been received to date.

2.0 PROJECT DESCRIPTION

The following describes the proposed Hanford Place Project (proposed project). This section includes a summary description of the project location and existing site characteristics, required approvals, and entitlements. The City is the lead agency for review of the project under the California Environmental Quality Act (CEQA).

2.1 PROJECT SITE

The following section describes the location and characteristics of the project site. This section also provides a brief overview of the existing land uses within the vicinity of the project site.

2.1.1 Location

The 39.23-acre vacant project site is comprised of four parcels and is located between State Route 198 (SR-198) and the San Joaquin Valley Railroad in the City, in Kings County (County). 5th Street cuts through the project site in an east/west direction and Campus Drive cuts through the project in a north/south direction. In addition, the Peoples Ditch runs through the project site.

The project site is generally bound to the north by the San Joaquin Valley Railroad and existing mixed-use structures, including commercial, medical, retail, and some residential uses, to the east by commercial land uses, to the south by SR-198, and to the west by commercial land uses. Regional access to the site is provided by SR-198, which is located adjacent to the southern border of the project site. Figure 1 shows the site's regional and local context. Figure 2 depicts an aerial photograph of the project site and surrounding land uses.

2.1.2 Existing Setting

The project site is primarily flat and is fallow and disturbed with no existing structures. The project site was previously used for agriculture, consistent with many of the surrounding lands in the region. The project site is located in an area with a mix of land uses, including residential, commercial, and medical uses. Adjacent parcels consist mostly of low-density residential and commercial uses, with several undeveloped lots located north of the project site.

The General Plan designation for the project site is currently C-H and the current zoning designation for the project site is C-H.

2.2 PROPOSED PROJECT

This section provides a description of the proposed project as identified in the project applicant's proposal materials and site plan, dated September 30, 2019.[1] The proposed project would develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical

1 The Hanford Group. 2019. *Hanford Place Medical and Mixed Use-Property Proposal*.

office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements.

The proposed project would include the extension of Glendale Avenue, 5th Street, and Campus Drive, which would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way. As part of the project, Glendale Avenue would also be realigned and any portion of existing right of way not used would be abandoned. In addition, the proposed project would convert the Peoples Ditch to an underground pipeline. Individual project components are further described below.

2.2.1 Project Characteristics

The proposed project would include the following: a 22,525-square-foot ambulatory surgery center; a 12,445-square-foot specialty clinic; two 12,445-square-foot medical office buildings; a 12,445-square-foot psychiatric health facility; a 100,000-square-foot, a four-story 105-room hotel with a conference center and pool; a 35,000-square-foot nursing college; a 54,611-square-foot skilled nursing facility; a 34,480-square-foot memory care facility; a 34,380-square-foot assisted living facility; a three-story 90-unit multi-family apartment; 41,500 square feet of medical/commercial uses; and a 5-acre bio infiltration basin. Table 2.A depicts the proposed buildings and their characteristics. Figure 3 shows the project site plan.

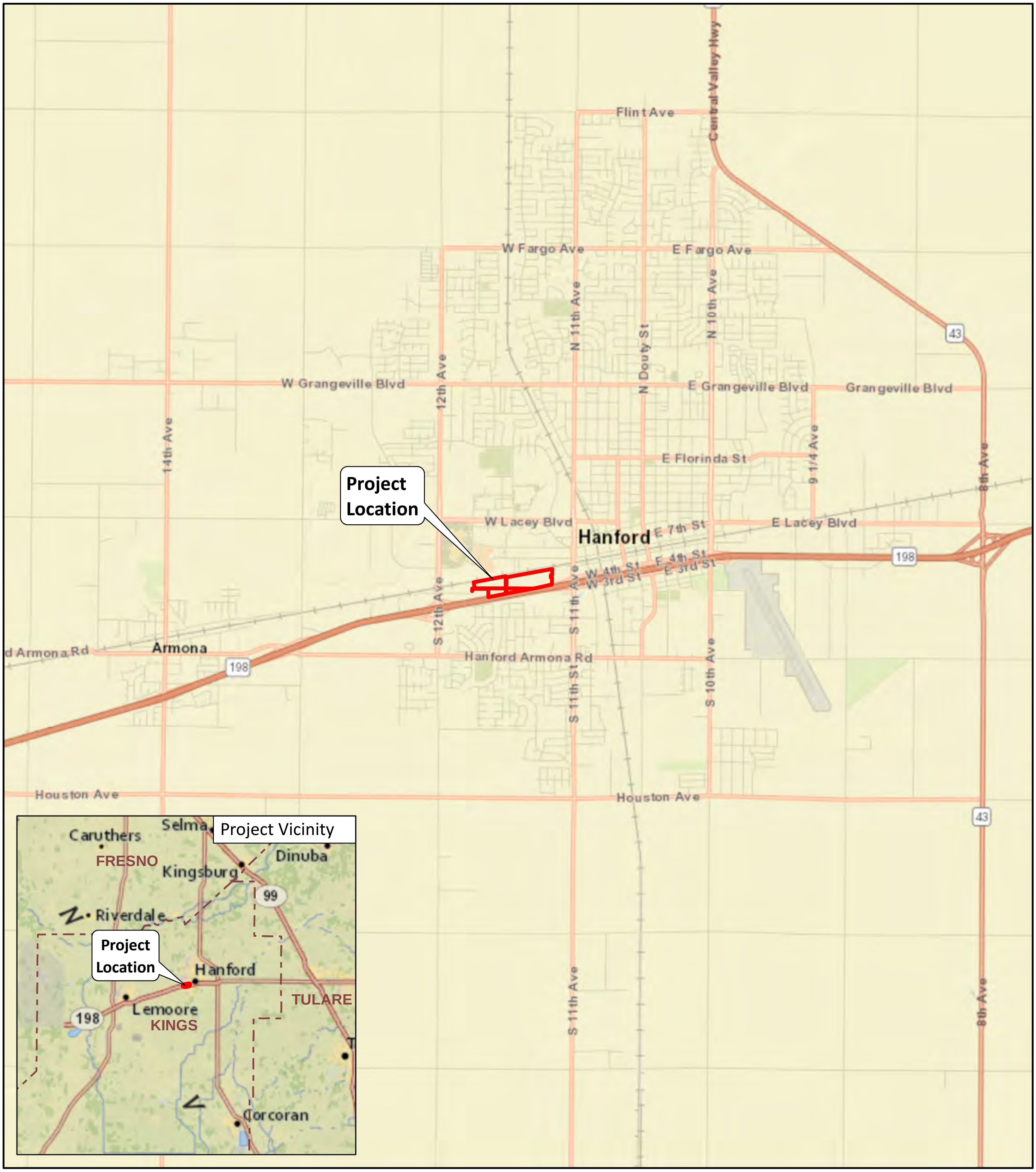
Table 2.A: Building Characteristics

Building	Total Square Feet	Number of Units	Stories
Ambulatory Surgery Center	22,525	-	2
Specialty Clinic	12,445	-	1
Medical Office Building	24,890	2 buildings	1
Psychiatric Health Facility	12,445	-	1
Hotel and Conference Center	100,000	105 rooms	4
Nursing College	35,000	8-10 classrooms	2
Skilled Nursing Facility	54,611	59 units	2
Memory Care	34,480	40 units	1
Assisted Living Facility	34,380	-	1
Multi-Family Apartment	76,500	90 units	3
Medical/Commercial	41,500	-	1

Source: The Hanford Group (2019).

As identified above, the proposed project would include a total of 90 residential units (approximately 76,500 square feet). Units would average 850 square feet, with 72 two-bedroom, two-bathroom units (80 percent of units), 14 one-bedroom, one-bathroom units (15 percent), and 4 three-bedroom, two-bathroom units (5 percent). In addition, the proposed project would provide outdoor space and amenities, including a dog park and a pool.

The proposed project would comply with the latest CALGreen standard building measures and Title 24 standards with some buildings being constructed to meet Leadership in Energy and Environmental Design (LEED) certifications. In addition, approximately 35 to 40 percent of the project's square footage would be covered by solar.



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LEGEND

Project Site

0 0.5 1
MILES

FIGURE 1

Hanford Place Project
Hanford, Kings County, California

Regional Location

SOURCE: Esri World Street Map (2020); National Geographic (2020).

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LSA

LEGEND

Project Site

FIGURE 2

0 250 500
FEET

Hanford Place Project
Hanford, Kings County, California

Project Location

SOURCE: Google Aerial Imagery (2020).

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FIGURE 3

NOT TO SCALE

SOURCE: LANGDON WILSON INTERNATIONAL, 2020.

Hanford Place Project
Hanford, Kings County, California
Site Plan

FRE10\P:\EPI2001 Hanford Place\PRODUCTS\Figure_3.ai (4/22/2020)

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2.2.2 General Plan and Zoning Designation

The General Plan designation for the project site is currently Highway Commercial; however, the project would amend the General Plan to Service Commercial and High-Density Residential. In addition, the current zoning designation for the project site is C-H; however, the project would require a rezone to Service Commercial (C-S) and High-Density Residential (R-H) with a Planned Unit Development (PUD) overlay that would allow uses allowed on the entire project site. This zoning designation and PUD would allow uses from both zones to be constructed anywhere on the project site, which could result in location changes of buildings shown on Figure 3.

2.2.3 Access and Circulation

Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout. In addition, the proposed project would provide 1,466 parking spaces throughout the project site.

2.2.4 Open Space and Landscaping

Consistent with City requirements, open space and drought-tolerant landscaping would be provided throughout the project site.

2.2.5 Utilities

Utilities required to serve the proposed project would include water, sanitary sewer, storm water drainage, electricity, natural gas, and telecommunications infrastructure. Water service, sewage disposal, and refuse collection would be provided by the City. In addition, all City utilities (i.e., water, sewer, and storm drain) would be constructed within the proposed right of way. Storm drainage would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards.

The proposed project would also convert the Peoples Ditch to a 66-inch-diameter below-ground pipeline where the ditch currently exists and would terminate approximately 20 feet short of the existing pipeline that runs under SR-198. The depth of the below-ground pipeline would be between two and six feet.

The proposed project would also require electrical, natural gas, telephone, and cable improvements. Electricity would be provided by Southern California Edison; natural gas would be provided by

Southern California Gas; and telephone services would be provided by AT&T. The extent of work required for utilities and gas would be determined during final project design.

2.2.6 Construction

The proposed project would be constructed in three phases and is anticipated to begin March 2024. Construction is anticipated to last approximately 3 years. The proposed project would comply with City standards, including the City's current building code, landscape standards, and lighting standards. In addition, the proposed project would be graded similar to other developments throughout the City. The proposed project would require between 50,000 to 90,000 cubic yards of soil moved throughout the site and may require re-compaction in place and over excavation. Over excavation would be between 30,000 and 60,000 cubic yards of soil.

3.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist in Chapter 3.0.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology/Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☐ Hydrology/Water Quality	☐ Land Use/Planning	☐ Mineral Resources
☐ Noise	☐ Population/Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities/Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

3.1 DETERMINATION

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "Potentially Significant Impact" or "Potentially Significant Unless Mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☒ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature   Date

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4.0 CEQA ENVIRONMENTAL CHECKLIST

4.1 AESTHETICS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

a. Would the project have a substantial effect on a scenic vista?

The vacant, undeveloped project site is located in an area with a mix of land uses, including residential, commercial, and medical uses. Adjacent parcels consist mostly of low-density residential and commercial uses, with several undeveloped lots located north of the project site. The Peoples Ditch, an irrigation canal dug in the 1870s, runs through the project site. There are no significant trees, rock outcroppings, and/or historic buildings located on the subject property that have been identified as important scenic resources. Therefore, the proposed project would not diminish the scenic views of the project area and would likewise not block or impede surrounding views. Therefore, the proposed project would not result in a substantial adverse effect on a scenic vista. This impact would be less than significant, and no mitigation is required.

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

The California Department of Transportation (Caltrans) manages the State Scenic Highway Program. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been officially designated. No officially designated State scenic highways are located in the City. The nearest State scenic highway to the City is SR-198 east of SR-99.[2] Although the project site is located adjacent to SR-198, the portion that is designated as a State scenic highway is located approximately 3.2 miles east of the project site. The project site would not

[2] California Department of Transportation (Caltrans). 2017. *California Scenic Highways*. February. Website: www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=f0259b1ad0fe4093a5604c9b838a486a (accessed March 2023).

be visible from this scenic roadway. Therefore, implementation of the proposed project would not affect scenic resources within view of a State or local scenic highway, and there would be no impact, and no mitigation is required.

c. In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The proposed project would develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements.

The Land Use and Community Design Element of the City's General Plan[3] states that through community design, the City can build and sustain an urban fabric that strengthens its assets and strives to bring coherence and an ongoing identity to this growing community. High-quality design contributes to memorable, vibrant places where people enjoy spending time. Engaging buildings and public spaces include pedestrian-friendly walkways and entries, open spaces, attractive streets, and efficient parking. In addition, the Land Use and Community Design Element states that the General Plan directs growth toward walkable and mixed-use areas that are planned to integrate housing with regional transit, employment, services, and amenities. The proposed project would develop a mixed-use, infill development consistent with the goals of the Land Use and Community Design Element.

The proposed project would require a rezone from C-H to C-S and R-H. Although the proposed project would require a General Plan Amendment and a Zone Change, the proposed uses would be consistent with the proposed General Plan designations and zones. Therefore, the proposed project would not substantially degrade the existing visual character or quality of the site and its surroundings and would not conflict with applicable zoning and other regulations governing scenic quality. This impact would be less than significant, and no mitigation is required.

d. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Glare is the result of improperly aimed or blocked lighting sources that are visible against a dark background such as the night sky. Glare may also refer to the sensation experienced looking into an excessively bright light source that causes a reduction in the ability to see or causes discomfort. Glare generally does not result in illumination of off-site locations but results in a visible source of light viewable from a distance.

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3 Hanford, City of. 2017. *General Plan – City of Hanford, California.* April. Website: cms6.revize.com/revize/hanfordca/document_center/Planning/General%20Plan/2035%20General%20Plan%20Policy%20Document.pdf (accessed March 2023).

Implementation of the proposed project would create new lighting sources on the project site associated with the new buildings, street and parking lot lighting, and security lighting. All project lighting is required to meet all applicable lighting standards in the City's Municipal Code. As required by Section 17.50.140 of the Municipal Code, all lights and light fixtures, except public streetlights, shall be located, aimed or shielded so as to minimize light trespassing across property boundaries or skyward and no lights shall flash, revolve, blink or otherwise resemble a traffic control signal or operate in such a fashion to create a hazard for passing traffic. Building mounted lighting fixtures shall be attached only to the walls of the building. The top of a light fixture attached to a building wall shall not be higher than the top of the building parapet or the top of the roof eave, whichever is lower and canopy ceiling light fixtures shall be recessed or the sides of the lens area shall be shielded in order to eliminate emission of horizontal light. In addition, mercury vapor lamps shall be a fully shielded fixture with all light directed on-site and freestanding light fixtures shall not exceed 18 feet in height.

Although the proposed project would increase the overall intensity of on-site land uses and associated lighting, the increase in lighting would not result in substantial increases in light intensity at off-site locations. In addition, light intensity diminishes rapidly as an observer moves away from the light source. As such, the intensity of project-related lighting would be concentrated on site with little potential to create perceptible changes in ambient lighting intensity at off-site, light-sensitive locations.

Daytime glare can result from natural sunlight reflecting from a shiny surface that would interfere with the performance of an off-site activity, such as the operation of a motor vehicle. Reflective surfaces can be associated with window glass, polished surfaces, and solar panels. The design of the proposed buildings, parking lot, and solar panels would be designed to be consistent with the City's standards to avoid the creation of intrusive glare within the immediate project area.

Nighttime lighting and glare sources from the proposed project could also include lighting from interior and exterior building lighting, security lighting, signage, parking lot lighting, and vehicle headlights. The nighttime glare produced by these sources would be similar to the existing nighttime glare produced by surrounding residential, commercial, and medical uses and would not result in enough glare to be considered substantial or affect nighttime views because lighting would be designed to be consistent with the development regulations outlined in the Municipal Code.

For these reasons, the proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the surrounding urban area, and project impacts would be less than significant. No mitigation is required.

4.2 AGRICULTURE AND FORESTRY RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

a. Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

The project site is classified as Grazing Land.[4] The project site is not zoned for agricultural uses and is not enrolled in a Williamson Act Contract. The State Department of Conservation classifies the project site as Non-Enrolled Land. The project site is not located on land that is designated as Prime Farmland or Farmland of State Importance. In addition, the project site is currently vacant and is not zoned for agricultural uses. Therefore, implementation of the proposed project would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the California Important Farmland Map, to a non-agricultural use. There would be no impact, and no mitigation is required.

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

The General Plan designation for the project site is currently Highway Commercial; however, the project would amend the General Plan to Service Commercial and High-Density Residential. In addition, the current zoning designation for the project site is C-H; however, the project would require a rezone to C-S and R-H. The project site is classified as Grazing Land and the land is not enrolled in a Williamson Act contract. Therefore, the proposed project would have no impact on

[4] California Department of Conservation. 2016. *California Important Farmland Finder.* Website: maps.conservation.ca.gov/DLRP/CIFF/ (accessed March 2023).

zoning designations for agricultural and farmland use or land currently under a Williamson Act contract, and no mitigation is required.

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

The project site is not zoned for, nor would it require the rezoning of, any existing parcels or land use designations, including forest land or timberland uses. In addition, there is no forest land or timberland subject to the Public Resources Code within the vicinity of the project site. Therefore, the proposed project would have no impact to forestland or timberland, and no mitigation is required.

d. Would the project result in the loss of forest land or conversion of forestland to non-forest use?

See Response 4.2.c. The proposed project would not convert forest land to non-forest use and would not result in the loss or conversion of forest land to a non-forest use, and no mitigation is required.

e. Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

As stated previously, the project site is currently vacant, and therefore would not convert farmland to a non-agricultural use. In addition, the project site would not contribute to environmental changes that could result in conversion of farmland to non-agricultural use. Therefore, no impacts to farmland or forest land would occur, and no mitigation is required.

4.3 AIR QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

The proposed project is located within the City of Hanford. Hanford is part of the San Joaquin Valley Air Basin (SJVAB), which is within the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAPCD is responsible for air quality regulation within the eight county San Joaquin Valley region.

Both the State of California (State) and the federal government have established health-based Ambient Air Quality Standards (AAQS) for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter ($PM_{2.5}$ and PM_{10}). The SJVAB is designated as non-attainment for O_3 and $PM_{2.5}$ for federal standards and non-attainment for O_3, PM_{10}, and $PM_{2.5}$ for State standards.

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the USEPA to identify regions as “attainment” or “nonattainment” depending on whether the regions meet the requirements stated in the applicable National Air Quality Standards (NAAQS). Nonattainment areas are imposed with additional restrictions as required by the USEPA. In addition, different classifications of attainment, such as marginal, moderate, serious, severe, and extreme, are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. The SJVAB attainment statuses for each of the criteria pollutants are listed in Table 4.A.

Table 4.A: SJVAB Air Quality Attainment Status

Pollutant	Federal	State
Ozone (1-hour)	No Federal Standard	Nonattainment/Severe
Ozone (8-hour)	Nonattainment/Extreme	Nonattainment
PM_{10}	Attainment	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment/Unclassified	Attainment/Unclassified
Nitrogen Dioxide	Attainment/Unclassified	Attainment
Lead	No Designation/Classification	Attainment
Sulfur Dioxide	Attainment/Unclassified	Attainment
Sulfates	No Federal Standard	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified

Source: San Joaquin Valley Air Pollution Control District (2016).

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

An air quality plan describes air pollution control strategies to be implemented by a city, county, or region classified as a non-attainment area. The main purpose of the air quality plan is to bring the area into compliance with the requirements of the federal and State air quality standards. The SJVAPCD *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI)[5] indicates that projects that do not exceed regional criteria pollutant emission thresholds would not conflict or obstruct the implementation plan.

This analysis used two tests to determine if the project conflicts or obstructs the applicable air quality plans. First, if the project would result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations or delay timely attainment of air quality standards or the interim emission reductions specified in the air quality plans. Second, if the project would comply with applicable control measures in the air quality plans.

Contribution to Air Quality Violations. A measure for determining if the project is consistent with the air quality plans is if the project would not result in an increase in the frequency or severity of existing air quality violations, cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the air quality plans. Regional air quality impacts and attainment of standards are the result of the cumulative impacts of all emission sources within the air basin. Individual projects are generally not large enough to contribute measurably to an existing violation of air quality standards. Therefore, the cumulative impact of the project is based on its cumulative contribution. Because of the region's nonattainment status for O_3, $PM_{2.5}$, and PM_{10}—if project-generated emissions of either of the O_3 precursor pollutants (nitrogen oxides [NO_x], reactive organic gases [ROG]), PM_{10}, or $PM_{2.5}$ would exceed SJVAPCD significance thresholds—then the project would be considered to contribute to violations of the applicable standards and conflict with the attainment plans.

5 San Joaquin Valley Air Pollution Control District. 2015. CEQA, Guidance/Policies/Rules, Guidance for Assessing and Mitigating Air Quality Impacts. March 19. Website: www.valleyair.org/transportation/ceqa_idx.htm (accessed March 2023).

As discussed in Response 4.3.b below, emissions of ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$ associated with construction and operation of the proposed project would not exceed SJVAPCD significance thresholds. In addition, the proposed project would not result in CO hotspots that would violate CO standards. Therefore, the proposed project would not contribute to air quality violations.

Compliance with Applicable Control Measures. A description of rules and regulations that apply to this project is provided below.

Rule 9510 (Indirect Source Review) is a control measure in the 2006 PM_{10} Plan that requires NO_x and PM_{10} emission reductions from development projects in the SJVAB. The NO_x emission reductions help reduce the secondary formation of PM_{10} in the atmosphere (and also reduce the formation of ozone. Reductions in directly emitted PM_{10} reduce particles such as dust, soot, and aerosols. Rule 9510 is also a control measure in the 2022 Plan for the 2015 8-Hour Ozone Standard. Developers of projects subject to Rule 9510 must reduce emissions occurring during construction and operational phases through on-site measures or pay off-site mitigation fees. The proposed project is required to comply with Rule 9510.

Regulation VIII (Fugitive PM_{10} Prohibitions) is a control measure that is one main strategies from the 2006 PM_{10} Plan for reducing the PM_{10} emissions that are part of fugitive dust. Projects over 10 acres are required to file a Dust Control Plan (DCP) containing dust control practices sufficient to comply with Regulation VIII. The proposed project is required to prepare a DCP to comply with Regulation VIII.

Other control measures that apply to the proposed project are Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operation) that requires reductions in volatile organic compounds (VOC) during paving and Rule 4601 (Architectural Coatings) that limits the VOC content of all types of paints and coatings sold in the SJVAB. These regulations are enforced at the manufacturing level and at point of sale, not at the project level.

The proposed project would comply with all applicable SJVAPCD rules and regulations. Therefore, the proposed project would comply with this criterion and would not conflict with or obstruct implementation of the applicable air quality attainment plan.

Conclusion. The proposed project's emissions would be less than significant for all criteria pollutants and would not result in inconsistency with applicable air quality plans. The proposed project would comply with applicable air quality plan control measures and would not conflict with or obstruct their implementation; therefore, the proposed project is consistent with the applicable air quality plans, and the impact would be less than significant.

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The SJVAB is designated as non-attainment for O_3 and $PM_{2.5}$ for federal standards and non-attainment for O_3, PM_{10}, and $PM_{2.5}$ for State standards. SJVAPCD nonattainment status is attributed to the region's development history. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.

In developing thresholds of significance for air pollutants, the SJVAPCD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions.

To result in a less than significant impact, the following criteria must be true: 1) regional analysis: emissions of nonattainment pollutants must be below SJVAPCD regional significance thresholds; 2) summary of projections: the project must be consistent with current air quality attainment plans including control measures and regulations; and 3) cumulative health impacts: the project must result in less than significant cumulative health effects from the nonattainment pollutants. The following analysis assesses the potential project-level construction- and operation-related air quality impacts.

Short-Term Construction Emissions. During construction, short-term degradation of air quality may occur due to the release of particulate matter emissions (i.e., fugitive dust) generated by grading, hauling, and other activities. Emissions from construction equipment are also anticipated and would include CO, NO_x, ROG, directly-emitted particulate matter ($PM_{2.5}$ and PM_{10}), and toxic air contaminants (TACs) such as diesel exhaust particulate matter.

Site preparation and project construction would involve grading, paving, and other activities. Construction-related effects on air quality from the proposed project would be greatest during the site preparation phase due to the disturbance of soils. If not properly controlled, these activities would temporarily generate particulate emissions. Sources of fugitive dust would include disturbed soils at the construction site. Unless properly controlled, vehicles leaving the site would deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Water or other soil stabilizers can be used to control dust, resulting in emission reductions of 50 percent or more. SJVAPCD Regulation VIII is designed to reduce PM_{10} emissions generated by human activity. The SJVAPCD has established Regulation VIII measures for reducing fugitive dust emissions (PM_{10}). With the implementation of Regulation VIII measures, fugitive dust emissions from construction activities would not result in adverse air quality impacts.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_x, ROGs and some soot particulate ($PM_{2.5}$

and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site.

Construction emissions were estimated for the project using the California Emissions Estimator Model, version 2022.1 (CalEEMod) as recommended by the SJVAPCD. The project was assumed to begin construction March 2024 and last approximately 3 years. The proposed project would require between 50,000 to 90,000 cubic yards of soil moved throughout the site and may require re-compaction in place and over excavation. Over excavation would be between 30,000 and 60,000 cubic yards of soil; as such, this analysis assumes that 60,000 cubic yards of soil would be off-hauled. This analysis also assumes the use of Tier 2 construction equipment. Other construction details are not yet known; therefore, default assumptions (e.g., construction fleet activities and worker and vendor trips) from CalEEMod were used.

Construction-related emissions for each year of construction are presented in Table 4.B. CalEEMod output sheets are included in Appendix A.

Table 4.B: Project Construction Emissions

Year	Emissions (tons per year)				
	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Construction 2024	0.2	3.7	3.3	0.5	0.2
Construction 2025	0.2	2.8	3.3	0.4	0.2
Construction 2026	0.3	2.5	2.8	0.3	0.1
Construction 2027	1.2	<0.1	0.1	<0.1	<0.1
Total Construction Emissions	**1.9**	**9.0**	**9.4**	**1.2**	**0.5**
Highest Annual Construction Emissions	**1.2**	**3.7**	**3.3**	**0.5**	**0.2**
Significance Thresholds	10.00	10.00	100.00	15.00	15.00
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**

Source: LSA (March 2023).

As shown in Table 4.B construction emissions associated with the project would not exceed SJVAPCD thresholds for ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$ emissions. Therefore, construction of the proposed project would not result in a cumulatively considerable net increase of PM_{10} or any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standards and impacts would be less than significant.

Long-Term (Operational) Emissions. Long-term air pollutant emission impacts are those associated with mobile sources (e.g., vehicle trips), energy sources (e.g., electricity and natural gas), and area sources (e.g., architectural coatings and the use of landscape maintenance equipment) related to the proposed project.

PM_{10} emissions result from running exhaust, tire and brake wear, and the entrainment of dust into the atmosphere from vehicles traveling on paved roadways. Entrainment of PM_{10} occurs when vehicle tires pulverize small rocks and pavement, and the vehicle wakes generate airborne dust. The contribution of tire and brake wear is small compared to the other PM emission processes. Gasoline-powered engines have small rates of particulate matter emissions compared with diesel-powered vehicles.

Energy source emissions result from activities in buildings for which electricity and natural gas are used. The quantity of emissions is the product of usage intensity (i.e., the amount of electricity or natural gas) and the emission factor of the fuel source. Major sources of energy demand include building mechanical systems, such as heating and air conditioning, lighting, and plug-in electronics, such as refrigerators or computers. Greater building or appliance efficiency reduces the amount of energy for a given activity and thus lowers the resultant emissions. The emission factor is determined by the fuel source, with cleaner energy sources, like renewable energy, producing fewer emissions than conventional sources.

Typically, area source emissions consist of direct sources of air emissions located at the project site, including architectural coatings and the use of landscape maintenance equipment. Area source emissions associated with the project would include emissions from the use of landscaping equipment and the use of consumer products.

Emission estimates for operation of the project were calculated using CalEEMod. Model results are shown in Table 4.C. Trip generation rates for the project were based on the project's trip generation estimates, as identified in Section 4.17, Transportation. However, as discussed in Section 4.17, Transportation, approximately 41,500 square feet of commercial/office uses is proposed. These uses would generate fewer trips than the 114,000 square feet of commercial/office uses that is analyzed in the proposed project trip generation estimate. The trip generation in CalEEMod was adjusted to reflect 41,500 square feet of commercial/office uses. As such, CalEEMod assumes a total of approximately 5,239 average daily trips (ADT), including 1,393 ADT for the Ambulatory Surgery Center, Specialty Clinic, Medical Office Building, and Psychiatric Health Facility, 682 ADT for the Hotel and Conference Center, 638 ADT for the Nursing College, 662 ADT for the Skilled Nursing Facility, Memory Care, Assisted Living Facility, 576 ADT for the Multi-Family Apartments, and 1,287 ADT for the Medical/Commercial uses based on the project's trip generation and taking into account a 10 percent reduction for internal trips. In addition, this analysis assumes the proposed project would be built to current Title 24 building standards. Where project-specific data were not available, default assumptions from CalEEMod were used to estimate project emissions.

The primary emissions associated with the project are regional in nature, meaning that air pollutants are rapidly dispersed on release or, in the case of vehicle emissions associated with the project; emissions are released in other areas of the Air Basin. The annual emissions associated with project operation are identified in Table 4.C for ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$.

Table 4.C: Project Operation Emissions

Source	Emissions (tons per year)				
	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Mobile Source Emissions	2.9	2.5	14.5	1.1	0.2
Area Source Emissions	2.4	0.1	4.3	0.3	0.3
Energy Source Emissions	<0.1	0.6	0.4	<0.1	<0.1
Total Operation Emissions	**5.4**	**3.2**	**19.2**	**1.5**	**0.6**
Significance Thresholds	10.00	10.00	100.00	15.00	15.00
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**

Source: LSA (March 2023).

The results shown in Table 4.C indicate the project would not exceed the significance criteria for annual ROG, NO_x, CO, PM_{10} or $PM_{2.5}$ emissions. In addition, the application of SJVAPCD Rule 9510, and implementation of the General Plan air quality-related policies would reduce impacts to the extent feasible. The project fulfills other General Plan objectives by increasing development densities and providing infill development in an area surrounded by existing development. As such, operation of the proposed project would not result in a cumulatively considerable net increase of PM_{10} or any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standards and impacts would be less than significant.

Project Health Impacts. In the 5th District Court of Appeal case Sierra Club v. County of Fresno (Friant Ranch, L.P.), the Court found the project's Environmental Impact Report (EIR) deficient because it did not identify specific health-related effects resulting from the estimated amount of pollutants generated by the project. The ruling stated that the EIR should give a "sense of the nature and magnitude of the 'health and safety problems' caused by a project's air pollution. The EIR should translate the emission numbers into adverse impacts or to understand why such translation is not possible at this time (and what limited translation is, in fact, possible)."

The pollutants of concern in the Friant Ranch ruling were regional criteria pollutants ozone and PM_{10}. It is important to note that the potential for localized impacts can be addressed through dispersion modeling. The SJVAPCD includes screening criteria that if exceeded would require dispersion modeling to determine if project emissions would result in a significant health impact. For this project, no significant localized health impacts would occur. Regional pollutants require more complex modeling as described below.

Ozone concentrations are estimated using regional photochemical models because ozone formation is subject to temperature, inversion strength, sunlight, emissions transport over long distances, dispersion, and the regional nature of the precursor emissions. The emissions from individual projects are too small to produce a measurable change in ozone concentrations – it is the cumulative contribution of emissions from existing and new development that is accounted for in the photochemical model. Ozone concentrations vary widely throughout the day and year even with the same amount of daily emissions. The SJVAPCD indicated in an Amicus Brief on Friant Ranch that running the photochemical model with just Friant Ranch emissions (109.5 tons/year NO_x) is not likely to yield valid information given the relative scale involved. The NO_x inventory for the San Joaquin Valley is 224 tons per day in 2019 or 81,760 tons per year. Friant Ranch would result in 0.13

percent increase in NO_x emissions. A project emitting at the SJVAPCD CEQA threshold of 10 tons per year would result in a 0.01 percent increase in NO_x emissions. Most project emissions are generated by motor vehicle travel distributed on regional roadways miles from the project site, and these emissions are not conducive to project-level modeling.

Emissions throughout the San Joaquin Valley are projected to decline in the coming decade. The SJVAPCD 2022 Ozone Plan predicts NO_x emissions will decline 72 percent between 2018 and 2037, contributing to the Valley's progress toward attainment of the 2015 8-hour ozone standard levels through implementation of control measures included in the plan. This means that ozone health impacts to residents of the San Joaquin Valley will be lower than currently experienced, and most areas of the San Joaquin Valley will have attained ozone air quality standards. The plan accounts for growth in population at rates projected by the State for the San Joaquin Valley, so only cumulative projects that would exceed regional growth projections would potentially delay attainment and prolong the time and the number of people would experience health impacts. It is unlikely that anyone would experience greater impacts from regional emissions than currently occur. The federal transportation conformity regulation provides a means of ensuring growth in emissions does not exceed emission budgets for each County. Regional Transportation Plans and Regional Transportation Improvement Plans must provide a conformity analysis based on the latest planning assumptions that demonstrates that budgets will not be exceeded. If budgets are exceeded, the San Joaquin Valley may be subject to Clean Air Act sanctions until the deficiency is addressed.

Particulate emission impacts can be localized and regional. Particulates can be directly emitted and can be formed in the atmosphere with chemical reactions. Small directly emitted particles such as diesel emissions and other combustion emissions can remain in the atmosphere for a long time and can be transported over long distances. Large particles such as fugitive dust tend to be deposited a short distance from where emitted but can also travel long distances during periods of high winds. Particulates can be washed out of the atmosphere by rain and deposited on surfaces. Secondary particulates formed in the atmosphere such as ammonium nitrate require NO_x and ammonia and require low inversion levels, and certain ranges of temperature and humidity to result in substantial concentrations. These complications, make modeling project particulate emissions to determine concentration only feasible for directly emitted particles at receptor locations close to the project site. Regional particulate concentrations are modeled using a gridded inventory (emissions in tons/day are placed a four-kilometer three-dimensional grid to spatially allocate the emissions geographically) and an atmospheric chemistry component to simulate the chemical reactions. The model uses relative reduction factors to determine the amount of reductions of each PM component will be needed to attain the air quality standards on the days with the conditions most favorable to high particulate concentrations. A small project would not produce sufficient emissions to determine a project's individual contribution to the particulate concentration and health impact.

Since the Basin is nonattainment for ozone, PM_{10}, and $PM_{2.5}$, it is considered to have an existing significant cumulative health impact without the project. When this occurs, the analysis considers whether the project's contribution to the existing violation of air quality standards is cumulatively considerable. The SJVAPCD regional thresholds for NO_x, VOC, PM_{10}, or $PM_{2.5}$ are applied as cumulative contribution thresholds. Projects that exceed the regional thresholds would have a cumulatively considerable health impact. As shown in Table 4.B and Table 4.B, the construction and operational emissions analysis indicates that the project would not exceed SJVAPCD significance thresholds.

In addition, the SJVAPCD Air Quality Attainment Plans predict that nonattainment pollutant emissions will continue to decline each year as regulations adopted to reduce these emissions are implemented, accounting for growth projected for the region. Therefore, the cumulative health impact will also decline even with the project's emission contribution. As such, impacts would be considered less than significant.

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors are defined as people that have an increased sensitivity to air pollution or environmental contaminants, including children, the elderly, and persons with pre-existing respiratory or cardiovascular illness. The SJVAPCD considers a sensitive receptor a location that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Examples of sensitive receptors include hospitals, residences, convalescent facilities, and schools. The proposed project includes residences, assisted living, and a skilled nursing facility that would house sensitive receptors.

Off-Site Sensitive Receptors. Construction activities associated with the proposed project may expose surrounding sensitive receptors to airborne particulates, as well as a small quantity of construction equipment pollutants (i.e., usually diesel-fueled vehicles and equipment). However, construction contractors would be required to implement measures to reduce or eliminate emissions by following the Regulation VIII, Fugitive PM_{10} Prohibitions. Project construction emissions would be below SJVAPCD significance thresholds. In addition, once the proposed project is constructed, the project would not be a significant source of long-term operational emissions. Therefore, the proposed project would not expose sensitive receptors to substantial pollutant concentrations, and potential impacts to off-site sensitive receptors would be considered less than significant.

On-Site Sensitive Receptors. The proposed project would not be a significant source of TAC emissions. Construction activities produce short term emissions that would not contribute substantially to cancer risk, which is estimated based on a 70-year exposure period. In the California Building Industry Association v. Bay Area Air Quality Management District (BAAQMD), 62 Cal.4th 369 (2015) (Case No. S213478) the California Supreme Court held that "agencies subject to CEQA generally are not required to analyze the impact of existing environmental conditions on a project's future users or residents." Although the Court ruled that impacts from the existing environment on projects are not required to be addressed under CEQA, land uses such as gasoline stations, dry cleaners, distribution centers, and auto body shops can expose residents or other sensitive receptors to high levels of TAC emissions if they are in proximity of the project site. Information regarding the location of existing TAC sources is provided for disclosure purposes only and not as a measure of the project's significance under CEQA. Consistency with these recommendations is assessed as follows:

- Heavily traveled roads. The California Air Resource Board (CARB) recommends avoiding new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day. Epidemiological studies indicate that the distance from the roadway and truck traffic densities were key factors in the correlation of health effects, particularly in children. The project is located north of SR-198. The traffic volume on SR-198 was 35,500 trips per day in 2017. Therefore, no roads serving the project would exceed this criterion.

- Distribution centers. CARB also recommends avoiding siting new sensitive land uses within 1,000 feet of a distribution center. The project is not located within 1,000 feet of a distribution center.

- Fueling stations. CARB recommends avoiding new sensitive land uses within 300 feet of a large fueling station (a facility with a throughput of 3.6 million gallons per year or greater). CARB recommends a 50-foot separation from typical gas dispensing facilities. The nearest gas station is approximately 0.18 mile southeast of the project site at the corner of 11th Avenue and West 3rd Street.

- Dry cleaning operations. CARB recommends avoiding siting new sensitive land uses within 300 feet of any dry-cleaning operation that uses perchloroethylene. For operations with two or more machines, CARB recommends a buffer of 500 feet. For operations with three or more machines, CARB recommends consultation with the local air district. The nearest dry-cleaning operation is approximately 0.76 mile east of the project site at 119 N. Douty Street.

- Auto body shops. Auto body shops have the potential to emit TACs related to painting. The nearest auto body shop is approximately 0.47 mile east of the project site at 329 W. 5th Street, which is beyond the distance that would result in a measurable impact.

As such, impacts to future on-site sensitive receptors would be less than significant.

Localized Pollutant Analysis. Emissions occurring at or near the project have the potential to create a localized impact, also referred to as an air pollutant hotspot. Localized emissions are considered significant if, when combined with background emissions, they would result in exceedance of any health-based air quality standard. The impact from localized pollutants is based on the impact to the nearest sensitive receptor.

The SJVAPCD's GAMAQI includes screening thresholds for identifying projects that need detailed analysis for localized impacts. Projects with on-site emission increases from construction activities or operational activities that exceed the 100 pounds per day screening level of any criteria pollutant after compliance with Rule 9510 and implementation of all enforceable mitigation measures would require preparation of an ambient air quality analysis. The criteria pollutants of concern for localized impact in the SJVAB are PM_{10}, $PM_{2.5}$, NO_x, and CO. There is no localized emission standard for ROG and most types of ROG are not toxic and have no health-based standard; however, ROG was included for informational purposes only.

The results of the construction screening analysis are presented in Table 4.D.

Table 4.D: Maximum Daily Air Pollutant Emissions during Construction

Year	Emissions (pounds per day)				
	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Highest Emissions in Any Year	**53.6**	**59.4**	**38.8**	**8.9**	**4.0**
Screening Thresholds	100.00	100.00	100.00	100.00	100.00
Exceed Threshold – Significant Impact?	**No**	**No**	**No**	**No**	**No**

Source: LSA (March 2023).

In addition, an analysis of maximum daily emissions during operation was conducted to determine if emissions would exceed 100 pounds per day for any pollutant of concern. Operational emissions include emissions generated on-site by area sources such as natural gas combustion and landscape maintenance, and off-site by motor vehicles accessing the project. By design, the localized impacts analysis only includes on-site sources; however, the CalEEMod outputs do not separate on-site and off-site emissions for mobile sources. Most motor vehicle emissions would occur distant from the site and would not contribute to a violation of ambient air quality standards; therefore, operational emissions only reflect the emissions within one half mile of the project site. As such, considering the total trip length included in CalEEMod, this analysis conservatively assumes that 5 percent of the project-related mobile source would occur on site. The results of the screening analysis are presented in Table 4.E.

Table 4.E: Maximum Daily Air Pollutant Emissions during Operations

Source	Emissions (pounds per day)				
	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Total	**20.0**	**3.5**	**80.6**	**7.9**	**7.3**
Screening Threshold	100.00	100.00	100.00	100.00	100.00
Exceed Threshold?	**No**	**No**	**No**	**No**	**No**

Source: LSA (March 2023).

As shown in Tables 4.D and 4.E, construction and operation of the proposed project would not exceed SJVAPCD screening thresholds for localized pollutant impacts; therefore, the project's localized criteria impacts would be less than significant.

Carbon Monoxide Hot Spot Analysis. Localized high levels of CO are associated with traffic congestion and idling or slow-moving vehicles. The SJVAPCD provides screening criteria to determine when to quantify local CO concentrations based on impacts to the level of service (LOS) of intersections in the project vicinity.

The construction of the project would result in minor increases in traffic for the surrounding road network during the duration of construction. Once operational, motor vehicles accessing the site would result in approximately 742 peak hourly trips and 7,493 average daily trips and would not substantially reduce the LOS with expected roadway improvements. As discussed in Section 4.17, Transportation, the 12th Avenue at Glendale Avenue intersection currently exceeds the City of Hanford's minimum LOS criteria during the PM peak hour. In addition, results of the analysis show that the proposed project contributes to an unacceptable LOS at five of the study intersections when comparing the Cumulative Year 2042 scenarios. Section 4.17, Transportation, identifies potential intersection improvements; however, the intersection of 12th Avenue at Glendale Avenue would be above the City's standard of LOS D standard. The City acknowledges in General Plan Objective CI 2 and Policy CI 2.2, that there may be instances where design considerations or other public health, safety, or welfare factors determine otherwise. Therefore, since additional improvements are not recommended due design considerations, impacts to intersection LOS are considered to be less than significant. Therefore, the project would not significantly contribute to an exceedance of state or federal CO standards.

Valley Fever. Valley fever, or coccidioidomycosis, is an infection caused by inhalation of the spores of the fungus, Coccidioides immitis (C. immitis). The spores live in soil and can live for an extended time in harsh environmental conditions. Activities or conditions that increase the amount of fugitive dust contribute to greater exposure, and they include dust storms, grading, and recreational off-road activities.

The San Joaquin Valley is considered an endemic area for Valley fever. However, within endemic areas less favorable for the occurrence of C. immitis include: cultivated fields; heavily vegetated areas (e.g. grassy lawns); higher elevations (above 7,000 feet); areas where commercial fertilizers (e.g. ammonium sulfate) have been applied; areas that are continually wet; paved (asphalt or concrete) or oiled areas; soils containing abundant microorganisms; and heavily urbanized areas where there is little undisturbed virgin soil.[6]

The project site is situated in an infill area. The project includes urbanization of a site that was formerly graded. Therefore, implementation of the project would have a low probability of the site having C. immitis growth sites and exposure to the spores from disturbed soil.

Construction activities would generate fugitive dust that could contain C. immitis spores. The proposed project would minimize the generation of fugitive dust during construction activities by complying with SJVAPCD Regulation VIII. Therefore, this regulation, combined with the relatively low probability of the presence of C. immitis spores, would reduce Valley fever impacts to less than significant. During operations, dust emissions are anticipated to be negligible, because most of the project area would be occupied by buildings, pavement, and landscaped areas. This condition would preclude the possibility of the project from providing habitat suitable for C. immitis spores and for generating fugitive dust that may contribute to Valley fever exposure. Impacts would be less than significant.

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6 U. S. Geological Survey. 2000. Operational Guidelines (version 1.0) for Geological Fieldwork in Areas Endemic for Coccidioidomycosis (Valley Fever). Website: pubs.er.usgs.gov/publication/ofr00348 (accessed March 2023).

Naturally Occurring Asbestos. According to a map of areas where naturally occurring asbestos in California are likely to occur,[7] there are no such areas in the project area. Therefore, development of the project is not anticipated to expose receptors to naturally occurring asbestos. Impacts would be less than significant.

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Land uses that are typically identified as sources of objectionable odors include landfills, transfer stations, sewage treatment plants, wastewater pump stations, composting facilities, feed lots, coffee roasters, asphalt batch plants, and rendering plants. The project would not engage in any of these activities. Therefore, the project would not be considered a generator of objectionable odors during operations.

During construction, the various diesel-powered vehicles and equipment in use on-site would create localized odors. These odors would be temporary and would not likely be noticeable for extended periods of time beyond the project's site boundaries. The potential for diesel odor impacts would therefore be less than significant.

As a residential and medical office development, the project has the potential to place sensitive receptors near existing odor sources. The City's wastewater treatment plant is located approximately 1.75 miles south southeast of the project site. The prevailing wind direction in Hanford is northwesterly; therefore, the site location would not be exposed to substantial odors. There are no other major odor-generating sources near the project site. Therefore, the proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and potential impacts would be considered less than significant.

[7] U.S. Geological Survey. 2011. Van Gosen, B.S., and Clinkenbeard, J.P. California Geological Survey Map Sheet 59. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Open-File Report 2011-1188. Website: http://pubs.usgs.gov /of/2011/1188/ (accessed March 2023).

4.4 BIOLOGICAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

The following discussion is based on the findings of the Biological Resources Assessment[8] prepared for the proposed project. The Biological Resources Assessment is included as Appendix B.

Methods. LSA Biologist Kelly McDonald conducted a literature review and records search on March 31, 2020, to identify the existence and potential for occurrence of sensitive or special status[9] plant and animal species in the vicinity of the project site. Federal and State lists of sensitive species were also examined. Current electronic database records reviewed included the following:

8 LSA. 2020. *Biological Resources Assessments Hanford Place Project Kings County, California*. May.

9 For the purposed of this report, the term "special-status species" refers to those species that are listed or proposed for listing under the CESA and/or FESA, California Fully Protected Species, California Species of Special Concern, and California Special Animals. It should be noted that "Species of Special Concern" and "California Special Animal" are administrative designations made by the CDFW and carry no formal legal protection status. However, Section 15380 of the *State CEQA Guidelines* indicates that these species should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein.

- **California Natural Diversity Data Base information (CNDDB – RareFind 5)**, which is administered by the California Department of Fish and Wildlife (CDFW), formerly known as the California Department of Fish and Game (CDFG). This database covers sensitive plant and animal species as well as sensitive natural communities that occur in California. Records from nine USGS quadrangles surrounding the project site (*Riverdale*, *Laton, Burris Park, Lemoore, Hanford, Remnoy, Stratford, Guernsey, and Waukena*) were obtained from this database to inform the field survey.

- **California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants**, which utilizes four specific categories or "lists" of sensitive plant species to assist with the conservation of rare or endangered botanical resources. All of the plants constituting California Rare Plant Ranks (CRPR) 1A, 1B, 2A, and 2B are intended to meet the status definitions of "threatened" or "endangered" in CESA and the California Department of Fish and Game Code, and are considered by CNPS to be eligible for State listing. At the discretion of the CEQA Lead Agency, impacts to these species may be analyzed as such, pursuant to the *State CEQA Guidelines* Sections 15125(c) and 15380. Plants in Rank 3 (limited information; review list), Rank 4 (limited distribution; watch list), or that are considered Locally Unusual and Significant may be analyzed under CEQA if there is sufficient information to assess potential significant impacts. Records from the nine USGS quadrangles surrounding the project site were obtained from this database to inform the field survey.

- **United States Fish and Wildlife Service's (USFWS) Information for Planning and Conservation (IPaC) Online System**, which lists all proposed, candidate, threatened, and endangered species managed by the Endangered Species Program of the USFWS that have the potential to occur on or near a particular site. This database also lists all known critical habitats, national wildlife refuges, and migratory birds that could potentially be impacted by activities from a proposed project. An IPaC Trust Resource Report was generated for the project area.

- **Designated and Proposed USFWS Critical Habitat Polygons** were reviewed to determine whether critical habitat has been designated or proposed within or in the vicinity of the project site.

- **The USFWS National Wetlands Inventory** was reviewed to determine whether any wetlands or surface waters of the United States have been previously-identified in the survey area.

- **eBird:** eBird is a real-time, online checklist program launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society. It provides rich data sources for basic information on bird abundance and distribution at a variety of spatial and temporal scales. eBird occurrence records for burrowing owl (*Athene cunicularia*) from a 5-mile radius around the project site were reviewed in May 2020.

In addition to the databases listed above, historic and current aerial imagery, existing environmental reports for developments in the project vicinity, and local land use policies related to biological resources were reviewed.

A general biological survey of the project site was conducted by LSA Biologist Kelly McDonald on April 27, 2020. The project site was surveyed on foot, and all biological resources observed were noted and mapped. Suitable habitat for any species of interest or concern was duly noted, and general site conditions were photographed. The field survey took place on a clear sunny morning with weather conditions conducive to the detection of plant and animal species.

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The Hanford region supports various special-status natural communities, plants, and animals. The Biological Resources Assessment provides tables that identify those special-status plant and animal species known to occur or that potentially occur in the vicinity of the project site (based on the literature review and experience in the region) and includes detailed information about each species' habitat and distribution, State and federal status designations, and probability of occurrence within the project site. As stated in the methodology section above, the background research included occurrence records from nine United States Geological Survey (USGS) topographic quadrangles surrounding the survey area. A nine USGS quadrangle search covers a large, variable geographic and topographic area containing numerous habitat types not found within or around the project site.

Special-Status Natural Communities. No special-status natural communities or conservation areas exist within the project site or in adjacent parcels. The project site is completely isolated and distant from all special-status natural communities that occur in the region. Therefore, as the project site does not contain any special-status natural communities, such habitats would not be impacted by the proposed project.

Special-Status Species. No special-status plant species are expected to occur within the project site or to be adversely affected by the proposed project.

While no special-status animal species (or signs of such species) were observed on site during the April 2020 survey, several small mammal burrows were observed within the project site that are considered suitable habitat for burrowing owl, a California Species of Special Concern, and/or San Joaquin kit fox, a federally listed as endangered and state-listed as threatened species. None of the small mammal burrows observed in the project site exhibited features typical of occupied kit fox or burrowing owl burrows at the time of the survey, although there is some potential for use by these species in the future. Potentially significant direct and indirect impacts, including mortality, harassment, or other forms of incidental take, could occur if construction-related ground disturbance occurs in or around an occupied den or burrow.

No other special-status species were determined to have a moderate or high probability of occurrence on the project site (refer to Appendix D of the Biological Resources Assessment). The removal of the disturbed annual grassland habitat documented on the project site is not anticipated to substantially impact the population sizes of any special-status animal species given the context and setting of the project site and additional habitats for such species in the project vicinity.

While suitable habitat for shrub and tree nesting birds is very limited on the project site (only one tree occurs within the site boundaries), the project site does contain suitable nesting habitat for a variety of ground-nesting birds and for other birds that could nest in the annual herbaceous vegetation. Nesting birds are protected under the California Fish and Game Code. Construction activities that occur during the nesting bird season (typically February 15 through September 15) have potential to result in the direct or indirect take of nesting birds.

If unmitigated or unavoided, these potential direct and indirect impacts on special-status wildlife species and nesting birds could be considered potentially significant. However, conducting pre-construction surveys and complying with applicable regulatory requirements would prevent or compensate for impacts on special-status specifies. Therefore, implementation of Mitigation Measures BIO-1 through BIO-4, as summarized below, which would require pre-construction surveys and compliance with applicable regulatory requirements, would effectively mitigate any impacts on special-status wildlife species to less-than-significant levels.

Mitigation Measure BIO-1 **Conduct Preconstruction Clearance Surveys for San Joaquin Kit Fox and Burrowing Owl.** A preconstruction clearance survey is required for San Joaquin kit fox and burrowing owl no more than 30 calendar days prior to initiation of project activities. All survey results must be delivered to the United States Fish and Wildlife Service's (USFWS), the California Department of Fish and Wildlife (CDFW), and the City. If the survey results find an active burrow of one or both of these species on the project site, the applicant must coordinate with the applicable resource agencies (CDFW for burrowing owl, CDFW and USFWS for kit fox) to obtain applicable agency approval(s)/permit(s) prior to any ground disturbance activities on the site.

Specific avoidance, den excavation, passive relocation, and compensatory mitigation activities shall be performed as required by the applicable agency. Appropriate provisions of the *CDFW Staff Report on Burrowing Owl Mitigation* and *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* shall be adhered to.

Mitigation Measure BIO-2 **Worker Environmental Awareness Training.** Prior to initial groundbreaking, Worker Environmental Awareness Training shall be conducted by a qualified biologist to educate all construction personnel on the relevant federal, state, and local laws related to potentially occurring special-status species at the site. The tailgate session shall include training on identification of species that may be found on the project site, the status of those species, and any legal protection afforded to those species. Personnel will be advised to report any special-status species encountered promptly. A fact sheet conveying this information will be prepared for display or for distribution to anyone who may enter the project site.

Mitigation Measure BIO-3 **Construction Site Housekeeping and Operational Requirements.** Habitat subject to permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities shall be minimized by adhering to the following *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox*:

a. To minimize temporary disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas shall also be included in preconstruction surveys and, to the extent possible, shall be established in locations disturbed by previous activities to prevent further impacts.

b. Project-related vehicles shall observe a daytime speed limit of 20-mph throughout the site in all project sites, except on county roads and state and federal highways; this is particularly important at night when kit foxes are most active. Night-time construction shall be minimized to the extent possible. However, if it does occur, then the speed limit shall be reduced to 10-mph. Off-road traffic outside of designated project sites shall be prohibited.

c. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2-feet deep shall be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks shall be installed. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the USFWS and the CDFW shall be contacted.

d. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS and CDFW have been consulted. If necessary, and under the direct supervision of a qualified biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped. In the case of trapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape, or the USFWS and CDFW should be contacted for further guidance.

e. All food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of in securely closed containers and removed at least once a week from a construction or project site.

f. Pets, such as dogs or cats, shall not be permitted on the project site to prevent harassment, mortality of kit foxes, or destruction of dens.

g. Use of rodenticides and herbicides in project sites shall be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.

Mitigation Measure BIO-4 **Nesting Bird Surveys and Avoidance.** If vegetation removal, construction, or grading activities are planned to occur within the active nesting bird season (February 15 through September 15), a qualified biologist shall conduct a preconstruction nesting bird survey no more than 5 days prior to the start of such activities. The nesting bird survey shall include the project site and areas immediately adjacent to the site that could potentially be affected by project-related activities such as noise, vibration, increased human activity, and dust, etc. For any active nest(s) identified, the qualified biologist shall establish an appropriate buffer zone around the active nest(s). The appropriate buffer shall be determined by the qualified biologist based on species, location, and the nature of the proposed activities. Project activities shall be avoided within the buffer zone until the nest is deemed no longer active by the qualified biologist.

Critical Habitat. The project would not result in any impacts to critical habitat, and no additional mitigation is required.

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No riparian habitat or other sensitive natural communities are present at the project site. Therefore, implementation of the proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community. As a result, no impact would occur.

c. Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

The project proposes to convert an open trapezoidal segment of Peoples Ditch (an excavated irrigation canal) to a 66-inch-diameter below-ground pipe culvert which would terminate approximately 20 feet short of the existing pipe culvert that runs under SR-198. Approximately 0.50 acre of the irrigation canal would be undergrounded as part of the project.

Peoples Ditch does not meet the definition of a jurisdictional water of the United States pursuant to the *Navigable Waters Protection Rule*, effective June 22, 2020. Furthermore, Peoples Ditch does not meet the wetland criteria outlined in the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, which excludes agricultural ditches with ephemeral flow that are not a relocated water of the state or excavated in a water of the state. Nevertheless, Peoples Ditch may fall within the jurisdiction of CDFW under Section 1602 of the California Fish and Game Code and the Regional Water Quality Control Board (RWQCB) under the California Water Code (e.g., the Porter-Cologne Water Quality Control Act). Furthermore, given the recent substantial changes in operable definitions that have occurred and may continue to occur, and considering the regulatory revisions and potential court actions, it is not possible to definitively predict the regulations that will be in place at the time of a particular jurisdictional determination or permit action by the USACE. Under currently effective Clean Water Act regulations and guidance, the USACE reserves the right to regulate certain resources on a case-by-case basis. Therefore, Mitigation Measure BIO-5 would be required.

Mitigation Measure BIO-5 **Agency Coordination for Peoples Ditch.** Prior to any modifications to Peoples Ditch, it is recommended to consult with the United States Army Corps of Engineers (USACE), CDFW, and Regional Water Quality Control Board (RWQCB) to verify the feature's jurisdictional status and obtain applicable permit(s) and/or authorization(s). A notification of streambed alteration should be submitted to the CDFW in accordance with Section 1602 of the California Fish and Game Code. Unless categorically excluded under effective definitions or existing documentation confirms that no permit is needed, the Central Valley RWQCB and Sacramento District of the USACE should be consulted regarding potential permitting needs under the California Water Code and federal Clean Water Act, respectively, associated with the proposed Peoples Ditch modifications.

Implementing applicable permit measures would prevent or compensate for impacts on jurisdictional aquatic resources. Considering the status of Peoples Ditch as a constructed and maintained irrigation canal and the lack of natural drainages, riparian areas, and wetlands on the project site, the project would not result in a substantial adverse effect on State or federally protected wetlands through direct removal, filling, hydrological interruption, or by other means. The impact would be considered less than significant with mitigation incorporated.

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The wildlife species that occur in the project vicinity are adapted to the urban-wildland interface, and the project would not introduce new affects to the area. The noise, vibration, light, dust, or human disturbance within construction areas would only temporarily deter wildlife from using areas in the immediate vicinity of construction activities. These indirect effects could temporarily alter migration behaviors, territories, or foraging habitats in select areas. However, because these are temporary effects, it is likely that wildlife already living and moving in close proximity to urban development would alter their normal functions for the duration of the project construction and then re-establish these functions once all temporary construction effects have been removed. The proposed project would not place any permanent barriers within any known wildlife movement corridors or interfere with habitat connectivity. The impact would be considered less than significant, and no additional mitigation is required.

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The City of Hanford and Kings County currently do not have a regional Natural Community Conservation Plan or Habitat Conservation Plan. The 2035 General Plan for the City outlines local relevant policies related to biological resources. Below is the list of applicable policies and consistency analysis:

- **5.5.1 Natural Habitat: Goal 04:** Protection of natural habitat and other biological resources.
  - *Policy 031 Provision of Open Space Areas: Preserve and enhance open space area.*

    Consistency Analysis: The project site is currently designated as a Highway Commercial land use and is isolated from open space areas; therefore, the project is considered consistent with this policy.

  - *Policy 032 Wetland and Riparian Corridor:* Where appropriate and feasible, establish permanent mechanisms to protect wetlands and riparian corridors.

    Consistency Analysis: The project is not located within wetlands or riparian corridors; therefore, the project is considered consistent with this policy.

- *Policy 033 Vernal Pools:* Identify and protect vernal pools that be located in Planning Area.

  Consistency Analysis: Vernal pools are not located within the project site; therefore, the project is considered consistent with this policy.

- *Policy 035 Impacts from Development:* Ensure that potential impacts to biological resources and sensitive habitat are carefully evaluated when considering development projects.

  Consistency Analysis: No sensitive or special-status natural communities occur on the project site. An appropriately timed field survey and biological resources assessment were conducted on the project site to determine the likelihood and suitability of sensitive habitat and species; the project is not likely to result in significant impacts on sensitive resources with the implementation of recommended measures. Therefore, the project is considered consistent with this policy.

- *Policy 037 Mature Trees:* Promote the preservation of existing mature trees and encourage the planting of appropriate shade trees in new developments.

  Consistency Analysis: The development plan includes the removal of one nonnative tree. The project will include the planting of trees as part of the landscaping plan, resulting in an overall increase in shade trees within the project area. Therefore, the project is considered consistent with this policy.

- *Policy 038 Native Tree Species and Drought Tolerant Vegetation:* Encourage the planting of native tree species and drought-tolerant vegetation.

  Consistency Analysis: The landscaping plan will be provided in accordance with Section 17.52 Landscape Standards of the Hanford Municipal Code; all species of trees shall be selected from a list approved by the City's Parks Division. Therefore, the project is considered consistent with this policy.

- **5.5.2 Wildlife and Sensitive Species**

  - *Policy 039 Endangered Wildlife and Habitat*: Establish programs in connection with environmental review processes to protect endangered wildlife and their habitats.

    Consistency Analysis: An appropriately-timed field survey and literature reviews were conducted for the project in support of the CEQA review process. Based on the analysis and with implementation of the recommended mitigation measures contained herein, it is unlikely that any endangered species would be adversely affected by the project. Therefore, the project is considered consistent with this policy.

  - *Policy 040 Sensitive Wildlife:* Work with State, federal, and local agencies on the preservation of sensitive wildlife species in the City.

Consistency Analysis: Implementation of recommended Mitigation Measures BIO-1 through BIO-4, as described above, would ensure consistency with applicable resource agency policies with regard to sensitive wildlife species determined to have potential of occurring on the project site. Therefore, the project is considered consistent with this policy.

With implementation of the Mitigation Measures BIO-1 through BIO-5 listed above, the proposed project would not conflict with any regional habitat conservation plan or local policies related to the protection and conservation of biological resources. Therefore, this impact is considered less than significant with mitigation incorporated.

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The project site is not within the boundaries of a habitat conservation plan or natural community conservation plan. This condition precludes the possibility that implementation of the proposed project would conflict with the provisions of such a plan, and no impact would occur.

4.5 CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☒	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

A Cultural Resource Inventory[10] was prepared for the proposed project, which included: (1) a records search at the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) to identify prior cultural resource studies and previously recorded cultural resources in the project area and surrounding 0.5-mile area; (2) desktop archival research to better understand land use and property ownership within the project area; (3) a search of the Native American Heritage Commission's (NAHC) Sacred Lands File and outreach with local tribal representatives; (4) a pedestrian survey of the project area to identify potential historical resources within the project area and preliminary recordation of identified resources on the appropriate California Department of Parks and Recreation record form(s); (5) a buried site sensitivity assessment; and (6) recommendations for further work to assess whether the proposed project would cause adverse impacts to historical resources—i.e., cultural resources eligible for listing on the California Register. The analysis in this Cultural Resources section is based on the results of the Cultural Resource Inventory. The Cultural Resource Inventory is included as Appendix C.

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Records Search Results. A records search of the project site and a 0.5-mile radius was conducted on May 5, 2020, by staff at the SSJVIC. The SSJVIC reported nine previous cultural studies encompassing portions of the project area that occurred between 1982 and 2015, and five additional studies in the surrounding 0.5-mile area. Of the nine studies within the project area, seven had negative results. The Peoples Ditch is the only previously recorded resource within the project area. In addition, the Southern Pacific Railroad/San Joaquin Valley Railroad is just outside the project area's northern boundary. Two additional built environment resources were identified within a 0.5-mile radius of the project area and one additional resource is also within 0.5 mile of the project area.

Buried Site Sensitivity Assessment. Geologic and soil data derived from the National Resources Conservation Service Web Soil Survey identify only one soil type within the project area, consisting of Nord coarse to fine sandy loam. Based on this soil type, the entire project area is encompassed by

10 Applied EarthWorks, Inc. 2020. *Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California*. August.

a soil type and landform that have high or very high potential for containing anthropogenic paleosols with intact cultural deposits. Adding to this sensitivity is the presence of Dry Creek within the project area during prehistory, which would have provided rich habitat and other resources for Native American groups. Dry Creek was a naturally occurring intermittent stream that was modified during Hanford's early settlement period. However, it is likely that portions of the project area have been disturbed by past infill of Dry Creek and the construction of Peoples Ditch in addition to impacts related to historic-era agricultural and domestic activities in the eastern portion of the project area. In these areas of disturbance, the sensitivity for intact and well-preserved buried sites is moderate, low, or none.

This evidence of modern disturbance notwithstanding, due to the very high sensitivity of the soil type in the project area, and because over excavation and recompacting of soil is recommended to mitigate the effects of potential hydrocompaction to at least 7 feet below the existing grade and to a distance of at least 10 feet beyond the perimeter of the planned buildings and surrounding improvements, limited subsurface archaeological testing to confirm the presence/absence of anthropogenic paleosols or intact cultural resource deposits is recommended. Based on the findings of subsurface archaeological testing, archaeological data recovery to assess prehistoric cultural deposits and cultural resource monitoring during ground disturbing construction activities may be needed. As such, implementation of Mitigation Measure CULT-1 would be required.

Field Survey Results. During the field survey, one historic-era refuse scatter (AE-4167-01) and one historic-era isolate (AE-4167-ISO-01) were observed. The artifacts date to the first half of the twentieth century, suggesting the deposit may be associated with the nonextant historical structure. In addition, the project site appears to have been impacted by previous agricultural activity that would have displaced artifacts within a few feet of their original placement. The condition of the subsurface deposit is unknown as it was not visible during the pedestrian survey. No prehistoric artifact concentrations, isolated artifacts, features, or evidence of human skeletal material were observed during the survey.

Built Environment Resources Results. A modern segment of Peoples Ditch and the remnants of its older, now abandoned, route were observed during survey. As such, the existing California Department of Parks and Recreation cultural resource record for the Peoples Ditch was updated to record its remnant historical alignment within the project area. The new segment is less than 50 years old. The only remaining evidence of the original alignment of the ditch is its scar on the landscape and the remains of a concrete containment well at the northern end of the abandoned segment.

Summary. To determine whether the proposed project would cause a substantial adverse change in the significant quantities of a historical resource, additional mapping and subsurface testing would be required. Conducting additional mapping and subsurface testing would prevent potential impacts to historic and archaeological resources that could be uncovered during construction activities. Therefore, Mitigation Measures CULT-1 and CULT-2 would be required to reduce the project's potential impacts to previous unidentified historical resources that may be encountered during construction. Implementation of this mitigation measure would reduce potential impacts to less than significant.

Mitigation Measure CULT-1 Because of the very high sensitivity of the soil type in the project area, the possibility exists that buried archaeological deposits within the project site. Therefore, archaeological monitoring must be conducted during ground-disturbing construction activities in native soil, including clearing and grubbing. Monitoring should occur on a full-time basis during all excavation activities until the Project Archaeologist, based on the archaeological monitor's observations, is satisfied that there is little likelihood of encountering intact archaeological deposits. The Project Archaeologist may also determine it is appropriate to reduce monitoring to spot-checking or on a part-time basis.

Upon completion of the monitoring and, if necessary, mitigation, the archaeologist should prepare a report to document the methods and results of the monitoring. The final report should be submitted to the SSJVIC.

Mitigation Measure CULT-2 Additional mapping and subsurface testing of AE-4167-01 shall be conducted to evaluate its eligibility for inclusion in the California Register of Historical Resources, pursuant to California Public Resources Code (PRC) 5024.1. Additional focused subsurface testing in areas not previously disturbed by historic-era activities must be conducted to confirm presence/absence of high-sensitivity paleosols that may include intact prehistoric cultural deposits. If intact prehistoric cultural deposits are encountered during subsurface presence/absence testing, further investigation must be conducted to determine if the deposit retains integrity and is eligible for inclusion in the California Register of Historical Resources. The methods and findings of the additional studies would be presented as an addendum to the Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project and would include cultural resource management recommendations to guide mitigation of potential adverse effects to any identified historical resources within the project area.

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Mitigation Measures CULT-1 and CULT-2, as presented in Response 4.5.a above, would ensure that potential impacts to archaeological resources would be reduced to a less-than-significant level by conducting additional mapping and subsurface testing to prevent potential impacts to historic and archaeological resources that could be uncovered during construction activities. Therefore, the project would not cause a substantial adverse change in the significance of an archeological resource.

c. Would the project disturb any humans remains, including those interred outside of formal cemeteries?

Although no such remains have been identified within the project site, there is a possibility of encountering such remains, either in isolation or with prehistoric archaeological deposits. Such remains could be uncovered during project ground-disturbing activities. The project would have a significant effect on the environment if it would disturb human remains, including those interred outside of formal cemeteries.

Implementation of Mitigation Measure CULT-3 would reduce potential impacts to human remains to a less than significant level by ensuring compliance with California Health and Safety Code Section 7050.5 in the event that any human remains are encountered during project-related ground-disturbing activities.

In addition, on January 10, 2017, the City of Hanford met with the Tachi Yokut Tribe, on a different project in order to establish conditions, which would apply to all projects in the City of Hanford, which required an initial study. In order to address the concerns of the Tachi Yokut Tribe, the City is requiring the implementation of a Burial Treatment Plan as a mitigation measure. Therefore, implementation Mitigation Measure CULT-4 would ensure implementation of a Burial Treatment Plan and would reduce impacts to a less than significant level.

Mitigation Measure CULT-3 Any human remains encountered during project-related ground-disturbing activities shall be treated in accordance with California Health and Safety Code Section 7050.5. The project sponsor shall inform all contractor(s) performing excavation of the sensitivity of the project site for human remains and include the following directive in the appropriate contract documents:

If human remains are uncovered, all work within 50 feet of the discovery shall be halted and the Kings County Coroner notified immediately. At the same time, the on-site monitoring archaeologist shall assess the situation and consult with agencies as appropriate. Project personnel shall not collect or move any human remains or associated materials. If the human remains are of Native American origin, the Coroner must notify the California State Native American Heritage Commission (NAHC) within 24 hours of this identification. The NAHC will formally identify a Native American Most Likely Descendant (MLD)—if one is not already on-site—to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. Such recommendations shall be carried out to the satisfaction of the NAHC prior to work resuming within 50 feet of the discovered remains.

Mitigation Measure CULT-4 A Burial Treatment Plan shall be entered into by the project applicant/property owner prior to any ground disturbing activities.

4.6 ENERGY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?	☐	☐	☒	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

a. Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?

The proposed project would increase the demand for electricity, natural gas, and gasoline. The discussion and analysis provided below is based on the CalEEMod output included as Appendix A.

Construction-Period Energy Use. The anticipated construction schedule assumes that the proposed project would be built over approximately 3 years. The proposed project would require grading, site preparation, and building activities during construction.

Construction of the proposed project would require energy for the manufacture and transportation of construction materials, preparation of the site for demolition and grading activities, and construction of the residences. Petroleum fuels (e.g., diesel and gasoline) would be the primary sources of energy for these activities. Construction activities are not anticipated to result in an inefficient use of energy as gasoline and diesel fuel would be supplied by construction contractors who would conserve the use of their supplies to minimize their costs on the project. Energy usage on the project site during construction would be temporary in nature and would be relatively small in comparison to the State's available energy sources. Therefore, construction energy impacts would be less than significant.

Operational Energy Use. Energy use consumed by the proposed project would be associated with natural gas use, electricity consumption, and fuel used for vehicle trips associated with the project. Energy and natural gas consumption was estimated for the project using default energy intensities by building type in CalEEMod.

CalEEMod divides building electricity and natural gas use into uses that are subject to Title 24 standards and those that are not. For electricity, Title 24 uses include the major building envelope systems covered by Part 6 (California Energy Code) of Title 24 (e.g., space heating, space cooling, water heating, and ventilation). Non-Title 24 uses include all other end uses (e.g., appliances, electronics, and other miscellaneous plug-in uses). Because some lighting is not considered as part of the building envelope energy budget, CalEEMod considers lighting as a separate electricity use category. For natural gas, uses are likewise categorized as Title 24 or Non-Title 24, with Title 24 uses including building heating and hot water end uses. Non-Title 24 natural gas uses include cooking and appliances (including pool/spa heaters).

Table 4.F, below, shows the estimated potential increased electricity, natural gas, gasoline, and diesel demand associated with the proposed project. The electricity and natural gas rates are from the CalEEMod analysis, while the gasoline and diesel rates are based on the traffic analysis in conjunction with United States Department of Transportation (DOT) fuel efficiency data.

Table 4.F: Estimated Annual Energy Use of Proposed Project

Land Use	Electricity Use (kWh per year)	Natural Gas Use (therms per year)	Gasoline (gallons per year)	Diesel (gallons per year)
Ambulatory Surgery Center, Specialty Clinic, Medical Office Building, and Psychiatric Health Facility	1,395,423	26,572	67,277	55,850
Hotel and Conference Center	1,403,506	30,168	32,955	27,358
Nursing College	365,853	15,649	30,809	25,576
Skilled Nursing Facility, Memory Care, Assisted Living Facility	701,757	24,991	37,905	31,467
Multi-Family Apartments	454,375	16,181	32,930	27,337
Medical/Commercial	427,442	2,508	62,119	51,569
Parking Lot	596,800	0	0	0
Total	**5,345,159**	**116,068**	**263,994**	**219,156**

Source: LSA (March 2023).

As shown in Table 4.F, the estimated potential increased electricity demand associated with the proposed project is 5,345,159 kilowatt-hours (kWh) per year. In 2021, California consumed approximately 280,738 gigawatt-hours (GWh) or 280,738,376,720 kWh.[11] Of this total, Kings County consumed 1,980 GWh or 1,980,705,673 kWh.[12] Therefore, electricity demand associated with the proposed project would only be approximately 0.27 percent of Kings County's total electricity demand.

The estimated potential increased natural gas demand associated with the proposed project is 116,068 therms per year, as shown in Table 4.F. In 2021, California consumed approximately 11,923 million therms or 11,923,705,642 therms, while Kings County consumed approximately 64 million therms or approximately 64,004,283 therms.[13] Therefore, natural gas demand associated with the proposed project would only be approximately 0.18 percent of Kings County's total natural gas demand.

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11 California Energy Commission. 2022b. Energy Consumption Data Management Service. Electricity Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/elecbycounty.aspx (accessed March 2023).

12 Ibid.

13 California Energy Commission. 2022c. Energy Consumption Data Management Service. Gas Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/gasbycounty.aspx (accessed March 2023).

In addition, the proposed project would result in energy usage associated with gasoline and diesel to fuel project-related trips. The average fuel economy for light-duty vehicles (autos, pickups, vans, and SUVs) in the United States has steadily increased from about 14.9 miles per gallon (mpg) in 1980 to 22.9 mpg in 2020.[14] The average fuel economy for heavy-duty trucks in the United States has also steadily increased, from 5.7 mpg in 2013 to a projected 8.0 mpg in 2021.[15]

Using the average USEPA gasoline fuel economy estimates for 2020, the California diesel fuel economy estimates for 2021, and the traffic data from the project traffic analysis, the proposed project would result in the annual consumption of approximately 263,994 gallons of gasoline and 219,156 gallons of diesel. In 2019, vehicles in California consumed approximately 15.6 billion gallons of gasoline and 3.8 billion gallons of diesel fuel.[16] Therefore, gasoline and diesel demand generated by vehicle trips associated with the proposed project would be a minimal fraction of gasoline and diesel fuel consumption in California and Kings County.

In addition, vehicles associated with trips to and from the project site would be subject to fuel economy and efficiency standards, which are applicable throughout the State. As such, the fuel efficiency of vehicles associated with project operations would increase throughout the life of the proposed project. Therefore, implementation of the proposed project would not result in a substantial increase in transportation-related energy uses.

The proposed project would be constructed to CALGreen standards, which would help to reduce energy and natural gas consumption. Therefore, the proposed project would not result in the wasteful, inefficient, or unnecessary consumption of fuel or energy and would incorporate renewable energy or energy efficiency measures into building design, equipment use, and transportation. Construction and operation period impacts related to consumption of energy resources would be less than significant.

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

In 2002, the Legislature passed Senate Bill 1389, which required the California Energy Commission (CEC) to develop an integrated energy plan every two years for electricity, natural gas, and transportation fuels, for the California Energy Policy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero emission (ZE) vehicles and their

[14] U.S. Department of Transportation (DOT). “Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles.” Website: https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles (accessed March 2023).

[15] Ibid.

[16] CEC. n.d. California Gasoline Data, Facts, and Statistics. Website: www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-gasoline-data-facts-and-statistics (accessed March 2023).

infrastructure needs, and encouragement of urban designs that reduce vehicle miles traveled (VMT) and accommodate pedestrian and bicycle access.

The most recently adopted report includes the 2021 Integrated Energy Policy Report[17] and the 2022 Integrated Energy Policy Report Update.[18] The Integrated Energy Policy Report provides the results of the CEC's assessments of a variety of energy issues facing California. Many of these issues will require action if the State is to meet its climate, energy, air quality, and other environmental goals while maintaining energy reliability and controlling costs. The Integrated Energy Policy Report covers a broad range of topics, including implementation of Senate Bill 350, integrated resource planning, distributed energy resources, transportation electrification, solutions to increase resiliency in the electricity sector, energy efficiency, transportation electrification, barriers faced by disadvantaged communities, demand response, transmission and landscape-scale planning, the California Energy Demand Preliminary Forecast, the preliminary transportation energy demand forecast, renewable gas (in response to Senate Bill 1383), updates on California electricity reliability, natural gas outlook, and climate adaptation and resiliency.

As indicated above, energy usage on the project site during construction would be temporary in nature. In addition, energy usage associated with operation of the proposed project would be relatively small in comparison to the State's available energy sources and energy impacts would be negligible at the regional level. Because California's energy conservation planning actions are conducted at a regional level, and because the project's total impact to regional energy supplies would be minor, the proposed project would not conflict with California's energy conservation plans as described in the CEC's Integrated Energy Policy Report. Thus, as shown above, the project would avoid or reduce the inefficient, wasteful, and unnecessary consumption of energy and not result in any irreversible or irretrievable commitments of energy. Therefore, the proposed project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation and this impact would be less than significant.

[17] CEC. 2021. *2021 Integrated Energy Policy Report*. California Energy Commission. Docket Number: 21-IEPR-01.

[18] CEC. 2022a. *2020 Integrated Energy Policy Report Update*. California Energy Commission. Docket Number: 22-IEPR-01.

4.7 GEOLOGY AND SOILS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic ground shaking?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv. Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

This section is based on the Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report.[19] The Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report is included as Appendix D.

a. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

The project site is not located within a currently designated Alquist-Priolo Earthquake Zone. In addition, no known active or potentially active faults or fault traces are located in the project vicinity and no major fault systems are known to exist in Kings County.[20] The project site is

19 Kleinfelder. 2020. *Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report Proposed Hanford Place, Medical and Mixed-Use Property Hanford, California*. June 9.

20 Hanford, City of. 2017, op. cit.

located approximately 58 miles east of the San Andreas fault and approximately 42 miles east of the Great Valley fault. A major seismic event on these fault segments may cause significant ground shaking at the site.[21] However, as no known active, or potentially active faults cross or project toward the project site, the potential for fault-related surface rupture at the site is considered very low.[22] In addition, the proposed project would be built to current building codes and standards to reduce the potential for structural failure caused by ground shaking and other geologic hazards. Therefore, no people or structures would be exposed to potential substantial adverse effects, including the risk of loss, injury, or death from the rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, and impacts would be less than significant.

ii. Strong seismic ground shaking?

As identified above, no known active or potentially active faults or fault traces are located in the project vicinity and no major fault systems are known to exist in Kings County. Ground shaking is the most likely damaging effect of an earthquake in Hanford. However, as no known active, or potentially active faults cross or project toward the project site, the potential for fault-related surface rupture at the site is considered very low.[23] In addition, the proposed project would be built to current building codes and standards to reduce the potential for structural failure caused by ground shaking and other geologic hazards. Therefore, impacts related to strong seismic ground shaking would be less than significant.

iii. Seismic-related ground failure, including liquefaction?

Secondary impacts of earthquakes can include landslides, seiches, liquefaction, and dam failure.[24] Liquefaction describes a condition in which a saturated, cohesionless soil loses shear strength during earthquake shocks. Ground motion from an earthquake may induce cyclic reversals of shearing strains of large amplitude. Lateral and vertical movements of the soil mass, combined with loss of bearing strength, usually result from this phenomenon. Historically, liquefaction of soils has caused severe damage to structures, berms, levees and roads. Liquefaction potential depends on soil type, void ratio, depth to groundwater, duration of shaking and confining pressures over the potentially liquefiable soil mass. Fine, well-sorted, loose sand, shallow groundwater, severe seismic ground motion and particularly long durations of ground shaking are conditions conducive for liquefaction. Soils in Hanford do not have significant liquefaction potential.[25] Hanford is located in a stable geologic formation, so the effects of ground shaking on soil stability should be minimal. As such, the proposed project would not expose people or structures to potential substantial effects associated with seismic-related ground failure, including liquefaction. Therefore, this impact is less than significant.

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21 Kleinfelder. 2020, op. cit.

22 Ibid.

23 Ibid.

24 Hanford, City of. 2014. *General Plan Background Report - Hanford, California.* March. Website: cms6.revize.com/revize/hanfordca/document_center/Planning/General%20Plan/2034%20General%20Plan%20Background%20Report.pdf (accessed March 2023).

25 Ibid.

iv. Landslides?

As discussed above, secondary impacts of earthquakes can include landslides, seiches, liquefaction, and dam failure. However, Hanford is located in a stable geologic formation, so the effects of ground shaking on soil stability should be minimal. In addition, because the project site is generally level, the proposed project would not expose people or structures to potential substantial adverse effects associated with landslides. Therefore, impacts related to landslides would be less than significant.

b. Would the project result in substantial soil erosion or the loss of topsoil?

Soil erosion is a process whereby soil materials are worn away and transported to another area, either by wind or water. Rates of erosion can vary depending on the soil material and structure, placement, and human activity. Soil containing high amounts of silt can be easily eroded, while sandy soils are less susceptible. Excessive soil erosion can eventually damage building foundations and roadways. Erosion is most likely to occur on sloped areas with exposed soil, especially where unnatural slopes are created by cut-and-fill activities. Soil erosion rates can be higher during the construction phase. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, or asphalt.

Implementation of the proposed project would include grading activities that could result in short-term soil erosion during the construction period. Exposed soils are considered erodible when subjected to concentrated surface flow or wind. Mitigation Measure GEO-1, described below, would reduce the potential for soil erosion.

Mitigation Measure GEO-1 To reduce the potential for soil erosion during construction of the proposed project, an Erosion Control Plan shall be prepared for the project in conformance with the California Storm Water Best Management Practice Handbook for Construction Activity, prior to the start of grading.

In addition, soil erosion and loss of topsoil would be minimized through implementation of SJVAPCD Regulation VIII fugitive dust control measures and compliance with the National Pollutant Discharge Elimination System (NPDES) permit requirements. With incorporation of Mitigation Measure GEO-1 and compliance with NPDES permit requirements, construction of the proposed project would not result in substantial soil erosion or loss of topsoil. This impact would be less than significant with mitigation incorporated.

c. Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

See Responses 4.7.a.iii and 4.7.a.iv above. The proposed project would not require a substantial grade change or change in topography. The project would not result in on- or off-site landslides, lateral spreading, subsidence, or liquefaction or collapse. However, some of the alluvial soils in the San Joaquin Valley are subject to hydrocompaction. Hydrocompactive soil has a relatively loose skeletal structure, which is weakly cemented by soluble salts or a slight clay mineral content. Moisture increase breaks down the inter-particle cementation causing a collapse of the skeletal structure. The significant loss in soil volume can result in settlement of overlying structures. The project geotechnical exploration and associated laboratory testing identified the in-place relative density of the subsurface soil was relatively low and compression characteristics were moderate. Based on laboratory testing, post saturation of four soil obtained from the project site had compression characteristics that were low to moderate, indicating a possibility of collapse potential. However, with implementation of the earthwork and design recommendations included in the Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report, impacts would be less than significant.

d. Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Expansive soils possess a "shrink-swell" characteristic. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage may occur over a long period of time, usually the result of inadequate soil and foundation engineering, or the placement of structures directly on expansive soils. Based on the borings conducted for the Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report, expansive soils were not encountered. Furthermore, based on review of soil survey, expansive soil was not identified within the project area. Expansive soils are not anticipated within the influence of foundation systems or zone of cyclic moisture changes, and therefore, would not dictate the need for special grading or special footing and concrete slab-on-grade design.[26] Therefore, the project would result in a less than significant impact related to substantial risks to life or property due to expansive soils.

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

The proposed project would not require the use of septic tanks or other alternative wastewater disposal systems. Therefore, no impact would occur.

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Paleontological resources are the mineralized (fossilized) remains of prehistoric plant and animal life exclusive of human remains or artifacts. Fossil remains such as bones, teeth, shells, and leaves are found in geologic deposits (rock formations) where they were originally buried. Fossil remains are considered to be important as they provide indicators of the earth's chronology and history. These resources are afforded protection under CEQA and are considered to be limited and nonrenewable, and they provide invaluable scientific and educational data. Due to the sensitive nature of these paleontological resources, they are not mapped.

[26] Kleinfelder. 2020, op. cit.

Implementation of the proposed project would require ground disturbing construction activities that may inadvertently encounter and damage paleontological resources. Should this occur, project construction at both well sites may result in the destruction of a unique paleontological site, resulting in a potentially significant impact. Mitigation Measure GEO-2 would reduce this impact to less than significant by redirecting ground-disturbing activities, consulting with agencies as appropriate, and making recommendations for the treatment of the discovery in the event that any human remains are encountered during project-related ground-disturbing activities.

The following mitigation measure would reduce the paleontological resource impacts associated with the proposed project to a less-than-significant level.

Mitigation Measure GEO-2 The project applicant shall inform its contractor(s) of the sensitivity of the project area for paleontological resources. Should paleontological resources be encountered during project subsurface construction activities, all ground-disturbing activities within 25 feet shall be redirected and a qualified paleontologist contacted to assess the situation, consult with agencies as appropriate, and make recommendations for the treatment of the discovery. If found to be significant, and project activities cannot avoid the paleontological resources, adverse effects to paleontological resources shall be mitigated. Mitigation may include monitoring, recording the fossil locality, data recovery and analysis, a final report, and accessioning the fossil material and technical report to a paleontological repository. Public educational outreach may also be appropriate. Upon completion of the assessment, a report documenting methods, findings, and recommendations shall be prepared and submitted to the City for review, and (if paleontological materials are recovered) a paleontological repository, such as the University of California Museum of Paleontology (UCMP). The City shall verify that the above directive has been included in the appropriate contract documents.

4.8 GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☒	☐	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

a. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Greenhouse gas emissions (GHGs) are present in the atmosphere naturally, and are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. However, over the last 200 years, human activities have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, and enhancing the natural greenhouse effect, which is believed to be causing global climate change. The gases that are widely seen as the principal contributors to human-induced global climate change are:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF_6)

Certain gases, such as water vapor, are short-lived in the atmosphere. Others remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is excluded from the list of GHGs above because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

These gases vary considerably in terms of Global Warming Potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time that the gas remains in the atmosphere ("atmospheric lifetime").

The GWP of each gas is measured relative to CO_2, the most abundant GHG; the definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of "CO_2 equivalents" (CO_2e).

This section discusses the proposed project's potential impacts related to the release of GHG emissions for both construction and project operation. Section 15064.4 of the *State CEQA Guidelines* states that: "A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." In performing that analysis, the lead agency has discretion to determine whether to use a model or methodology to quantify GHG emissions, or to rely on a qualitative analysis or performance-based standards. In making a determination as to the significance of potential impacts, the lead agency then considers the extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting, whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project, and the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

Neither the City of Hanford, nor the SJVAPCD has developed or adopted numeric GHG significance thresholds. Therefore, this analysis evaluates the GHG emissions based on the project's consistency with State GHG reduction goals.

Construction Activities. Construction activities associated with the proposed project would produce combustion emissions from various sources. During construction, GHGs would be emitted through the operation of construction equipment and from worker and builder supply vendor vehicles, each of which typically use fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as CO_2, CH_4, and N_2O. Furthermore, CH_4 is emitted during the fueling of heavy equipment. Exhaust emissions from on-site construction activities would vary daily as construction activity levels change.

Total GHG emissions generated during all phases of construction were combined and are presented in Table 4.G. The SJVAPCD does not recommend assessing the significance of construction-related emissions. However, other jurisdictions, such as the South Coast Air Quality Management District (SCAQMD) and the Sacramento Metropolitan Air Quality Management District (SMAQMD), have concluded that construction emissions should be included since they may remain in the atmosphere for years after construction is complete. In order to account for the construction emissions, amortization of the total emissions generated during construction were based on the life of the development (nonresidential— 30 years) and added to the operational emissions.

Table 4.G: Project Construction GHG Emissions

Year	Metric Tons of CO_2e per Year
2024	815.0
2025	623.0
2026	525.0
2027	11.0
Total	**1,973.0**
Amortized over 30 years	65.8

Source: LSA (March 2023).

As shown in Table 4.G, it is estimated that construction of the proposed project would generate approximately 1,973.0 metric tons of CO_2e. When considered over the 30-year life of the project, the total amortized construction emissions for the proposed project would be 65.8 metric tons of CO_2e per year.

Operational Emissions. Long-term GHG emissions are typically generated from mobile sources (e.g., cars, trucks, and buses), area sources (e.g., maintenance activities and landscaping), indirect emissions from sources associated with energy consumption, waste sources (land filling and waste disposal), and water sources (water supply and conveyance, treatment, and distribution). Mobile-source GHG emissions would include project-generated vehicle trips to and from the project. Area-source emissions would be associated with activities such as landscaping and maintenance on the project site. Energy source emissions would be generated at off-site utility providers as a result of increased electricity demand generated by the project. Waste source emissions generated by the proposed project include energy generated by land filling and other methods of disposal related to transporting and managing project generated waste. In addition, water source emissions associated with the proposed project are generated by water supply and conveyance, water treatment, water distribution, and wastewater treatment.

Emissions estimates for operation of the proposed project were calculated using CalEEMod. Model results are shown in Table 4.H. Trip generation rates for the project were based on the project's trip generation estimates, as identified in Section 4.17, Transportation. However, as discussed in Section 4.17, approximately 41,500 square feet of commercial/office uses is proposed. These uses would generate fewer trips than the 114,000 square feet of commercial/office uses that is analyzed in the proposed project trip generation estimate. The trip generation in CalEEMod was adjusted to reflect 41,500 square feet of commercial/office uses. As such, CalEEMod assumes a total of approximately 5,239 ADT, including 1,393 ADT for the Ambulatory Surgery Center, Specialty Clinic, Medical Office Building, and Psychiatric Health Facility, 682 ADT for the Hotel and Conference Center, 638 ADT for the Nursing College, 662 ADT for the Skilled Nursing Facility, Memory Care, Assisted Living Facility, 576 ADT for the Multi-Family Apartments, and 1,287 ADT for the Medical/Commercial uses based on the project's trip generation and taking into account a 10 percent reduction for internal trips. In addition, this analysis assumes the proposed project would be built to current Title 24 building standards. Where project-specific data were not available, default assumptions from CalEEMod were used to estimate project emissions.

Table 4.H: Operational GHG Emissions

Emissions Category	Operational Emissions (Metric Tons per Year)				
	CO_2	CH_4	N_2O	CO_2e	Percent of Total
Mobile Source	3,166.0	0.2	0.2	3,236.0	56
Area Source	142.0	0.2	<0.1	148.0	3
Energy Source	1,906.0	0.1	<0.1	1,912.0	33
Water Source	33.9	0.8	<0.1	60.6	1
Waste Source	124.0	12.4	0.0	433.0	7
Total Operational				**5,789.6**	**100.0**

Source: Compiled by LSA (February 2023).
Note = Some values may not appear to add up correctly due to rounding.
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
N_2O = nitrous oxide

As shown in Table 4.H, the proposed project would generate approximately 5,789.6 metric tons of CO_2e annually.

The Kings County Association of Government Final Regional Climate Action Plan (Regional CAP) meets the requirements for a Qualified GHG Reduction Strategy and is designed to streamline environmental review of future development projects in the County consistent with *State CEQA Guidelines* Section 15183.5(b). However, the Regional CAP identifies emission reduction goals to reduce GHG emissions in the region by 15 percent below the 2005 emissions levels by 2020, consistent with Assembly Bill (AB) 32. The proposed project would not be operational until post-2020; therefore, because the Regional CAP was prepared based on the 2020 GHG targets, which are now superseded by the 2030 GHG targets established in Senate Bill (SB) 32, the Regional CAP would not be applicable for CEQA streamlining.

In addition, the SJVAPCD has not established a numeric threshold for GHG emissions. As discussed, the significance of GHG emissions may be evaluated based on locally adopted quantitative thresholds or consistency with a regional GHG reduction plan (such as a Climate Action Plan). Neither the City of Hanford, nor the SJVAPCD has developed or adopted numeric GHG significance thresholds. Therefore, the proposed project was analyzed for consistency with the 2022 Scoping Plan.

The 2022 Scoping Plan includes key project attributes that reduce operational GHG emissions in Appendix D, Local Actions[27], of the 2022 Scoping Plan. As discussed in Appendix D of the 2022 Scoping Plan, absent consistency with an adequate, geographically specific GHG reduction plan such as a CEQA-qualified CAP, the first approach the State recommends for determining whether a proposed residential or mixed-use residential development would align with the State's climate goals is to examine whether the project includes key project attributes that reduce operational GHG emissions while simultaneously advancing fair housing. The following project attributes result in reduced GHG emissions from residential and mixed-use development. Residential and mixed-use projects that have all of the key project attributes in Table 4.I would accommodate growth in a manner consistent with State GHG reduction and equity prioritization goals.

[27] CARB, 2022. *2022 Scoping Plan Appendix D Local Actions.* November. Website: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf (accessed March 2023).

Table 4.I: Project Consistency with the 2022 Scoping Plan Key Residential and Mixed-Use Project Attributes that Reduce GHGs

Priority Areas	Key Project Attribute	Project Consistency
Transportation Electrification	Provides EV charging infrastructure that, at minimum, meets the most ambitious voluntary standard in the California Green Building Standards Code at the time of project approval.	***Consistent with Mitigation Measure GHG-1.*** CALGreen requires provision of infrastructure to accommodate EV chargers. It is not yet known whether the proposed project would include electric vehicle charging; therefore, implementation of Mitigation Measure GHG-1 would be required to ensure the proposed project would provide electric vehicle charging. With implementation of Mitigation Measure GHG-1, the proposed project would be consistent with this key project attribute.
VMT Reduction	Is located on infill sites that are surrounded by existing urban uses and reuses or redevelops previously undeveloped or underutilized land that is presently served by existing utilities and essential public services (e.g., transit, streets, water, sewer).	***Consistent***. The project site is located in an area with a mix of land uses, including residential, commercial, and medical uses that are presently served by existing utilities and essential public services (e.g., transit, streets, water, sewer). In addition, as discussed in Section 4.17, the proposed project would result in a less-than-significant VMT impact. Therefore, the proposed project would be consistent with this key project attribute.
	Does not result in the loss or conversion of natural and working lands.	***Consistent.*** The project site is classified as Grazing Land and is not zoned for agricultural uses or enrolled in a Williamson Act Contract. The State Department of Conservation classifies the project site as Non-Enrolled Land. The project site is not located on land that is designated as Prime Farmland or Farmland of State Importance. In addition, the project site is currently vacant and is not zoned for agricultural uses. As such, the proposed project would be consistent with this key project attribute.
	Consists of transit-supportive densities (minimum of 20 residential dwelling units per acre) or Is in proximity to existing transit stops (within a half mile), or satisfies more detailed and stringent criteria specified in the region's SCS.	***Consistent.*** The proposed project would not include 20 residential dwelling units per acre; however, the project site is located within 0.25 mile of a transit stop. In addition, the proposed project would develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements. In addition, the proposed project would include apartments that allow employees of the project medical office and service facilities to live within walking distance. The proposed project would also provide pedestrian infrastructure connecting to neighboring uses. The roads serving the project are designed for low speed and would be conducive to bicycle use. As such, the project would promote initiatives to reduce vehicle trips and VMT and would increase the use of alternate means of transportation.

Table 4.I: Project Consistency with the 2022 Scoping Plan Key Residential and Mixed-Use Project Attributes that Reduce GHGs

Priority Areas	Key Project Attribute	Project Consistency
		As such, the proposed project would be consistent with this key project attribute.
	Reduces parking requirements by: eliminating parking requirements or including maximum allowable parking ratios (i.e., the ratio of parking spaces to residential units or square feet); or providing residential parking supply at a ratio of less than one parking space per dwelling unit; or for multifamily residential development, requiring parking costs to be unbundled from costs to rent or own a residential unit.	***Consistent.*** The proposed project would consist of 15 buildings consisting of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses. The proposed project would provide 1,466 parking spaces throughout the project site. Based on the proposed uses when compared to the number of parking spaces, the proposed project would be consistent with this key project attribute.
	At least 20 percent of units included are affordable to lower-income residents.	***Consistent.*** The proposed project would not include affordable residential units. However, the proposed project would include apartments that allow employees of the project medical office and service facilities to live within walking distance. In addition, the proposed project would include Skilled Nursing Facility, Memory Care, Assisted Living Facility uses. Although the proposed project would not include affordable housing, the proposed project would provide needed multi-family and senior housing. Therefore, the proposed project would be consistent with this key project attribute.
	Results in no net loss of existing affordable units.	***Consistent.*** The proposed project would not result in the removal of any existing residential units. As such, the proposed project would be consistent with this key project attribute.
Building Decarbonization	Uses all-electric appliances without any natural gas connections and does not use propane or other fossil fuels for space heating, water heating, or indoor cooking.	***Consistent*** The proposed project would be consistent with State building code requirements as Title 24 advances to implement the building decarbonization goals from the 2022 Scoping Plan, As such, the proposed project would be consistent with this key project attribute.

Source: Compiled by LSA (February 2023).

With implementation of Mitigation Measure GHG-1, the proposed project would be consistent with the 2022 Scoping Plan key residential and mixed-use project attributes related to EV charging requirements and building electrification. Therefore, with implementation of Mitigation Measure GHG-1, the proposed project would be consistent with all project attributes in the 2022 Scoping Plan GHG emission thresholds.

Mitigation Measure GHG-1 In order to meet the 2022 Scoping Plan greenhouse gas (GHG) requirements, consistent with State GHG reduction and equity prioritization goals, the proposed project shall provide electric vehicle charging capabilities that meet the most ambitious voluntary standard in the California Green Building Standards Code at the time of project approval as part of the final project design.

Implementation of Mitigation Measure GHG-1 would ensure that the proposed project would be consistent with all project attributes in the 2022 Scoping Plan GHG emission thresholds. As such, the proposed project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. Impacts would be less than significant with mitigation.

b. Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The following analysis evaluates the proposed project's consistency with adopted plans to reduce GHG emissions. The City of Hanford adopted the Regional CAP in 2014. The CAP includes a GHG inventory, a benchmarking/goal-setting process, and identifies a reduction target for 2020. This allowed the City to take advantage of the streamlining provisions contained in the *State CEQA Guidelines* amendments adopted for SB 97 and clarifications provided in the CEQA Guidelines amendments adopted on December 28, 2018. Although the CAP does not include a target for 2030, the measures in the plan will continue to provide reductions after the milestone year and help demonstrate continued progress toward achieving the SB 32 2030 target.

Regional CAP. The CAP includes a number of policies that support emission reductions from new development. The applicable policies and a discussion of the project's consistency with the policies are provided in Table 4.J. The project is consistent with all applicable policies.

In summary, the proposed project would incorporate a number of features that would minimize GHG emissions. These features are consistent with project-level strategies identified by the Regional CAP and CARB's Scoping Plan. As demonstrated in the impact analysis above, the proposed project would not significantly hinder or delay the State's ability to meet the reduction targets contained in AB 32 or SB 32 or conflict with implementation of the Scoping Plan. The proposed project would promote the goals of the Scoping Plan through implementation of design measures that reduce energy consumption, water consumption, and reduction in VMT. Therefore, the proposed project would not conflict with any plans to reduce GHG emissions. The impact would be less than significant. No mitigation would be required.

Table 4.J: Consistency with the Regional Climate Action Plan

Climate Action Plan Policy	Project Consistency
E-4.1 Encourage local homebuilders to participate in the New Solar Homes Partnership to install solar PV systems on qualifying new homes. (Community)	**Consistent.** The proposed project would comply with the latest CALGreen solar readiness and installation requirements.
E-4.2 Work with the building industry to incorporate designs improving solar readiness into building plans through voluntary green building guidelines. (Community)	**Consistent.** The proposed project would comply with the latest CALGreen solar readiness and installation requirements.
E-5.2 Provide project applicants with green building resources, including the SJVAPCD's Best Performance Standards list for GHG reductions, and promote workshops offered by community organizations. (Community)	**Consistent.**. The proposed project would include sustainability features in the project design in accordance with SJVAPCD requirements, CALGreen, and City of Hanford standards.

Table 4.J: Consistency with the Regional Climate Action Plan

Climate Action Plan Policy	Project Consistency
TL-1.1 Support and encourage mixed-use and medium- and high-density land use categories located within ¼ mile of a transit stop, park and ride facility, or existing developed areas, by allowing flexible zoning and/or density bonuses for applicable projects. (Community)	**Consistent.** The project site is located within 0.25 mile of a transit stop. The proposed project would consist of mixed uses with high-density residential, hotel, and medical office uses.
TL-1.2 Prioritize infill development by publicly providing the location and zoning of infill sites on the local jurisdiction's website and working with developers to expedite applications. (Community)	**Consistent.** The project site is an infill location.
TL-1.3 Allow live/work developments that permit residents to live at their place of work and thereby reduce VMT and associated GHG emissions. (Community)	**Consistent.** The proposed project would include apartments that allow employees of the project medical office and service facilities to live within walking distance.
TL-2.3 Establish minimum design criteria for bicycle and pedestrian circulation and implement through the design review process. (Community)	**Consistent.** The proposed project would provide pedestrian infrastructure connecting to neighboring uses. The roads serving the project are designed for low speed and would be conducive to bicycle use.
TL-2.4 Encourage the installation of adequate and secure bicycle parking at all multi-family residential, commercial, governmental, and recreational locations throughout the region. (Community)	**Consistent.** The proposed project would comply with CALGreen Code requirements for bicycle parking.
TL-2.5 Support land use planning that will promote pedestrian and bicyclist access to and from new development by encouraging land use and subdivision designs that provide safe bicycle and pedestrian circulation, including bicycle parking facilities and internal bicycle and pedestrian routes, where feasible. (Community)	**Consistent.** The proposed project would comply with all applicable City design standards related to safe bicycle and pedestrian circulation.
TL-3.4 Support and encourage new development that provides safe routes to adjacent transit stops, where applicable. (Community)	**Consistent.** The proposed project would comply with City design standards that provide a safe route to a nearby transit stop.
TL-4.2 Work with employers and developers to provide affordable transportation alternatives and telecommuting options to serve both new and existing land uses. (Community)	**Consistent.** The proposed project's tenants would be able to participate in commute services offered by the Kings County Association of Governments and the City.
TL-4.3 Support compliance with SJVAPCD Rule 9410 by providing guidance and resources to employers required to comply with the eTRIP Rule. The eTRIP Rule requires employers with over 100 eligible employees to establish an Employer Trip Reduction Implementation Plan (eTRIP) to encourage employees to reduce single-occupancy vehicle trips by providing end of trip facilities such as preferential parking for vanpools and rideshare, bicycle parking, and other facilities suitable for the type of business. (Community)	**Consistent.** Tenants with over 100 eligible employees would be required to prepare an eTrip Plan that provides programs and measures that encourage ridesharing and use of alternative modes of transportation.
TL.5.2 Allow the joint use of parking facilities for both private businesses and public agencies. (Community)	**Consistent.** The parking lots would serve multiple businesses located throughout the complex.

Source: Kings County Association of Governments (2014) and LSA (March 2023).

4.9 HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☒	☐
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The proposed project would develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements.

Construction activities associated with the proposed project would involve the use of limited amounts of potentially hazardous materials, including but not limited to, solvents, paints, fuels, oils, and transmission fluids. However, all materials used during construction would be contained, stored, and handled in compliance with applicable standards and regulations established by the Department of Toxic Substances Control (DTSC), the U.S. Environmental Protection Agency (USEPA), and the Occupational Safety and Health Administration (OSHA). No manufacturing, industrial, or other uses utilizing large amounts of hazardous materials would occur within the project site.

Project operation would involve the use of common materials associated with residential, commercial, office, and medical uses (i.e., cleaning products, fertilizers, pesticides, herbicides, etc.) that could be potentially hazardous if handled improperly or ingested. However, these products are not considered acutely hazardous and are not generally considered unsafe. All storage, handling, and disposal of hazardous materials during project construction and operation would comply with applicable standards and regulations. The proposed residential uses would not generate significant amounts of any hazardous materials. Therefore, the proposed project would have a less-than-significant impact associated with the routine transport, use, or disposal of hazardous materials.

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

See Response 4.9.a, above. The proposed project would not result in a significant hazard to the public or the environment through a reasonably foreseeable upset or accident condition related to the release of hazardous materials. This impact would be less than significant.

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The closest existing school is Roosevelt Elementary School, located approximately 0.1 mile south of the project site. As previously stated, the proposed project would not result in the use or emission of substantial quantities of hazardous materials that would pose a human or environmental health risk. In addition, all materials would be handled, stored, and disposed of in accordance with applicable standards and regulations. Therefore, because the proposed project does not involve activities that would result in the emission of hazardous materials or acutely hazardous substances, implementation of the proposed project would result in a less-than-significant impact in the use or emission of hazardous materials that would adversely affect an existing school.

d. Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

According to the DTSC EnviroStor database,[28] the project site is not located on a federal superfund site, State response site, voluntary cleanup site, school cleanup site, evaluation site, school investigation site, military evaluation site, tiered permit site, or corrective action site. The project site is not included on the list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. [29] As a result, no impacts related to this issue are anticipated.

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28 California Department of Toxic Substances Control. 2019. EnviroStor. Website: www.envirostor.dtsc.ca.gov/public (accessed March 2023).

29 California Environmental Protection Agency. 2019. *Government Code Section 65962.5(a).* Website: calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/ (accessed March 2023).

e. Would the project be located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

The Hanford Municipal Airport is the closest airport and is located approximately 1.5 miles southeast of the project site. Although the project is located within 2 miles of the airport, implementation of the proposed project is not expected to result in a safety hazard or excessive noise for people residing or working in the project area. In addition, the project site is not within noise contours of the airport. As such, impacts would be less than significant. No mitigation is required.

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The project site is not located along an emergency evacuation route. Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout. Therefore, project implementation would not physically interfere with emergency evacuation or the City Fire Department access to and from the project site. Therefore, impacts would be less than significant as a result of project implementation and no mitigation is required.

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Wildland fires occur in geographic areas that contain the types and conditions of vegetation, topography, weather, and structure density susceptible to risks associated with uncontrolled fires that can be started by lightning, improperly managed campfires, cigarettes, sparks from automobiles, and other ignition sources. According to the California Department of Forestry and Fire Protection (CAL FIRE) Very High Fire Hazard Severity Zone (VHFHSZ) Map for Kings County, the project site is not located within a High or Very High Fire Hazard Severity Zone.[30] Therefore, implementation of the proposed project would not expose people to significant risk of loss, injury, or death due to wildland fires and this impact would be less than significant.

30 California Department of Forestry and Fire Protection (CAL FIRE). 2007. *Fire Hazard Severity Zone in Local Resource Area (LRA)*. September 20. Website: osfm.fire.ca.gov/media/6689/fhszl06_1_map16.pdf (accessed March 2023).

4.10 HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☒	☐	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☐	☒	☐	☐
i. Result in substantial erosion or siltation on- or off-site;	☐	☒	☐	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☒	☐	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☒	☐	☐
iv. Impede or redirect flood flows?	☐	☒	☐	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☒	☐	☐

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

The proposed project is located in the City of Hanford and Kings County, which is within the jurisdiction of the Central Valley RWQCB.

Pollutants of concern during construction include eroded sediments, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and other construction-related chemicals. Each of these pollutants on its own or in combination with other pollutants can have a detrimental effect on water quality. During construction activities, excavated soil would be exposed, and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. In addition, there is a potential for chemicals, petroleum products, other liquids (such as paints and solvents), and concrete-related waste to be spilled or leaked and transported via storm runoff into a stormwater drainage basin.

The project site is approximately 39.23-acres. Because construction of the proposed project would disturb greater than 1 acre of soil, the proposed project would be subject to the requirements of the NPDES Construction General Permit (CGP). To prevent significant water quality impacts during ground-disturbance activities, the proposed project would need to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that includes construction BMPs that comply with the requirements of the CGP. These requirements are included in Mitigation Measure HYDRO-1.

Mitigation Measure HYDRO-1 To minimize any potential short-term water quality effects from project-related construction activities, the project contractor shall implement Best Management Practices (BMPs) in conformance with the California Storm Water Best Management Practice Handbook for Construction Activity. In addition, the proposed project shall be in compliance with existing regulatory requirements, including the Water Pollution Control Preparation (WPCP) Manual. In addition, implementation of a Storm Water Pollution Prevention Plan (SWPPP) would be required under the National Pollutant Discharge Elimination System (NPDES) to regulate water quality associated with construction activities.

During operation of the proposed project, expected pollutants of concern include chemicals, liquid products, petroleum products (such as paints, solvents, and fuels), and waste that may be spilled or leaked and have the potential to be transported via runoff during periods of heavy precipitation. The proposed project would increase impervious surface area, which would increase the volume of runoff during a storm and more effectively transport pollutants to receiving waters. In addition, an increase in impervious surface area would increase the total amount of pollutants in the storm water runoff, which would increase the amount of pollutants discharged to downstream receiving waters. In order to avoid impacts to water quality during project operation, the proposed project would need to prepare and implement a Storm Water Management Plan (SWMP) to reduce the discharge of pollutants of concern to the maximum extent practicable.

Mitigation Measure HYDRO-2 To reduce the potential for degradation of surface water quality during project operation, a Storm Water Management Plan (SWMP) shall be prepared for the proposed project. The SWMP shall describe specific programs to minimize storm water pollution resulting from the proposed project. Specifically, the SWMP shall identify and describe source control measures, treatment controls, and BMP maintenance requirements to ensure that the project complies with post-construction storm water management requirements of the Regional Water Quality Control Board (RWQCB).

With implementation of Mitigation Measure HYDRO-1 and Mitigation Measure HYDRO-2, the proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. Therefore, the project's impacts would be less than significant with mitigation incorporated.

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Groundwater was not encountered up to a depth of 45 feet below ground surface (bgs) during geotechnical borings on the project site.[31] Therefore, due to the depth to the groundwater table and the depth of excavation, dewatering of the groundwater table would not be required. Although excavation would occur well above existing groundwater levels, perched groundwater could be present beneath the project site. As such, groundwater dewatering of perched groundwater may be required during construction. Groundwater dewatering would not substantially affect groundwater supplies or recharge because groundwater dewatering would be temporary, would cease after project construction, and would only affect perched groundwater. Therefore, construction impacts related to depletion of groundwater supplies or interference with groundwater recharge would be less than significant, and no mitigation would be required.

Currently, the project site is vacant and undeveloped. Development of the proposed project would increase impervious surfaces on the project site, which would decrease on-site infiltration. However, due to the depth to groundwater, it is unlikely that groundwater recharge from stormwater infiltration currently occurs on the project site. Regardless, any decrease in infiltration would be minimal in comparison to the size of the watershed and the amount of existing impervious surface area in the vicinity of the project area. Furthermore, project operation would not include groundwater extraction. Therefore, the proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin, and impacts would be less than significant.

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site;

During construction activities, soil would be exposed and disturbed, drainage patterns would be temporarily altered during grading and other construction activities, and there would be an increased potential for soil erosion and siltation compared to existing conditions. Additionally, during a storm event, soil erosion and siltation could occur at an accelerated rate. As discussed above in Response 4.10.a, Mitigation Measure HYDRO-1 requires compliance with applicable permits and preparation of a SWPPP to identify construction BMPs to be implemented as part of the proposed project to reduce impacts to water quality during construction, including those impacts associated with soil erosion and siltation. Compliance with applicable permit requirements and implementation of the construction BMPs would ensure that construction impacts related to on- or off-site erosion or siltation would be reduced to less than significant with mitigation incorporated.

31 Kleinfelder. 2020, op. cit.

Once operational, implementation of the proposed project would result in new internal access roads and surface parking lots, increasing impervious surface area which is not prone to erosion or siltation. The project would also include landscaping that would minimize erosion and siltation. The project site would be designed for storm water to be captured by the storm drain system, which would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards. The proposed project would also convert the Peoples Ditch to a 66-inch-diameter below-ground pipeline where the ditch currently exists. The depth of the below-ground pipeline would be between two and six feet. Therefore, on-site flooding, erosion, and siltation would not occur. This impact would be less than significant.

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

During construction activities, soil would be exposed and disturbed, drainage patterns would be temporarily altered during grading and other construction activities, and there would be an increased potential for flooding compared to existing conditions. Additionally, during a storm event, flooding could occur at an accelerated rate. As discussed above in Response 4.10.a, Mitigation Measure HYDRO-1 requires compliance with applicable permits and preparation of a SWPPP to identify construction BMPs to be implemented as part of the proposed project to manage and convey storm water during construction. Proper management of storm water during construction would reduce impacts associated with flooding. Therefore, impacts related to on- or off-site flooding would be less than significant with mitigation incorporated.

Once operational, the proposed project would increase impervious surface area on the site and could potentially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite. However, as discussed previously, the project site would be designed for storm water to be captured by the storm drain system, which would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards. The proposed project would also convert the Peoples Ditch to a 66-inch-diameter below-ground pipeline where the ditch currently exists. Therefore, the proposed project would not substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site. As such, operational impacts related to on-site or off-site flooding would be less than significant.

iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

As discussed above in Response 4.10.a, there is a potential for sediments, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals to be spilled or leaked and transported via storm runoff into stormwater basins. Each of these pollutants on its own or in combination with other pollutants can have a detrimental effect on water quality. Drainage patterns would be temporarily altered during grading and other construction activities, and construction-related pollutants could be spilled, leaked, or transported via storm runoff into adjacent drainages and stormwater basins. Mitigation Measure HYDRO-1 requires compliance with applicable permits and preparation of a SWPPP to identify construction BMPs to be implemented as part of the proposed project to manage and convey storm water during construction. Therefore, construction of the proposed project would not create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Impacts would be less than significant with mitigation incorporated.

In addition, as discussed above in Response 4.10.a, expected pollutants of concern during operation of the proposed project include chemicals, liquid products, petroleum products (such as paints, solvents, and fuels), and waste that may be spilled or leaked and have the potential to be transported via runoff during periods of heavy precipitation. The proposed project would increase impervious area, which would increase the volume of runoff during a storm and more effectively transport pollutants to receiving waters. In addition, an increase in impervious surface would increase the total amount of pollutants in the storm water runoff, which would increase the amount of pollutants discharged to downstream receiving waters.

As discussed previously, the project site would be designed for storm water to be captured by the storm drain system, which would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards. The proposed project would also convert the Peoples Ditch to a 66-inch-diameter below-ground pipeline where the ditch currently exists. Therefore, operation of the proposed project would not create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Impacts would be less than significant.

iv. Impede or redirect flood flows?

Refer to Response 4.10.a.ii above. With implementation of Mitigation Measure HYDRO-1, implementation of the proposed project would not impede or redirect flood flows. This impact would be less than significant with mitigation incorporated.

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Tsunamis are sea waves of unusual size that occur from significant earthquakes either under the ocean floor or adjacent to shorelines and can travel great distances to impact low-lying communities and developments. Considering that the Coast Range protects the site from the sea, the potential to be affected by a tsunami is nil. A seiche is a free or standing wave oscillation that occurs in a confined body of water, such as a reservoir or lake. Earthquake-generated ground waves, which have a period that matches the natural period of the lake or reservoir, may cause the water to oscillate, which can cause damage to shoreline improvements. The Kings County General Plan indicates that earthquake-induced seiches are not considered a risk within the vicinity of the project site.[32]

According to the Kings County General Plan, two major dams could cause substantial flooding in Kings County in the event of a failure: Pine Flat and Terminus Dams. The project site is located within an area of potential flooding due to dam failure of Pine Flat Dam. However, the Kings County General Plan does not state the potential inundation depth in the event of failure of Pine Flat Dam. The project site is not located within potential flooding of the Terminus Dam.

According to the Federal Emergency Management Agency (FEMA), the majority of the project site lies within a Zone X flood designation (Map Number 06031C0185C, dated June 16, 2009). Areas within Flood Zone X are outside of the 500-year floodplain. According to FEMA, "the areas of minimal flood hazard, which are the areas outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded)". Therefore, the project site lies outside of the 100-year floodplain and the designated SFHA. Therefore, implementation of the proposed project would not place housing within a flood hazard area, and a less-than-significant impact would result related to flood hazards.

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

As discussed above in Response 4.10.a, during construction activities, excavated soil would be exposed with an increased potential to expose soils to wind and water erosion, which could result in temporary minimal increases in sediment load in nearby water bodies. Pollutants of concern during construction include sediments, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals and have the potential to be transported via stormwater runoff into receiving waters. However, Mitigation Measure HYDRO-1 would ensure implementation of BMPs and would require implementation of a SWPPP to control stormwater runoff and discharge of pollutants.

In addition, as discussed above in Response 4.10.a, operation of the proposed project could result in surface water pollution associated with chemicals, liquid products, petroleum products (such as paints, solvents, and fuels), and waste that may be spilled or leaked and have the potential to be transported via runoff during periods of heavy precipitation. As required by Mitigation Measure HYDRO-2, the proposed project would implement a SWMP, which shall identify and describe source control measures, treatment controls, and BMP maintenance requirements to ensure that the project complies with post-construction storm water management requirements of the RWQCB.

For the reasons discussed above, with implementation of Mitigation Measures HYDRO-1 and HYDRO-2, the proposed project would not result in water quality impacts that would conflict with the RWQCB's Water Quality Control Plan (Basin Plan). Therefore, impacts related to conflict with a water quality control plan would be less than significant.

[32] Kleinfelder. 2020, op. cit.

4.11 LAND USE AND PLANNING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☒	☐
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

a. Would the project physically divide an established community?

The project site is located in an area with a mix of land uses, including residential, commercial, and medical uses. Adjacent parcels consist mostly of low-density residential and commercial uses, with several undeveloped lots located north of the project site. The project site is generally bound to the north by the San Joaquin Valley Railroad and existing mixed-use structures, including commercial, medical, retail, and some residential uses, to the east by commercial land uses, to the south by SR-198, and to the west by commercial land uses.

The proposed project is located within a generally urbanized area of the City. The project site is currently undeveloped; however, as identified above, it is bordered by low-density residential and commercial uses. The proposed project would develop the project site with a new mixed-use development on an infill site. Although other land uses are located within the vicinity of the project site, none of these uses would be encroached upon or divided by project development. In addition, the project would not disturb or alter access to any existing adjacent uses. Therefore, the proposed project would not physically divide an established community. This impact would be less than significant.

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The main documents regulating land use on the project site include the City's General Plan and the Zoning Ordinance. The General Plan designation for the project site is currently Highway Commercial and the current zoning designation is C-H. The proposed project would develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses. Medical uses, education uses, and multi-family are not consistent with the land uses allowed in the Highway Commercial designation. Therefore, a change in the General Plan and zoning designations are required.

The project would amend the General Plan to Service Commercial and High-Density Residential. In addition, the project would require a rezone to C-S and R-H with a PUD overlay that would allow uses allowed on the entire project site. This zoning designation and PUD would allow uses from both zones to be constructed anywhere on the project site.

General Plan. The City's General Plan is the fundamental policy document of the City of Hanford. Within the General Plan, the Land Use and Community Design Element is the principal document guiding land use and development within the City. It serves as a blueprint for development throughout the community and is the vehicle through which the community needs, desires, and aspirations are balanced.

As identified above, without a General Plan amendment, the proposed project is inconsistent with the policies of the General Plan as they pertain to the existing Highway Commercial designation. The proposed project would amend the General Plan to Service Commercial and High-Density Residential.

Service Commercial. The Service Commercial designation provides a broad range of commercial activities such as businesses which have both retail and service components along SR-198.

The proposed project would be consistent with applicable Land Use and Community Design Element policies:

- **Policy L51 Purpose of Service Commercial Land Use Designation:** Establish the Service Commercial land use designation to provide for establishments that engage in servicing equipment, materials, products and related sales and travel conveniences, but which do not require the manufacturing, assembly, packaging or processing of articles or merchandise for distribution.

- **Policy L52 Typical Uses in Service Commercial Land Use Designation:** Define the uses allowed in the Service Commercial land use designation to include a broad range of commercial activities such as businesses which have both retail and service components. Among these are uses such as vehicle sales and service; auto rental and equipment rental; motels; restaurants (including fast food); service stations; car washes; building material supply; warehousing; wholesale trade; contractors, suppliers, small equipment yards; and other similar uses.

- **Policy L53 Existing Service Commercial Designations:** Encourage existing service commercial centers to expand or adapt to market changes through reuse, rehabilitation, and infill development.

- **Policy L54 Design of the Service Commercial Land Use Designation:** Require that new development projects and major site reconfigurations in the Service Commercial land use designation provide site layouts, landscaping, and screening so that the site appears aesthetically pleasing from the public street.

- **Policy L55 Location and Size of Service Commercial Land Use Designation:** Locate Service Commercial land use designations along Highway 198 and where they can serve as a buffer land use, such as between residential areas and railroad corridors. Require new development projects to be a minimum of one acre.

The proposed medical outpatient clinic services, hotel and conference center, specialized education, retail, and medical office, land uses would be consistent with the allowable uses within the Service Commercial designation. The project site is located along SR-198, consistent with Policy L55.

High-Density Residential. The High-Density Residential designation allows a density range of 14 to 29 units per gross acre with an expected typical density of 16 units per gross acre.

The proposed project would be consistent with applicable Land Use and Community Design Element policies:

- **Policy L38 Purpose of the High Density Residential Land Use Designation:** Establish the High-Density Residential land use designation primarily for multi-family apartment and condominium development in proximity to arterial streets, commercial and recreation facilities, and employment centers.

- **Policy L39 Typical Uses in the High-Density Residential Land Use Designation:** Define the uses allowed in the High-Density Residential land use designation to include multi-family residential dwellings in apartment buildings complexes.

- **Policy L40 Design of the High-Density Residential Land Use Designation:** Develop and enforce design policies and/or ordinances for High-Density Residential developments that ensure high-quality constructions design, open space amenities, safety and security, overall compatibility with the rest of the neighborhood.

- **Policy L41 Location and Size of the High Density Residential Land Use Designation:** Locate High-Density Residential land use designations in close proximity to Arterial streets, commercial centers, recreational facilities, and employment centers.

The proposed multi-family residential, skilled nursing, and assisted living land uses would be consistent with the allowable uses within the High-Density Residential designation. In addition, project site is located in proximity to arterial streets (11th Avenue), commercial (planned on site), and employment centers (planned on site), consistent with Policy L41.

Zoning Ordinance. The current zoning designation for the project site is C-H; however, the project would require a rezone to C-S and R-H with a PUD overlay that would allow uses allowed on the entire project site. This zoning designation and PUD would allow uses from both zones to be constructed anywhere on the project site.

Service Commercial (C-S). The C-S zone allows for commercial uses that engage in servicing equipment, materials, products and related sales and travel conveniences, but which do not require the manufacturing, assembly, packaging or processing of articles or merchandise for distribution. The minimum site area must be 5,000 square feet, unless a smaller site is approved with a conditional use permit in accordance with Chapter 17.80. No structure shall be placed within a building setback area, as identified in Section 17.20.060 of the Municipal Code. The minimum distance between any residential structures shall be 10 feet, except as provided by the building code.

The C-S zone does not require usable open space. Landscaping also must be provided in accordance with Section 17.52 of the Municipal Code. In addition, driveways, parking, signage, mechanical equipment, lighting, and coverings must be designed consistent with City standards. The proposed project would be required to comply with these standards.

High-Density Residential (R-H). The R-H zone allows for a density range of 14 to 29 units per gross acre with a minimum site area per dwelling unit of 1,500 square feet. The minimum site area per dwelling unit shall be 1,500 square feet. The maximum coverage of a lot shall be determined by the combined building setback area requirements, accessory structure limitations, open space requirements, and off-street parking. In addition, no structure shall be placed within a building setback area, as identified in Section 17.14.070 of the Municipal Code. The minimum distance between structures shall be 10 feet, except as provided by the building code, and the maximum structure height shall be 35 feet.

Lots with five or more dwelling units shall provide for a usable open space area equal to five percent of the lot area. Where multiple lots that together make up a single development site, the required open space may be combined into common open space areas that are accessible to all residents of the site. Landscaping also must be provided in accordance with Section 17.52 of the Municipal Code. In addition, driveways, parking, signage, mechanical equipment, lighting, and coverings must be designed consistent with City standards. The proposed project would be required to comply with these standards.

Summary. Although the proposed project would require a General Plan Amendment and a Zone Change, the proposed uses would be consistent with the proposed General Plan designations and zones. Therefore, the proposed project would be consistent with proposed General Plan and zoning designations and would not conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. This impact would be less than significant.

4.12 MINERAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

The Surface Mining and Reclamation Act (SMARA) regulates surface mining in California. SMARA was adopted in 1975 to protect the State's need for a continuing supply of mineral resources and to protect the public and environmental health. SMARA requires that all cities incorporate mapped mineral resource designations approved by the State Mining and Geology Board into their General Plans.

The City's General Plan indicates that at this time there are no known significant deposits of minerals, and no active mines.[33] The only mineral commodities that have been found within the City are sand and gravel that could be used for road and building construction. The Monterey Shale lies beneath Kings County and contains both oil and natural gas deposits. However, the City's General Plan states there have been no efforts to date to attempt extraction of these resources within or near the City. Therefore, implementation of the proposed project is not expected to result in the loss of known mineral resources or recovery sites. Therefore, this impact would be less than significant.

b. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

The project site is not located within an area known to contain locally important mineral resources. No impacts related to the loss of availability of a locally important mineral resource recovery site as delineated on a local general plan, specific plan, or other land use plan would occur as a result of project implementation.

[33] Hanford, City of. 2017, op. cit.

4.13 NOISE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in:				
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 2 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?	☐	☐	☒	☐

This section is based on the Acoustical Analysis prepared for the proposed project.[34] The Acoustical Analysis is included as Appendix E.

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. Several noise measurement scales exist that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative intensity of a sound. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness; and similarly, each 10 dB decrease in sound level is perceived as half as loud. Sound intensity is normally measured through the A-weighted sound level (dBA). This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. The A-weighted sound level is the basis for 24-hour sound measurements that better represent human sensitivity to sound at night.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6 dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise sensitive receptor of concern.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for human communities in the State are the L_{eq}, the community noise equivalent level (CNEL), and the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the

[34] WJV Acoustics, Inc. 2021. *Acoustical Analysis Hanford Place Hanford, California WJVA Report No. 20-016.* May 12.

hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening relaxation hours. CNEL and L_{dn} are within one dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

A project would have a significant noise effect if it would substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of applicable regulatory agencies, including, as appropriate, the City of Hanford.

The City of Hanford Noise Element of the 2017 General Plan provides generalized Noise Goals and Policies for various noise sources and land uses, related to development within the City. However, the 2017 General Plan does not provide specific noise standards applicable to development projects. Therefore, City staff provided the noise level standards from the City's 2002 General Plan. The standards provided in the 2002 General Plan are the same as those provided in the Kings County General Plan and will be considered the applicable standards for this project.

The 2002 General Plan provided noise level compatibility standards for transportation and non-transportation (stationary) noise sources. Table 4.K provides the City of Hanford 2002 General Plan noise standards for transportation noise sources and Table 4.L provides the City of Hanford 2002 General Plan noise standards for non-transportation (stationary) noise sources.

Table 4.K: Maximum Allowable Noise Exposure Transportation Noise Sources

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	45	-
Transient Lodging	60[3]	45	-
Hospitals, Nursing Homes	60[3]	45	-
Theaters, Auditoriums, Music Halls	-	-	35
Churches, Meeting Halls	60[3]	-	40
Office Buildings	-	-	45
Schools, Libraries, Museums	-	-	45
Playgrounds, Neighborhoods Parks	70	-	-

Source: WJV Acoustics, Inc. (2021).
Notes:
[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] Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/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.

Table 4.L: Noise-Level Performance Standards for New Projects Affected by or Including Non-Transportation (Stationary) Noise Sources

Category	Noise-Level Descriptor	Exterior Noise Level Standard (Applicable at Property Line)		Interior Noise Level Standard	
		Daytime	Nighttime	Daytime	Nighttime
Residential	L_{eq}	50	45	40	35
	L_{max}	70	65	60	35
Transient Lodging Hospitals, Nursing Homes	L_{eq}	-	-	40	35
	L_{max}	-	-	60	55
Theaters, Auditoriums, Music Halls	L_{eq}	-	-	35	35
Churches, Meeting Halls	L_{eq}	-	-	40	40
Office Buildings	L_{eq}	-	-	45	-
Schools, Libraries, Museums	L_{eq}	-	-	45	-
Playgrounds, Neighborhood Parks	L_{eq}	65	-	-	-

Source: WJV Acoustics, Inc. (2021).
Notes:
Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

Certain land uses are considered more sensitive to noise than others. Examples of these land uses include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The project site generally bound by SR-198 to the south, San Joaquin Valley Railroad to the north, an existing retail shopping center to the east, and a mini-storage facility and former amusement/water park located west of the project site. The closest sensitive receptors to the proposed project include the residential land uses located north of the project site (across the San Joaquin Valley Railroad line) and south of the project site (across SR-198).

To assess existing noise levels, noise monitoring was conducted to establish the existing ambient noise environment at the project site. Eight short-term (15-minute) and two long-term (24-hour) noise measurements were conducted at the project site on May 5, 2021, and May 6, 2021. Noise measurement data collected during the noise monitoring area summarized in Table 4.M. As shown in Table 4.M, the short-term noise measurements indicate that ambient noise in the project site vicinity ranges from approximately 51.8 dBA to 62.6 dBA L_{eq}. The measured L_{dn} value at site LT-1 for May 5th and May 6th was 68.8 dB L_{dn} and 68.9 dB L_{dn}, respectively. The measured L_{dn} value at site LT-2 for May 5th and May 6th was 67.6 dB L_{dn} and 64.9 dB L_{dn}, respectively. Vehicle traffic, aircraft, agricultural activities, voices, birds, barking dogs, and a rooster were reported as the primary noise sources.

Table 4.M: Ambient Noise Monitoring Results (dBA)

Location Number	Location Description	Time	L_{eq}[1]	L_{max}[1]
LT-1	Located within the central portion of the project site, approximately 300 feet from the centerline of SR-198.	Daytime Average (7:00 a.m. – 10:00 p.m.)	64.5/ 65.0[3]	81.0/ 79.1[3]
		Night Average (10:00 p.m. – 7:00 a.m.)	60.3/ 60.5[3]	76.2/ 77.5[3]
LT-2	Located near the northern portion of the project site, adjacent to the existing residential land uses, and approximately 50 feet from the San Joaquin Valley Railroad line.	Daytime Average (7:00 a.m. – 10:00 p.m.)	59.9/ 58.0[3]	80.8/ 79.2[3]
		Night Average (10:00 p.m. – 7:00 a.m.)	54.4/ 51.7[3]	70.8/ 68.2[3]
ST-1	Located near the northeast portion of the project site, in the vicinity of existing retail/commercial land uses adjacent to the project site.	7:35 a.m.	51.8	56.0
		4:25 p.m.	53.7	62.1
ST-2	Located near the project site access point along Campus Drive.	8:05 a.m.	62.6	76.3
		4:45 p.m.	56.7	62.3
ST-3	Located near the northwestern portion of the project site, in the parking lot of Adventist Health Hospital.	8:30 a.m.	51.9	70.1
		5:10 p.m.	52.1	66.6
ST-4	Located at the intersection of Campus Drive and 7th Street, north of the project site.	8:50 a.m.	60.3	77.0
		5:30 p.m.	61.4	74.2

Source: WJV Acoustics, Inc. (2021)

Notes:

[1] L_{eq} represents the average of the sound energy occurring over the measurement time period for the short-term noise measurements.

[2] L_{max} is the highest sound level measured during the measurement time period.

[3] May 5, 2021 data/May 6, 2021 data

a. Would the project result in 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?

The following section describes how the short-term construction and long-term operational noise impacts of the proposed project would be less than significant with mitigation.

Traffic Noise Impacts to Off-Site Noise-Sensitive Land Uses. The Federal Highway Administration (FHWA) Traffic Noise Model was used to quantify expected project-related increases in traffic noise exposure along roadways in the project vicinity based on ADT.

Project-related significant impacts would occur if an increase in traffic noise associated with the project would result in noise levels exceeding the City's applicable noise level standards at the location(s) of sensitive receptors. For the purpose of this analysis a significant impact was also assumed to occur if traffic noise levels were to increase by 3 dB at sensitive receptor locations where noise levels already exceed the City's applicable noise level standards (without the project), as 3 dB generally represents the threshold of perception in change for the human ear.

The City's exterior noise level standard for residential land uses is 60 dB L_{dn} (an exterior noise exposure of up to 65 dB L_{dn} is allowed in instances where it is not possible to reduce noise exposure in outdoor activity areas to 60 L_{dn} or less using a practical application of available noise reduction measures.). Traffic noise was modeled at seven receptor locations. The seven modeled receptors are located at roadway setback distances representative of the sensitive receptors (residences) along each analyzed roadway segment. The receptor locations are described below:

- R-1: Residential land use located approximately 90 feet from the centerline of Lacey Boulevard.
- R-2: Residential land use located approximately 60 feet from the centerline of 7th Street.
- R-3: Residential land use located approximately 95 feet from the centerline of 7th Street.
- R-4: Residential land use located approximately 60 feet from the centerline of 6th Street.
- R-5: Residential land use located approximately 100 feet from the centerline of Campus Drive.
- R-6: Residential land use located approximately 95 feet from the centerline of 7th Street.
- R-7: Residential land use located approximately 90 feet from the centerline of 6th Street.

Traffic volumes for Existing and Cumulative Year 2042 Conditions without and with project traffic noise levels at these receptor locations are shown in Table 4.N. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between traffic and the location where the noise contours are drawn.

Table 4.N: Project Contribution to Traffic Noise (dB L_{dn})

Modeled Receptor	Existing Conditions			Cumulative Conditions		
	Without Project	Plus Project	Project Contribution	Without Project	Plus Project	Project Contribution
R-1	63	63	0	64	64	0
R-2	62	62	0	64	64	0
R-3	58	59	+1	60	60	0
R-4	55	58	+3	56	59	+3
R-5	51	51	0	53	53	0
R-6	59	59	0	61	61	0
R-7	52	52	0	54	54	0

Source: WJV Acoustics, Inc. (2020).
Note: As discussed in Section 4.17, Transportation, approximately 41,500 square feet of commercial/office uses is proposed. These uses would generate fewer trips than the 114,000 square feet of commercial/office uses that is analyzed in the TIS/proposed project trip generation estimate. Thus, the traffic noise analysis evaluates a project with higher trip generation potential. Therefore, this analysis can be considered conservative.

As shown in Table 4.N, project-related traffic would not result in noise levels at any sensitive receptors to exceed the City's noise level standard, nor result in an increase of more than 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project. In addition, the project's contribution to Cumulative 2042 traffic noise exposure levels at the modeled representative receptor locations would not result in noise levels to exceed the City's noise level standard, nor result in an increase of more than 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project. Therefore, project-related traffic noise impacts to off-site noise-sensitive land uses would be less than significant. No mitigation is required.

Stationary Source Noise Impacts. The proposed project would include a variety of medical buildings, hotel and conference center, medical instruction facilities, retail/drive-thru buildings, commercial buildings and a multi-family apartment building. A wide variety of noise sources can be associated with these land use designations. The noise levels produced by such sources can also be highly variable and could potentially impact existing off-site and proposed on-site sensitive receptors. Typical examples of stationary noise sources associated with such land uses include: heating ventilation, and air conditioning (HVAC) and mechanical equipment; truck deliveries; parking lot activities; and drive-thru operations. These noise sources are evaluated below.

Mechanical Equipment. It is assumed that the project would include roof-mounted HVAC units on the proposed buildings. The HVAC requirements for the buildings would likely require the use of multiple packaged roof-top units. For the purpose of noise and aesthetics, roof-mounted HVAC units are typically shielded by means of a roof parapet. Based on reference noise level measurements at numerous commercial and retail buildings with roof-mounted HVAC units, associated noise levels typically range between approximately 45-50 dBA L_{max} at a distance of 50 feet from the building façade.

For this project, the closest residential property lines to any potential roof-mounted HVAC equipment would be located at a minimum setback distance of 200 feet. Taking into account the standard rate of noise attenuation with increased distance from a point source (a reduction of 6 dB per doubling of distance), noise levels associated with the operation of roof-mounted HVAC units would be approximately 33-38 dBA L_{max} at the closest sensitive receptor property line. These noise levels would not exceed any City of Hanford noise level standard or exceed existing (without project) ambient noise levels. Therefore, potential impacts related to mechanical equipment noise would be less than significant and no mitigation is required.

Truck Movements. At the time of this analysis, a specific truck access route (or routes) had not been designated. However, trucks would access the project site by one of three access points, Glendale Avenue from the west, Campus Drive from the north or 5th Street from the east. It is assumed that truck deliveries would occur at various times and locations throughout the overall project area. Precise details on truck deliveries were not known at the time of this analysis.

Based on reference measurements of the noise levels produced by slowly moving trucks, truck movements would be expected to produce noise levels in the range of 65 to 71 dBA L_{max} at a distance of 100 feet. The range in measured truck noise levels is due to differences in the size of trucks, their speed of movement and whether they have refrigeration units in operation during the pass-by.

If truck movements were to access the project site via the 5th Street access point, truck movements could occur as close as approximately 130 feet from the closest residential property lines to the north. At this distance, noise levels associated with truck movements would produce maximum noise levels in the range of approximately 63 to 69 dBA L_{max}, which would not exceed the City's daytime (7:00 a.m. to 10:00 p.m.) noise level standard of 70 dBA L_{max}, but would have the potential to exceed the City's nighttime (10:00 p.m. to 7:00 a.m.) noise level standard of 65 dBA L_{max}. Based on the existing ambient noise levels in the vicinity of the future 5th Street access point (noise monitoring site LT-2), the City's nighttime 65 dBA L_{max} standard was exceeded during twelve of the 18 nighttime hours measured over the two-day monitoring period. However, implementation of Mitigation Measure NOI-1 would reduce potential impacts related to truck movement noise by requiring truck movements to use the Glendale access point only during nighttime hours.

Mitigation Measure NOI-1 **Truck Movements.** All truck movements occurring during nighttime hours of 10:00 p.m. to 7:00 a.m. shall be required to use the Glendale Avenue access point only.

With implementation of Mitigation Measure NOI-1, impacts associated with truck movement noise would be reduced to a less-than-significant level.

Parking Lot Activities. Noise due to traffic in parking lots is typically limited by low speeds and is not usually considered to be significant. Human activity in parking lots that can produce noise includes voices, stereo systems and the opening and closing of car doors and trunk lids. Such activities can occur at any time. The noise levels associated with these activities cannot be precisely defined due to variables such as the number of parking movements, time of day and other factors. It is typical for a passing car in a parking lot to produce a maximum noise level of 60 to 65 dBA at a distance of 50 feet, which is comparable to the level of a raised voice.

For this project, parking would be dispersed throughout the overall project area. The closest proposed parking areas would be located at least 150 feet from the closest existing residential property lines to the north. At this distance, maximum parking lot vehicle movements would be expected to be approximately 51 to 56 dBA L_{max}, which would not exceed any of the City's applicable noise levels standards or exceed existing ambient noise levels at the closest residential land uses. Due to existing elevated ambient noise levels at the closest sensitive receptor locations (residential land uses north of the project site), noise levels associated with parking lot activities would generally not be audible over existing (without project) noise levels. Therefore, potential impacts related to parking lot activity noise would be less than significant and no mitigation is required.

Drive-Thru Retail. The proposed project would include two retail areas that would likely include drive-thru operations. While the exact tenants and type of retail store was not known at this time, it is assumed that amplified speech would be incorporated into drive-thru operations.

In order to assess potential project noise levels associated with drive-thru operations, reference noise levels were used from previous noise measurements at a drive-thru restaurant. Based on the previous noise measurements, the microphone used by customers to order food and the loudspeaker used by employees to confirm orders are both integrated into a menu board that is located a few feet from the drive-thru lane at the approximate height of a typical car window. Vehicles would enter the drive-thru lane from the west and then turn to the north along the east side of the restaurant.

Reference noise measurements were obtained at a distance of approximately 40 feet from the menu board containing the microphone/loudspeaker system at an angle of about 45° toward the rear of the vehicle being served. This provided a worst-case exposure to sound from the loudspeaker system since the vehicle was not located directly between the loudspeaker and measurement location. Cars were lined up in the access lane during the noise measurement period indicating that the drive-through lane was operating at or near a peak level of activity.

Each ordering cycle was observed to take approximately 60 seconds including vehicle movements. A typical ordering cycle included 5-10 seconds of loudspeaker use with typical maximum noise levels in the range of 60-62 dBA L_{max} at the 40 foot-reference location. Vehicles moving through the drive-thru lane produced noise levels in the range of 55-60 dBA L_{max} at the same distance. Vehicles parked at the ordering position (between the menu board and measurement site) were observed to provide significant acoustic shielding during the ordering sequence. The effects of such shielding are reflected by the noise measurement data. Noise levels were measured to approximately 60 dB L_{eq} at the measurement site, and included noise from all sources, including the loudspeaker, vehicle movements and HVAC equipment.

The closest noise-sensitive receptors (residential land uses) to the proposed retail drive-thru operations are located approximately 190 feet to the north. At this setback distance, noise levels associated with drive-thru retail operations would be expected to produce noise levels of approximately 47-49 dB L_{max} and approximately 46 dB L_{eq}. Potential project-related noise exposure at the locations of the closest residential land uses was calculated based upon the above-described reference noise measurement data, the existing sound walls, and the normal rate of sound attenuation over distance for a “point” noise source (6 dB/doubling of distance).

It is unknown if nighttime operations would occur at the drive-thru retail locations. The noise level of 46 dB L_{eq} at the closest residential property line assumes the drive-thru would be in constant operation and should therefore be considered a worst-case assessment of drive-thru noise levels. While drive-thru operational noise levels (46 dB L_{eq}) slightly exceed the City’s nighttime noise level standard of 45 dB L_{eq}, such levels are below existing (without project) nighttime ambient noise levels at the residential property lines and would therefore not be considered a significant impact. Therefore, potential impacts related to drive-thru noise would be less than significant, and no mitigation is required.

Construction Noise Impacts. Construction noise would occur at various locations within the project site through the buildout period and at locations where off-site infrastructure improvements may be required. Existing sensitive receptors could be located as close as 150 feet from construction activities. Table 4.O provides typical construction-related noise levels at distances of 100 feet, 200 feet, and 300 feet.

Construction noise is not considered to be a significant impact if construction is limited to the allowed hours and construction equipment is adequately maintained and muffled. The City of Hanford limits hours of construction to occur only between the hours of 7:00 a.m. to 8:00 p.m. Construction noise impacts could result in annoyance or sleep disruption for nearby residents if nighttime operations were to occur or if equipment is not properly muffled or maintained.

Table 4.O: Typical Construction Equipment Maximum Noise Levels (dBA)

Type of Equipment	100 Feet	200 Feet	300 Feet
Concrete Saw	84	78	74
Crane	75	69	65
Excavator	75	69	65
Front End Loader	73	67	63
Jackhammer	83	77	73
Paver	71	65	61
Pneumatic Tools	79	73	69
Dozer	76	70	66
Rollers	74	68	64
Trucks	82	72	70
Pumps	74	68	64
Scrapers	81	75	71
Portable Generators	74	68	64
Backhoe	80	74	70
Grader	80	74	70

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman (1987).

Noise levels associated with construction activities would be reduced by incorporating noise mitigation measures and appropriate best management practices. The following mitigation measures and best management practices should be applied during periods of project construction.

Mitigation Measure NOI-2 The project contractor shall implement the following measures during construction of the project:

- Per the City of Hanford Municipal Code, construction activities should not occur outside the hours of 7:00 a.m. to 8:00 p.m.
- All construction equipment shall be properly maintained and muffled as to minimize noise generation at the source.
- Noise-producing equipment shall not be operating, running, or idling while not in immediate use by a construction contractor.
- All noise-producing construction equipment shall be located and operated, to the extent possible, at the greatest possible distance from any noise-sensitive land uses.
- Locate construction staging areas, to the extent possible, at the greatest possible distances from any noise-sensitive land uses.
- Signs shall be posted at the construction site and near adjacent sensitive receptors displaying hours of construction activities and providing the contact phone number of a designated noise disturbance coordinator.

Implementation of Mitigation Measure NOI-2 would limit construction hours and require the construction contractor to implement noise reducing measures during construction, which would reduce short-term construction noise impacts to a less-than-significant level.

Noise Impacts to Proposed On-Site Sensitive Receptors. The proposed project would include sensitive receptors (residential land uses, transient lodging, nursing homes, offices, etc.) that could be impacted by exterior and interior noise exposure associated with existing transportation noise sources (SR-198 and San Joaquin Valley Railroad line). The applicable exterior and interior noise level standards for such land uses are provided above as Table 4.K.

Exterior Noise Exposure. Exterior noise exposure within the project site is dominated by vehicle traffic associated with SR-198 to the south and railroad operations associated with the San Joaquin Valley Railroad line to the north. Noise levels measured at ambient noise monitoring sites LT-1 and LT-2 indicate that overall project site noise exposure is approximately 65-70 dB L_{dn}.

The exterior noise level standard applicable to the above-described sensitive receptors is 60 dB L_{dn}. The General Plan also states that where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance.

Exterior noise level compatibility standards for transportation noise sources are applied at the outdoor activity areas of sensitive receptors. Outdoor activity areas typically include backyards of single-family residential uses and outdoor common use areas (pools, BBQ/picnic areas, playgrounds, etc.) as well as individual patios, balconies and decks of multi-family residential uses and transient lodging land uses. The exact locations of such outdoor activity areas were not known at the time of this analysis; however, the project site plan (Figure 3) provides preliminary locations of pool areas for both the apartment development and the hotel development. Other proposed sensitive receptors (memory care facility, assisted living facility, skilled nursing facility, etc.) may also include outdoor activity areas, at which this exterior noise level standard would apply.

Based upon project site noise exposure (approximately 65-70 dB L_{dn}) and the preliminary locations of the apartment and hotel pool areas (outdoor activity areas), mitigating exterior noise levels at these locations to at or below 60 dB L_{dn} would likely not be feasible. However, a preliminary analysis using a sound wall insertion loss model indicates that a sound wall constructed to a minimum height of 6.5 feet above ground level constructed around the two pool areas (apartment and hotel land uses) would mitigate exterior noise levels to below 65 dB L_{dn} within these outdoor activity areas.

Other proposed sensitive receptors (memory care facility, assisted living facility, skilled nursing facility, etc.) may also include outdoor activity areas, at which this exterior noise level standard would apply. The potential locations of outdoor activity areas associated with these land uses was not known at the time of this analysis. However, a similarly constructed sound wall around such uses would reduce noise levels to below 65 dB L_{dn}. Such noise levels are allowed by the City.

Therefore, since transportation noise exposure levels are expected to exceed the City's 60 dB L_{dn} exterior noise level standard at outdoor activity areas associated with the multi-family apartment land use and the hotel land use, implementation of Mitigation Measure NOI-3 would be required.

Mitigation Measure NOI-3 **Exterior Noise Levels.** The final design shall include a minimum 6.5-foot above-ground level sound wall around outdoor activity areas associated with the proposed hotel and apartment land uses to mitigate exterior noise levels to below 65 dB L_{dn} within these outdoor activity areas.

Interior Noise Exposure. As described above, exterior project site noise exposure throughout the overall project area is approximately 65-70 dB L_{dn}, as a result of varying levels of proximity to both SR-198 and the San Joaquin Valley Railroad line. Additionally, peak hour exterior noise levels would be approximately 70 dB L_{eq} at the exterior of the office land uses to the north and the nursing college to the south. Interior noise level standards applicable to the project site vary, based upon proposed land uses. These interior noise level standards applicable to the project are:

- 45 dB L_{dn}: Multi-family apartment, hotel, skilled nursing facility, memory care facility, assisted living facility, and any additional facility where people are residing and sleep disturbance is considered.
- 45 db L_{eq}: Office buildings, nursing college (as determined for a typical worst-case hour during periods of use).
- Based upon the above-described exterior noise exposure levels and applicable interior noise level standards, the proposed construction measures must be capable of providing approximately 25 dB of outdoor-to-indoor noise level reduction (NLR) (70-45=25).

Generally speaking, construction measures complying with current building code standards would typically be expected to provide approximately 20-25 dB of outdoor-to-indoor NLR, provided windows and doors can remain closed for sound insulation purposes. However, additional sound attenuation measures may be required in conditions where the exterior façade consists of large portions of window or storefront glazing assemblies. Once construction plans are developed, an acoustical consultant should review to determine if additional interior noise level mitigation measures may be required.

Mitigation Measure NOI-4 **Interior Noise Levels.** Once building-specific construction plans become available, interior noise levels should be reviewed and calculated by a qualified acoustical consultant to determine if additional noise attenuation mitigation measures are required to comply with interior noise level standards.

Implementation of Mitigation Measures NOI-3 and NOI-4 would reduce exterior and interior noise levels at future sensitive receptors and would reduce potential impacts to a less-than-significant level.

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

The dominant sources of man-made vibration are sonic booms, blasting, pile driving, pavement breaking, demolition, diesel locomotives, and rail-car coupling. None of these activities are anticipated to occur with construction or operation of the proposed project. Vibration from construction activities could be detected at the closest sensitive land uses, especially during movements by heavy equipment or loaded trucks and during some paving activities (if they were to occur).

Construction of the proposed project could result in the generation of groundborne vibration. This construction vibration impact analysis assesses the potential for building damages using vibration levels in peak particle velocity (PPV) (in/sec). Typical vibration levels at distances of 100 feet and 300 feet are summarized by Table 4.P. The closest existing sensitive receptors are located approximately 150 feet from construction activity. At this distance, vibration levels would not be expected to exceed any significant threshold levels for annoyance or damage. Therefore, construction-related vibration impacts would be less than significant, and no mitigation is required.

Table 4.P: Typical Vibration Levels During Construction

Equipment	PPV (in/sec)	
	100 feet	300 feet
Bulldozer (large)	0.0110	0.00600
Bulldozer (small)	0.0004	0.00019
Loaded Truck	0.0100	0.00500
Jackhammer	0.0050	0.00200
Vibratory Roller	0.0300	0.01300
Caisson Drilling	0.0100	0.00600

Source: WJV Acoustics, Inc. (2021).

Once operational, it is not expected that ongoing operational activities would result in any vibration impacts at nearby sensitive uses. Activities involved in trash bin collection could result in minor on-site vibrations as the bin is placed back onto the ground. Such vibrations would not be expected to be felt at the closest off-site sensitive uses. As such, operational vibration impacts would be less than significant, and no mitigation is required.

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 2 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 closest airport to the project site is the Hanford Municipal Airport, located approximately 1.5 miles southeast of the project site. Aircraft noise is occasionally audible at the project site; however, no portion of the project site lies within the 60 dBA CNEL noise contours of any public airport. Therefore, the proposed project would not result in the exposure of people residing or working in the project area to excessive noise levels. This impact would be less than significant, and no mitigation is required.

4.14 POPULATION AND HOUSING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

The proposed project would include medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, memory care, skilled nursing, and assisted living uses, and multi-family residential uses. The project site does not currently contain any permanent residents in the existing condition. As such, implementation of the proposed project would potentially result in an increase in residents of the City. The proposed project would result in the development of 90 multi-family residential apartment units, which would result in approximately 280 additional residents based on the estimated 3.11 persons per household[35] in Hanford. The skilled nursing, and assisted living uses are not a typical residential use and would likely attract existing residents that already live in the City and surrounding areas rather than inducing new population growth from outside the area. Nevertheless, this analysis assumes the facility would house one resident per unit. Therefore, these facilities would house 139 residents. Therefore, the proposed project would add up to 419 new residents on the project site. The addition of 419 new residents represents 0.7 percent of Hanford's 2021 population of 58,496.[36]

During project operation, the proposed project would also generate new employment. According to the most recently data published by the U.S. Census Bureau, the City of Hanford had approximately 58.8 percent of the population within the civilian labor force (approximately 34,396 individuals employed).[37] Therefore, because the region's existing labor force already includes a large number of people employed, it is reasonable to assume that the proposed project's employees would most likely be comprised of individuals who already live in the general area. As such, it is unlikely that these employment opportunities would cause employees to relocate their residences to be close to

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35 Kings County and Cities of Avenal, Corcoran, Hanford and Lemoore. 2016. *2016-2024 Housing Element*. January. Website: https://cms6.revize.com/revize/hanfordca/document_center/Planning/Plans/Housing%20Element%20approved%20by%20HCD_2016-03-31%20final.pdf (accessed March 2023).

36 U.S. Census Bureau. 2022. QuickFacts Hanford City, California. Website: census.gov/quickfacts/hanfordcitycalifornia (accessed March 2023).

37 Ibid.

the project site, thereby inducing growth within the City. Population growth in the area as a result of on-site employment opportunities would be negligible.

All utilities infrastructure, including sewer and water facilities and storm drains, exists in the immediate vicinity of the project site and would be extended to the project site. These existing utility and service systems have adequate capacity to serve the proposed project (refer to Section 4.19, below). Therefore, the proposed project would not result in significant population growth as a result of project implementation. Impacts would be less than significant.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No housing is currently present on the project site, and therefore, there are no people living on the project site that would be displaced by the proposed project. Conversely, the project would result in the development of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, skilled and nursing and assisted living uses, and multi-family residential uses. Therefore, there would be no impacts related to the displacement of substantial numbers of people or housing units, and no mitigation is required.

4.15 PUBLIC SERVICES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i. Fire protection?	☐	☐	☒	☐
ii. Police protection?	☐	☐	☒	☐
iii. Schools?	☐	☐	☒	☐
iv. Parks?	☐	☐	☒	☐
v. Other public facilities?	☐	☐	☒	☐

a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

i. Fire protection?

Fire suppression, emergency medical and rescue services, and other life safety services are provided to the project area and the site by the Fire Department. There are three fire stations within the City, with the closest to the project site being Fire Station 3 at 1070 S. 12th Street, Hanford, approximately 1.5 miles south of the project site.

As noted above, the proposed project would result in an incremental increase in the population of the City and therefore incrementally increase the demand for emergency fire services and emergency medical services. However, the proposed project would be required to comply with all applicable codes for fire safety and emergency access. In addition, the Fire Department would also review the site plans and fire access plan for the proposed project to ensure that adequate emergency access is provided prior to issuance of a building permit.

The Fire Department would provide services to the project site and would not require additional firefighters to serve the proposed project. The construction of a new or expanded fire station would also not be required. The proposed project would not result in a significant impact on the physical environment due to the incremental increase in demand for fire protection and life safety services, and the potential increase in demand for service is not expected to adversely affect existing response times to the site or within the City. In addition, the project applicant would be required to pay development impact fees for fire facilities, which are charged to all new development to support the needs for fire protection. Therefore, with payment of development impact fees, construction and operation of the proposed project would have a less-than-significant impact on fire protection and safety services and facilities.

ii. Police protection?

The City of Hanford Police Department (Police Department) provides police protection to the project area and project site. The Police Department is located at 425 N. Irwin Street, approximately 1.4 miles northeast of the project site. Development of the proposed project would increase the population on the project site and incrementally increase demand for emergency police services to the project site. However, the Police Department would continue to provide service to the project site and would not require additional officers to serve the project site. The construction of new or expanded police facilities would not be required. In addition, the project applicant would be required to pay development impact fees for police facilities, which are charged to all new development to support the needs for police protection. Therefore, with payment of development impact fees, the proposed project would not result in a substantial adverse impact associated with the provision of additional police facilities or services, and impacts to police services represent a less-than-significant impact.

iii. Schools?

There are six elementary school districts and one high school district within Hanford, including Hanford Joint Union High School District, Hanford Elementary School District, Pioneer Union Elementary School District, Kings River-Hardwick Union Elementary School District, Kit Carson Union Elementary School District, Lakeside Union Elementary School District, and Armona Union Elementary School District. There are also private schools that provide educational services.

The estimated number of students the proposed project would generate is derived by multiplying the number of students per dwelling unit (the student yield factor) by the number of dwelling units in the proposed project (90 new units). The California State Allocation Board Office of Public-School Instruction reports that the Statewide student yield factor of 0.7 student per dwelling unit is applicable for unified school districts. Applying the Statewide average student yield factor, the proposed project would generate 63 students.

Senate Bill 50 (SB 50), which revised the existing limitation on developer fees for school facilities, was enacted as urgency legislation which became effective on November 4, 1998, as a result of the California voters approving a bond measure (Proposition 1A). SB 50 established a 1998 base amount of allowable developer fees (Level One fee) for residential construction (subject to adjustment) and prohibits school districts, cities, and counties from imposing school impact mitigation fees or other requirements in excess or in addition to those provided in the statute.

The project sponsor would be required to pay Hanford Joint Union High School District school impact fees prior to issuance of a certificate of occupancy. The Hanford Joint Union High School District is responsible for implementing the specific methods for mitigating school impacts under the Government Code. These fees would be directed towards maintaining adequate service levels, which would ensure that any impact to schools that could result from the proposed project would be offset by development fees, and in effect, reduce potential impacts to a less-than-significant level.

iv. Parks?

Development of the proposed project could increase the use of parks within the vicinity of the project site. However, this increase in use is not expected to adversely affect the physical conditions of local and regional open space areas or recreational facilities or require the provision of new parks or facilities. Specifically, the proposed project is anticipated to increase the City population by less than one percent. The proposed project would not result in a substantial increase in demand for park or recreation services in the vicinity, such that new facilities would be required to serve the project. In addition, the project applicant would be required to pay development impact fees for parks and recreation facilities. Therefore, with payment of development impact fees, the proposed project would have a less-than-significant impact related to the provision of park and recreational facilities.

v. Other public facilities?

Development of the proposed project could also increase demand for other public services, including libraries, community centers, and public health care facilities. However, due to the minimal increase in population, the proposed project would not result in a substantially increase the use of these facilities, such that new facilities would be needed to maintain service standards, as these facilities are not currently overused and have capacity to serve new demand. In addition, the project applicant would be required to pay development impact fees, which would ensure that impacts to other public facilities would be less than significant.

4.16 RECREATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

As discussed in Section 4.15, Public Services, residents of the proposed project would be expected to use local parks and community facilities within the City as well as regional recreational facilities. Although the proposed project would incrementally increase use of these facilities, this minor increase in use is not expected to result in substantial physical deterioration of local parks, trails, and community centers and this impact would be less than significant. Specifically, the proposed project is anticipated to increase the City's population by less than one percent and these facilities are anticipated to have capacity to serve this minimal increase in demand. In addition, the project applicant would be required to pay development impact fees for parks and recreation facilities. Therefore, with payment of development impact fees, the proposed project would have a less-than-significant impact on existing parks or other recreational facilities.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The proposed project would involve development of the project site with residential uses. The proposed project does not include or require the construction or expansion of existing public recreational facilities. Therefore, development of the proposed project and associated recreational opportunities for use by project residents would not result in additional environmental effects beyond those described in this document, and no impact would occur.

4.17 TRANSPORTATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b. Conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?	☐	☐	☒	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d. Result in inadequate emergency access?	☐	☐	☒	☐

a. Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

This section is based on the Traffic Impact Study (TIS) prepared for the proposed project.[38] The TIS is included as Appendix F.

When preparing a TIS, guidelines set by affected agencies are followed. In analyzing street and intersection capacities the LOS methodologies are applied. LOS standards are applied by transportation agencies to quantitatively assess a street and highway system's performance. In addition, safety concerns are analyzed to determine the need for appropriate mitigation resulting from increased traffic near sensitive uses, the need for dedicated ingress and egress access lanes to the project, and other evaluations such as the need for signalized intersections or other improvements. Guidelines incorporated in the Highway Capacity Manual (HCM), 6th Edition, published in 2016 were also used in the development of this TIS. The study area for the TIS included the following study intersections and roadway segments.

Intersections

1. 12th Avenue/Glendale Avenue
2. 12th Avenue/SR-198 westbound (WB) Ramps
3. 12th Avenue/SR-198 eastbound (EB) Ramps
4. Campus Drive/Lacey Boulevard
5. Campus Drive/7th Street
6. Campus Drive/6th Street
7. 11th Avenue/Lacey Boulevard
8. 11th Avenue /7th Street
9. 11th Avenue/6th Street
10. 11th Avenue/5th Street
11. 11th Avenue/4th Street-SR-198 WB On Ramp
12. 11th Avenue/3rd Street-SR-198 EB Off Ramp

[38] VRPA Technologies, Inc. 2020. *Draft Hanford Place Development Traffic Impact Study*. December.

Segments

1. Lacey Boulevard
    - 12th Avenue to Campus Drive
    - Campus Drive to 11th Avenue
    - 7th Street
    - Campus Drive to 11th Avenue
2. 6th Street
    - Campus Drive to 11th Avenue
3. Glendale Avenue
    - East of 12th Avenue
4. 5th Avenue
    - West of 11th Avenue
5. Campus Drive
    - Lacey Boulevard to Glendale Avenue

The TIS includes the LOS analysis for the following traffic scenarios:

- Existing Conditions
- Existing Plus Project
- Near-Term Plus Project
- Cumulative Year 2042 Without Project
- Cumulative Year 2042 Plus Project

Existing Traffic Counts and Roadway Geometrics. The first step toward assessing project traffic impacts is to assess existing traffic conditions. Existing traffic counts were estimated considering the Kings County Association of Governments (KCAG) travel model and historic traffic counts in the study area given the COVID-19 pandemic. The methodology used for the development of existing traffic counts included the following:

- A comparison of the KCAG base year and future year travel model showed that the growth in the study area is approximately 2 percent per year. The 2 percent per year growth rate was applied to historical average daily trip (ADT) counts collected in the study area to estimate Year 2020 pre-COVID conditions.

- The estimated pre-COVID year 2020 ADT values (obtained using the 2 percent per year growth rate) were compared to October 2020 ADT values. Results of the comparison indicated that traffic counts taken in October 2020 ADT (i.e., during COVID) should be increased by a factor of 1.30 to estimate 2020 pre-COVID levels.

- Where intersection turning movement counts in years prior to 2020 are available, a 2 percent per year growth rate was applied to estimate year 2020 conditions.

- Where intersection turning movement counts are not available in years prior to 2020, a factor of 1.3 was applied to the October 2020 turning movement counts collected in the study area.

City of Hanford Level of Service Policies. The City of Hanford adopts minimum levels of service to control congestion that may result as new development occurs.

The City of Hanford General Plan Circulation Element states: "The City of Hanford has adopted an overall LOS standard of C with peak hour LOS standard of D acceptable in some instances. Due to the nature of the roadway system, improvements to existing developed areas are extremely difficult. As a result, there may be instances where a lower LOS is acceptable."

The City of Hanford General Plan Objective CI 2 states: "Provide timely and effective means of programming and constructing street and highway improvements to maintain an overall Level of Service of "C", with a peak hour Level of Service of "D" as defined in the HCM (published by the Transportation Research Board of the National Research Council) or better unless the City's design considerations or other public health, safety, or welfare factors determine otherwise."

The City of Hanford General Plan Policy CI 2.2 states: "Street improvements shall be prioritized with emphasis on current and forecasted service levels. Roadways experiencing or forecasted to experience conditions less than Level-of-Service "D" shall require improvements, unless the City's design considerations or other public health, safety or welfare factors determine otherwise."

Caltrans Level of Service Policies. With the changes brought about by SB 743 (described further in 4.17.1.b below), Caltrans no longer uses LOS to determine the need for transportation improvements. Instead, the focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020, and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance was used in determining the need for roadway improvements on Caltrans facilities.

Project Trip Generation. To assess potential impacts that the project may have on the surrounding roadway network, the first step was to determine project trip generation. Project trip generation is identified in Table 4.Q based on trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition) and the ITE Trip Generation Handbook (3rd Edition).

As discussed in Chapter 3.0, Project Description, 41,500 square feet of medical/commercial uses is currently proposed. However, the TIS evaluated 114,000 square feet of medical/commercial uses. As such, the proposed project would generate fewer trips than analyzed in the TIS/proposed project trip generation estimate. Thus, this analysis evaluates a project with higher trip generation potential. Therefore, this analysis can be considered conservative.

Intersection Capacity Analysis. Intersection LOS analysis was conducted using the Synchro software program. Synchro supports HCM methodologies and is deemed an acceptable program by City of Hanford staff for assessment of traffic impacts. LOS can be determined for both signalized and unsignalized intersections. Table 4.R indicates the ranges in the amounts of average delay for a vehicle at signalized and unsignalized intersections for the various levels of service ranging from LOS "A" to "F".

Table 4.Q: Project Trip Generation

Land Use	Average Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Ambulatory Surgery Center	148	46	13	59	9	21	30
Specialty Clinic	475	36	10	46	13	31	44
Medical Office Building	869	51	14	65	24	62	86
Psychiatric Health Facility	56	12	10	22	10	12	22
Hotel & Conference Center	758	28	19	47	27	26	53
Nursing College	709	55	17	72	32	33	65
Skilled Nursing Facility	363	23	7	30	13	19	32
Memory Care	229	15	4	19	9	12	21
Assisted Living Facility	144	10	3	13	5	12	17
Multi-Family Apartment	640	10	33	43	34	20	54
Medical/ Commercial	3,934	234	66	300	112	288	400
Subtotal Trip Generation	**8,325**	**520**	**196**	**716**	**288**	**536**	**824**
Internal Vehicle Trips (10 percent)	**833**	**52**	**20**	**72**	**29**	**54**	**82**
Total External Trip Generation	**7,493**	**468**	**176**	**644**	**259**	**482**	**742**

Source: VRPA Technologies, Inc. (2020).

Table 4.R: Relationship of Delay to Level of Service

Level of Service	Signalized Intersections Average Total Delay (seconds/vehicle)	Unsignalized Intersections Average Total Delay (seconds/vehicle)
A	≤10.0	0.0-10.0
B	>10.0-20.0	>10.0-15.0
C	>20.0-35.0	>15.0-25.0
D	>35.0-55.0	>25.0-35.0
E	>55.0-80.0	>35.0-50.0
F	>80.0	>50.0

Source: *Highway Capacity Manual*, 6th Edition (Transportation Research Board 2016).

When an unsignalized intersection does not meet acceptable LOS standards, the investigation of the need for a traffic signal shall be evaluated. The latest edition of the California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) introduces standards for determining the need for traffic signals. The California MUTCD indicates that the satisfaction of one or more traffic signal warrants does not in itself require the installation of a traffic signal. In addition to the warrant analysis, an engineering study of the current or expected traffic conditions should be conducted to determine whether the installation of a traffic signal is justified. The California MUTCD Peak Hour Warrant (Warrant 3) was used to determine if a traffic signal is warranted at unsignalized intersections that fall below current LOS standards.

Table 4.S shows the intersection LOS for the existing conditions. Results of the analysis show that the 12th Avenue at Glendale Avenue intersection currently exceeds the City of Hanford's minimum LOS criteria during the PM peak hour. Table 4.S also provides the intersection LOS analysis for the study intersections for Existing Plus Project Scenario, Near-Term Traffic Conditions, and Cumulative Year 2042 Plus Project Traffic Conditions.

Table 4.S: Intersection Operations

Intersection	Peak Hour	Existing Without Project		Existing Plus Project		Near-Term Plus Project		Cumulative Year 2042 Without Project		Cumulative Year 2042 Plus Project	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. 12th Avenue / Glendale Avenue[1]	AM	22.7	C	30.2	D	**37.2**	**E**	**74.4**	**F**	**154.4**	**F +**
	PM	**100.4**	**F+**	**184.6**	**F +**	**269.9**	**F +**	**++**	**F**	**++**	**F +**
2. 12th Avenue / SR-198 WB Ramps[2]	AM	13.8	B	13.7	B	14.5	B	18.8	B	19.9	B
	PM	17.8	B	19.4	B	23.0	C	64.5	E	75.1	E
3. 12th Avenue / SR-198 EB Ramps[2]	AM	11.9	B	12.5	B	12.7	B	13.2	B	13.7	B
	PM	13.0	B	13.6	B	14.3	B	19.0	B	20.1	C
4. Campus Drive / Lacey Boulevard[2]	AM	25.0	C	25.2	C	25.4	C	25.7	C	25.5	C
	PM	28.0	C	29.2	C	31.4	C	52.2	D	52.9	D
5. Campus Drive / 7th Street[3]	AM	9.9	A	11.9	B	12.6	B	12.1	B	15.0	B
	PM	15.6	C	23.7	C	31.8	D	**92.9**	**F**	**146.9**	**F**
6. Campus Drive / 6th Street[1]	AM	10.4	B	13.3	B	13.6	B	10.7	B	13.1	B
	PM	10.6	B	13.9	B	14.3	B	11.5	B	14.7	B
7. 11th Avenue / Lacey Boulevard[2]	AM	20.4	C	20.3	C	21.0	C	25.3	C	25.9	C
	PM	27.5	C	28.5	C	31.6	C	49.9	D	52.7	D
8. 11th Avenue / 7th Street[2]	AM	18.9	C	18.9	B	19.7	B	24.2	C	24.4	C
	PM	28.8	C	29.0	C	31.8	C	**55.6**	**E**	**57.6**	**E**
9. 11th Avenue / 6th Street[1]	AM	12.6	B	12.7	B	13.3	B	17.1	C	17.3	C
	PM	17.4	C	18.1	C	20.6	C	**74.3**	**F**	**83.6**	**F**
10. 11th Avenue / 5th Street[2]	AM	4.9	A	9.6	A	9.7	A	6.5	A	10.7	B
	PM	121	B	18.1	B	19.5	B	23.8	C	42.3	D
11. 11th Avenue / 4th Street-SR-98 WB On Ramp[2]	AM	10.0	B	15.3	B	15.9	B	16.4	B	20.8	C
	PM	12.7	B	14.6	B	15.6	B	21.0	C	28.4	C
12. 11th Avenue / 3rd Street-SR 198-EB Off Ramp[2]	AM	18.6	B	21.0	C	22.9	C	27.0	C	30.2	C
	PM	25.1	C	30.6	C	35.4	D	76.3	E	97.4	F

Source: VRPA Technologies, Inc. (2020).
Notes:
Bold denotes LOS standard has been exceeded.
+ Meets peak hour signal warrants.
++ Delay Exceeds 300 seconds.
[1] Two-way stop sign
[2] Signalized
[3] All-way stop sign

Results of the analysis show that the proposed project contribute to an unacceptable LOS at five of the study intersections when comparing the Cumulative Year 2042 scenarios. Potential intersection improvements are discussed below.

12th Avenue at Glendale Avenue. Installation of a traffic signal would alleviate LOS deficiencies at the intersection for all study scenarios. However, providing a traffic signal at this location is not practical given the close spacing of adjacent intersections. In lieu of the traffic signal, dual right turn lanes for the eastbound and westbound approaches to the intersection should be considered to alleviate queuing at the eastbound and westbound approaches.

Campus Drive at 7th Street. Installation of a traffic signal at Campus Drive at 7th Street would improve the intersection to meet the City of Hanford's acceptable LOS standard of 'D' for the Cumulative Year 2042 Plus Project scenario.

11th Avenue at 7th Street. Providing additional turning movement lanes along 11th Avenue and 7th Street is not possible due to design constraints or infeasible/impractical due to the presence of commercial development that currently exists along the north and south side of 7th Street.

11th Avenue at 6th Street. This intersection is forecasted to operate at unacceptable LOS 'F' during the PM peak hour under Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project conditions; however, this intersection does not meet the peak hour traffic signal warrant because the minor approaches do not carry enough traffic to justify signalization. Therefore, no improvements are recommended for the project's contribution of traffic at the intersection for the Cumulative Year 2042 Plus Project condition.

12th Avenue at SR-198 WB Ramps. Providing additional turning movement lanes at the 12th Avenue and SR -98 WB Ramps intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the north side of the SR-198 WB Ramps. As noted above, Caltrans no longer uses LOS to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

Campus Drive at 7th Street. Providing additional turning movement lanes at the 11th Avenue and 3rd Street-SR-198 EB Off Ramp intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the south side of 3rd Street and the SR-198 EB Off Ramp. As above, Caltrans no longer uses LOS to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

Intersection operations with these potential improvements is shown in Table 4.T below. As shown in Table 4.T, the intersection of 12th Avenue at Glendale Avenue would be above the City's standard of LOS D standard; however, the City acknowledges in General Plan Objective CI 2 and Policy CI 2.2, that there may be instances where design considerations or other public health, safety, or welfare factors determine otherwise. Therefore, since additional improvements are not recommended due design considerations, impacts to intersection LOS would be less than significant. No mitigation is required.

Roadway Segment Analysis. According to the HCM, LOS is categorized by two parameters of traffic: uninterrupted and interrupted flow. Uninterrupted flow facilities do not have fixed elements such as traffic signals that cause interruptions in traffic flow. Interrupted flow facilities do have fixed elements that cause an interruption in the flow of traffic, such as stop signs and signalized intersections along arterial roads. A roadway segment is defined as a stretch of roadway generally located between signalized or controlled intersections.

Table 4.T: Intersection Operations with Improvements

Intersection	Peak Hour	Existing Plus Project		Near-Term Plus Project		Cumulative Year 2042 Plus Project	
		Delay	LOS	Delay	LOS	Delay	LOS
1. 12th Avenue / Glendale Avenue	AM	**30.2**	**D**	**37.2**	**E[1]**	**154.4**	**F[1]**
	PM	**184.6**	**F[1]**	**269.9**	**F[1]**	**++**	**F[1]**
2. 12th Avenue / SR-198 WB Ramps	AM	-	-	-	-	19.9	B
	PM	-	-	-	-	75.1	E[2]
5. Campus Drive / 7th Street	AM	-	-	-	-	12.8	B
	PM	-	-	-	-	20.4	C
8. 11th Avenue / 7th Street	AM	-	-	-	-	24.4	C
	PM	-	-	-	-	57.6	E[2]
9. 11th Avenue / 6th Street	AM	-	-	-	-	17.3	C
	PM	-	-	-	-	83.6	F[3]
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	AM	-	-	-	-	30.2	C
	PM	-	-	-	-	97.4	F[2]

Source: Source: VRPA Technologies, Inc. (2020).
Notes:
Bold denotes LOS standard has been exceeded.
[1] Installation of a traffic signal would alleviate LOS deficiencies at the intersection. A traffic signal is not recommended given the close spacing of adjacent intersections.
[2] Improvements to the intersection aren't recommended given the presence of abutting commercial development at the intersection.
[3] Intersection does not meet the peak hour traffic signal warrant.
++ Delay exceeds 300 seconds.

Segment LOS is important in order to understand whether the capacity of a roadway can accommodate future traffic volumes. The performance criteria used for evaluating volumes and capacities on the road and highway system for this study were estimated using the Modified HCM-Based LOS Tables which are widely accepted throughout the central valley, including Kings County. The tables consider the capacity of individual road and highway segments based on numerous roadway variables (design speed, passing opportunities, signalized intersections per mile, number of lanes, saturation flow, etc.). These variables were identified and applied to reflect segment LOS conditions. Street segment capacity was determined using information shown in Table 4.U, which comes from the Modified Arterial Level of Service Tables included in Appendix A of the TIS.

Table 4.U: Peak Hour Two-Way Volumes

Level of Service					
Lanes	Division	B	C	D	E
2	Undivided	N/A	324	1,125	1,521
2	Divided	N/A	340	1,181	1,597
4	Undivided	77	2,083	2,763	2,890
4	Divided	81	2,205	2,925	3,060
6	Divided	135	3,339	4,401	4,617

Source: VRPA Technologies, Inc. (2020).

Results of the segment analysis along the existing street and highway system are reflected in Table 4.V. Table 4.V also shows the results of the analysis.

Table 4.V: Segment Operations

Street Segment	Peak Hour	Existing		Existing Plus Project		Near-Term Plus Project		Cumulative Year 2042 Without Project		Cumulative Year 2042 Plus Project	
		Volume	LOS	Volume	LOS	Volume	LOS	Volume	LOS	Volume	LOS
Lacey Boulevard											
12th Avenue to Campus Drive	AM	855	C	919	C	990	C	1,322	C	1,386	C
	PM	1,693	C	1,767	C	1,907	C	2,617	D	2,691	D
Campus Drive to 11th Avenue	AM	963	C	1,027	C	1,107	C	1,489	C	1,553	C
	PM	1,873	C	1,947	C	2,101	C	2,896	D	**2,970**	**E**
7th Street											
Campus Drive to 11th Avenue	AM	346	D	378	D	407	D	535	D	567	D
	PM	743	D	780	D	841	D	**1,149**	**E**	**1,186**	**E**
6th Street											
Campus Drive to 11th Avenue	AM	127	C	127	C	137	C	196	C	196	C
	PM	142	C	142	C	154	C	220	C	220	C
Glendale Avenue											
East of 12th Avenue	AM	130	C	323	C	334	D	201	C	394	D
	PM	163	C	385	D	399	D	252	C	474	D
5th Avenue											
West of 11th Avenue	AM	101	C	359	D	367	D	156	C	414	D
	PM	464	D	760	D	799	D	717	D	1,014	D
Campus Drive											
Lacey Boulevard to Glendale Avenue	AM	251	C	AM	380	D	400	D	388	D	517
	PM	393	D	PM	541	D	574	D	608	D	756

Source: VRPA Technologies, Inc. (2020).
Notes:
Bold denotes LOS standard has been exceeded.

As indicated in Table 4.V, two study roadway segments would exceed LOS standards in the Cumulative year 2042 scenarios. Potential roadway segments improvements are discussed below.

Lacey Boulevard between Campus Drive and 11th Avenue. Providing additional travel lanes along Lacey Boulevard is not possible due to design constraints or infeasible/impractical due to the presence of retail development that currently exists along the north and south side of Lacey Boulevard. In addition, accommodating additional travel lanes along Lacey Boulevard could result in the elimination of parking along Lacey Boulevard.

7th Street between Campus Drive and 11th Avenue. Restriping 7th Street between Campus Drive and 11th Avenue to provide two-way left turn lane with removal of parking as necessary would improve capacity on 7th Street Campus Drive and 11th. However, providing additional travel lanes along 7th Street is not possible due to right-of-way constraints.

Roadway operations with these potential improvements is shown in Table 4.W below. As shown in Table 4.W, Lacey Boulevard between Campus Drive and 11th Avenue and 7th Street between Campus Drive and 11th Avenue would be above the City's standard of LOS D standard; however, the City acknowledges in General Plan Objective CI 2 and Policy CI 2.2, that there may be instances where design considerations or other public health, safety, or welfare factors determine otherwise. Therefore, since additional improvements are not recommended due design considerations, impacts to roadway segment LOS would be less than significant. No mitigation is required.

Table 4.W: Segment Operations with Improvements

Street Segment	Peak Hour	Cumulative Year 2042 Plus Project	
		Volume	LOS
Lacey Boulevard			
Campus Drive to 11th Avenue	AM	1,553	C
	PM	**2,970**	**E[1]**
7th Street			
Campus Drive to 11th Avenue	AM	567	C
	PM	**1,186**	**E[1]**

Source: VRPA Technologies, Inc. (2020).
Notes:
Bold denotes LOS standard has been exceeded.
[1] Capacity increasing improvements to the roadway segment aren't recommended given the presence of abutting commercial development.

b. Would the project conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?

On December 28, 2018, the California Office of Administrative Law cleared the revised *State CEQA Guidelines* for use. Among the changes to the guidelines was removal of vehicle delay and level of service from consideration under CEQA. With the adopted guidelines, transportation impacts are to be evaluated based on a project generated VMT.

The City has recently adopted its SB 743 guidelines – City of Hanford VMT Thresholds and Implementation Guidelines (guidelines), November 2022. Therefore, the project VMT analysis was conducted using the methodology and significant threshold criteria identified in the guidelines. As previously mentioned, the project includes residential, multiple medical uses, and commercial land uses. As per the guidelines, mixed-use projects should be evaluated separately for each component of the project using the applicable VMT metric. The VMT analysis is based on the Hanford Place Medical Mixed-use Development Project VMT Analysis Memorandum,[39] which is included as Appendix G.

The guidelines also provide screening criteria to screen out land use projects from a detailed VMT analysis. As per the guidelines, mixed-use projects should be evaluated separately for each component of the project using applicable VMT metrics. Based on the screening criteria, only the medical/commercial uses component of the project can be screened out of detailed VMT analysis

39 LSA. 2023. *Hanford Place Medical Mixed-use Development Project Vehicle Miles Traveled (VMT) Analysis Memorandum*. March.

since the project would include less than 55,000 square feet of retail uses. However, the medical/ commercial uses component was included in the project model run to appropriately account for the internal capture that will occur due to the mixed-use nature of the project. Given that the project land uses other than medical/commercial uses cannot be screened out, a detailed VMT analysis was conducted for these land uses.

For projects that require a detailed VMT analysis, the guidelines recommend use of KCAG travel demand model to conduct the VMT analysis. Therefore, the KCAG model was used for the VMT evaluation of the project. Numerical values for the regional thresholds (VMT per capita, VMT per employee, and VMT per service population) were obtained from the guidelines document – Table E: Significance Thresholds for VMT Analysis.

Table 4.X shows the result of the VMT analysis. As shown in Table 4.X, the project VMT per capita for residential component of the project is 39.9 percent lower than the regional threshold. Similarly, the project VMT per employee for the memory care, assisted living, and skilled nursing facility uses is 62.7 percent lower than the corresponding regional threshold. Also, the VMT per service population for rest of non-residential uses (except medical/commercial uses) is 43.6 percent lower than the regional threshold. As such, based on the project's VMT analysis, the project would not have a significant VMT impact.

Table 4.X: Project VMT Metrics and Regional Threshold Comparison

	Project	City of Hanford Threshold	Difference	Percent Difference
VMT Per Capita	5.40	8.99	-3.59	-39.9%
VMT per Employee	6.32	16.95	-10.63	-62.7%
VMT per Service Population	12.32	21.84	-9.52	-43.6%

Source: Source: LSA (March 2023).
Note: The City of Hanford Threshold was obtained from the City of Hanford VMT Thresholds and Implementation Guidelines, Table E: Significance Thresholds for VMT Analysis (November 2022).

In summary, as described above the proposed project would not exceed the VMT regional average standards. As such the proposed project would not conflict with or be inconsistent with *State CEQA Guidelines* §15064.3, subdivision (b).

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout.

The proposed project would not include any sharp curves or other roadway design elements that would create dangerous conditions. In addition, the project design features would be required to comply with standards set by the City's General Plan and City Engineer. In addition, the proposed project would also be required to submit plans to the City Fire Department for review and approval prior to the issuance of building permits to ensure there are no substantial hazards associated with the project design. Therefore, the proposed project would result in a less-than-significant impact related to hazards associated with a design feature, and no mitigation is required.

d. Would the project result in inadequate emergency access?

Emergency access would be provided to the project site by Glendale Avenue, 5th Street, and Campus Drive. Further, the proposed project's site plan would be subject to review and approval by the City Fire Department to ensure the project includes adequate emergency access. In addition, as discussed in Response 4.9.f, project implementation would not physically interfere with emergency evacuation or the City Fire Department access to and from the project site. Therefore, the proposed project would result in less-than-significant impacts related to emergency access, and no mitigation is required.

4.18 TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project: a. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)? Or	☐	☒	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)? Or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52, which became law on January 1, 2015, provides for consultation with California Native American tribes during the CEQA environmental review process, and equates significant impacts to “tribal cultural resources” with significant environmental impacts.

Public Resources Code (PRC) Section 21074 states that “tribal cultural resources” are:

Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe and are one of the following:

- Included or determined to be eligible for inclusion in the California Register of Historical Resources;
- Included in a local register of historical resources as defined in subdivision (k) of PRC Section 5020.1; or
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

A "historical resource" (PRC Section 21084.1), a "unique archaeological resource" (PRC Section 21083.2(g)), or a "nonunique archaeological resource" (PRC Section 21083.2 (h)) may also be a tribal cultural resource if it is included or determined to be eligible for inclusion in the California Register. The consultation provisions of the law require that a public agency consult with local Native American tribes that have requested placement on that agency's notification list for CEQA projects. Within 14 days of determining that a project application is complete, or a decision by a public agency to undertake a project, the lead agency must notify tribes of the opportunity to consult on the project, should a tribe have previously requested to be on the agency's notification list. California Native American tribes must be recognized by the NAHC as traditionally and culturally affiliated with the project site and must have previously requested that the lead agency notify them of projects. Tribes have 30 days following notification of a project to request consultation with the lead agency.

The purpose of consultation is to inform the lead agency in its identification and determination of the significance of tribal cultural resources. If a project is determined to result in a significant impact on an identified tribal cultural resource, the consultation process must occur and conclude prior to adoption of a Negative Declaration or Mitigated Negative Declaration, or certification of an Environmental Impact Report (PRC Sections 21080.3.1, 21080.3.2, 21082.3).

California Native American tribes traditionally and culturally affiliated with the project site and area were notified of the proposed project on August 5, 2020. Follow-up contact by email and telephone was completed on August 13, 2020. No responses have been received to date.

The proposed excavation of the project sites could potentially result in adverse effects of unanticipated tribal cultural resources. Mitigation Measures CULT-1 through CULT-3 would address unknown archaeological materials and unknown human remains. In addition, in order to address the concerns of the Tachi Yokut Tribe, the City is requiring the implementation of a Burial Treatment Plan as a mitigation measure on all projects. Mitigation Measure CULT-4 would ensure implementation of a Burial Treatment Plan and would reduce impacts to a less than significant level. Therefore, implementation of Mitigation Measures CULT-1 through CULT-4, the proposed project would not have a significant impact on tribal cultural resources.

4.19 UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☒	☐	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

As identified in Section 2.0, Project Description, utilities required to serve the proposed project would include water, sanitary sewer, storm water drainage, electricity, natural gas, and telecommunications infrastructure. Water service, sewage disposal, and refuse collection would be provided by the City of Hanford. In addition, all City utilities (i.e., water, sewer, and storm drain) would be constructed within the proposed right of way. Storm drainage would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards.

Water. The City of Hanford provides water service to the project site. Based on the City's 2020 Urban Water Management Plan (UWMP), the City currently uses local groundwater as the sole source of water supply and does not purchase or import water from any other water suppliers or entities. At the time of preparation of the 2020 UWMP, the City had recorded metered water deliveries to 17,965 accounts. The total amount of metered water delivered in 2020 was 11,714 acre-feet per year (afy). Based on the 2020 UWMP, the total project water demand for customers served by the City of Hanford will be 12,172 afy in 2030.[40]

Short term demand for water may occur during excavation, grading, and construction activities on site. Construction activities would require water primarily for dust mitigation purposes. Water from the existing potable water lines in the vicinity of the project site would be used. Overall, short-term construction activities would require minimal water and are not expected to have any adverse impacts on the existing water system or available water supplies. The proposed project would not require the construction of new or expanded water conveyance, treatment, or collection facilities with respect to construction activities. Therefore, the impacts on water facilities during construction would be less than significant, and no mitigation is required.

According to water demand factors included in CalEEMod, the proposed project is estimated to demand approximately 77,272 gallons per day (gpd) or 86.6 afy of water. Therefore, the estimated increase in water demand associated with the project would represent approximately 0.7 percent of the City's projected potable water demand of 12,172 afy in 2030. The project-generated increase in water demand would be minimal and would fall within the City's existing capacity and available supply. As such, the proposed project would not necessitate new or expanded water entitlements, and the City would be able to accommodate the increased demand for potable water.

Wastewater. The City collects wastewater from residential, commercial, and industrial customers within the City limits and some unincorporated areas. The collected flows are conveyed through a trunk system to a Wastewater Treatment Facility (WWTF) in the south of the City. The City's large industrial area near the southern boundary of the City limits collect flows at a series of lift stations before being pumped north to the WWTF. Based on available data received from City staff, the WWTF treated an average annual wastewater flow of approximately 4,944 afy in 2020.[41]

No significant increase in wastewater flows is anticipated as a result of construction activities on the project site. Sanitary services during construction would be provided by portable toilet facilities, which transport waste off-site for treatment and disposal. Therefore, during construction, potential impacts to wastewater treatment and wastewater conveyance infrastructure would be less than significant, and no mitigation would be required.

As discussed above, according to water demand factors included in CalEEMod, the proposed project is estimated to demand approximately 77,272 gpd or 86.6 afy of water. Wastewater generation associated with the proposed project is not anticipated to exceed the WWTF wastewater treatment requirements or exceed the available capacity to accommodate the increased wastewater flows from the proposed project. The project would be adequately served by the capacity and the existing wastewater conveyance system. As such, the proposed project would not necessitate new or

[40] Hanford, City of. 2021. *2020 Urban Water Management Plan*. October. Website: http://cms6.revize.com/revize/hanfordca/document_center/Public%20Works/Water%20Management/2020%20UWMP,%20Final.pdf (accessed March 2023).

[41] Ibid,

expanded water entitlements, and the City would be able to accommodate the increased demand for potable water.

Stormwater and Drainage Facilities. During construction activities, soil would be exposed and disturbed, drainage patterns would be temporarily altered during grading and other construction activities, and there would be an increased potential for soil erosion and siltation compared to existing conditions. Additionally, during a storm event, soil erosion and siltation could occur at an accelerated rate. As discussed above in Response 4.10.a, Mitigation Measure HYDRO-1 requires compliance with applicable permits and preparation of a SWPPP to identify construction BMPs to be implemented as part of the proposed project to reduce impacts to water quality during construction, including those impacts associated with soil erosion and siltation. Compliance with applicable permit requirements and implementation of the construction BMPs would ensure that the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts, and the impact would be less than significant with implementation of Mitigation Measure HYDRO-1.

Once operational, implementation of the proposed project would result in new internal access roads and surface parking lots, increasing impervious surface area which is not prone to erosion or siltation. The project would also include landscaping that would minimize erosion and siltation. The project site would be designed for storm water to be captured by the storm drain system, which would be collected by an underground conveyance system and delivered to the onsite bio infiltration basin. The basin would be privately held by the owners and would collect both the proposed project and the City right of way. All storm drain facilities would be designed to City standards. The proposed project would also convert the Peoples Ditch to a 66-inch-diameter below-ground pipeline where the ditch currently exists. The depth of the below-ground pipeline would be between two and six feet. Storm drainage facilities would be constructed to City standards, which would ensure that sufficient capacity in the downstream drain systems is available to accommodate any increase in storm runoff from the project site so that on- and off-site flooding does not occur.

With the adherence to Mitigation Measure HYDRO-1, the proposed project would result in less than significant impacts related to the construction or expansion of stormwater drainage facilities. No additional mitigation is required.

Electricity. Electrical power would be supplied to the proposed project site by SCE. SCE provides services through a grid of transmission lines and related facilities. SCE provides electricity to more than 15 million people in a 50,000 sq mi area of Central, Coastal, and Southern California.[42] According to the CEC, total electricity consumption in the SCE service area in 2021 was 103,045 GWh.[43] Total electricity consumption in Kings County was 1,980 GWh or 1,980,705,673 kWh.[44]

[42] Southern California Edison (SCE). 2020. About Us. Website: https://www.sce.com/about-us/who-we-are (accessed March 2023).

[43] California Energy Commission. 2022b. Energy Consumption Data Management Service. Electricity Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/elecbycounty.aspx (accessed March 2023).

[44] Ibid.

Short-term construction activities would be limited to providing power to the staging area and portable construction equipment and would not substantially increase demand for electricity. The heavy equipment used for construction is primarily powered by diesel fuel. Temporary electric power would be provided via existing utility boxes and lines on the project site. Given the limited nature of potential demand for electricity during construction and the availability of existing power lines on the site, there would not be a need to construct new or alter existing electric transmission facilities. Impacts to local regional supplies of electricity would be less than significant, and no mitigation is required.

The proposed project includes connections to the surrounding electrical system on site. Operation of the proposed project would increase on-site electricity demand. As discussed in Response 4.6.a, the estimated potential increased electricity demand associated with the proposed project is 5,345,159 kWh per year. Therefore, electricity demand associated with the proposed project would only be approximately 0.27 percent of Kings County's total electricity demand. Because the proposed project would only represent a small fraction of electricity demand in Kings County, the project would meet Title 24 requirements and incorporate additional energy conservation measures, and there would be sufficient electricity supplies available, energy demand for the proposed project would be less than significant. Therefore, although the proposed project would require the construction of new improvements related to the provision of electricity service, the proposed project would not result in significant environmental impacts and the proposed project's impacts would be less than significant. No mitigation is required.

Natural Gas. The Southern California Gas Company (SoCalGas) is the natural gas service provider for the project site. SoCalGas provides natural gas to approximately 21.8 million people in a 24,000-square-mile service area throughout Central and Southern California, from Visalia to the Mexican border.[45] According to the CEC, total natural gas consumption in the SoCalGas service area in 2021 was 6,755 million therms (2,308 million therms for the residential sector). Kings County consumed approximately 64 million therms or approximately 64,004,283 therms.[46]

Operation of the proposed project would increase on-site natural gas demand. As discussed in Response 4.6.a, the estimated potential increased natural gas demand associated with the proposed project is 116,068 therms per year. Therefore, natural gas demand associated with the proposed project would only be approximately 0.18 percent of Kings County's total natural gas demand. Because the proposed project would only represent a small fraction of electricity demand in Kings County, the project would meet Title 24 requirements and incorporate additional energy conservation measures, and there would be sufficient natural gas supplies available, energy demand for the proposed project would be less than significant. Therefore, although the proposed project would require the construction of new improvements related to the provision of natural gas service, the proposed project would not result in significant environmental impacts and the proposed project's impacts would be less than significant. No mitigation is required.

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45 Southern California Gas Company (SoCalGas). 2020. About SoCalGas. Website: https://www3.socalgas.com/about-us/company-profile (accessed March 2023).

46 California Energy Commission. 2022c. Energy Consumption Data Management Service. Gas Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/gasbycounty.aspx (accessed March 2023).

Telecommunication Facilities. Existing telephone, cable, and internet service lines in the vicinity would serve the project site. Internal to the project site, the project Applicant/Developer would be responsible for constructing adequate telecommunication facility extensions for the proposed project. The reconfiguration of these facilities would occur on site during the site preparation and earthwork phase and are not expected to impact any telephone, cable, or internet services offsite that serve the surrounding areas. Additionally, telecommunication facilities are generally installed concurrently with utility expansions and impacts associated with the expansion of telecommunications facilities are already considered in the air quality, noise, and construction traffic analysis. Therefore, the project impacts associated with the relocation or construction of new or expanded telecommunication facilities and impacts would be less than significant. No mitigation is required.

Summary. The proposed project would not require or result in the relocation or construction of new or expanded facilities for water, wastewater treatment, storm drainage, electric power, natural gas, or telecommunications. With implementation of Mitigation Measure HYDRO-1 included in Section 4.10, Hydrology and Water Quality, the project would not substantially increase demand upon these facilities. Therefore, impacts to these utility facilities would be less than significant.

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Refer to discussion a) of Section 4.10, Hydrology and Water Quality. As discussed above, sufficient water supply would be available to serve the project site. As a result, the project would result in a less-than-significant impact related to water supply.

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The proposed project is not expected to exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

d. Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Solid waste and recycling pickup and disposal in the City of Hanford is provided by the Kings Waste Management Authority (KWMA). The KWRA does not operate an active landfill. Waste is hauled by transfer trucks from the Material Recover Facility (MRF) to the State permitted 320-acre Chemical Waste Management Landfill site in Kettleman Hills, approximately 45 miles west of the MRF. A combined MRF and Transfer Station (TS) was constructed near the old landfill southeast of Hanford. The MRF and TS facility includes a small but complete Household Hazardous Waste collection station.[47] Waste Management Kettleman Hills Landfill is permitted to receive a maximum of 2,000 tons of municipal solid waste per day, but typically receives an average of only about 1,350 tons per

47 Hanford, City of. 2017, op. cit.

day.[48] In addition, Waste Management Kettleman Hills Landfill is currently proposing a facility expansion to extend its hazardous waste operations and increase the capacity at the existing landfill.[49]

Based on the CalEEMod output, operation of the proposed project would generate approximately 5,896 pounds of solid waste per day or about 3 tons of solid waste per day. Given the available capacity at the landfill, the additional solid waste generated by the proposed project is not anticipated to cause the facility to exceed its daily permitted capacity. As such, the project would be served by a landfill with sufficient capacity to accommodate the project's waste disposal needs, and impacts associated with the disposition of solid waste would be less than significant.

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

The proposed project would comply with all federal, State, and local solid waste statutes and/or regulations related to solid waste. Also refer to Response 4.19.d. Therefore, the proposed project would result in a less-than-significant impact related to solid waste regulations.

48 Waste Management, 2021. *Facility Overview*. Website: https://kettlemanhillslandfill.wm.com/fact-sheets/2011/facility-overview.jsp (accessed March 2023).

49 Waste Management, 2019. *Facility Expansion.* Website: kettlemanhillslandfill.wm.com/facility-expansion/index.jsp (accessed March 2023).

4.20 WILDFIRE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

a. Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

Wildland fires occur in geographic areas that contain the types and conditions of vegetation, topography, weather, and structure density susceptible to risks associated with uncontrolled fires that can be started by lightning, improperly managed campfires, cigarettes, sparks from automobiles, and other ignition sources. According to the California Department of Forestry and Fire Protection (CAL FIRE) Very High Fire Hazard Severity Zone (VHFHSZ) Map for Kings County, the project site is not located within a High or Very High Fire Hazard Severity Zone.

The proposed project consists of a mixed-use development on an infill site within the City. As a result, project implementation would not physically interfere with evacuation plans or the City Fire Department access to and from the project site. In addition, the proposed project’s site plan would be subject to review and approval by the City Fire Department to ensure the project includes adequate emergency access. Moreover, since the project site is not located in or near a VHFHSZ nor is it located in or near a State Responsibility Area (SRA), potential impacts associated with emergency access described above would not pertain to wildfire and would more likely be associated with an urban fire or other emergency situations. Therefore, operation of the proposed project would not substantially impair an adopted emergency response plan or emergency evacuation plan. This impact would be less and significant and no mitigation would be required.

b. Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

As stated previously, the project site is not located in or near a VHFHSZ nor is it located in or near a SRA. Therefore, the proposed project would not exacerbate wildfire risks due to slope and prevailing winds, thereby exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. This impact would be less and significant, and no mitigation would be required.

c. Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Utility and infrastructure improvements included as part of the project are described in Section 2.0, Project Description. These improvements would include the installation of water, sanitary sewer, storm water drainage, electricity, natural gas, and telecommunications infrastructure. The project would also include new internal roads and would realign Glendale Avenue at the northwest corner of the Hanford Veterinary Hospital development.

The project site is not located in or near a VHFHSZ nor is it located in or near a SRA. Utility installations and internal roads would not exacerbate fire risk due to the location of the project site in an urban area outside of a designated fire hazard zone. Therefore, the proposed project would not require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment. This impact would be less and significant, and no mitigation would be required.

d. Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Landslides and other forms of mass wasting, including mud flows, debris flows, and soil slips, occur as soil moves downslope under the influence of gravity. Landslides are frequently triggered by intense rainfall or seismic shaking but can also occur as a result of erosion and downslope runoff caused by rain following a fire. As previously discussed in Response 4.7.a, Hanford is located in a stable geologic formation, so the effects of ground shaking on soil stability should be minimal. In addition, the project site is generally level and would not expose people or structures to potential substantial adverse effects associated with landslides. Further, as stated previously, the project site is not located in or near a VHFHSZ nor is it located in or near a SRA. Therefore, the proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes. This impact would be less than significant, and no mitigation would be required.

4.21 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☒	☐	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Implementation of Mitigation Measures CULT-1, CULT-2, CULT-3, CULT-4, and GEO-2 would ensure that potential impacts to historic, archaeological, tribal and paleontological resources that could be uncovered during construction activities would be reduced to a less-than-significant level. Implementation of Mitigation Measures BIO-1 through BIO-5 would ensure that potential impacts to special-status species and modifications to Peoples Ditch would be reduced to a less-than-significant level. Therefore, with the incorporation of mitigation measures, development of the proposed project would not: (1) degrade the quality of the environment; (2) substantially reduce the habitat of a fish or wildlife species; (3) cause a fish or wildlife species population to drop below self-sustaining levels; (4) threaten to eliminate a plant or animal community; (5) reduce the number or restrict the range of a rare or endangered plant or animal; or (6) eliminate important examples of the major periods of California history.

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

The proposed project's impacts would be individually limited and not cumulatively considerable. The potentially significant impacts that can be reduced to a less-than-significant level with implementation of recommended mitigation measures include the topics of biological resources, cultural resources, geology and soils, hydrology and water quality, and noise. For the topic of biological resources, implementation of Mitigation Measures BIO-1 through BIO-5 would ensure that impacts related to special status-species and modification of the Peoples Ditch are reduced to a less-than-significant level. For the topic of cultural resources, potentially significant impacts to archaeological resources would be reduced to less-than-significant levels with implementation of Mitigation Measures CULT-1 and CULT-2 and Mitigation Measures CULT-3 and CULT-4 would reduce potential impacts to human remains to a less than significant level. For the topic of geology and soils, potentially significant impacts related to soil erosion during construction would be reduced to less-than-significant levels with implementation of Mitigation Measure GEO-1 and potentially significant impacts related to paleontological resources would be reduced to less-than-significant levels with implementation of Mitigation Measure GEO-2. For the topic of hydrology and water quality, implementation of Mitigation Measures HYDRO-1 and HYDRO-2 would ensure that potential water quality impacts are reduced to a less-than-significant level. For the topic of noise, impacts would be reduced to a less-than-significant level with implementation of Mitigation Measures NOI-1 through NOI-4.

For the topics of aesthetics, air quality, agricultural and forestry resources, energy, greenhouse gas emissions, hazards and hazardous materials, land use and planning, mineral resources, population and housing, public services, recreation, transportation, tribal cultural resources, utilities and service systems, and wildfire, the project would have no impacts or less-than-significant impacts, and therefore, the project would not substantially contribute to any potential cumulative impacts for these topics. All environmental impacts that could occur as a result of the proposed project would be reduced to a less-than-significant level through the implementation of the mitigation measures recommended in this document.

Implementation of these measures would ensure that the impacts of the project would be below established thresholds of significance and that these impacts would not combine with the impacts of other cumulative projects to result in a cumulatively considerable impact on the environment as a result of project development. Therefore, this impact would be less than significant.

c. *Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

The proposed project would not result in any environmental effects that would cause substantial direct or indirect adverse effects to human beings.

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6.0 REFERENCES

Applied EarthWorks, Inc. 2020. Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California. August.

Bolt Beranek and Newman Inc. 1987. Noise Control for Buildings and Manufacturing Plants.

California Air Resources Board. 2017. California's 2017 Climate Change Scoping Plan. November.

_____. 2022. 2022 Scoping Plan Appendix D Local Actions. November. Website: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf (accessed March 2023).

California Department of Conservation (DOC). 2016. California Important Farmland Finder. Website: maps.conservation.ca.gov/DLRP/CIFF/ (accessed March 2023).

California Department of Fish and Wildlife (CDFW). 2012. *Staff Report on Burrowing Owl Mitigation*. State of California Natural Resources Agency. March 2012.

California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zone in Local Resource Area (LRA). September 20. Website: osfm.fire.ca.gov/media/6689/fhszl06_1_map16.pdf (accessed March 2023).

California Department of Toxic Substances Control (DTSC). 2019. EnviroStor. Website: www.envirostor.dtsc.ca.gov/public (accessed March 2023).

California Department of Transportation (Caltrans). 2017. California Scenic Highways. February. Website: www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=f0259b1ad0fe4093a5604c9b838a486a (accessed March 2023).

California Energy Commission (CEC). 2021. *2021 Integrated Energy Policy Report*. California Energy Commission. Docket Number: 21-IEPR-01.

_____. 2022a. 2020 Integrated Energy Policy Report Update. California Energy Commission. Docket Number: 22-IEPR-01.

_____. 2022b. Energy Consumption Data Management Service. Electricity Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/elecbycounty.aspx (accessed March 2023).

_____. 2022c. Energy Consumption Data Management Service. Gas Consumption by County and Entity. Website: www.ecdms.energy.ca.gov/gasbycounty.aspx (accessed March 2023).

_____. n.d. California Gasoline Data, Facts, and Statistics. Website: www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-gasoline-data-facts-and-statistics (accessed March 2023).

California Environmental Protection Agency (CalEPA). 2019. Government Code Section 65962.5(a). Website: calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/ (accessed March 2023).

Governor's Office of Planning and Research (OPR). 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA. December 2018.

Hanford, City of. 2014. General Plan Background Report - Hanford, California. March. Website: cms6.revize.com/revize/hanfordca/document_center/Planning/General%20Plan/2034%20General%20Plan%20Background%20Report.pdf (accessed March 2023).

_____. 2017. General Plan – City of Hanford, California. April. Website: cms6.revize.com/revize/hanfordc a/document_center/Planning/General%20Plan/2035%20General%20Plan%20Policy%20Document.pdf (accessed March 2023).

_____. 2021. *2020 Urban Water Management Plan*. October. Website: http://cms6.revize.com/revize/hanfordca/document_center/Public%20Works/Water%20Management/2020%20UWMP,%20Final.pdf (accessed March 2023).

_____. 2022. VMT Thresholds and Implementation Guidelines. November.

Kings County and Cities of Avenal, Corcoran, Hanford and Lemoore. 2016. 2016-2024 Housing Element. January. Website: cms6.revize.com/revize/hanfordca/document_center/Planning/General%20Plan/Adopted%20Housing%20Element%20(03-31-2016).pdf (accessed March 2023).

Kings County Association of Governments. 2014. Final Regional Climate Action Plan. May 28. Website: https://www.kingscog.org/vertical/sites/%7BC427AE30-9936-4733-B9D4-140709AD3BBF%7D/uploads/RegionalCAP-GHGAppendices.pdf (accessed March 2023).

Kleinfelder. 2020. Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report Proposed Hanford Place, Medical and Mixed-Use Property Hanford, California. June 9.

LSA Associates, Inc. (LSA). 2020. Biological Resources Assessments Hanford Place Project Kings County, California. May.

_____. 2023. Hanford Place Medical Mixed-use Development Project Vehicle Miles Traveled (VMT) Analysis Memorandum. March.

Mitchell Air Quality Consulting. 2020. Air Quality and Greenhouse Gas Analysis Report Hanford Place Medical and Mixed-Use Project Hanford, California. July 30.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2009. Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA. December 17. Website: www.valleyair.org/Programs/CCAP/12-17-09/3%20CCAP%20-%20FINAL%20LU%20Guidance%20-%20Dec%2017%202009.pdf (accessed March 2023).

_____. 2015. CEQA, Guidance/Policies/Rules, Guidance for Assessing and Mitigating Air Quality Impacts. March 19. Website: www.valleyair.org/transportation/ceqa_idx.htm (accessed March 2023).

_____. 2016. San Joaquin Valley Air Basin. Air Quality Attainment Status.

Southern California Edison (SCE). 2020. About Us. Website: https://www.sce.com/about-us/who-we-are (accessed March 2023).

Southern California Gas Company (SoCalGas). 2020. About SoCalGas. Website: https://www3.socalgas.com/about-us/company-profile (accessed March 2023).

State Water Resources Control Board (SWRCB). 2019. *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* [For Inclusion in the Water Quality Control Plans for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California]. Adopted April 2, 2019. Effective May 28, 2020.

The Hanford Group. 2019. Hanford Place Medical and Mixed Use-Property Proposal.

Transportation Research Board. 2016. Highway Capacity Manual, 6th Edition.

U.S. Census Bureau. 2022. QuickFacts Hanford City, California. Website: census.gov/quickfacts/hanfordcitycalifornia (accessed March 2023).

U.S. Department of Transportation (DOT). 2017. "Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles." Website: www.bts.gov/archive/publications/national_transportation_statistics /table_04_23 (accessed March 2023).

U.S. Energy Information Administration (EIA). 2019. Southern California Daily Energy Report. Website: www.eia.gov/special/disruptions/socal/winter/#commentary (accessed March 2023)

U.S. Fish and Wildlife Service (USFWS). 2011. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance*. Sacramento Fish and Wildlife Office. January 2011.

U. S. Geological Survey. 2000. Operational Guidelines (version 1.0) for Geological Fieldwork in Areas Endemic for Coccidioidomycosis (Valley Fever). Website: pubs.er.usgs.gov/publication/ofr00348 (accessed March 2023).

_____. 2011. Van Gosen, B.S., and Clinkenbeard, J.P. California Geological Survey Map Sheet 59. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Open-File Report 2011-1188. Website: http://pubs.usgs.gov /of/2011/1188/ (accessed March 2023).

VRPA Technologies, Inc. 2020. Draft Hanford Place Development Traffic Impact Study. December.

Waste Management. 2019. Facility Expansion. Website: kettlemanhillslandfill.wm.com/facility-expansion/index.jsp (accessed March 2023).

_____. 2021. *Facility Overview*. Website: https://kettlemanhillslandfill.wm.com/fact-sheets/2011/facility-overview.jsp (accessed March 2023).

WJV Acoustics, Inc. 2021. Acoustical Analysis Hanford Place Hanford, California WJVA Report No. 20-016. May 12.

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APPENDIX A

CALEEMOD OUTPUTS

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Hanford Place Project Custom Report

Table of Contents

5.18.2. Sequestration

5.18.2.1. Unmitigated

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Hanford Place Project
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.40
Precipitation (days)	23.0
Location	36.32149538375269, -119.66421703413741
County	Kings
City	Hanford
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2627
EDFZ	9
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Medical Office Building	72.3	1000sqft	3.09	72,305	0.00	—	—	—
Hotel	105	Room	4.15	100,000	0.00	—	—	—
Junior College (2yr)	35.0	1000sqft	0.95	35,000	0.00	0.00	—	—

Congregate Care (Assisted Living)	139	Dwelling Unit	4.76	123,471	0.00	—	431	—
Apartments Mid Rise	90.0	Dwelling Unit	3.55	76,500	0.00	—	279	—
Other Non-Asphalt Surfaces	5.00	Acre	6.00	0.00	0.00	—	—	—
Parking Lot	1,466	Space	15.6	0.00	170,755	—	—	—
Strip Mall	41.5	1000sqft	2.00	41,500	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.01	59.4	38.8	0.12	1.53	7.79	8.91	1.40	3.97	4.99	—	15,564	15,564	0.35	1.42	16,019
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	53.6	39.9	29.0	0.05	1.12	7.79	8.91	1.02	3.97	4.99	—	5,431	5,431	0.24	0.22	5,451
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	6.71	20.3	18.1	0.03	0.58	2.26	2.84	0.53	0.79	1.33	—	4,820	4,820	0.16	0.31	4,920
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.22	3.70	3.31	0.01	0.11	0.41	0.52	0.10	0.15	0.24	—	798	798	0.03	0.05	815

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	2.01	59.4	38.8	0.12	1.53	7.79	8.91	1.40	3.97	4.99	—	15,564	15,564	0.35	1.42	16,019
2025	1.93	21.0	28.1	0.03	0.70	2.06	2.76	0.65	0.51	1.16	—	5,373	5,373	0.22	0.21	5,450
2026	1.77	20.9	27.0	0.03	0.70	2.06	2.76	0.65	0.51	1.16	—	5,311	5,311	0.22	0.20	5,386
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	1.84	39.9	29.0	0.05	1.12	7.79	8.91	1.02	3.97	4.99	—	5,431	5,431	0.24	0.22	5,451
2025	1.71	21.3	25.0	0.03	0.70	2.06	2.76	0.65	0.51	1.16	—	5,122	5,122	0.24	0.21	5,190
2026	53.6	21.2	24.1	0.03	0.70	2.06	2.76	0.65	0.51	1.16	—	5,066	5,066	0.17	0.21	5,133
2027	53.6	1.26	2.65	< 0.005	0.07	0.37	0.44	0.06	0.09	0.15	—	509	509	0.02	0.02	515
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	1.01	20.3	17.8	0.03	0.58	2.26	2.84	0.53	0.79	1.33	—	4,820	4,820	0.16	0.31	4,920
2025	1.23	15.1	18.1	0.02	0.50	1.45	1.95	0.47	0.36	0.82	—	3,709	3,709	0.16	0.15	3,761
2026	1.54	13.7	15.4	0.02	0.47	1.17	1.64	0.44	0.29	0.73	—	3,131	3,131	0.10	0.12	3,172
2027	6.71	0.16	0.34	< 0.005	0.01	0.05	0.05	0.01	0.01	0.02	—	65.5	65.5	< 0.005	< 0.005	66.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.18	3.70	3.25	0.01	0.11	0.41	0.52	0.10	0.15	0.24	—	798	798	0.03	0.05	815
2025	0.23	2.76	3.31	< 0.005	0.09	0.26	0.36	0.08	0.06	0.15	—	614	614	0.03	0.02	623
2026	0.28	2.51	2.81	< 0.005	0.09	0.21	0.30	0.08	0.05	0.13	—	518	518	0.02	0.02	525
2027	1.22	0.03	0.06	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	10.8	10.8	< 0.005	< 0.005	11.0

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	37.3	19.1	165	0.40	7.96	5.91	13.9	7.69	1.04	8.73	2,041	34,390	36,431	87.5	1.39	39,252
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	32.1	20.5	138	0.38	7.94	5.91	13.9	7.66	1.04	8.70	2,041	32,764	34,806	87.7	1.47	37,598
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	29.4	17.7	105	0.25	2.11	5.91	8.02	2.05	1.04	3.09	1,076	31,371	32,447	83.0	1.42	35,132
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.37	3.22	19.2	0.05	0.39	1.08	1.46	0.37	0.19	0.56	178	5,194	5,372	13.7	0.24	5,817

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	18.0	13.0	86.4	0.20	0.18	5.91	6.08	0.17	1.04	1.21	—	20,234	20,234	1.02	1.20	20,676
Area	19.1	2.96	76.3	0.18	7.55	—	7.55	7.28	—	7.28	1,245	2,490	3,735	5.87	0.01	3,883
Energy	0.17	3.05	2.13	0.02	0.24	—	0.24	0.24	—	0.24	—	11,510	11,510	0.81	0.07	11,550
Water	—	—	—	—	—	—	—	—	—	—	48.8	156	205	5.01	0.12	366
Waste	—	—	—	—	—	—	—	—	—	—	748	0.00	748	74.7	0.00	2,616

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
Total	37.3	19.1	165	0.40	7.96	5.91	13.9	7.69	1.04	8.73	2,041	34,390	36,431	87.5	1.39	39,252
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	15.8	14.8	83.6	0.18	0.18	5.91	6.08	0.17	1.04	1.21	—	18,687	18,687	1.24	1.28	19,102
Area	16.2	2.74	52.5	0.18	7.53	—	7.53	7.26	—	7.26	1,245	2,411	3,655	5.86	< 0.005	3,803
Energy	0.17	3.05	2.13	0.02	0.24	—	0.24	0.24	—	0.24	—	11,510	11,510	0.81	0.07	11,550
Water	—	—	—	—	—	—	—	—	—	—	48.8	156	205	5.01	0.12	366
Waste	—	—	—	—	—	—	—	—	—	—	748	0.00	748	74.7	0.00	2,616
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
Total	32.1	20.5	138	0.38	7.94	5.91	13.9	7.66	1.04	8.70	2,041	32,764	34,806	87.7	1.47	37,598
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	16.1	13.9	79.5	0.19	0.18	5.91	6.08	0.17	1.04	1.21	—	19,124	19,124	1.12	1.24	19,546
Area	13.2	0.72	23.5	0.04	1.70	—	1.70	1.64	—	1.64	280	581	860	1.32	< 0.005	894
Energy	0.17	3.05	2.13	0.02	0.24	—	0.24	0.24	—	0.24	—	11,510	11,510	0.81	0.07	11,550
Water	—	—	—	—	—	—	—	—	—	—	48.8	156	205	5.01	0.12	366
Waste	—	—	—	—	—	—	—	—	—	—	748	0.00	748	74.7	0.00	2,616
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
Total	29.4	17.7	105	0.25	2.11	5.91	8.02	2.05	1.04	3.09	1,076	31,371	32,447	83.0	1.42	35,132
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	2.93	2.53	14.5	0.03	0.03	1.08	1.11	0.03	0.19	0.22	—	3,166	3,166	0.19	0.20	3,236
Area	2.40	0.13	4.30	0.01	0.31	—	0.31	0.30	—	0.30	46.3	96.1	142	0.22	< 0.005	148
Energy	0.03	0.56	0.39	< 0.005	0.04	—	0.04	0.04	—	0.04	—	1,906	1,906	0.13	0.01	1,912
Water	—	—	—	—	—	—	—	—	—	—	8.08	25.8	33.9	0.83	0.02	60.6
Waste	—	—	—	—	—	—	—	—	—	—	124	0.00	124	12.4	0.00	433
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26.6
Total	5.37	3.22	19.2	0.05	0.39	1.08	1.46	0.37	0.19	0.56	178	5,194	5,372	13.7	0.24	5,817

3. Construction Emissions Details

3.1. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	39.9	28.3	0.05	1.12	—	1.12	1.02	—	1.02	—	5,296	5,296	0.21	0.04	5,314
Dust From Material Movement	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	39.9	28.3	0.05	1.12	—	1.12	1.02	—	1.02	—	5,296	5,296	0.21	0.04	5,314
Dust From Material Movement	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	2.73	1.94	< 0.005	0.08	—	0.08	0.07	—	0.07	—	363	363	0.01	< 0.005	364
Dust From Material Movement	—	—	—	—	—	0.53	0.53	—	0.27	0.27	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.50	0.35	< 0.005	0.01	—	0.01	0.01	—	0.01	—	60.1	60.1	< 0.005	< 0.005	60.3
Dust From Material Movement	—	—	—	—	—	0.10	0.10	—	0.05	0.05	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.06	0.97	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	153	153	0.01	0.01	156
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	0.74	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	136	136	0.01	0.01	138
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	9.64	9.64	< 0.005	< 0.005	9.78
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.60	1.60	< 0.005	< 0.005	1.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.3. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.33	48.8	35.3	0.06	1.36	—	1.36	1.23	—	1.23	—	6,598	6,598	0.27	0.05	6,621
Dust From Material Movement	—	—	—	—	—	3.61	3.61	—	1.43	1.43	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	8.03	5.81	0.01	0.22	—	0.22	0.20	—	0.20	—	1,085	1,085	0.04	0.01	1,088
Dust From Material Movement	—	—	—	—	—	0.59	0.59	—	0.23	0.23	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	1.47	1.06	< 0.005	0.04	—	0.04	0.04	—	0.04	—	180	180	0.01	< 0.005	180

Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.04	0.04	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.07	1.10	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	175	175	0.01	0.01	178
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.16	10.5	2.30	0.06	0.17	2.32	2.48	0.17	0.63	0.80	—	8,791	8,791	0.07	1.36	9,220
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.15	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	26.4	26.4	< 0.005	< 0.005	26.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	1.81	0.38	0.01	0.03	0.38	0.40	0.03	0.10	0.13	—	1,446	1,446	0.01	0.22	1,514
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.38	4.38	< 0.005	< 0.005	4.44
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.33	0.07	< 0.005	< 0.005	0.07	0.07	< 0.005	0.02	0.02	—	239	239	< 0.005	0.04	251

3.5. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,398	2,398	0.10	0.02	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,398	2,398	0.10	0.02	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	6.80	5.15	0.01	0.25	—	0.25	0.23	—	0.23	—	863	863	0.04	0.01	866
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	1.24	0.94	< 0.005	0.05	—	0.05	0.04	—	0.04	—	143	143	0.01	< 0.005	143
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.34	0.93	14.3	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	2,260	2,260	0.11	0.08	2,296
Vendor	0.06	1.36	0.67	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	778	778	0.01	0.11	814
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.17	1.15	10.9	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	2,000	2,000	0.13	0.08	2,028
Vendor	0.05	1.44	0.70	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	780	780	0.01	0.11	814
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.43	0.38	4.10	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	747	747	0.04	0.03	758
Vendor	0.02	0.50	0.25	< 0.005	< 0.005	0.07	0.07	< 0.005	0.02	0.02	—	280	280	< 0.005	0.04	293
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.75	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	124	124	0.01	< 0.005	126
Vendor	< 0.005	0.09	0.04	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	46.4	46.4	< 0.005	0.01	48.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.7. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,398	2,398	0.10	0.02	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,398	2,398	0.10	0.02	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	13.5	10.2	0.02	0.49	—	0.49	0.46	—	0.46	—	1,713	1,713	0.07	0.01	1,719
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	2.46	1.86	< 0.005	0.09	—	0.09	0.08	—	0.08	—	284	284	0.01	< 0.005	285
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.26	0.86	13.1	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	2,211	2,211	0.11	0.08	2,246
Vendor	0.05	1.31	0.65	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	764	764	0.01	0.11	799
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.04	1.07	10.0	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	1,958	1,958	0.13	0.08	1,986
Vendor	0.04	1.39	0.68	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	766	766	0.01	0.11	798
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.76	0.66	7.46	0.00	0.00	1.32	1.32	0.00	0.32	0.32	—	1,450	1,450	0.08	0.06	1,472
Vendor	0.03	0.97	0.47	< 0.005	0.01	0.14	0.14	0.01	0.04	0.04	—	546	546	0.01	0.08	570

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.14	0.12	1.36	0.00	0.00	0.24	0.24	0.00	0.06	0.06	—	240	240	0.01	0.01	244
Vendor	0.01	0.18	0.09	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	90.5	90.5	< 0.005	0.01	94.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.9. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,397	2,397	0.10	0.02	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62	18.9	14.3	0.02	0.69	—	0.69	0.64	—	0.64	—	2,397	2,397	0.10	0.02	2,405
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.35	10.7	8.09	0.01	0.39	—	0.39	0.36	—	0.36	—	1,356	1,356	0.05	0.01	1,360
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.06	1.95	1.48	< 0.005	0.07	—	0.07	0.07	—	0.07	—	224	224	0.01	< 0.005	225
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.10	0.72	12.0	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	2,164	2,164	0.11	0.08	2,197
Vendor	0.05	1.27	0.62	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	750	750	0.01	0.11	784
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.97	0.94	9.17	0.00	0.00	1.87	1.87	0.00	0.45	0.45	—	1,917	1,917	0.06	0.08	1,943
Vendor	0.04	1.36	0.65	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	752	752	0.01	0.11	784
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.56	0.48	5.41	0.00	0.00	1.04	1.04	0.00	0.25	0.25	—	1,124	1,124	0.03	0.05	1,141
Vendor	0.03	0.74	0.36	< 0.005	0.01	0.11	0.11	0.01	0.03	0.04	—	425	425	0.01	0.06	443
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.99	0.00	0.00	0.19	0.19	0.00	0.05	0.05	—	186	186	< 0.005	0.01	189
Vendor	< 0.005	0.14	0.07	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	70.3	70.3	< 0.005	0.01	73.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.11. Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	13.3	10.6	0.01	0.58	—	0.58	0.54	—	0.54	—	1,511	1,511	0.06	0.01	1,516
Paving	0.82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	1.82	1.45	< 0.005	0.08	—	0.08	0.07	—	0.07	—	207	207	0.01	< 0.005	208
Paving	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.33	0.27	< 0.005	0.01	—	0.01	0.01	—	0.01	—	34.3	34.3	< 0.005	< 0.005	34.4
Paving	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.53	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	111	111	< 0.005	< 0.005	113

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	15.8	15.8	< 0.005	< 0.005	16.1
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.62	2.62	< 0.005	< 0.005	2.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	1.09	0.96	< 0.005	0.07	—	0.07	0.06	—	0.06	—	134	134	0.01	< 0.005	134
Architectural Coatings	53.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.05	1.05	< 0.005	< 0.005	1.05
Architectural Coatings	0.42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.17	0.17	< 0.005	< 0.005	0.17
Architectural Coatings	0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.19	0.19	1.83	0.00	0.00	0.37	0.37	0.00	0.09	0.09	—	383	383	0.01	0.02	389
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.11	3.11	< 0.005	< 0.005	3.16
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.52	0.52	< 0.005	< 0.005	0.52

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

3.15. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	1.09	0.96	< 0.005	0.07	—	0.07	0.06	—	0.06	—	134	134	0.01	< 0.005	134
Architectural Coatings	53.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	16.7	16.7	< 0.005	< 0.005	16.8
Architectural Coatings	6.68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	2.77	2.77	< 0.005	< 0.005	2.78

Architectu Coatings	1.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.18	0.17	1.69	0.00	0.00	0.37	0.37	0.00	0.09	0.09	—	376	376	0.01	0.02	381
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.22	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	48.8	48.8	< 0.005	< 0.005	49.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.08	8.08	< 0.005	< 0.005	8.19
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	4.77	3.39	22.4	0.05	0.05	1.51	1.55	0.04	0.27	0.31	—	5,169	5,169	0.27	0.31	5,283
Hotel	2.34	1.66	11.0	0.02	0.02	0.74	0.76	0.02	0.13	0.15	—	2,532	2,532	0.13	0.15	2,588
Junior College (2yr)	2.18	1.55	10.2	0.02	0.02	0.69	0.71	0.02	0.12	0.14	—	2,367	2,367	0.12	0.14	2,419
Congregate Care (Assisted Living)	2.31	1.77	11.9	0.03	0.02	0.85	0.87	0.02	0.15	0.17	—	2,886	2,886	0.13	0.17	2,947
Apartments Mid Rise	2.01	1.54	10.3	0.02	0.02	0.74	0.76	0.02	0.13	0.15	—	2,507	2,507	0.12	0.14	2,560
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	4.40	3.13	20.6	0.05	0.04	1.39	1.43	0.04	0.24	0.28	—	4,773	4,773	0.25	0.29	4,878
Total	18.0	13.0	86.4	0.20	0.18	5.91	6.08	0.17	1.04	1.21	—	20,234	20,234	1.02	1.20	20,676
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	4.17	3.83	21.8	0.05	0.05	1.51	1.55	0.04	0.27	0.31	—	4,775	4,775	0.33	0.33	4,883
Hotel	2.04	1.88	10.7	0.02	0.02	0.74	0.76	0.02	0.13	0.15	—	2,339	2,339	0.16	0.16	2,392

Junior College (2yr)	1.91	1.75	9.98	0.02	0.02	0.69	0.71	0.02	0.12	0.14	—	2,187	2,187	0.15	0.15	2,236
Congregate Care (Assisted Living)	2.03	2.01	11.3	0.03	0.02	0.85	0.87	0.02	0.15	0.17	—	2,663	2,663	0.16	0.18	2,720
Apartments Mid Rise	1.76	1.74	9.79	0.02	0.02	0.74	0.76	0.02	0.13	0.15	—	2,314	2,314	0.14	0.15	2,363
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	3.85	3.54	20.1	0.04	0.04	1.39	1.43	0.04	0.24	0.28	—	4,409	4,409	0.30	0.31	4,508
Total	15.8	14.8	83.6	0.18	0.18	5.91	6.08	0.17	1.04	1.21	—	18,687	18,687	1.24	1.28	19,102
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	0.78	0.66	3.77	0.01	0.01	0.27	0.28	0.01	0.05	0.06	—	809	809	0.05	0.05	827
Hotel	0.38	0.32	1.85	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	396	396	0.02	0.03	405
Junior College (2yr)	0.36	0.30	1.73	< 0.005	< 0.005	0.13	0.13	< 0.005	0.02	0.03	—	370	370	0.02	0.02	379
Congregate Care (Assisted Living)	0.38	0.34	1.97	< 0.005	< 0.005	0.15	0.16	< 0.005	0.03	0.03	—	451	451	0.02	0.03	461
Apartments Mid Rise	0.33	0.30	1.71	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	392	392	0.02	0.02	400

Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	0.72	0.61	3.48	0.01	0.01	0.25	0.26	0.01	0.04	0.05	—	747	747	0.05	0.05	764
Total	2.93	2.53	14.5	0.03	0.03	1.08	1.11	0.03	0.19	0.22	—	3,166	3,166	0.19	0.20	3,236

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	2,034	2,034	0.13	0.02	2,042
Hotel	—	—	—	—	—	—	—	—	—	—	—	2,046	2,046	0.13	0.02	2,053
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	533	533	0.03	< 0.005	535
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	1,023	1,023	0.06	0.01	1,027
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	—	662	662	0.04	< 0.005	665
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00

Parking Lot	—	—	—	—	—	—	—	—	—	—	—	870	870	0.05	0.01	873
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	623	623	0.04	< 0.005	625
Total	—	—	—	—	—	—	—	—	—	—	—	7,790	7,790	0.48	0.06	7,820
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	2,034	2,034	0.13	0.02	2,042
Hotel	—	—	—	—	—	—	—	—	—	—	—	2,046	2,046	0.13	0.02	2,053
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	533	533	0.03	< 0.005	535
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	1,023	1,023	0.06	0.01	1,027
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	—	662	662	0.04	< 0.005	665
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	870	870	0.05	0.01	873
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	623	623	0.04	< 0.005	625
Total	—	—	—	—	—	—	—	—	—	—	—	7,790	7,790	0.48	0.06	7,820
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	337	337	0.02	< 0.005	338
Hotel	—	—	—	—	—	—	—	—	—	—	—	339	339	0.02	< 0.005	340

Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	88.3	88.3	0.01	< 0.005	88.6
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	169	169	0.01	< 0.005	170
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	—	110	110	0.01	< 0.005	110
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	144	144	0.01	< 0.005	145
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	103	103	0.01	< 0.005	104
Total	—	—	—	—	—	—	—	—	—	—	—	1,290	1,290	0.08	0.01	1,295

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	0.04	0.71	0.60	< 0.005	0.05	—	0.05	0.05	—	0.05	—	852	852	0.08	< 0.005	854
Hotel	0.04	0.81	0.68	< 0.005	0.06	—	0.06	0.06	—	0.06	—	967	967	0.09	< 0.005	970
Junior College (2yr)	0.02	0.42	0.35	< 0.005	0.03	—	0.03	0.03	—	0.03	—	502	502	0.04	< 0.005	503

Congregate Care (Assisted Living)	0.04	0.63	0.27	< 0.005	0.05	—	0.05	0.05	—	0.05	—	801	801	0.07	< 0.005	803
Apartments Mid Rise	0.02	0.41	0.17	< 0.005	0.03	—	0.03	0.03	—	0.03	—	519	519	0.05	< 0.005	520
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	80.4	80.4	0.01	< 0.005	80.6
Total	0.17	3.05	2.13	0.02	0.24	—	0.24	0.24	—	0.24	—	3,720	3,720	0.33	0.01	3,730
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	0.04	0.71	0.60	< 0.005	0.05	—	0.05	0.05	—	0.05	—	852	852	0.08	< 0.005	854
Hotel	0.04	0.81	0.68	< 0.005	0.06	—	0.06	0.06	—	0.06	—	967	967	0.09	< 0.005	970
Junior College (2yr)	0.02	0.42	0.35	< 0.005	0.03	—	0.03	0.03	—	0.03	—	502	502	0.04	< 0.005	503
Congregate Care (Assisted Living)	0.04	0.63	0.27	< 0.005	0.05	—	0.05	0.05	—	0.05	—	801	801	0.07	< 0.005	803
Apartments Mid Rise	0.02	0.41	0.17	< 0.005	0.03	—	0.03	0.03	—	0.03	—	519	519	0.05	< 0.005	520
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00

Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	80.4	80.4	0.01	< 0.005	80.6
Total	0.17	3.05	2.13	0.02	0.24	—	0.24	0.24	—	0.24	—	3,720	3,720	0.33	0.01	3,730
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	0.01	0.13	0.11	< 0.005	0.01	—	0.01	0.01	—	0.01	—	141	141	0.01	< 0.005	141
Hotel	0.01	0.15	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	160	160	0.01	< 0.005	161
Junior College (2yr)	< 0.005	0.08	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	83.0	83.0	0.01	< 0.005	83.3
Congregate Care (Assisted Living)	0.01	0.12	0.05	< 0.005	0.01	—	0.01	0.01	—	0.01	—	133	133	0.01	< 0.005	133
Apartments Mid Rise	< 0.005	0.07	0.03	< 0.005	0.01	—	0.01	0.01	—	0.01	—	85.9	85.9	0.01	< 0.005	86.1
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
Strip Mall	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.3	13.3	< 0.005	< 0.005	13.3
Total	0.03	0.56	0.39	< 0.005	0.04	—	0.04	0.04	—	0.04	—	616	616	0.05	< 0.005	618

4.3. Area Emissions by Source

4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	5.80	2.74	52.5	0.18	7.53	—	7.53	7.26	—	7.26	1,245	2,411	3,655	5.86	< 0.005	3,803
Consumer Products	9.68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.73	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	2.92	0.22	23.8	< 0.005	0.02	—	0.02	0.03	—	0.03	—	79.2	79.2	< 0.005	< 0.005	79.5
Total	19.1	2.96	76.3	0.18	7.55	—	7.55	7.28	—	7.28	1,245	2,490	3,735	5.87	0.01	3,883
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	5.80	2.74	52.5	0.18	7.53	—	7.53	7.26	—	7.26	1,245	2,411	3,655	5.86	< 0.005	3,803
Consumer Products	9.68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.73	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	16.2	2.74	52.5	0.18	7.53	—	7.53	7.26	—	7.26	1,245	2,411	3,655	5.86	< 0.005	3,803
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.24	0.11	2.15	0.01	0.31	—	0.31	0.30	—	0.30	46.3	89.7	136	0.22	< 0.005	141
Consumer Products	1.77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.26	0.02	2.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.47	6.47	< 0.005	< 0.005	6.49

Total	2.40	0.13	4.30	0.01	0.31	—	0.31	0.30	—	0.30	46.3	96.1	142	0.22	< 0.005	148

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	17.4	52.1	69.5	1.79	0.04	127
Hotel	—	—	—	—	—	—	—	—	—	—	5.10	15.3	20.4	0.52	0.01	37.2
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	3.29	9.86	13.1	0.34	0.01	24.0
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	10.4	31.2	41.5	1.07	0.03	75.9
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	6.73	20.2	26.9	0.69	0.02	49.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	9.65	9.65	< 0.005	< 0.005	9.69
Strip Mall	—	—	—	—	—	—	—	—	—	—	5.89	17.6	23.5	0.61	0.01	43.0
Total	—	—	—	—	—	—	—	—	—	—	48.8	156	205	5.01	0.12	366

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	17.4	52.1	69.5	1.79	0.04	127
Hotel	—	—	—	—	—	—	—	—	—	—	5.10	15.3	20.4	0.52	0.01	37.2
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	3.29	9.86	13.1	0.34	0.01	24.0
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	10.4	31.2	41.5	1.07	0.03	75.9
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	6.73	20.2	26.9	0.69	0.02	49.1
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	9.65	9.65	< 0.005	< 0.005	9.69
Strip Mall	—	—	—	—	—	—	—	—	—	—	5.89	17.6	23.5	0.61	0.01	43.0
Total	—	—	—	—	—	—	—	—	—	—	48.8	156	205	5.01	0.12	366
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	2.88	8.62	11.5	0.30	0.01	21.0
Hotel	—	—	—	—	—	—	—	—	—	—	0.85	2.53	3.38	0.09	< 0.005	6.17
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	0.54	1.63	2.18	0.06	< 0.005	3.97

Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	1.72	5.16	6.88	0.18	< 0.005	12.6
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	1.11	3.34	4.45	0.11	< 0.005	8.13
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	1.60	1.60	< 0.005	< 0.005	1.60
Strip Mall	—	—	—	—	—	—	—	—	—	—	0.98	2.92	3.90	0.10	< 0.005	7.12
Total	—	—	—	—	—	—	—	—	—	—	8.08	25.8	33.9	0.83	0.02	60.6

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	421	0.00	421	42.1	0.00	1,472
Hotel	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	108
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	24.5	0.00	24.5	2.45	0.00	85.8

Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	212	0.00	212	21.2	0.00	742
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	35.9	0.00	35.9	3.59	0.00	126
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Strip Mall	—	—	—	—	—	—	—	—	—	—	23.5	0.00	23.5	2.35	0.00	82.2
Total	—	—	—	—	—	—	—	—	—	—	748	0.00	748	74.7	0.00	2,616
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	421	0.00	421	42.1	0.00	1,472
Hotel	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	108
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	24.5	0.00	24.5	2.45	0.00	85.8
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	212	0.00	212	21.2	0.00	742
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	35.9	0.00	35.9	3.59	0.00	126
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00

Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Strip Mall	—	—	—	—	—	—	—	—	—	—	23.5	0.00	23.5	2.35	0.00	82.2
Total	—	—	—	—	—	—	—	—	—	—	748	0.00	748	74.7	0.00	2,616
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	69.7	0.00	69.7	6.96	0.00	244
Hotel	—	—	—	—	—	—	—	—	—	—	5.13	0.00	5.13	0.51	0.00	17.9
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	4.06	0.00	4.06	0.41	0.00	14.2
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	35.1	0.00	35.1	3.51	0.00	123
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	5.94	0.00	5.94	0.59	0.00	20.8
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Strip Mall	—	—	—	—	—	—	—	—	—	—	3.89	0.00	3.89	0.39	0.00	13.6
Total	—	—	—	—	—	—	—	—	—	—	124	0.00	124	12.4	0.00	433

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.85
Hotel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	156
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.55
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.85
Hotel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	156
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57

Apartments	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.55
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Medical Office Building	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.31
Hotel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25.9
Junior College (2yr)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02
Congregate Care (Assisted Living)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26
Apartments Mid Rise	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26.6

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Sequester	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	3/4/2024	4/5/2024	5.00	25.0	—
Grading	Grading	4/8/2024	6/28/2024	5.00	60.0	—
Building Construction	Building Construction	7/1/2024	10/16/2026	5.00	600	—
Paving	Paving	10/19/2026	12/25/2026	5.00	50.0	—
Architectural Coating	Architectural Coating	12/28/2026	3/5/2027	5.00	50.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Tier 2	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Tier 2	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Tier 2	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Tier 2	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Tier 2	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Tier 2	2.00	8.00	423	0.48
Grading	Tractors/Loaders/Backhoes	Diesel	Tier 2	2.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Tier 2	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Tier 2	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Tier 2	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Tier 2	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Tier 2	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Tier 2	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Tier 2	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Tier 2	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Tier 2	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	10.6	LDA,LDT1,LDT2

Site Preparation	Vendor	—	3.50	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	10.6	LDA,LDT1,LDT2
Grading	Vendor	—	3.50	HHDT,MHDT
Grading	Hauling	125	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	258	10.6	LDA,LDT1,LDT2
Building Construction	Vendor	65.3	3.50	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	10.6	LDA,LDT1,LDT2
Paving	Vendor	—	3.50	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	51.6	10.6	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	3.50	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Water unpaved roads twice daily	55%	55%
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%
Sweep paved roads once per month	9%	9%

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	404,941	134,980	373,208	124,403	56,558

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	37.5	0.00	—
Grading	—	60,000	180	0.00	—
Paving	0.00	0.00	0.00	0.00	21.6

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Medical Office Building	0.00	0%
Hotel	0.00	0%

Junior College (2yr)	0.00	0%
Congregate Care (Assisted Living)	—	0%
Apartments Mid Rise	—	0%
Other Non-Asphalt Surfaces	6.00	0%
Parking Lot	15.6	100%
Strip Mall	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	532	0.03	< 0.005
2025	0.00	532	0.03	< 0.005
2026	0.00	532	0.03	< 0.005
2027	0.00	532	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Medical Office Building	1,393	1,393	1,393	508,561	5,447	5,447	5,447	1,988,040
Hotel	683	683	683	249,113	2,668	2,668	2,668	973,818
Junior College (2yr)	638	638	638	232,888	2,494	2,494	2,494	910,395
Congregate Care (Assisted Living)	663	663	663	242,006	3,069	3,069	3,069	1,120,102
Apartments Mid Rise	576	576	576	210,240	2,666	2,666	2,666	973,076
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Strip Mall	1,287	1,287	1,287	469,573	5,029	5,029	5,029	1,835,629

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Congregate Care (Assisted Living)	—
Wood Fireplaces	0
Gas Fireplaces	70
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	70
Conventional Wood Stoves	0
Catalytic Wood Stoves	7
Non-Catalytic Wood Stoves	7
Pellet Wood Stoves	0
Apartments Mid Rise	—
Wood Fireplaces	0
Gas Fireplaces	45
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	45
Conventional Wood Stoves	0
Catalytic Wood Stoves	5
Non-Catalytic Wood Stoves	5

Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
404941.27499999997	134,980	373,208	124,403	56,558

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Medical Office Building	1,395,423	532	0.0330	0.0040	2,657,190
Hotel	1,403,506	532	0.0330	0.0040	3,016,789
Junior College (2yr)	365,853	532	0.0330	0.0040	1,564,872
Congregate Care (Assisted Living)	701,757	532	0.0330	0.0040	2,499,095
Apartments Mid Rise	454,375	532	0.0330	0.0040	1,618,119
Other Non-Asphalt Surfaces	0.00	532	0.0330	0.0040	0.00
Parking Lot	596,800	532	0.0330	0.0040	0.00
Strip Mall	427,442	532	0.0330	0.0040	250,756

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Medical Office Building	9,072,870	0.00
Hotel	2,663,511	0.00
Junior College (2yr)	1,716,716	0.00
Congregate Care (Assisted Living)	5,426,108	0.00
Apartments Mid Rise	3,513,308	0.00
Other Non-Asphalt Surfaces	0.00	0.00
Parking Lot	0.00	2,737,629
Strip Mall	3,074,010	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Medical Office Building	781	0.00
Hotel	57.5	0.00
Junior College (2yr)	45.5	0.00
Congregate Care (Assisted Living)	127	0.00
Apartments Mid Rise	21.5	0.00
Other Non-Asphalt Surfaces	0.00	0.00
Parking Lot	0.00	0.00
Strip Mall	43.6	0.00

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Medical Office Building	Household refrigerators and/or freezers	R-134a	1,430	0.45	0.60	0.00	1.00
Medical Office Building	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Hotel	Household refrigerators and/or freezers	R-134a	1,430	0.00	0.60	0.00	1.00
Hotel	Other commercial A/C and heat pumps	R-410A	2,088	1.80	4.00	4.00	18.0
Hotel	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Junior College (2yr)	Household refrigerators and/or freezers	R-134a	1,430	0.02	0.60	0.00	1.00
Junior College (2yr)	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Junior College (2yr)	Stand-alone retail refrigerators and freezers	R-134a	1,430	< 0.005	1.00	0.00	1.00
Junior College (2yr)	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
Congregate Care (Assisted Living)	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Congregate Care (Assisted Living)	Household refrigerators and/or freezers	R-134a	1,430	0.22	0.60	0.00	1.00
Apartments Mid Rise	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Apartments Mid Rise	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

Strip Mall	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Strip Mall	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Strip Mall	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

8. User Changes to Default Data

Screen	Justification
Land Use	Medical Office Building includes: a 22,525-square-foot ambulatory surgery center; a 12,445-square-foot specialty clinic; two 12,445-square-foot medical office buildings; and a 12,445-square-foot psychiatric health facility. Strip Mall includes 41,500 square feet of medical/commercial uses. Hotel includes a 100,000-square-foot, a four-story 105-room hotel with a conference center. Junior College includes a 35,000-square-foot nursing college. Congregate Care (Assisted Living) includes; a 54,611-square-foot skilled nursing facility; a 34,480-square-foot memory care facility; and a 34,380-square-foot assisted living facility. Mid-rise Apartment includes a three-story 90-unit multi-family apartment. Total project acreage is 39.23 acres. Assuming 10% of the project site would be landscaped.
Construction: Construction Phases	Construction is anticipated to begin March 2024 and last approximately 3 years.
Construction: Off-Road Equipment	Assuming the use of Tier 2 construction equipment.
Construction: Dust From Material Movement	Over excavation would be between 30,000 and 60,000 cubic yards of soil; therefore, this analysis assumes up to 60,000 cubic yards of export.

Operations: Vehicle Data	Assuming approximately 1,393 average daily trips (ADT) for the Medical Office Building land uses, 682 ADT for the hotel use, 638 ADT for the nursing college, 662 ADT for the assisted living uses, 576 ADT for the apartments, and 1,287 ADT for the Strip Mapp land uses based on the project's trip generation and taking into account 10% internal trips.

APPENDIX B

BIOLOGICAL RESOURCES ASSESSMENT

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BIOLOGICAL RESOURCES ASSESSMENT

HANFORD PLACE PROJECT

CITY OF HANFORD, CALIFORNIA

LSA

June 2021

BIOLOGICAL RESOURCES ASSESSMENT

HANFORD PLACE PROJECT

CITY OF HANFORD, CALIFORNIA

Submitted to:

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LSA Project No. EPI2001

LSA

June 2021

EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) prepared this biological resources assessment for the proposed Hanford Place Project (project) located between State Route 198 and the San Joaquin Valley Railroad in the City of Hanford, Kings County, California. The project consists of a medical and mixed-use development spanning approximately 40 acres. A total of 15 buildings are proposed, including medical outpatient clinic services, hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as an infiltration basin, associated open space, circulation and parking, and infrastructure improvements. The project site was historically used for agricultural but has remained fallow for many years. The site is located on the margin of urban portions of the City of Hanford with no connection to undisturbed or natural lands.

In March 2020, LSA biologists conducted a literature review and records search to identify the existence and potential for occurrence of sensitive or special-status plant and animal species in the vicinity of the project site. Federal and state lists of sensitive species were also examined. Current electronic database records reviewed included the California Natural Diversity Database, California Native Plant Society's Electronic Inventory of Rare and Endangered Vascular Plants, and United States Fish and Wildlife Service's National Wetlands Inventory. Historic and current aerial imagery, existing environmental reports for developments in the project vicinity, regional habitat conservation plans, and local land use policies related to biological resources were also reviewed. A field survey covering the project site was conducted on April 27, 2020.

With the exception of the Peoples Ditch, the project site is strictly upland in nature with well-drained soils and vegetation consisting of nonnative grassland with patches of mixed herbaceous ruderal/invasive species and bare ground in several areas. Ongoing soil disturbance and the resulting competitive exclusion by invasive nonnative plants limit the potential for native flora to occur in the project site. No native or special-status vegetation communities exist on the project site. No special-status plant species were observed during the field survey and none are expected to occur due to historical and ongoing anthropogenic disturbances.

Habitat in the project site is considered low quality with respect to most of the regionally-occurring special-status animal species, and no special-status species were observed during the field survey. However, two special-status animal species—San Joaquin kit fox (*Vulpes macrotis mutica*) and burrowing owl (*Athene cunicularia*)—have sat least a low potential to occur in the project site due to the presence of suitable habitat and known occurrence records in the project vicinity. The project site also contains foraging habitat for certain raptors such as Swainson's hawk (*Buteo swainsoni*) but suitable tree-nesting habitat is generally absent from the project site. Suitable avian nesting habitat on the project site is limited to that which supports ground-nesting species such as Savannah sparrow (*Passerculus sandwichensis*) and other birds that may nest in the annual herbaceous cover.

With the implementation of recommended impact avoidance, minimization, and mitigation measures—including pre-construction surveys and compliance with applicable regulatory requirements—there would be no significant impacts to special-status biological resources resulting from the project.

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ATTACHMENTS

INTRODUCTION

LSA has prepared this Biological Resources Assessment for the proposed Hanford Place Project (project) located between State Route 198 and the San Joaquin Valley Railroad in the City of Hanford (City), Kings County, California (refer to Figure 1, Project Location; all figures are provided in Appendix A). The purpose of this report is to describe and document biological resources—including sensitive and special-status species—known to occur or with the potential to occur on the proposed project site. This technical information is provided for project planning purposes and review under the California Environmental Quality Act (CEQA), California Endangered Species Act (CESA), the Federal Endangered Species Act (FESA), and other pertinent regulations.

The Biological Resources Assessment conducted for the project involved the following components:

- Reviewing existing relevant scientific literature and other pertinent information related to the survey area;
- Creating a list of regionally occurring special-status species determined to have the potential to occur on or in the vicinity of the project site;
- Characterizing the vegetation communities present within the survey area;
- Evaluating the potential for the occurrence of special-status plant and wildlife species within the survey area;
- Assessing the potential for the project to adversely impact existing biological resources; and
- Recommending avoidance, minimization, and mitigation measures to avoid or minimize any potentially significant project-related impacts to biological resources.

PROJECT DESCRIPTION

The project involves a medical and mixed use development consisting of medical facility, skilled nursing, assisted living, retail and multi-family units on approximately 40 acres of vacant land located between State Route 198 and the San Joaquin Valley Railroad in the City of Hanford (Figure 2). Once constructed, and extension of 5th Street would run through the project site in an east/west direction and Campus Drive would be extended south into the site, with a roundabout constructed near the center portion of the site. Proposed road extensions and improvements would be dedicated as public right of way. As part of the project, Glendale Avenue would also be realigned and any portion of existing right of way not used would be abandoned. In addition, an open segment of Peoples Ditch (a constructed irrigation canal) that currently runs through the project site would be converted to an underground culvert.

The General Plan and zoning designation for the project site is currently Highway Commercial (C-H). The project would amend the General Plan and require a rezone to a combination of Office, Medium- or High-Density Residential and Regional or Highway Commercial.

The project would include the following: a 22,525-square-foot ambulatory surgery center; a 12,445-square-foot specialty clinic; two 12,445-square-foot medical office buildings; a 12,445-square-foot psychiatric health facility; a 10,000-square-foot, a four-story 105-room hotel with a conference center and pool; a 35,000-square-foot nursing college; four 15,55-square-foot strip retail buildings; two 15,000-square-foot retail/drive-through/medical commercial buildings; a 54,611-square-foot skilled nursing facility; a 34,480-square-foot memory care facility; a three-story 90-unit multi-family apartment; two 11,000 medical/commercial buildings; and a 5-acre bio infiltration basin. In addition, the project would provide 1,466 parking spaces throughout the project site. Figure 3 shows the project site plan.

Regional access to the site is provided by State Route 198, which is borders the southern portion of the project site and is located approximately 0.5 miles from the project site entrance. Site access would be provided by one main driveway along Campus Drive, as well as Fifth Street on the east side of the project site that would extend on the existing street alignment. The project would not require any work within undeveloped lands outside of the approximately 40-acre project site.

PROJECT SETTING

The project site is located along the south central portion of the San Joaquin Valley floor in the Kings County. Specifically, the project site is located on four legal parcels (Assessor's Parcel Numbers 012-290-042, 012-290-054, 011-060-007, and 011-060-080) in the northeastern quarter of the United States Geological Survey (USGS) *Hanford, California*, 7.5-minute topographic quadrangle map (refer to Figure 1). The "project site" discussed in this report refers to all areas within the four legal parcels described above (totaling approximately 40 acres) and includes all areas where temporary and permanent ground disturbance would occur.

The project site is currently fallow and disturbed with no existing structures (Figure 2). The site was previously used for agriculture, consistent with many of the surrounding lands in the region. According to historic aerial imagery, the project site has remained in its current condition for more than 20 years. Adjacent parcels consist mostly of low-density residential and commercial developments, with several undeveloped lots located to the north of the project site. Recent developments along the margins of the City of Hanford and expansion into ranch land settlements have brought increased urban development throughout lands previously used for agriculture. Some lands in the vicinity of the project site are fallow or active agricultural lands; however, most of the lands are developed and are a mixture of school, residential, commercial, retail, and industrial uses. There are no undisturbed open spaces in the vicinity of the project site.

The project site is located within the San Joaquin Valley Sub-region of the California Floristic Province (Baldwin, et al. 2012) and within the Sand Slough watershed (Hydrologic Unit Code #180300122002). The project site is flat with almost no topographic variation and is at approximately 228 feet (69 meters) above mean sea level in elevation. An open segment of Peoples Ditch (a constructed irrigation canal) is located within the project site, but there are no natural drainage features or riparian areas present in the project site. Extensive soil disturbance from foot traffic and vehicles is evident throughout the site, and the site appears to be regularly disked for vegetation control. Several homeless encampments were present in multiple portions of the project site during the April 2020 site survey.

METHODS

LITERATURE REVIEW AND RECORDS SEARCH

LSA Biologist Kelly McDonald conducted a literature review and records search on March 31, 2020, to identify the existence and potential for occurrence of sensitive or special-status[1] plant and animal species in the vicinity of the project site. Federal and State lists of sensitive species were also examined. Current electronic database records reviewed included the following:

- **California Natural Diversity Data Base information (CNDDB – RareFind 5)**, which is administered by the California Department of Fish and Wildlife (CDFW), formerly known as the California Department of Fish and Game (CDFG). This database covers sensitive plant and animal species as well as sensitive natural communities that occur in California. Records from nine USGS quadrangles surrounding the project site (*Riverdale*, *Laton, Burris Park, Lemoore, Hanford, Remnoy, Stratford, Guernsey, and Waukena*) were obtained from this database to inform the field survey.

- **California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants**, which utilizes four specific categories or "lists" of sensitive plant species to assist with the conservation of rare or endangered botanical resources. All of the plants constituting California Rare Plant Ranks 1A, 1B, 2A, and 2B are intended to meet the status definitions of "threatened" or "endangered" in CESA and the California Department of Fish and Game Code, and are considered by CNPS to be eligible for State listing. At the discretion of the CEQA Lead Agency, impacts to these species may be analyzed as such, pursuant to the CEQA Guidelines Sections 15125(c) and 15380. Plants in Rank 3 (limited information; review list), Rank 4 (limited distribution; watch list), or that are considered Locally Unusual and Significant may be analyzed under CEQA if there is sufficient information to assess potential significant impacts. Records from the nine USGS quadrangles surrounding the project site were obtained from this database to inform the field survey.

- **United States Fish and Wildlife Service's (USFWS) Information for Planning and Conservation (IPaC) Online System**, which lists all proposed, candidate, threatened, and endangered species managed by the Endangered Species Program of the USFWS that have the potential to occur on or near a particular site. This database also lists all known critical habitats, national wildlife refuges, and migratory birds that could potentially be impacted by activities from a proposed project. An IPaC Trust Resource Report (USFWS 2020a) was generated for the project area.

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[1] For the purposed of this report, the term "special-status species" refers to those species that are listed or proposed for listing under the CESA and/or FESA, California Fully Protected Species, California Species of Special Concern, and California Special Animals. It should be noted that "Species of Special Concern" and "California Special Animal" are administrative designations made by the CDFW and carry no formal legal protection status. However, Section 15380 of the CEQA Guidelines indicates that these species should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein.

- **Designated and Proposed USFWS Critical Habitat Polygons** were reviewed to determine whether critical habitat has been designated or proposed within or in the vicinity of the project site (USFWS 2020b).

- **The USFWS National Wetlands Inventory** was reviewed to determine whether any wetlands or surface waters of the United States have been previously-identified in the survey area (USFWS 2020c).

- **eBird:** eBird is a real-time, online checklist program launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society. It provides rich data sources for basic information on bird abundance and distribution at a variety of spatial and temporal scales. eBird occurrence records for burrowing owl (*Athene cunicularia*) from a 5 mile radius around the project site were reviewed in May 2020 (eBird 2020).

In addition to the databases listed above, historic and current aerial imagery, existing environmental reports for developments in the project vicinity, and local land use policies related to biological resources were reviewed.

FIELD SURVEY

A general biological survey of the project site was conducted by LSA Biologist Kelly McDonald on April 27, 2020. The project site was surveyed on foot, and all biological resources observed were noted and mapped. Suitable habitat for any species of interest or concern was duly noted, and general site conditions were photographed (Appendix C, Site Photos). The field survey took place on a clear sunny morning with weather conditions conducive to the detection of plant and animal species.

RESULTS

This section summarizes the environmental setting and provides further analysis of the data collected in the field. Discussions regarding the existing project site conditions, soils, vegetation communities, potentially occurring special-status biological resources, and habitat connectivity are presented below.

The project site consists of flat, undeveloped parcels supporting nonnative grassland and other invasive plant species. Ruderal and nonnative grassland vegetation existing on the site appears to be regularly maintained. There is one tree, tree of heaven (*Ailanthus altissima*; a nonnative species), within the project site. Much of the soil and vegetation within the project site is disturbed from existing roadways in the immediate vicinity, off-highway vehicles, homeless encampment, and human foot traffic. Worn foot paths, litter, and trampling are evident throughout the project site.

Habitat within the project site is considered low quality with respect to most of the special-status animal species identified during the literature review and the project site is not expected to support any special-status plant species (refer to Appendix D). Wildlife species observed during the April 2020 field survey include: rock pigeon (*Columba livia*; nonnative species), Savannah sparrow (*Passerculus sandwichensis*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), double-crested cormorant (*Phalacrocorax auritus*), common raven (*Corvus corax*), red-tailed hawk (*Buteo jamaicensis*), European starling (*Sturnus vulgaris*; nonnative species), western fence lizard (*Sceloporus occidentalis*), Sierran tree frog (*Pseudacris sierra*), California toad (*Anaxyrus boreas halophilus*; tadpoles) and California ground squirrel (*Otospermophilus beecheyi*).

No riparian habitat exists in the project site or on adjacent parcels and there are no depressional wetlands (e.g., vernal pools) or natural drainage features within the project site. The project site does not serve as a wildlife nursery or as a wildlife migration corridor. Further details regarding specific biological resources are provided in the following subsections.

VEGETATION COMMUNITIES AND LAND COVER TYPES

With the exception of an open portion of Peoples Ditch (an irrigation canal excavated in the late 1800's), the project site is strictly upland in nature with dominant vegetation consisting of nonnative grassland with patches of mixed herbaceous ruderal/invasive species. Ongoing soil disturbance and the resulting competitive exclusion by invasive nonnative plants limit the potential for native flora to occur in the project site. No native or special-status vegetation communities exist in the project site.

The identification and characterizations of vegetation communities generally follow the plant community descriptions in the Manual of California Vegetation (Sawyer et al. 2009). Anthropogenic areas are those areas that have been converted from their natural habitat to ones that are subject to ongoing human maintenance and disturbance; these areas include roads, road shoulders, and areas that are disturbed or maintained. The acreages of each vegetation community and land cover type occurring in the project site are shown in Table A, below. Representative photographs of the project site are presented in Appendix C, and Figure 4 provides a map of these vegetation and land cover types within the project site.

Table A: Vegetation and Land Cover Types Within the Project site

Vegetation / Land Cover Type	Acreage[1]
Wild oats and annual brome grasslands	38.51
Developed	0.17
Disturbed / Barren	1.10
Peoples Ditch – Irrigation Canal	0.51
Total	**40.29**

[1] All acreages were calculated using geographic information system (GIS) measurements and are considered approximate.

A total of 36 vascular plant species were identified within the project site during the April 2020 field survey (refer to Appendix B). A total of 27 of these plant species (75 percent) represent nonnative taxa, reflecting a high level of disturbance within the project site.

Wild oats and annual brome grassland (*Avena spp. - Bromus spp.* Herbaceous Semi-Natural Alliance)

Disturbed nonnative wild oats and annual brome grassland comprises the majority of the project site. Wild oats and annual brome grasslands are often found in foothills, waste places, rangelands, and opening in woodlands. This alliance is dominated by invasive/pioneering nonnative grasses including slender oats (*Avena barbata*), ripgut grass (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), barely grasses (*Hordeum* spp), along with other nonnative/ruderal plant species such as Russian thistle (*Salsola tragus*). Less prevalent species at the time of survey included London rocket (*Sisymbrium irio*), cheeseweed mallow (*Malva parviflora*) and Mediterranean storks' bill (*Erodium malacoides*).

The dominance of these nonnative weedy species is indicative of historical and recent soil disturbance. Native perennial shrubs are entirely absent from the project site, and the site appears to be regularly maintained.

Large tracts of annual grassland habitat provide foraging and/or breeding habitat for many wildlife species. Vacant lots in the vicinity of the project site provide suitable habitat for numerous invertebrate species (such as insects), many of which provide a food source for animals such as lizards, birds, and small mammals, which in turn serve as a prey base for larger predator animals, including snakes, raptors, and coyotes. Due to the extensive weed coverage of the wild oats and annual brome grassland within the project site, it is not expected to provide high-quality foraging or nesting habitat for many special-status wildlife species known to occur in the region.

Disturbed / Barren

Based on an analysis of historical aerial imagery and observations during the April 2020 site survey, vehicles regularly park and drive across portions of the site, specifically along the project site perimeter. Portions of the central survey area also appeared to be disturbed by off-highway vehicles (as evinced by tire tracks, ruts, etc.). These disturbed areas lacked vegetation or supported a sparse cover of ruderal vegetation, with annual nonnative grasses and Russian thistle being the most frequently encountered plant species. Several other invasive, pioneering plant species were also observed in these areas.

Developed

Developed sites consist of paved areas, buildings, and other areas that are cleared or graded for anthropogenic purposes. A small portion (0.17 acre) of the project site contains an existing paved road which is mapped as developed.

SOILS

According to the NRCS online soil survey of Kings County, the project site is primarily composed of Nord complex soils (99.3%) and the remaining are urban land (Figure 5). The Nord complex soil classification is discussed in greater detail below.

Nord complex, 0 to 2 Percent Slopes, MLRA 17

The parent material of this soil type is alluvium derived from igneous rock, occurring between 58 and 183 m in elevation. The drainage class of this soil type is well drained, and it is typically composed of fine sandy loam and stratified sandy loam to loam. Nord complex usually occurs on alluvial fans, and is used for growing irrigated field, forage, and row crops. When not irrigated, vegetation is typically annual grasses and forbs.

SPECIAL-STATUS BIOLOGICAL RESOURCES

The Hanford region supports various special-status natural communities, plants, and animals. Appendix D provides tables that identify those special-status plant and animal species known to occur or that potentially occur in the vicinity of the project site (based on the literature review and experience in the region) and includes detailed information about each species' habitat and distribution, State and Federal status designations, and probability of occurrence within the project site. As stated in the methodology section above, the background research included occurrence records from nine USGS topographic quadrangles surrounding the survey area. A nine USGS quadrangle search covers a large, variable geographic and topographic area containing numerous habitat types not found within or around the project site.

The following subsections provide specific discussions for special-status natural communities, plant and animal species, and habitats of concern (including critical habitat, jurisdictional aquatic resources, wildlife movement corridors, and regional and local habitat conservation plans).

Special-Status Natural Communities

The CNDDB search identified occurrences of two special-status natural (i.e., plant) communities within the nine-quad search area: Valley Sacaton Grassland and Valley Sink Scrub.

No special-status natural communities or conservation areas exist within the project site or in adjacent parcels. The project site is completely isolated and distant from all special-status natural communities that occur in the region.

Special-Status Plants

The literature review identified eight special-status plant species that are known to occur within a nine-quad radius of the project site (refer to Appendix D). The majority of the rare plant species that were identified in the databases have specialized habitat requirements (i.e., they occur on predominantly alkaline soils, woodland, riparian, or wetland habitats, etc.) that do not occur within the project site.

Historic anthropogenic disturbances have greatly altered the natural hydrologic regimes and have either eliminated or greatly impacted the pre-settlement habitats needed to support the special-status plant species identified in the CNDDB and CNPS queries. As such, the specific habitats, soil substrates or "micro-climates" necessary for special-status plant species to occur are absent within the boundaries of the project site. Based on site observations coupled with the habitat suitability analysis, no special-status plant species are expected to occur within the project site. It is also unlikely that any source populations exist in adjacent or nearby parcels.

Special-Status Animals

The historic anthropogenic disturbances in the project site and adjacent parcels (i.e., farming, disking, off-highway vehicles , etc.) have greatly altered, eliminated, or impacted the pre-settlement habitats needed to support most of the special-status animal species identified in the CNDDB and USFWS queries (refer to Appendix D). There are no known occurrences of any special-status animal species in the project site, and none were observed during the April 2020 field survey. Nonetheless, suitable habitat for several regionally-occurring special-status species is present in the project site and those species are discussed in further detail below.

Two special-status animal species, San Joaquin kit fox (*Vulpes macrotis mutica*), and burrowing owl (*Athene cunicularia*) have a moderate potential to occur in the project site due to the presence of suitable habitat and known records in the project vicinity. However, no sign which would indicate occupation or use by these species (e.g., scat, tracks, nesting materials, prey remains, or any other sign) was identified. Several small mammal burrows, including active California ground squirrel burrows and others (likely those of California vole [*Microtus californicus*], and/or Botta's pocket gopher [*Thomomys bottae*]), were observed within the grassland habitats in the project site. None of the small mammal burrows observed in the project site exhibited features typical of occupied kit fox or burrowing owl burrows, although there is some potential for use by these species in the future. It should also be noted that the April 2020 survey took place at a time when regional documented burrowing owl habitat was occupied by the species (eBird 2020).

The project site contains foraging habitat for certain raptors such as the Swainson's hawk (*Buteo swainsoni*) but potential tree-nesting habitat is extremely limited on the project site (only one nonnative tree was present during the April 2020 survey). Suitable avian nesting habitat in the project site is limited to that which supports ground-nesting species such as Savannah sparrow (*Passerculus sandwichensis*) and other birds that may nest in the annual herbaceous cover.

The evaluation of special-status animal species occurrence within the project site was based on a habitat suitability analysis. It did not include exhaustive surveys to determine their presence or absence, but did include direct observation of on-site and off-site conditions and a review of the available recorded occurrence data from the area to conclude whether or not a particular species could be expected to occur. Based on this analysis, it is unlikely that the remaining special-status wildlife species listed in Appendix D occur within the project site. Significant adverse impacts to special-status wildlife species are not anticipated with the implementation of the recommended impact avoidance, minimization, and mitigation measures described in further detail below.

Critical Habitat

The project site is not located within or adjacent to designated or proposed critical habitat for any species.

Jurisdictional Aquatic Resources

With the exception of an open segment of Peoples Ditch (an irrigation canal excavated in the late 1800's), the project site is strictly upland in nature with well-drained soils.

The Peoples Ditch is an artificially-constructed and maintained irrigation canal (owned and operated by the Peoples Ditch Company) that conveys diverted water to farmland south of the project site. Within the Hanford region, Peoples Ditch has open trapezoidal sections as well as portions that run underground through culverts of various sizes and lengths. At the project site, the Peoples Ditch is an open trapezoidal channel measuring approximately 32 feet in width from the top-of-bank to top-of-bank and approximately 10 feet deep. Most of the canal was dry during the April 2020 site survey, indicating an ephemeral flow regime at this location. The active channel width (e.g., area typically subject to seasonal flows) was measured in two locations (one near the culvert outfall at the southern terminus of Campus Drive/railroad alignment, and one near the southern culvert inlet that goes under State Route 198); the active channel width measures approximately 12 feet wide. The canal appears to be regularly maintained for vegetation control and irrigation water conveyance.

Three plants typically associated with wetlands were observed in the canal: seep monkeyflower (*Mimulus guttatus*), western marsh cudweed (*Gnaphalium palustre*), and common knotweed (*Persicaria lapathifolia*). Additionally, Sierran tree frog (*Pseudacris sierra*) were heard calling and California toad (*Anaxyrus boreas halophilus*) tadpoles were observed within the canal. Litter and signs of other human disturbance were also present within the canal.

Due to the presence of a bed and bank and presence of water-dependent plants and wildlife, the Peoples Ditch may fall within the jurisdiction of CDFW under Section 1602 of the California Fish and Game Code and the Regional Water Quality Control Board (RWQCB) under the California Water Code. However, the Peoples Ditch does not appear to have a downstream nexus with any jurisdictional water of the United States based on analysis of aerial imagery and topographic maps, and pursuant to the *Navigable Waters Protection Rule* (EPA and DOA 2020), effective June 22, 2020, the Peoples Ditch does not meet the definition of a jurisdictional water of the United States subject to regulation under Section 404 of the federal Clean Water Act. Furthermore, the Peoples Ditch does not meet the wetland criteria outlined in the *State Wetland Definition and Procedures for*

Discharges of Dredged or Fill Material to Waters of the State (SWRCB 2019), which excludes agricultural ditches with ephemeral flow that are not a relocated water of the state or excavated in a water of the state. Nevertheless, prior to any project project-related impacts to Peoples Ditch, it is recommended to consult with the United States Army Corps of Engineers (USACE), CDFW, and RWQCB to verify the feature's jurisdictional status, and obtain applicable permit(s) and/or authorization(s), if any.

Wildlife Movement and Habitat Connectivity

The project site is isolated from natural areas and is surrounded by existing developments and highways. Therefore, it is unlikely that the site serves as an important corridor for animals moving locally, regionally, or in broader migrations. Migratory bird species may utilize the project site for foraging; however, the usage is likely transient and limited to species that forage over open grassland areas. The project site does not possess any characteristics that would indicate a locally significant stopover point for migratory species including raptors or waterfowl.

No known wildlife movement corridors occur within the project site or in the immediate vicinity.

Regional Habitat Conservation Plans and Local Policies

The City of Hanford and Kings County currently do not have a regional Natural Community Conservation Plan or Habitat Conservation Plan. The 2035 General Plan for the City of Hanford outlines local relevant policies related to biological resources. Below is the list of applicable polices:

- 5.5.1 Natural Habitat: Goal 04: Protection of natural habitat and other biological resources.
    - *Policy 031 Provision of Open Space Areas*: Preserve and enhance open space area.
    - *Policy 032 Wetland and Riparian Corridor:* Where appropriate and feasible, establish permanent mechanisms to protect wetlands and riparian corridors.
    - *Policy 033 Vernal Pools:* Identify and protect vernal pools that be located in Planning Area.
    - *Policy 035 Impacts from Development:* Ensure that potential impacts to biological resources and sensitive habitat are carefully evaluated when considering development projects.
    - *Policy 037 Mature Trees:* Promote the preservation of existing mature trees and encourage the planting of appropriate shade trees in new developments.
    - *Policy 038 Native Tree Species and Drought Tolerant Vegetation:* Encourage the planting of native tree species and drought-tolerant vegetation.

- 5.5.2 Wildlife and Sensitive Species
    - *Policy 039 Endangered Wildlife and Habitat*: Establish programs in connection with environmental review processes to protect endangered wildlife and their habitats.
    - *Policy 040 Sensitive Wildlife:* Work with state, federal, and local agencies on the preservation of sensitive wildlife species in the City.

IMPACT FINDINGS AND RECOMMENDED MITIGATION MEASURES

The following impact assessment and recommended mitigation measures are intended to support the CEQA review process. The project, as proposed by the applicant, coupled with LSA's survey results and review of biological literature, provided the basis for this analysis. The impact discussion below addresses the range of impacts that could result from the proposed project, as well as recommended mitigation measures that would avoid, reduce, or compensate for such impacts.

SPECIAL-STATUS NATURAL COMMUNITIES

The project site does not contain any special-status natural communities and such habitats would not be impacted by the proposed project.

SPECIAL-STATUS SPECIES

No special-status plant species are expected to occur within the project site or to be adversely affected by the proposed project.

While no special-status animal species (or signs of such species) were observed on site during the April 2020 survey, several small mammal burrows were observed within the project site that are considered suitable habitat for burrowing owl, a California Species of Special Concern, and/or San Joaquin kit fox, a federally listed as endangered and state-listed as threatened species. None of the small mammal burrows observed in the project site exhibited features typical of occupied kit fox or burrowing owl burrows at the time of the survey, although there is some potential for use by these species in the future. Potentially significant direct and indirect impacts, including mortality, harassment, or other forms of incidental take, could occur if construction-related ground disturbance occurs in or around an occupied den or burrow.

No other special-status species were determined to have a moderate or high probability of occurrence on the project site (refer to Appendix D). The removal of the disturbed annual grassland habitat documented on the project site is not anticipated to substantially impact the population sizes of any special-status animal species given the context and setting of the project site and additional habitats for such species in the project vicinity.

While suitable habitat for shrub and tree nesting birds is very limited on the project site (only one tree occurs within the site boundaries), the project site does contain suitable nesting habitat for a variety of ground-nesting birds and for other birds that could nest in the annual herbaceous vegetation. Nesting birds are protected under the California Fish and Game Code. Construction activities that occur during the nesting bird season (typically February 15 through September 15) have potential to result in the direct or indirect take of nesting birds.

If unmitigated or avoided, these potential direct and indirect impacts on special-status wildlife species and nesting birds could be considered potentially significant. However, implementation of Mitigation Measures BIO-1 through BIO-4, as summarized below, would effectively mitigate any impacts on special-status wildlife species to less-than-significant levels.

Mitigation Measure BIO-1: **Conduct Preconstruction Clearance Surveys for San Joaquin Kit Fox and Burrowing Owl.** A preconstruction clearance survey is required for San Joaquin kit fox and burrowing owl no more than 30 calendar days prior to initiation of project activities. All survey results must be delivered to the USFWS, the CDFW, and the City of Hanford. If the survey results find an active burrow of one or both of these species on the project site, the applicant must coordinate with the applicable resource agencies (CDFW for burrowing owl, CDFW and USFWS for kit fox) to obtain applicable agency approval(s)/permit(s) prior to any ground disturbance activities on the site.

Specific avoidance, den excavation, passive relocation, and compensatory mitigation activities shall be performed as required by the applicable agency. Appropriate provisions of the *CDFW Staff Report on Burrowing Owl Mitigation* (CDFG 2012) and *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* (USFWS 2011) shall be adhered to.

Mitigation Measure BIO-2. **Worker Environmental Awareness Training.** Prior to initial groundbreaking, Worker Environmental Awareness Training shall be conducted by a qualified biologist to educate all construction personnel on the relevant federal, state, and local laws related to potentially occurring special-status species at the site. The tailgate session shall include training on identification of species that may be found on the project site, the status of those species, and any legal protection afforded to those species. Personnel will be advised to report any special-status species encountered promptly. A fact sheet conveying this information will be prepared for display or for distribution to anyone who may enter the project site.

Mitigation Measure BIO-3. **Construction Site Housekeeping and Operational Requirements.** Habitat subject to permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities shall be minimized by adhering to the following *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* (USFWS 2011):

A. To minimize temporary disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas shall also be included in preconstruction surveys and, to the extent possible, shall be established in locations disturbed by previous activities to prevent further impacts.

B. Project-related vehicles shall observe a daytime speed limit of 20-mph throughout the site in all project sites, except on county roads and state and federal highways; this is particularly important at night when kit foxes are most active. Night-time construction shall be minimized to the extent possible. However if it does occur, then the speed limit shall be reduced to 10-mph. Off-road traffic outside of designated project sites shall be prohibited.

C. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2-feet deep shall be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks shall be installed. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the USFWS and the CDFW shall be contacted.

D. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS and CDFW have been consulted. If necessary, and under the direct supervision of a qualified biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped. In the case of trapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape, or the USFWS and CDFW should be contacted for further guidance.

E. All food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of in securely closed containers and removed at least once a week from a construction or project site.

F. Pets, such as dogs or cats, shall not be permitted on the project site to prevent harassment, mortality of kit foxes, or destruction of dens.

G. Use of rodenticides and herbicides in project sites shall be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.

Mitigation Measure BIO-4: **Nesting Bird Surveys and Avoidance.** If vegetation removal, construction, or grading activities are planned to occur within the active nesting bird season (February 15 through September 15), a qualified biologist shall conduct a preconstruction nesting bird survey no more than 5 days prior to the start of such activities. The nesting bird survey shall include the project site and areas immediately adjacent to the site that could potentially be affected by project-related activities such as noise, vibration, increased human activity, and dust, etc. For any active nest(s) identified, the qualified biologist shall establish an appropriate buffer zone around the active nest(s). The appropriate buffer shall be determined by the qualified biologist based on species, location, and the nature of the proposed activities. Project activities shall be avoided within the buffer zone until the nest is deemed no longer active by the qualified biologist.

CRITICAL HABITAT

The project would not result in any impacts to critical habitat, and no additional mitigation is required.

JURISDICTIONAL AQUATIC RESOURCES

The project proposes to convert an open trapezoidal segment of Peoples Ditch (an excavated irrigation canal) to a 66-inch-diameter below-ground pipe culvert which would terminate approximately 20 feet short of the existing pipe culvert that runs under State Route 198. Approximately 0.50 acre of the irrigation canal would be undergrounded as part of the project.

As previously discussed, Peoples Ditch does not meet the definition of a jurisdictional water of the United States pursuant to the *Navigable Waters Protection Rule* (EPA and DOA 2020), effective June 22, 2020. Furthermore, Peoples Ditch does not meet the wetland criteria outlined in the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (SWRCB 2019), which excludes agricultural ditches with ephemeral flow that are not a relocated water of the state or excavated in a water of the state. Nevertheless, Peoples Ditch may fall within the jurisdiction of CDFW under Section 1602 of the California Fish and Game Code and the RWQCB under the California Water Code (e.g., the Porter-Cologne Water Quality Control Act). Furthermore, given the recent substantial changes in operable definitions that have occurred and may continue to occur, and considering the regulatory revisions and potential court actions, it is not possible to definitively predict the regulations that will be in place at the time of a particular jurisdictional determination or permit action by the USACE. Under currently effective Clean Water Act regulations and guidance, the USACE reserves the right to regulate certain resources on a case-by-case basis. Therefore, Regulatory Compliance Measure BIO-1 is recommended.

Regulatory Compliance Measure BIO-1: **Agency Coordination for Peoples Ditch.** Prior to any modifications to Peoples Ditch, it is recommended to consult with the USACE, CDFW, and RWQCB to verify the feature's jurisdictional status and obtain applicable permit(s) and/or authorization(s). A notification of streambed alteration should be submitted to the California Department of Fish and Wildlife in accordance with Section 1602 of the California Fish and Game Code. Unless categorically excluded under effective definitions or existing documentation confirms that no permit is needed, the Central Valley RWQCB and Sacramento District of the USACE should be consulted regarding potential permitting needs under the California Water Code and federal Clean Water Act, respectively, associated with the proposed Peoples Ditch modifications.

Implementing applicable permit measures would prevent or compensate for impacts on jurisdictional aquatic resources. Considering the status of Peoples Ditch as a constructed and maintained irrigation canal and the lack of natural drainages, riparian areas, and wetlands on the project site, the project would not result in a substantial adverse effect on state or federally protected wetlands through direct removal, filling, hydrological interruption, or by other means. The impact is considered less than significant.

WILDLIFE MOVEMENT AND HABITAT CONNECTIVITY

The wildlife species that occur in the project vicinity are adapted to the urban-wildland interface, and the project would not introduce new affects to the area. The noise, vibration, light, dust, or human disturbance within construction areas would only temporarily deter wildlife from using areas in the immediate vicinity of construction activities. These indirect effects could temporarily alter migration behaviors, territories, or foraging habitats in select areas. However, because these are temporary effects, it is likely that wildlife already living and moving in close proximity to urban development would alter their normal functions for the duration of the project construction and then re-establish these functions once all temporary construction effects have been removed. The proposed project would not place any permanent barriers within any known wildlife movement corridors or interfere with habitat connectivity. The impact is considered less than significant, and no additional mitigation is required.

REGIONAL HABITAT CONSERVATION PLANS AND LOCAL POLICIES

- 5.5.1 Natural Habitat: Goal 04: Protection of natural habitat and other biological resources.
    - *Policy 031 Provision of Open Space Areas*: Preserve and enhance open space area.

Consistency Analysis: The project site is located within the Highway Commercial land use designation and is isolated from open space areas; therefore the project is considered consistent with this policy.

- *Policy 032 Wetland and Riparian Corridor:* Where appropriate and feasible, establish permanent mechanisms to protect wetlands and riparian corridors.

  Consistency Analysis: The project is not located within wetlands or riparian corridors; therefore the project is considered consistent with this policy.

- *Policy 033 Vernal Pools:* Identify and protect vernal pools that be located in Planning Area.

  Consistency Analysis*:* Vernal pools are not located within the project site; therefore the project is considered consistent with this policy.

- *Policy 035 Impacts from Development:* Ensure that potential impacts to biological resources and sensitive habitat are carefully evaluated when considering development projects.

  Consistency Analysis: No sensitive or special-status natural communities occur on the project site. An appropriately-timed field survey and biological resources assessment were conducted on the project site to determine the likelihood and suitability of sensitive habitat and species; the project is not likely to result in significant impacts on sensitive resources with the implementation of recommended measures. Therefore, the project is considered consistent with this policy.

- *Policy 037 Mature Trees:* Promote the preservation of existing mature trees and encourage the planting of appropriate shade trees in new developments.

  Consistency Analysis: The development plan includes the removal of one nonnative tree. The project will include the planting of trees as part of the landscaping plan, resulting in an overall increase in shade trees within the project area. Therefore, the project is considered consistent with this policy.

- *Policy 038 Native Tree Species and Drought Tolerant Vegetation:* Encourage the planting of native tree species and drought-tolerant vegetation.

  Consistency Analysis: The landscaping plan will be provided in accordance with Section 17.52 Landscape Standards of the Hanford Municipal Code; all species of trees shall be selected from a list approved by the City's Parks Division. Therefore, the project is considered consistent with this policy.

- 5.5.2 Wildlife and Sensitive Species

- *Policy 039 Endangered Wildlife and Habitat*: Establish programs in connection with environmental review processes to protect endangered wildlife and their habitats.

  Consistency Analysis: An appropriately-timed field survey and literature reviews were conducted for the project in support of the CEQA review process. Based on the analysis and with implementation of the recommended mitigation measures contained herein, it is unlikely that any endangered species would be adversely affected by the project. Therefore, the project is considered consistent with this policy.

- *Policy 040 Sensitive Wildlife:* Work with state, federal, and local agencies on the preservation of sensitive wildlife species in the City.

  Consistency Analysis*:* Implementation of recommended Mitigation Measures BIO-1 through BIO-4, as described above, would ensure consistency with applicable resource agency policies with regard to sensitive wildlife species determined to have potential of occurring on the project site. Therefore, the project is considered consistent with this policy.

With implementation of the recommended mitigation measures listed above, the proposed project would not conflict with any regional habitat conservation plan or local policies related to the protection and conservation of biological resources.

CONCLUSION

Based on field observations coupled with the habitat suitability analysis conducted for this assessment, the proposed project has low-to-moderate potential to impact several regionally-occurring special-status wildlife species, but is not anticipated to impact any special-status plant species, natural communities, or other habitats of concern. The implementation of the recommended mitigation measures detailed herein would ensure consistency with local policies related to biological resources, and would reduce any potentially significant impacts on special-status wildlife species to a less than significant level.

REFERENCES

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

California Burrowing Owl Consortium. 1993. *Burrowing Owl Survey Protocol and Mitigation Guidelines*. April 1993.

California Native Plant Society (CNPS). 2020. *Inventory of Rare and Endangered Plants (online edition v8)*. Available at: http://cnps.org/cnps/rareplants/inventory/. March 2020.

California Department of Fish and Game (CDFG). 2012. *Staff Report on Burrowing Owl Mitigation*. State of California Natural Resources Agency. March 2012.

______. 2018. California Natural Diversity Data Base (CNDDB). Special Animals List. November 2018. Periodic publication. 67 pp.

______. 2020. State of California, Department of Fish and Wildlife Biogeographic Data Branch. California Natural Diversity Database (CNDDB). Rarefind Version 5. March 2020. Rarefind query of the USGS 7.5-minute quads nine-quad review area – *Riverdale, Laton, Burris Park, Lemoore, Hanford, Remnoy, Stratford, Guernsey, and Waukena*, and GIS query of occurrences within a 5-mile buffer (project vicinity).

City of Hanford, Kings County. 2017. 2035 General Plan City of Hanford, Biological Resources. Last updated: April 2017.

eBird. 2020. eBird: An online database of bird distribution and abundance. Species occurrence records for Burrowing Owl (*Athene cunicularia*). eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. Accessed: May 7, 2020.

Environmental Protection Agency (EPA) and Department of the Army (DOA). 2020. *The Navigable Waters Protection Rule: Definition of "Waters of the United States."* 85 Federal Register 22250. Available at: https://www.federalregister.gov/documents/2020/04/21/2020-02500/the-navigable-waters-protection-rule-definition-of-waters-of-the-united-states

Natural Resource Conservation Service (NRCS). 2020. Web Soil Survey. Available at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Sawyer, J., T. Keeler-Wolf, and J. Evans. 2009. *A Manual of California Vegetation*. 2nd edition. California Native Plant Society. Sacramento, California: California Native Plant Society. 1,300 pp.

State Water Resources Control Board (SWRCB). 2019. *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* [For Inclusion in the Water Quality Control Plans for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California]. Adopted April 2, 2019. Effective May 28, 2020. Available at: https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf

U.S. Fish and Wildlife Service (USFWS). 2011. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance*. Sacramento Fish and Wildlife Office. January 2011.

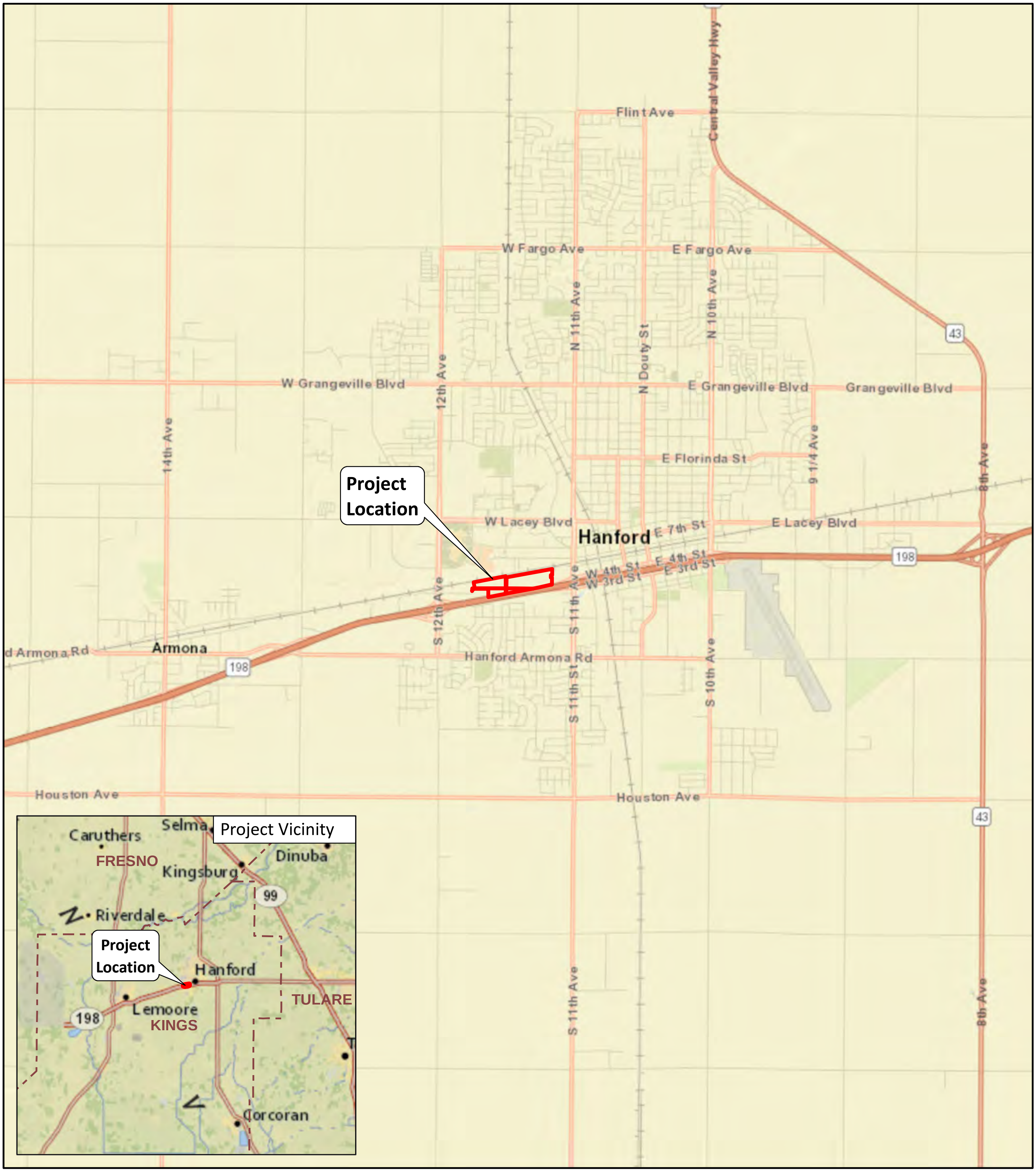
______. 2020a. Environmental Conservation Online System (ECOS). Information for Planning and Conservation (IPaC) Trust Resources Report. March 2020. Available at: http://ecos.fws.gov/ecp/.

______. 2020b. USFWS Critical Habitat Polygons. Available at: http://ecos.fws.gov/crithab/. March 2020.

______. 2020c. USFWS National Wetlands Inventory (NWI), Online Mapper Tool. Available at: https://www.fws.gov/wetlands/data/mapper.html

APPENDIX A

FIGURES



LSA

LEGEND

Project Site

0 0.5 1
MILES

FIGURE 1

Hanford Place Project
Hanford, Kings County, California

Regional Location

SOURCE: Esri World Street Map (2020); National Geographic (2020).

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LSA

LEGEND

Project Site

FIGURE 2

N

0 250 500

FEET

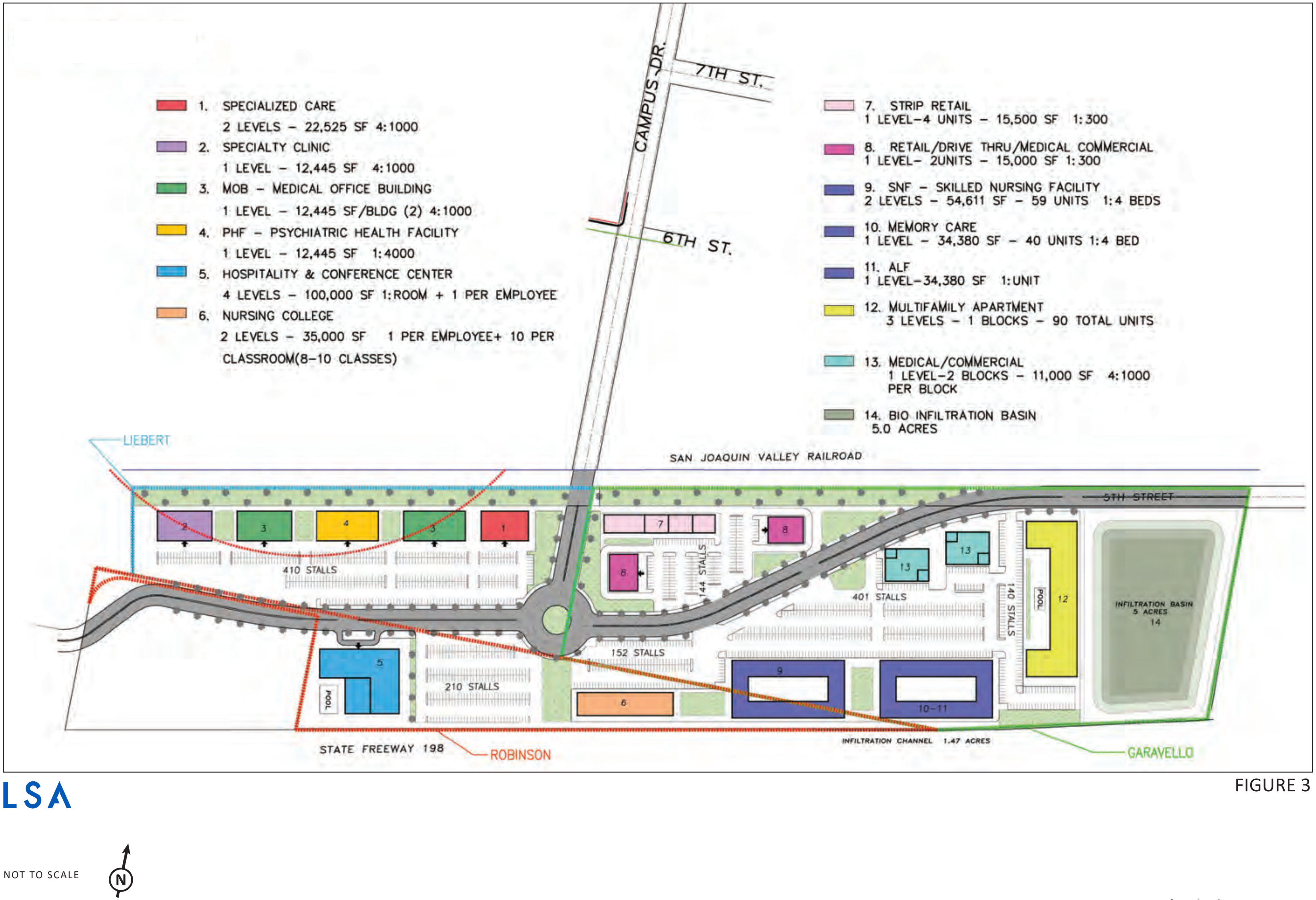
Hanford Place Project

Hanford, Kings County, California

Project Location

SOURCE: Google Aerial Imagery (2020).

\\PTR11\images\EPI2001\GIS\Maps\Figure 2_Project Location_rev1.mxd (5/11/2020)



LSA

FIGURE 3

Hanford Place Project
Hanford, Kings County, California
Site Plan

SOURCE: LANGDON WILSON INTERNATIONAL, 2020.

FRE10\P:\EPI2001 Hanford Place\PRODUCTS\Figure_3.ai (4/22/2020)

LSA

LEGEND

Project Site

Vegetation and Land Use Type

Developed

Barren/Disturbed

Peoples Ditch- Irrigation Canal

Wild Oats and Annual Brome Grassland

0 250 500

FEET

SOURCE: Google Aerial Imagery (2020).

FIGURE 4

Hanford Place Project

Hanford, Kings County, California

Vegetation Map

\\PTR11\images\EPI2001\GIS\Maps\Figure 4_Vegetation Map_rev1.mxd (6/10/2021)

LSA

LEGEND

Project Site

Soil Type

149-Nord complex, 0 to 2 percent slopes MLRA 17

167- Urban land

0 250 500
FEET

FIGURE 5

Hanford Place Project
Hanford, Kings County, California

Soils Map

SOURCE: Google Aerial Imagery (2020).

\\PTR11\images\EPI2001\GIS\Maps\Figure 5_Soils Map.mxd (4/30/2020)

APPENDIX B

PLANT SPECIES OBSERVED

The table below contains a list of plant species identified on the project site by LSA Biologist Kelly McDonald on April 27, 2020.

Plant Species Observed

EUDICOTS	
Amaranthaceae	**Amaranth family**
* *Amaranthus albus*	pigweed amaranth
Asteraceae	**Sunflower Family**
* *Erigeron bonariensis*	flax-leaved horseweed
Erigeron canadensis	Canadian horseweed
Gnaphalium palustre	Western marsh cudweed
Helianthus annuus	common sunflower
* *Lactuca serriola*	prickly lettuce
Matricaria discoidea	pineapple weed
* *Silybum marianum*	milk thistle
* *Soncus asper*	spiny sow-thistle
Boraginaceae	**Borage family**
Amsinckia menziesii	common fiddleneck
Brassicaceae	**Mustard Family**
* *Capsella bursa-pastoris*	Shepherd's purse
* *Hirschfeldia incana*	shortpod mustard
* *Lepidium didymum*	lesser swine cress
* *Raphanus raphanistrum*	wild radish
* *Sisymbrium altissimum*	tumble mustard
* *Sisymbrium irio*	London rocket
Chenopodiaceae	**Goosefoot Family**
* *Salsola tragus*	Russian thistle
Geraniaceae	**Geranium Family**
* *Erodium malacoides*	Mediterranean storks' bill
Fabaceae	**Legume Family**
* *Melilotus albus*	whitesweet clover
* *Melilotus indicus*	yellow sweetclover
Trifolium willdenovii	Tomcat clover
Malvaceae	**Mallow Family**
* *Malva parviflora*	cheeseweed mallow
Polygonaceae	**Buckwheat Family**
Persicaria lapathifolia	common knotweed
* *Rumex crispus*	curly dock
Phrymaceae	**Lopseed Family**
Erythranthe guttata	common monkeyflower
Solanacea	**Nightshade Family**

Plant Species Observed

*	*Solanum elaeagnifolium*	white-horse nettle
Simaroubaceae		**Quassi Family**
*	*Ailanthus altissima*	tree of heaven
MONOCOTS		
Poaceae		**Grass Family**
*	*Avena barbata*	wild oat
*	*Bromus diandrus*	ripgut grass
*	*Bromus madritensis* ssp. *rubens*	red brome
*	*Bromus madritensis* ssp. *madritensis*	foxtail chess
*	*Bromus tectorum*	cheat grass
*	*Hordeum murinum*	foxtail barley
*	*Polypogon monspeliensis*	rabbitsfoot grass
*	*Sorghum halepense*	Johnsongrass

* = nonnative species

APPENDIX C

REPRESENTATIVE SITE PHOTOS

Site overview showing disturbed areas and wild oats and annual brome grassland vegetation. Photo taken facing east from the central portion of the project site, east of Peoples Ditch. April 27, 2020.

The southwest portion of the project site supports wild oats and annual brome grassland vegetation. Photo taken facing west near Highway 198, near the southwestern corner of the project site. April 27, 2020.

LSA

APPENDIX B

(Sheet 1 of 4)

Hanford Place Project

Site Photographs

View of Peoples Ditch and barren areas, facing northwest. A single tree (*Ailanthus altissima;* nonnative species) is present on the project site. April 27, 2020.

View of Peoples Ditch and barren areas, facing west. April 27, 2020.

View of Peoples Ditch, facing south near the Campus Drive culvert outfall. April 27, 2020.

View of existing Peoples Ditch culvert inlet that goes underneath Highway 198, facing south. Visible signs of debris and human disturbance were observed within the canal. April 27, 2020.

Site overview showing disturbed/barren areas, debris, and wild oats and annual brome grassland vegetation. Photo taken facing east from the northeastern corner of the project site. April 27,2020.

Site overview showing disturbance from off-highway vehicle use, foot paths, and wild oats and annual brome grassland vegetation. Photo taken facing east near the northern portion of the project site. April 27, 2020.

LSA

APPENDIX B
(Sheet 3 of 4)

Hanford Place Project

Site Photographs

One of several burrows located in the barren areas surrounding Peoples Ditch. No burrowing owl or kit fox sign was detected at any of the observed burrows. April 27,2020.

View of the northeastern portion of the project site showing the worn foot path and wild oats and annual brome grassland vegetation, near the railroad tracks. April 27, 2020.

LSA

APPENDIX B
(Sheet 4 of 4)

Hanford Place Project

Site Photographs

APPENDIX D

SPECIAL-STATUS SPECIES IDENTIFIED AS POTENTIALLY OCCURING IN THE PROJECT VICINITY

Table D-1: Special-Status Plant Species Potentially Occurring in the Project Vicinity

Common Name	Scientific Name	Status	General Habitat Description	Flowering Period	Likelihood of Occurrence and Rationale
Earliart orache	*Atriplex cordulata var. erecticaulis*	US: – CA: – CNPS: 1B:2	Annual herb occurring in valley and foothill grassland between 40 and 100 m in elevation. Kings, Kern and Tulare counties.	August-September	**Not Expected.** There are no known historical records of occurrence in the project vicinity [1] and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.
Brittlescale	*Atriplex depressa*	US: – CA: – CNPS: 1B:2	Annual herb occurring in chenopod scrub, meadows, seeps, valley/foothill grasslands, playas and vernal pools between 1 and 320 m elevation. Found in Central Valley counties.	April-October	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.
Lesser saltscale	*Atriplex minuscula*	US: – CA: – CNPS: 1B:1	Annual herb occurring in chenopod scrub, valley/foothill grassland, and playas in sandy soils between 15 and 200 m in elevation. Found in Central Valley counties.	May-October	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.
Subtle orache	*Atriplex subtilis*	US: – CA: – CNPS: 1B:2	Annual herb occurring in valley and foothill grassland on alkaline soils between 40 and 100 m in elevation. Found in Central Valley counties.	June-October	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.
Recurved larkspur	*Delphinium recurvatum*	US: – CA: – CNPS: 1B.2	Perennial herb associated with chenopod scrub, cistomante woodlands, and valley/foothill grasslands on alkaline soils between 3 and 790 m in elevation. Found in Central Valley counties.	March-June	**Not expected.** There are no known records of occurrence in the project vicinity and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence. The April 2020 survey was conducted during the typical blooming period of this species.
Panoche pepper-grass	*Lepidium jaredii ssp. album*	US: – CA: – CNPS: 1B.2	Annual herb occurring in valley and foothill grasslands on steep slopes with clay and alkaline soils between 185 and 745 m elevation. Fresno, San Benito and San Luis Obispo counties.	February-June	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat conditions are absent in the project area.

Table D-1: Special-Status Plant Species Potentially Occurring in the Project Vicinity

Common Name	Scientific Name	Status	General Habitat Description	Flowering Period	Likelihood of Occurrence and Rationale
Mud nama	*Nama stenocarpa*	US: – CA: – CNPS: 1B.1	Annual/perennial herb occurring lake margins, river banks, marshes and swamps between 5 and 500 m in elevation. Found in interior southern California counties.	January-July	**Not Expected.** There are historical records of occurrence in the project vicinity (CNDDB 1942); however, suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.
California alkali grass	*Puccinellia simplex*	US: – CA: – CNPS: 1B.2	Annual herb occurring in chenopod scrub, vernal pools, valley/foothill grasslands, and meadows/seeps. On alkaline, vernally mesic, sinks, flats and lake margins between 2 and 930 m in elevation. Central Valley counties.	March-May	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is limited in the project area; the maintained nature of the project area reduces the likelihood of occurrence.

[1]Project vicinity = Project area plus a 5 mile buffer

Status: Federal Endangered (FE), Federal Threatened (FT), Federal Candidate (FC), Federal Proposed (FP, FPE, FPT), Federal Delisted (FD), California Endangered (CE), California Threatened (CT), California Species of Special Concern (SSC), California Fully Protected Species (CFP), California Special Plant (CSP), California Special Animal (CSA)

California Native Plant Society Designations:
1B = Rare, threatened, or endangered in California and elsewhere
2B = Rare, threatened, or endangered in California, but not elsewhere
0.1 = seriously endangered
0.2 = fairly endangered

CA = California
CNPS = California Native Plant Society
ft = foot/feet
m = meter/meters
mi = mile/miles
US = United States

Table D-2: Special-Status Animal Species Potentially Occurring or Known to Occur in the Project Vicinity

Common Name	Scientific Name	Status Listing	Habitat and Comments	Likelihood of Occurrence and Rationale
INVERTEBRATES				
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	US: FT CA: –	Requires elderberry trees, usually in riparian ecosystems, as host sources for breeding and forage.	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
San Joaquin tiger beetle	*Cicindela tranquebarica ssp.*	US: – CA: –	Known only to occur in Tulare and Kings counties.	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
vernal pool fairy shrimp	*Branchinecta lynchi*	US: FT CA: –	Occurs only in vernal pools or vernal pool-like habitats and does not occur in riverine, marine, or other permanent bodies of water.	**Not expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
vernal pool tadpole shrimp	*Lepidurus packardi*	US: FE CA: –	Occurs only in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands.	**Not expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
AMPHIBIANS				
California tiger salamander	*Ambystoma californiense*	US: FT CA: CT	Located in riparian woodlands and valley/foothills grasslands. Requires underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	**Not expected.** There are no known records of occurrence in the project vicinity and minimal suitable habitat is present.
Western spadefoot	*Spea hammondii*	US: FCT CA: SSC	Occurs primarily in grassland and other relatively open habitats. Found in elevations ranging from sea level to 4,500 ft. Requires temporary pools for breeding.	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and minimal suitable habitat is present within the canal and the surrounding grassland. However, debris and human disturbance were observed within the canal limiting the likelihood of occurrence.
REPTILES				
California glossy snake	*Arizona elegans occidentalis*	US:- CA: SSC	Occurs in low-elevation arid scrub, open woodland, grasslands, and chaparral slope habitats throughout the southwest and into Mexico. Dependent on diurnal lizards for major food source, small reptiles, birds, and mammals.	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and minimal suitable habitat is present.
Blunt-nosed leopard lizard	*Gambella sila*	US: FE CA: CE	Prefers sparsely vegetated arid grasslands and brush/scrub where there are abundant rodent burrows. Rare or absent in dense vegetation or tall grass.	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and suitable habitat is largely absent in the project area due to high, dense vegetation. Human disturbance also limits the likelihood of occurrence.

Table D-2: Special-Status Animal Species Potentially Occurring or Known to Occur in the Project Vicinity

Common Name	Scientific Name	Status Listing	Habitat and Comments	Likelihood of Occurrence and Rationale
Western pond turtle	*Emys marmorata*	US: – CA: SSC	Occurs in ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Upland habitat is needed for basking and breeding.	**Very low probability of occurrence.** There are no known records of occurrence in the project vicinity and only marginally suitable habitat is present within the canal and the surrounding grassland. However, debris and human disturbance were observed within the canal, and the ephemeral flow regime limit the likelihood of occurrence.
BIRDS				
Tricolored blackbird	*Agelalus tricolor*	US: – CA: CT	Occurs in open country or marshes in large colonies mainly in CA Central Valley. Breeds in freshwater marshes with tall emergent vegetation, feeds on insects.	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
Burrowing owl	*Athene cunicularia*	US: – CA: SSC	Burrows in open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably the California ground squirrel.	**Moderate probability of occurrence.** There are no known occurrences on the project site and marginally suitable habitat is present in the project area. Several small mammal burrows were unoccupied during the April 2020 survey, and no owl sign was observed. Known burrow sites in the Hanford region were occupied at the time of the April 2020 survey (eBird 2020).
Swainson's hawk	*Buteo swainsoni*	US: – CA: CT	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannas, and agricultural/ranch lands. Requires adjacent suitable foraging areas such as grasslands, alfalfa, or grain fields supporting rodent populations.	**Moderate probability of foraging; Low probability of nesting.** There are historical records of occurrence in the project vicinity (CNDDB 2012, 2016) where nesting occurred. The project area does contain one tree that could provide suitable nesting habitat. The surrounding grassland could also provide suitable foraging habitat.
Western snowy plover	*Charadrius alexandrinus nivosus*	US: FT CA: SSC	Inhabits sandy beaches, salt pond levees & shores of large alkali lakes. Nests on sandy, gravelly or friable soils.	**Low probability of occurrence.** There are no known records of occurrence in the project vicinity and suitable nesting habitat is restricted to the top of the canal. However, debris and human disturbance were observed within project area limiting the likelihood of occurrence.

Table D-2: Special-Status Animal Species Potentially Occurring or Known to Occur in the Project Vicinity

Common Name	Scientific Name	Status Listing	Habitat and Comments	Likelihood of Occurrence and Rationale
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	US: – CA:SSC	Known to inhabit marshes and riparian areas in the Central Valley.	**Not Expected.** There are no known records of occurrence in the project vicinity and suitable habitat is absent in the project area.
MAMMALS				
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	US: FE CA: CE	Inhabits open lands with sparse wood shrubs and low cover of annual grasses and forbs, alkali and saltbush scrublands.	**Low probability of occurrence**. There are no known records of occurrence in the project vicinity and suitable habitat is largely absent in the project area due to high, dense vegetation. Several small mammal burrows were unoccupied during the April 2020 survey, however debris and human disturbance were observed within the project area limiting the likelihood of occurrence
Hoary bat	*Lasiurus cinereus*	US: – CA: CSA	Prefers open habitats or habitat mosaics with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	**Roosting Not Expected.** There is a historical record of occurrence in the project vicinity (CNDDB 1991). Suitable roosting habitat is absent in the project area. Some suitable foraging habitat present in the project area.
San Joaquin kit fox	*Vulpes macrotis mutica*	US: FE CA: CT	Prefers open, level areas with loose-textured soils supporting scattered, shrubby vegetation with little human disturbance. Some agricultural areas may support these foxes.	**Moderate probability of occurrence.** There are historical records of occurrence in the project vicinity (CNDDB 1975, 2000, 2006). Known to historically forage and den in the project vicinity, although there are no records in the project site and the site is isolated by existing urban development. Marginal denning habitat is present in the project site. Several small mammal burrows appeared to be unoccupied during the April 2020 survey, and no fox sign was observed.

[1]Project vicinity = Project area plus a 5 mile buffer
Status: Federal Endangered (FE), Federal Threatened (FT), Federal Candidate (FC), Federal Proposed (FP, FPE, FPT), Federal Delisted (FD), California Endangered (CE), California Threatened (CT), California Species of Special Concern (SSC), California Fully Protected Species (CFP), California Special Animal (CSA)

ft = foot/feet
m = meter/meters
mi = mile/miles
US = United States
CA = California

APPENDIX C

CULTURAL RESOURCE INVENTORY

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Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California

Diana T. Dyste, Jessica Jones, Dennis McDougall,
Ward Stanley, and Carlos van Onna

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44045 Margarita Road, Suite 100
Temecula, CA 92592

August 2020
draft

USGS Hanford 7.5-minute quadrangle; T18S, R21E, Section 35
42.73 acres surveyed, 0.11 acre not surveyed
Keywords: Peoples Ditch (P-16-000246/CA-KIN-97H); AE-4167-01; AE-4167-ISO-01

MANAGEMENT SUMMARY

Applied EarthWorks, Inc. (Æ), at the request of the Hanford Group and under subcontract to Epic Management Group, Inc., completed a cultural resource inventory for the Hanford Place Medical and Mixed-Use Property Project (Project) in Kings County, California. The Project proposes the construction of 15 buildings and structures that will be utilized for medical outpatient clinic services, hospitality, specialized education, retail, medical offices, skilled nursing and assisted living facilities, and multifamily housing. Project activities that could cause ground disturbance include grading; trenching for installation of water, sewer, and electrical infrastructure; construction of a roundabout; and excavation of a storm water retention basin in addition to construction of buildings, structures, and facilities.

The Project must comply with the California Environmental Quality Act (CEQA), which mandates that government agencies consider the impacts of their actions on the environment, including cultural resources. This report documents whether historical resources, as defined by the CEQA Guidelines, would be adversely impacted by the proposed Project. Æ's cultural resource inventory included a records search at the California Historical Resources Information System Southern San Joaquin Valley Information Center at California State University, Bakersfield; a review of historic maps, aerial photographs, and atlases; a search of the Native American Heritage Commission's (NAHC) Sacred Lands File; nongovernmental outreach to local Native American representatives identified by the NAHC; a buried site sensitivity assessment; and an intensive pedestrian survey of the Project area to identify cultural resources observable on the ground surface.

The Southern San Joaquin Valley Information Center records search for the Project and surrounding 0.5-mile area identified nine previous investigations intersecting the Project area and five additional studies in the surrounding 0.5-mile area. One historic-era resource was identified in the Project area (a segment of Peoples Ditch) and three historic-era resources were identified in the surrounding 0.5-mile area. A search of the NAHC Sacred Lands File did not identify sacred sites in the Project area. No responses have been received in response to Æ's outreach to six Native American representatives identified by the NAHC.

Æ archaeologists conducted an intensive pedestrian survey of the Project area to identify prehistoric and historic-era cultural resources visible at the ground surface. No prehistoric sites were identified during the pedestrian survey; however, Æ recorded one isolated historic artifact (AE-4167-ISO-01) and one historic-era deposit (AE-4167-01) observed on the ground surface in the southeastern portion of the Project area.

In addition, the buried site sensitivity assessment concluded that there is high potential for the soils in previously undisturbed portions of the Project area to contain anthropogenic paleosols that may harbor intact prehistoric cultural deposits. Portions of the Project area previously disturbed by the construction of the historic-era Peoples Ditch canal and its modern realignment, or within the historic-era plow zone (up to 24 inches below the ground surface) have a much lower sensitivity for containing paleosols with intact prehistoric deposits.

To fully comply with CEQA and determine if the Project will cause a substantial adverse change in the significant qualities of a historical resource, Æ recommends additional mapping and subsurface testing of AE-4167-01 to evaluate its eligibility for inclusion in the California Register of Historical Resources, pursuant to California Public Resources Code Section 5024.1. Æ additionally recommends focused subsurface testing in areas of the site not previously disturbed by historic-era activities to confirm the presence/absence of high-sensitivity paleosols that may include intact prehistoric cultural deposits. Completion of mapping, site testing, and soil testing will allow for an adequate assessment of whether the proposed Project may cause adverse impacts to historical resources (i.e., cultural resources eligible for listing on the California Register of Historical Resources). The methods and findings of the additional study would be presented as an addendum to this report and would include cultural resource management recommendations.

Field notes and photographs are on file at Æ's office in Fresno, California. A copy of the final version of this report and associated cultural resource records will be transmitted to the Southern San Joaquin Valley Information Center for inclusion in the California Historical Resources Information System.

CONTENTS

APPENDICES

FIGURES

1
INTRODUCTION

Applied EarthWorks, Inc. (Æ), under subcontract to Epic Management Group, Inc., performed a cultural resource inventory for the Hanford Place Medical and Mixed-Use Facility Project (Project) in the city of Hanford, Kings County, California (Figure 1-1). Specifically, the Project is in Section 35, Township 18 South, Range 21 East, Mount Diablo Base and Meridian (Figure 1-2). The Project includes 42.84 acres between the Burlington Northern Santa Fe Railway tracks and State Route 198 (Figure 1-3).

The Project is subject to the California Environmental Quality Act (CEQA; California Public Resources Code [PRC] Sections 21000–21189) and the CEQA Guidelines (Title 14, California Code of Regulations [CCR], Sections 15000–15387), which mandate that public agencies consider the impacts of discretionary projects on the environment, including cultural resources. If a project has the potential to cause substantial adverse change in the characteristics of an important cultural resource or "historical resource" through demolition, destruction, relocation, alteration, or other means, then the project is judged to have a significant effect on the environment (14 CCR 15064.5[b]). Sections 15064.5(a)(1–3) of the CEQA Guidelines state that a historical resource is: (1) listed or determined eligible for listing in the California Register of Historical Resources; (2) included in a local register of historical resources (pursuant to PRC Section 5020.1[k]) or identified as significant in a historical resource survey per the CRHR eligibility criteria (PRC 5024.1[c]); or (3) considered eligible by a lead agency under PRC 5020.1(j) or 5024.1. The definition subsumes a variety of resources, including prehistoric and historical archaeological sites, structures, buildings, and objects (14 CCR 15064.5[a][3] and 15064.5[c]). The City of Hanford is the lead agency for purposes of the CEQA.

1.1 PROJECT BACKGROUND

The Project proposes to construct 15 buildings, structures, and facilities that will be utilized for medical outpatient clinic services, hospitality, specialized education, retail, medical offices, skilled nursing and assisted living, and multifamily housing. Project activities with potential to cause ground disturbance would include grading; installation of water, sewer, and electrical infrastructure; construction of a roundabout; and excavation of a storm water retention basin in addition to construction of the 15 buildings and structures. The roundabout would be incorporated into the public right-of-way. Maximum depth of ground disturbance is presently undefined. Similarly, maximum height of proposed structures is not determined.

To assist the Hanford Group in fulfilling CEQA requirements for the proposed Project, Æ conducted a cultural resource inventory that included: (1) a records search at the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) to identify prior cultural resource studies and previously recorded cultural resources in the Project area and surrounding 0.5-mile area; (2) desktop archival research to better understand land use and property ownership within the Project area; (3) a search of the Native American Heritage Commission's (NAHC) Sacred Lands File and outreach with local

Figure 1-1 Project vicinity in Hanford, California.

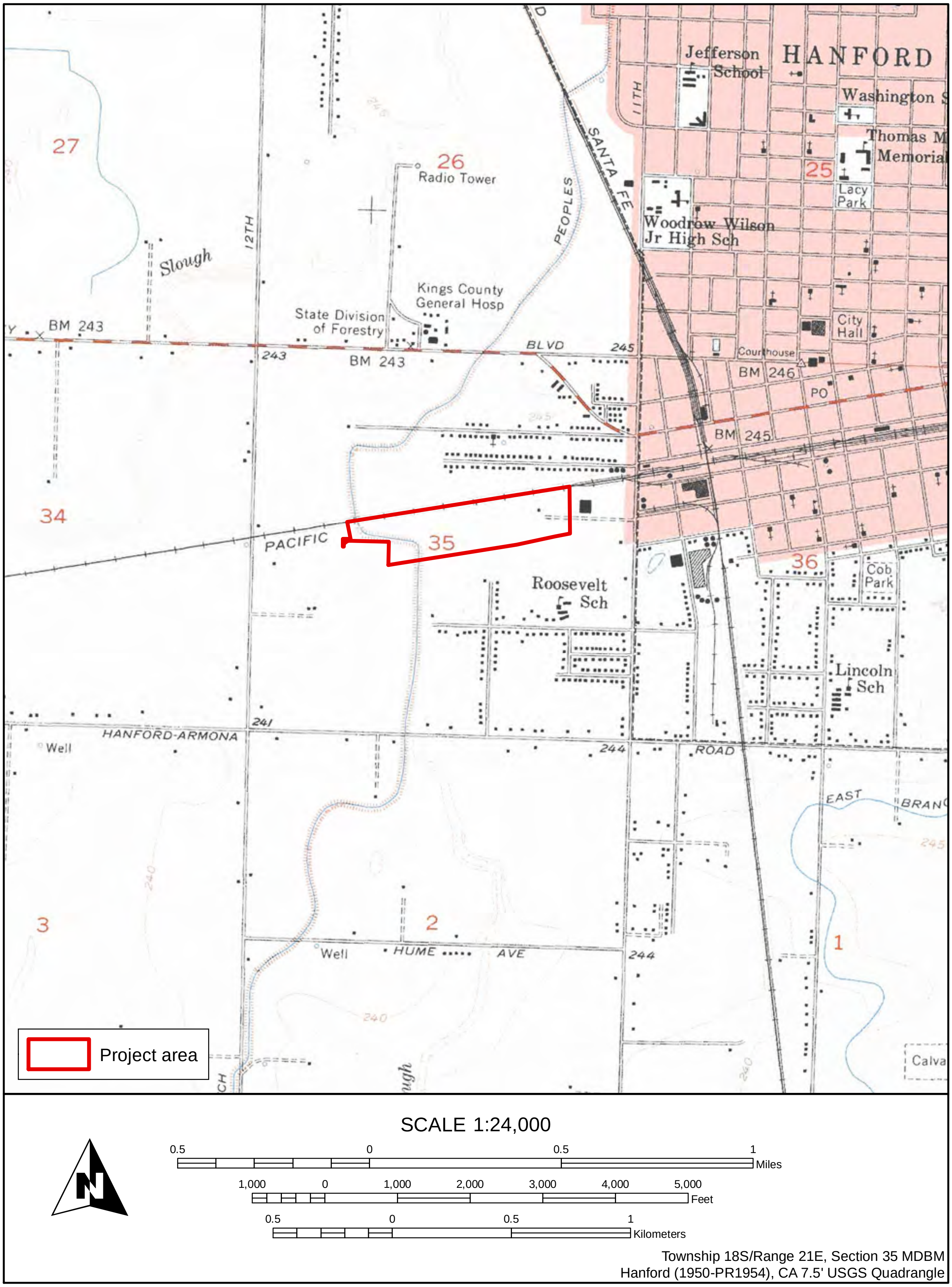

Figure 1-2 Project location on the USGS Hanford, CA 7.5-minute quadrangle.

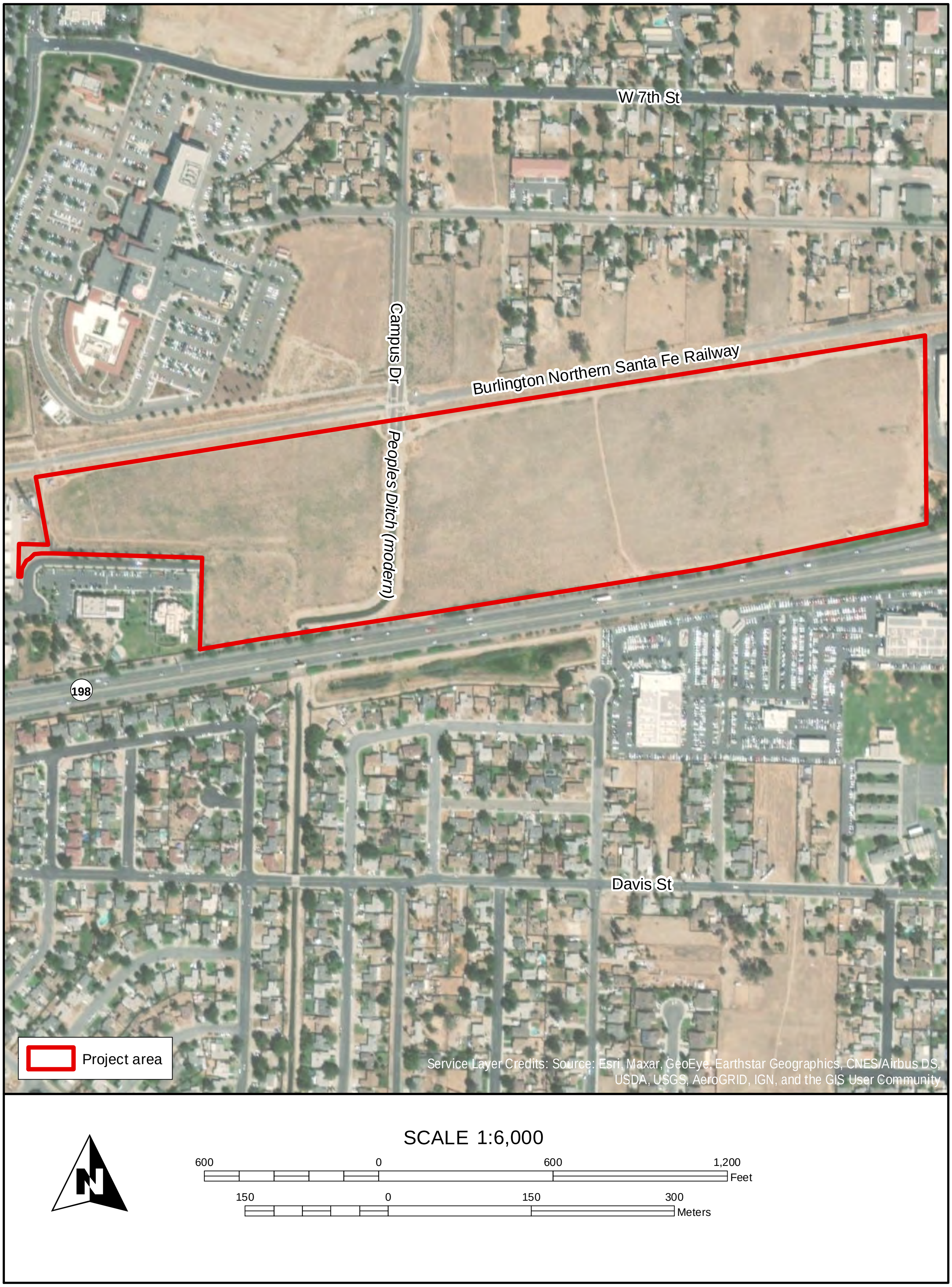

Figure 1-3 Aerial view of the Project area.

tribal representatives; (4) a pedestrian survey of the Project area to identify potential historical resources within the Project area and preliminary recordation of identified resources on the appropriate California Department of Parks and Recreation record form(s); (5) a buried site sensitivity assessment; and (6) recommendations for further work to assess whether the proposed Project would cause adverse impacts to historical resources—i.e., cultural resources eligible for listing on the California Register.

1.2 PROFESSIONAL QUALIFICATIONS

Æ Senior Archaeologist Diana T. Dyste (M.A.), a Registered Professional Archaeologist (RPA 39362477), served as project manager and co-author of this report, providing quality oversight and technical guidance. Æ Senior Architectural Historian Carlos van Onna (M.A.) conducted site-specific archival research and prepared the historic context for the Peoples Ditch (P-16-000246/CA-KIN-97H). Æ Senior Archaeologist Dennis McDougall assisted van Onna with research. Æ Staff Archaeologist Ward Stanley completed the archaeological pedestrian survey and, along with Staff Archaeologist Jessica Jones, contributed to the technical report. Staff Archaeologist/GIS Technician Flavio Silva (Ph.D.) prepared maps, report graphics, and compiled the GIS data. Résumés for key personnel are provided in Appendix A.

1.3 REPORT ORGANIZATION

This technical report was prepared according to California Office of Historic Preservation (1990) standards outlined in *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* and thus fulfills the requirements for the CEQA.

Following this introduction, Chapter 2 describes the natural environment, prehistoric setting, ethnography of the region, and historic setting encompassing the Project area. Chapter 3 discusses the methods used during archival research, buried site sensitivity assessment, and archaeological and built environment surveys. Research findings and results of the survey and buried site assessment are provided in Chapter 4. A summary of findings and cultural resource management recommendations are included in Chapter 5. References cited are provided in Chapter 6, followed by Appendices A–D.

2
PROJECT SETTING

2.1 NATURAL SETTING

The Project is in the San Joaquin Valley, the southern half of an elongated trough called the Great Valley. The Great Valley is a 50-mile-wide lowland that extends approximately 500 miles south from the Cascade Range to the Tehachapi Mountains (Norris and Webb 1990:412). Between the Mesozoic and Cenozoic eras, the Great Valley served as a shallow marine embayment containing numerous lakes, primarily within the San Joaquin Valley (Norris and Webb 1990:412). Waters began to diminish around 10 million years ago during the late Pliocene and eventually were cut off from the ocean altogether by the formation of the Coast Ranges, leaving tributaries and small lakes that survived until the historic era (Hill 1984:28; Norris and Webb 1990:380).

Much of the Great Valley rests upon thick strata of alluvial sediments washed down from the Sierra Nevada and Coast Ranges during the Quaternary (Norris and Webb 1990). It is this same soil that today makes the valley a fertile agricultural region. Below these levels are layers from the Pliocene and older epochs, which consist of both marine (shale, sandstone) and nonmarine (basalt, andesite) materials. Primary soils have been developed by weathering, seasonal erosion, and mass flood events that cause downward movement of granitic parent material. Secondary soils are formed by a combination of eolian and alluvial forces that have transported granitic and assorted metamorphic and metavolcanic materials along mountain streams (Weir 1956). Quaternary and recent alluvium covers most of the valley basin (Meyer et al. 2010).

The Project area is in the Tulare Lake Basin hydrologic unit, which includes a portion of one of the San Joaquin Valley's dominant hydrologic features, the Kings River. Several smaller order creeks and streams flow north into the Kings River toward Hanford, while the westward-flowing Tule River is south of Hanford. Intermittent creeks feed the Kings River, which can remain dry for long periods of the year. However, before historic drainage projects and modern reclamation, seasonal flooding from the Kings River produced extensive wetlands in the valley. Lakes, marshes, and sloughs once covered more than 3,000 square miles in the San Joaquin Valley (Moratto 1984:168). The largest of these was ancient Tulare Lake. The lake existed approximately 25 miles southwest of the Project area and spanned as much as 30 miles from shore to shore (Preston 1981). As more water was historically diverted from major streams for agricultural purposes, the shores of the lake progressively retreated. By the early twentieth century, Tulare Lake had all but disappeared except in unusually wet years when high levels of runoff are released.

The abundance of water near and within the Project area provided a rich habitat for plants and animals in prehistory and through the historic era. Common native plants would have included white and live oaks (*Quercus* spp.) as well as walnut (*Juglans* sp.), cottonwood (*Populus fremontii*), willow (*Salix* sp.), and tule (*Schoenoplectus* sp.), and possibly hardstem bulrush (*Scirpus acutus*) and cattail (*Typha* sp.). Various grasses, forbs, and sedges would have flourished in the area. A variety of animals lived in and around the Project area prior to the modern era, including mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), tule elk (*Cervus* sp.), pronghorn (*Antilocapra americana*), grizzly bears (*Ursus arctos californicus*) and black bears (*U. americanus*) (Preston 1981:245–247). These resources provided humans with a diverse range of medicinal, dietary, and other resources used for tool production and other subsistence purposes during prehistory and the historic era.

2.2 CULTURAL SETTING

2.2.1 Prehistory

The San Joaquin Valley prehistoric record is among the least understood of all regions in California. Reconstruction of past cultural patterns has been stymied by two key factors: geomorphology and human activity (Dillon 2002; Siefkin 1999). The valley floor that encompasses the Project area has been inundated with thick alluvial deposits resulting from granitic and sedimentary outflow from the Kings River, particularly during mass flood events. This pattern has continued for millennia and has resulted in the burial of early- to mid-Holocene archaeological sites, estimated to be buried at depths of up to 10 meters along the lower stretches of the San Joaquin Valley drainage systems (Meyer et al. 2010; Onken 2020). Thus, compared to other regions in the state, there is a paucity of research and a related lack of data from which to build a complete understanding of past human behavior specific to the valley.

Nevertheless, available data for sites in valley lacustrine environs help identify key cultural changes within the Project area and surrounding environs. The summary of cultural traits presented below is based on a review of San Joaquin Valley lacustrine, riverine, and valley floor site data discussed in Rosenthal et al. (2007). Cultural periods and accompanying dates (given as calibrated calendar years [cal B.C. or A.D.]) are based on Rosenthal et al. (2007:150–159), Moratto (1984:333), McGuire and Garfinkel (1980:49–53), and Bennyhoff and Fredrickson’s chronologies (Fredrickson 1973, 1974).

Archaeological investigations in the Tulare Lake and Buena Vista Lake localities suggest that people occupied the San Joaquin Valley as early as 11,000–12,000 years ago (Fredrickson and Grossman 1977; Riddell and Olsen 1969). Because there has been very little systematic and thorough archaeological excavation in the immediate vicinity of the Project area, it is unclear whether the cultural phases identified in the adjacent foothills or southern valley extend to this area. Although some limited data suggest that phases developed for Yosemite National Park and Buchanan Reservoir for the most recent period of prehistory can be extended to sites in the San Joaquin Valley (Baloian et al. 2006), there is no evidence that this holds true for earlier phases.

The Paleo-Indian Period (11,500–8550 cal B.C.) is represented by ephemeral lacustrine sites dominated by atlatl dart and spear projectile points. The earliest evidence of distinct valley cultural patterns appears during the Lower Archaic Period (8550–5550 cal B.C.) when crescents and stemmed projectile points are first used and evidence appears of dietary use of freshwater fish, waterfowl, mussels, deer, and pronghorn. The Middle Archaic (5550–550 cal B.C.) includes a time, estimated between 5950–3150 cal B.C., when semipermanent villages first appear along riverbanks in tandem with larger, more established lacustrine villages. Stone tools were used in abundance, meanwhile ground stone tool kits emerged along with long-distance trade and exchange networks focused on obsidian, shell beads, and ornaments.

New cultural patterns emerged during the Upper Archaic Period (550 cal B.C. to cal A.D. 1100), especially between 3150–1350 cal B.C. when a distinct shift in burial practices occurred and geographic differences in site and artifact types appeared. The time between 1350–650 cal B.C. is marked by the sudden presence of mound sites in the valley. Widespread proliferation of specialized technology is evident, including new types of bone tools, projectile points, and ceremonial objects such as wands and blades. Paleoethnobotanical studies also suggest the use of labor-intensive and seasonally abundant resources, including acorns, pine nuts, salmon, and shellfish. Similarly, the Emergent Period, extending from cal A.D. 1000 to the historic era, is marked by continued variation in settlement and burial patterns across the valley, coupled with the disappearance of atlatl and dart tool kits that are replaced with bow-and-arrow technology (i.e., small corner-notched and Desert series projectile points) at about cal A.D. 1000. Fishing tool kits expanded to include more efficient harpoons, bone fishhooks, and gorge hooks. In the Tulare basin, pottery obtained via trade appears as well as baked clay balls used for cooking and making carved clay effigies.

2.2.2 Ethnohistory

The Project area is in the Southern Valley Yokuts ethnographic territory. The Yokuts are one of eight subgroups of the Penutian linguistic phylum that is present across the western coast and inland regions of North America from Canada to Mexico (Golla 2011:128). The Yokuts had many language subgroups and spoke a variety of mutually intelligible dialects across the San Joaquin Valley and Sierra Nevada (Golla 2011). The Southern Valley Yokuts populated the shores of Tulare, Buena Vista, and Kern lakes, their connecting sloughs, and the lower portions of the Kings, Kaweah, Tule, and Kern rivers (Latta 1999; Silverstein 1978).

The Tachi Yokut, who were the northernmost of the Tulare Lake tribes, occupied a large area of the Central Valley, extending from the western shores of Tulare Lake northward to the Fresno Slough and westward to the Coast Ranges (Kroeber 1976:484). A major ethnohistoric Tachi Yokut village *Wiu* (also *Waiu*, or Mussel Slough) was just south of Lemoore. Wiu is at the present location of the Santa Rosa Rancheria Tachi Yokut reservation, approximately 9 miles southwest of the Project area (Kroeber 1976:484).

During the historic era, the general vicinity of Hanford was a seasonal plant, seed, and nut collection area for local tribes. The Tachi Yokut relied on the plentiful supply of lacustrine and riverine resources, including lake trout, chubs, perch, and suckers as well as turtles and freshwater shellfish. Wild seeds and acorns were harvested in the early summer and fall, respectively, and stored for use throughout the year. Waterfowl and other game attracted to the lake supplemented the Tachi Yokut diet.

Intensive European exploration of the San Joaquin Valley Yokuts territory did not take place until the early nineteenth century (Wallace 1978). As a result of European contact with Native American populations in the valley, indigenous populations were significantly reduced by disease. Native American settlement patterns within the valley were disrupted because of recruitment for Missions Soledad, San Luis Obispo, San Antonio de Padua, and San Juan Bautista. Further traumatic impacts to the valley's Native American population were caused by a series of parasitic (i.e., malaria) and viral (e.g., influenza) epidemics that began in 1833. The diseases struck with such virulence that by 1846 an estimated 40–75 percent of Native Americans had died during outbreaks in California (Cook 1955).

Many Southern Valley Yokuts tribes have survived the effects of colonization, particularly the Santa Rosa Rancheria Tachi Yokut Tribe, which has since developed an early childhood education to college success program and has worked to preserve song, dance, and oral history traditions of the Tribe (Golla 2011:154). The Santa Rosa Rancheria Tachi Yokut Tribe is governed by General and Tribal Councils and operates auxiliary departments that serve local Native American populations in areas of governance, healthcare, education, housing, cultural resource management, and administration of the Tachi Palace Hotel and Casino. The Tribe contributes annually to the Kings County fire department, health initiatives, other community welfare programs, and state public use funding programs.

2.2.3 Historical Setting

The first organized Euro-American foray into the western valley occurred in 1806 when Spanish Lieutenant Gabriel Moraga and his men explored stretches of the San Joaquin, Kings, and Kaweah rivers (Cook 1960:247–253). The most relevant exploration was the 1815 travels of Sergeant Juan de Ortega and his band, who camped at a place they called "Chenem" just after crossing the coastal mountains from the Presidio of Monterey (Cook 1960:268). Chenem, which was 32 miles southwest of the Project area, was later occupied and renamed by Mexican settlers, who referred to the place as Posa Chiné or Poso Chané. A 1932 Tulare newspaper article stated:

> [At] one time, there were perhaps a dozen Spanish and Mexican families living at the old Posa. They ranged cattle and horses and a few goats. The swamp area was cultivated and they planted trees, vines, and garden truck [Clough and Secrest 1984:40].

In 1854, the Higuera family established a homestead at Posa Chiné/Poso Chané and herded cattle and stock as far as the west shore of Tulare Lake. They likely resided there until 1862–1863 when a flood destroyed the watering hole.

Ranching had been a part of the state's economy since the Mexican period, and the industry's growth accelerated as many successful prospectors and businessmen reinvested their profits from the gold rush in cattle and sheep herds. In the early days of ranching, sheep were a valued commodity because they not only could be sold for consumption but could be sheared for their wool. From 1857 to 1871, the amount of wool produced in California increased more than 20-fold, while revenue grew at an average annual rate of 30 percent (Vandor 1919:164). Similarly, cattle provided beef and dairy products as well as hides. Tallow can be rendered from the fat of both cattle and sheep.

In 1850, California gained statehood and the area that was to become Kings County, along with Fresno and several other counties, was part of Mariposa County. Mariposa, truly the "mother of counties," was the largest county in the state, encompassing more than one fifth of California. Tulare County was formed from parts of Mariposa County in 1852. Kings County, as it exists today, was formed in 1893 from a portion of Tulare County.

2.2.3.1 Transportation and Development of Hanford

In 1877 the Southern Pacific Railway (SPR) established the city of Hanford at the site of a small Chinese sheepherders' camp. The city was named after SPR executive James Madison Hanford and soon grew into a hub for railway transportation in the southern central valley (Menefee and Dodge 1913:209). As with other towns in the valley, the SPR greatly contributed to Hanford's growth in its early years of existence. City streets were aligned with the passing railroad rather than in cardinal directions (Figure 2-1). Blocks contained 32 lots ready for purchase at inflated rates from the railroad company that was granted rights to the land. While many towns in their early days were located a few blocks off the railroad where land was originally purchased at lower prices, by 1892 the town of Hanford was refocused on the rail line (Preston 1981:123–125). By the early part of the twentieth century, Hanford had a public free library, several churches of various denominations, a fire station, high school, and developed farming districts surrounding the town (Menefee and Dodge 1913:212–216).

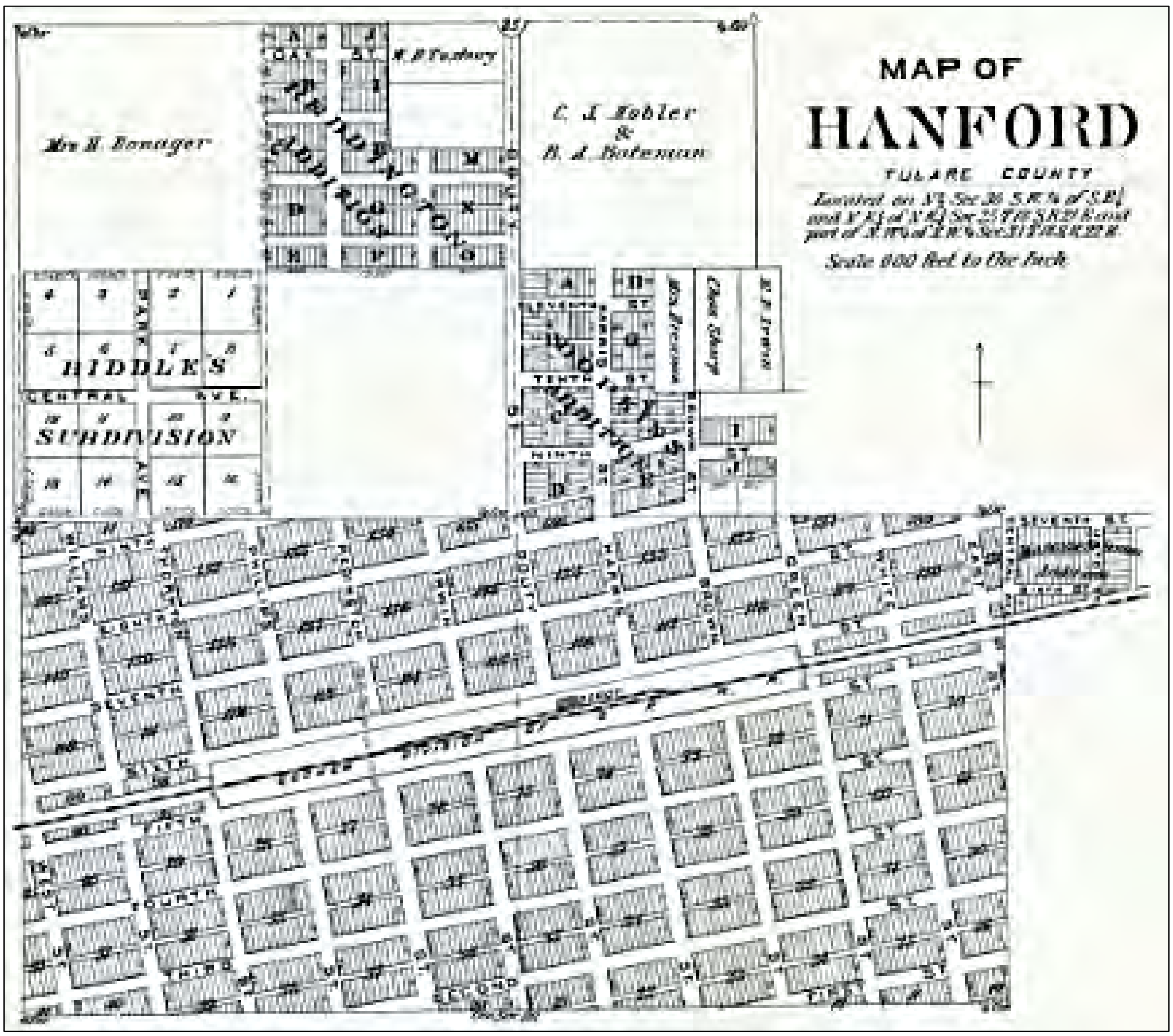

Figure 2-1 City of Hanford circa 1892 showing streets and blocks aligned to the SPR tracks (Thompson 1892:58).

2.2.3.2 Agriculture in the Central Valley

Early settlers in the Tulare Lake basin area encountered hogs left from the Spanish-Mexican era. Hogs were preferred stock over wandering cattle because the animals could be fattened quickly and cuts cured for easy transport (Mitchell 1976:34–37). Large numbers of hogs were fattened in the endless tule reeds surrounding Tulare Lake, then driven to the Sierra foothills in the fall to gorge on ripened acorns (Nordhoff 1874:209). The hog industry helped sustain early Euro-American settlers, whose food supplies otherwise had to be transported by wagon from Stockton (Preston 1981:74–75).

Agriculture had been gathering its own momentum since the gold rush. Early efforts to grow wheat without a sufficient water supply met with failure. Before the 1870s and the advent of large-scale water conveyance systems, farms were generally located near a perennial water source. This constraint on early agriculture kept the valley's two major industries—farming and ranching—in balance within the economy. Competition for real estate was minimized because agricultural interests had little reason to expand into pasturelands that were unsuitable for farming.

By the early 1870s the scales began to tip in favor of agriculture. The construction of extensive irrigation systems, financed by developers like A. Y. Easterby, converted the valley's dry soils into fertile farmlands. The 1874 "no fence" law underscored the growing dominance of agricultural interests and resulted in both operational and monetary repercussions for the sheep and cattle industry:

> The "no fence" law obligated the stock owner to herd his cattle and sheep, whereas before the stock roamed at will and was not assembled except for the annual rodeo. He was also made responsible for damage done by his beasts. The farmer was not required to fence his holdings, though. .. he occasionally did so [Vandor 1919:163].

The "no fence" law was a major setback to ranching; the stockman no longer had the entire extent of the San Joaquin Valley at his disposal and was now burdened with the cost of fencing in his herds and flocks. Nevertheless, the industry continued to grow within the county, albeit not at the same pace as agriculture. The cattle empire of Miller and Lux, which operated well into the twentieth century, owned as much as 145,000 acres of pastureland in Madera County (Barcroft 1933) and utilized additional grazing lands within Kings County (Roberts 2008:79).

While much of the valley was covered in wheat fields in the mid-1870s (Clough 1986), farmers had been experimenting with grape vines and citrus trees since the 1850s. By the 1880s, a nationwide glut in the grain market and attendant drop in the price of wheat caused valley farmers to shift their attention to these newer crops. In a relatively short time, large-scale vineyards and orchards had replaced wheat fields in most regions of the valley.

2.2.3.3 Water Conveyance

Irrigation efforts near the city of Hanford began in the area known as "Mussel Slough," which contained arid dry soils cut by a single slough connecting the Kings River with Tulare Lake. Early settlers saw the potential to irrigate this land before the SPR established a railroad through the area. In 1875, local citizens formed the Peoples Ditch Company and quickly began construction on an irrigation canal through the heart of Mussel Slough country. Despite many setbacks, such as poor engineering, soft collapsing soils, and lack of capital, the Peoples Ditch canal was completed sometime in 1878 or 1879 (Menefee and Dodge 1913:192–193). A remnant segment of this canal is in the eastern half of the Project area, and a modern realignment of the Peoples Ditch intersects the Project area north–south just below Campus Drive (Figure 1-3).

Water typically has been distributed to farmers primarily at the county level through the water companies of the nineteenth century and more recently by such entities as irrigation districts. By the late 1920s and early 1930s, however, it became apparent to the state government that a valley-wide system was necessary to alleviate local shortages (JRP Historical Consulting Services and California Department of Transportation 2000:73–74). The solution was the Central Valley Project (CVP), a multicomponent water conveyance system that included, among other elements, the Delta-Mendota Canal and the Friant-Kern Canal. Funding for such a massive project was beyond the means of the local water concerns, and the State of California was unable to sell the necessary bond issues due to the monetary constraints of the depression.

> The state then turned to the federal government, suggesting a role for construction of the CVP in President Franklin D. Roosevelt's New Deal. Through a complicated series of negotiations, California officials were finally able to secure federal funding for the project, in part by promoting the project as a major job-creation undertaking—a convincing selling point during the early years of the Great Depression [JRP and Caltrans 2000:74].

Although construction of the CVP began in the late 1930s, labor and material shortages caused by World War II delayed many of the project's components, and the final stage of construction was not completed until the 1970s.

2.2.3.4 Historical Use and Development of the Project Area

Numerous archival resources were consulted to identify historical land use and development in the Project area. These resources include General Land Office (GLO) survey plat maps (1855, 1867, and 1891); an 1892 property atlas; USGS topographic quadrangle maps (1926 and 1954); and aerial photographs from 1934, 1937, and 1942.

No historical structures or features (e.g., roads, trails, ditches) are depicted within the Project area on any of the GLO plats examined. Only an intermittent creek (Dry Creek) is shown meandering roughly east–west through the Project area on the 1855 GLO plat (Figure 2-2). However, the property atlas map (Thompson 1892:57) shows that most of the Project area consisted of agricultural land owned by H. F. Schumaker, with smaller portions owned by A. L. Cressey, H. F. Pepys, Mrs. Ada McKelvey, and J. Itin (Figure 2-3). Also depicted is a structure on the Schumaker property within the eastern portion of the Project area, and the Southern Pacific Railroad borders its northern edge. Dry Creek is shown following a southerly course through the Project area. It should also be noted that none of the property owners named above are listed in a contemporary history (Menefee and Dodge 1913) as significant contributors to the growth and development of Kings County.

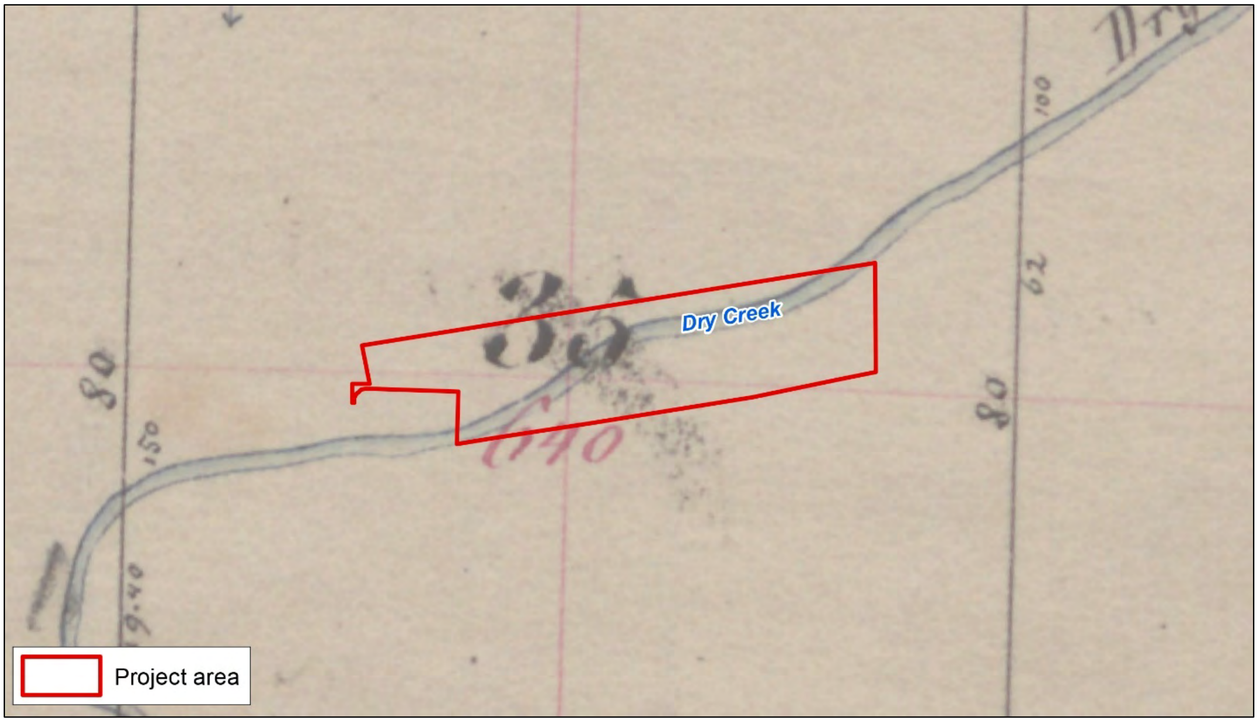

Figure 2-2 **Dry Creek present within the Project area prior to irrigation, as depicted on an 1855 GLO Plat.**

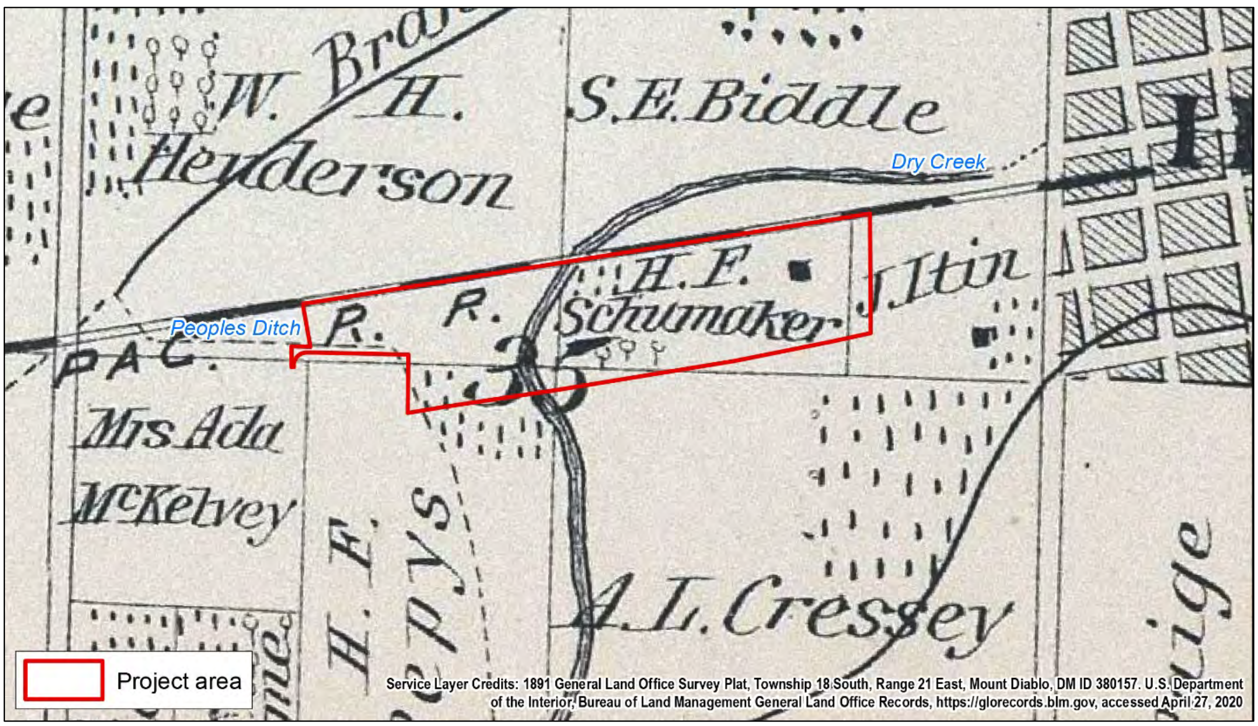

Figure 2-3 **Project area on Thompson's 1892 Tulare County property atlas showing the structure on H. F. Schumaker's property.**

A 1926 USGS topographic map (Figure 2-4) shows a structure within the Project area at the approximate location of the structure shown on the Schumaker property in 1892. The 1926 map also depicts a dirt road leading to this structure from the adjacent property to the east (shown as the property owned by J. Itin in 1892; see Figure 2-3) as well as the Peoples Ditch within the western portion of the Project area and the Southern Pacific Railroad bordering its northern edge.

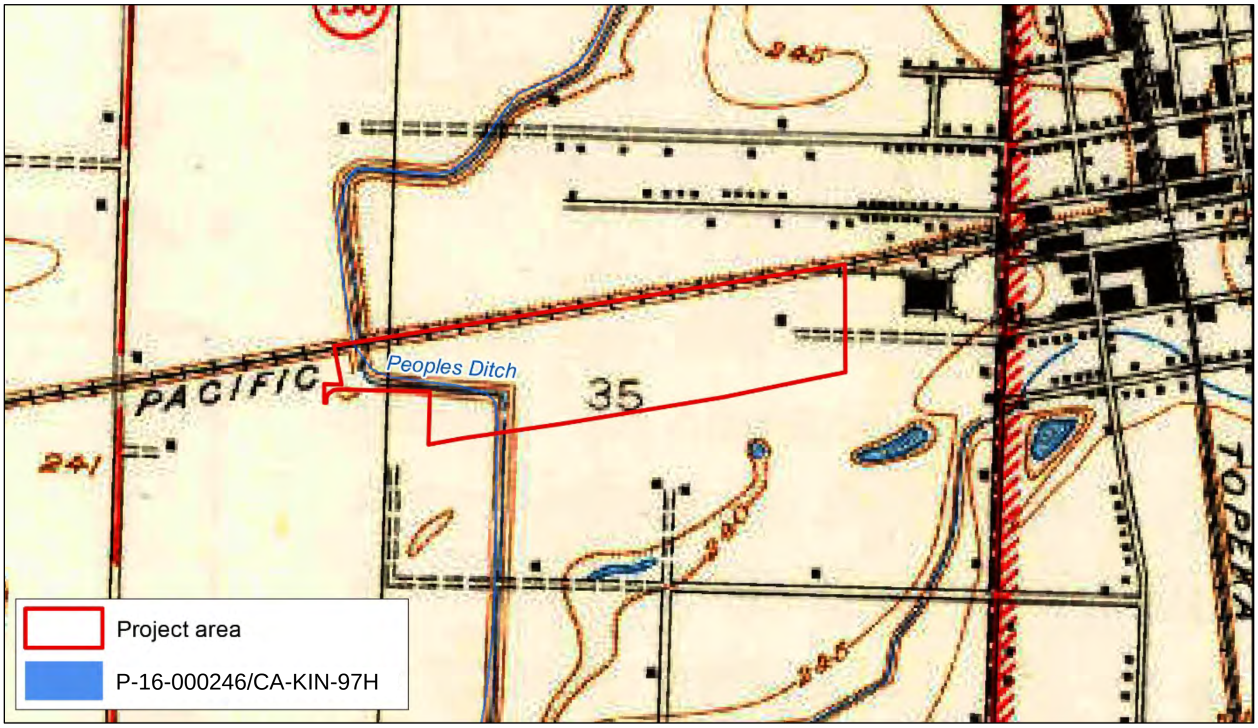

Figure 2-4 USGS Hanford, California, 1926 topographic map showing location of the structure identified on the 1892 Tulare County atlas and the historical alignment of Peoples Ditch within the Project area.

The structure shown within the eastern portion of the Project area in 1892 and 1926, the Peoples Ditch within the western Project area, and the Southern Pacific Railroad to the north continue to be shown at their respective locations on aerial photographs from 1934, 1937 (Figure 2-5), and 1942, as well as on the USGS Hanford, California, 7.5-minute topographic quadrangle photorevised in 1954 (Figure 2-6). No other structures or features are represented within the Project area. These same archival resources show continued use of the Project area as agricultural land throughout these years.

An aerial photograph of the Project area taken in 1976 (Figure 2-7) shows agricultural activity only in the western Project area. The structure in the eastern Project area has been removed by that year. Unfortunately, archival research did not identify maps or aerial images postdating 1954 and predating 1976 that could help refine the timing of when the structure was removed from the property; however, Figure 2-7 does show that the original alignment of Peoples Ditch in the western Project area was still in use in 1976. Archival data indicate that the original alignment of Peoples Ditch was abandoned sometime between 1994 and 2003, when it was realigned to its present configuration within the Project area (see Appendix D).

Figure 2-5 1937 aerial photo depicting the alignment of the Peoples Ditch, the history-era residence, and the Southern Pacific/San Joaquin Valley Railroad within the Project area.

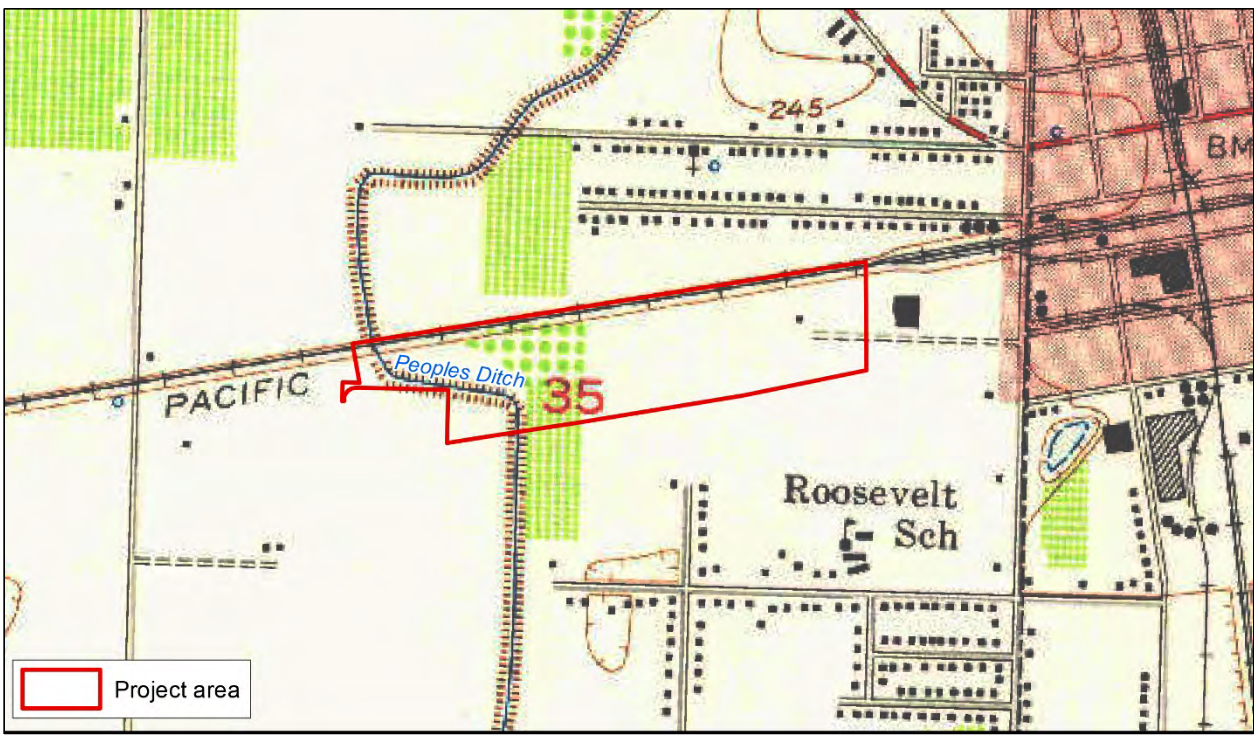

Figure 2-6 USGS Hanford, CA 1954 photorevised topographic map showing historical building in eastern portion of the Project area and Peoples Ditch in the western portion.

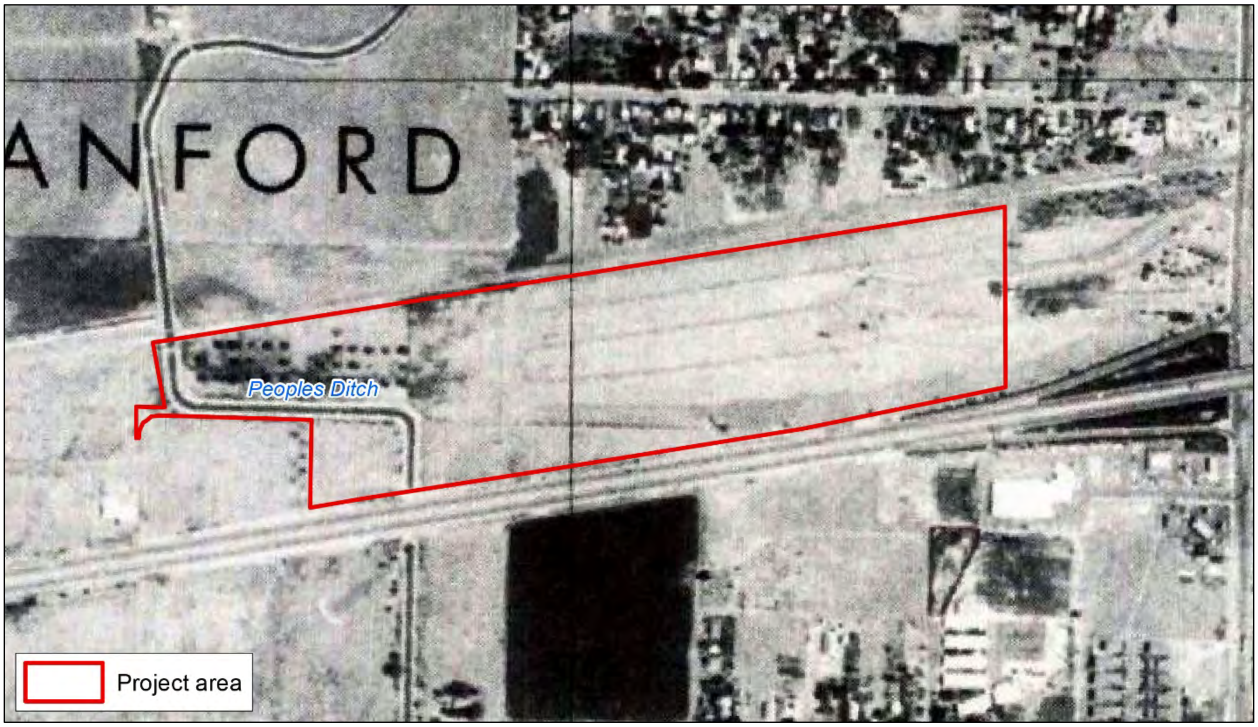

Figure 2-7 1976 aerial photograph demonstrating removal of historical building in the eastern portion of the Project area and the alignment of the Peoples Ditch at that time in the western portion.

3
METHODS

3.1 RECORDS SEARCH

On April 21, 2020, Æ requested a records search of the CHRIS from the SSJVIC at California State University, Bakersfield, to identify previously recorded resources and prior surveys within the Project area and surrounding 0.5-mile area. SSJVIC staff examined site records, files, and maps, and completed searches of the Historic Property Data File, National Register of Historic Places, California Register of Historical Resources, and California Historical Resources databases.

3.2 ARCHIVAL RESEARCH

The purpose of archival research is to provide information regarding the history of land use and to assess the potential for prehistoric and historic-era archaeological deposits within the Project area. Æ's investigation compiled information from several sources, including:

- Map and Aerial Locator Tool (MALT) (http://malt.library.fresnostate.edu/MALT/);
- U.S. Geological Survey TopoView (https://ngmdb.usgs.gov/topoview);
- GLO survey plats (https://glorecords.blm.gov/default.aspx); and
- Æ's in-house library, which includes maps and local histories.

3.3 NATIVE AMERICAN OUTREACH

On April 21, 2020, Æ requested that the Native American Heritage Commission (NAHC) conduct a search of its Sacred Lands File to identify previously recorded sacred sites or cultural resources of special importance to tribes and provide contact information for local Native American representatives who may have information about the Project area. The NAHC responded on April 22, 2020, with its findings and attached a list of Native American tribes and individuals culturally affiliated with the Project area. On August 5, 2020, Æ mailed an outreach letter to each of the contacts identified by the NAHC and kept a log of all responses (Appendix C). The outreach letter and follow-up calls are considered best practices within cultural resource management. Æ's outreach efforts thus do not qualify as CEQA Assembly Bill 52 government-to-government consultation, which would be the responsibility of the CEQA lead agency (City of Hanford).

3.4 BURIED SITE SENSITIVITY ASSESSMENT

Æ conducted a geologic and hydrologic review of the Project area to assess the potential for paleosols that may contain intact prehistoric cultural deposits. Æ consulted geological maps, historical maps, the U.S. Department of Agriculture Natural Resources Conservation Service

Web Soil Survey online database, and regional geoarchaeological studies (e.g., Meyer et al. 2010). These sources provided information regarding the natural watercourses in the area as well as data about local soils and sediments, parent rock formations, and historical vegetation. This information was used to estimate the age of the sediments surrounding the study area, consider the hydrologic and geologic forces that created and placed these sediments, and assess the likelihood of encountering buried cultural resources within the vertical Project area during proposed construction activity as described in a preliminary geotechnical investigation report for the Project area (AhTye et al. 2020).

3.5 ARCHAEOLOGICAL SURVEY

On May 23 and 24, 2020, Æ Staff Archaeologist Ward Stanley conducted an intensive archaeological pedestrian survey of the entire Project area. Stanley used parallel transects spaced 15–20 meters apart and took photographs of the area using an iPhone 11 camera. Methods and observations were recorded on Æ Daily Work Record and Survey Field Record forms. Stanley used a Trimble Global Positioning System (GPS) unit to collect geospatial data. All photographs and field notes are on file at Æ's Fresno office.

3.5.1 Documentation of Cultural Resources

Æ recorded cultural resources by first establishing a site boundary that encompasses the distribution of artifacts across the ground surface and then examining potentially temporal diagnostic artifacts to establish the general age of the resource (e.g., prehistoric, historic, post-World War II, modern). A few artifacts were then collected from the ground surface and transported to the Æ laboratory in Fresno to confirm the age of the resource using Æ library resources and historic artifact guides. All collected artifacts were placed in archival bags labeled with provenience information, which included Project number, site number, Universal Transverse Mercator coordinates, date of collection, and surveyor's initials. The resources were then recorded on California Department of Parks and Recreation Primary Record and Location Map forms.

4
FINDINGS

4.1 RECORDS SEARCH RESULTS

The SSJVIC responded to Æ's records search request on May 5, 2020 (Records Search File No. 20-168). The SSJVIC reported nine previous cultural studies encompassing portions of the Project area that occurred between 1982 and 2015, and five additional studies in the surrounding 0.5-mile area (see Appendix B). Of the nine studies within the Project area, seven had negative results. The Peoples Ditch (P-16-000246/CA-KIN-97H) is the only previously recorded resource within the Project area. The Southern Pacific Railroad/San Joaquin Valley Railroad (P-16-000122/CA-KIN-177H) is just outside the Project area's northern boundary. Two additional built environment resources, the Burlington North and Santa Fe Railway (P-16-000120) and a Craftsman bungalow (P-16-000205) are within a 0.5-mile radius of the Project area (Appendix B).

Æ's in-house cultural resource database revealed that one additional resource, the Kingsburg-Lemoore transmission line, is also within 0.5 miles of the Project area.

4.2 ARCHIVAL RESEARCH

The desktop research resulted in key historical information presented in Section 2.2.3. Specific sources of map and aerial images consulted during archival research are identified in Appendix B.

4.3 NATIVE AMERICAN OUTREACH

The NAHC responded to Æ's request on April 22, 2020, and stated that its search of the Sacred Lands File did not identify any known cultural resources that could have special importance to Native American groups within the Project area or surrounding 0.5-mile area. However, the NAHC cautioned that the absence of information in the Sacred Lands File does not indicate the absence of Native American cultural resources within the Project area (see Appendix C). The NAHC supplied a list of Native American representatives to be contacted for information regarding sacred or special sites of cultural and spiritual significance in the Project area and surrounding 0.5-mile area, including:

- Stan Alec of the Kings River Choinumni Farm Tribe;
- Chairperson Leo Sisco of the Santa Rosa Rancheria of Tachi Yokut Tribe;
- Cultural Resource Director Bob Pennell of the Table Mountain Rancheria;
- Chairperson Neil Peyron of the Tule River Indian Tribe;
- Chairperson Kenneth Woodrow of the Wuksache Indian Tribe/Eshom Valley Band; and

- Chairperson Leanne Walker-Grant of the Table Mountain Rancheria.

On August 5, 2020, Æ sent a letter describing the Project to each of the Native American representatives identified above. Follow-up contact by email and telephone was completed on August 13, 2020. No responses have been received to date.

4.4 BURIED SITE SENSITIVITY ASSESSMENT

This section assesses the potential for the proposed Project to impact intact buried archaeological deposits in the Project area and identifies the conditions that may affect preservation of cultural materials, should any exist. Estimating the general sensitivity of soils to contain buried archaeological material is based on various factors, including the Project area's distance from water, age of geological deposits, landform, river formation patterns, ground slope, and soil types within the Project area and their respective characteristics (Rapp and Hill 2006; Waters 1992). In general, the potential for buried prehistoric resources increases with proximity to natural watercourses.

Geologic and soil data derived from the National Resources Conservation Service Web Soil Survey identify only one soil type within the Project area, consisting of Nord coarse to fine sandy loam. In general, the Nord series has high to very high sensitivity for containing paleosols with intact cultural deposits. Nord sandy loam soil consists of mixed alluvium formed from decomposed granite and sedimentary rock. These soils are found on alluvial fan remnants and floodplains with a slope between 0 and 2 percent. The soil type likely spans the Early to Late Holocene. It is a very deep (i.e., extending 35 feet below the ground surface), well-drained soil with variable salinity and low clay content that supports native grasses, herbs, and white oak (*Quercus lobata*) (Soil Survey Staff 1999). A geotechnical investigation prepared for the Project area described the soil within 10 feet below the ground surface level as having the potential for hydrocompaction (liquefaction) when exposed to moisture (AhTye et al. 2020:18).

Alluvial fan landforms are typically environments with high potential to contain anthropogenic paleosols, particularly near streams where the effects of continuous high-velocity helical water flow are comparatively less than is observed commonly in larger rivers. However, subsurface conditions composed of well-drained highly saline soils tend to only moderately preserve bone, teeth, and other organic materials (Schiffer 1987). Saline introduced into cultural deposits via groundwater percolation, which is common in agricultural areas, may contribute to an accelerated rate of decay of certain artifact classes. Metals and other porous materials would be most susceptible to corrosion resulting from saline-rich groundwater percolation, particularly with increasing acidic conditions (Kibblewhite et al. 2015; Rapp and Hill 2006). Yet, improved preservation of cultural deposits is expected below the hardpan, as the decomposing effects of excessive water percolation are slowed (Kibblewhite et al. 2015). Thus, the possibility of encountering moderately or well-preserved cultural deposits within the vertical Project area increases with depth. Therefore, the potential for encountering a well-preserved anthropogenic paleosol would be greatest where the hardpan would be encompassed by the vertical Project area. However, moderately preserved and intact cultural deposits could be encountered in any paleosol above the hardpan. An important concept to understand is that even poor to moderately preserved cultural remains may be eligible for listing in the California Register of Historical Resources or National Register of Historic Places.

In conclusion, the entire Project area is encompassed by a soil type and landform that have high or very high potential for containing anthropogenic paleosols with intact cultural deposits. Adding to this sensitivity is the presence of Dry Creek within the Project area during prehistory, which would have provided rich habitat and other resources for Native American groups. Dry Creek was a naturally occurring intermittent stream that was modified during Hanford's early settlement period (see Figure 2-2). However, as can be seen in historical GLO plats, atlases, and aerial images, it is likely that portions of the Project area have been disturbed by past infill of Dry Creek and the construction of Peoples Ditch in addition to impacts related to historic-era agricultural and domestic activities in the eastern portion of the Project area. In these areas of disturbance, the sensitivity for intact and well-preserved buried sites is moderate, low, or none.

This evidence of modern disturbance notwithstanding, due to the very high sensitivity of the soil type in the Project area, and because overexcavation and recompaction of soil is recommended to mitigate the effects of potential hydrocompaction "to at least 7 feet below the existing grade and to a distance of at least 10 feet beyond the perimeter of the planned buildings and surrounding improvements" (AhTye et al. 2020:21), limited subsurface archaeological testing to confirm the presence/absence of anthropogenic paleosols or intact cultural resource deposits is recommended. Based on the findings of subsurface archaeological testing, archaeological data recovery to assess prehistoric cultural deposits and cultural resource monitoring during ground disturbing construction activities may be needed.

4.5 ARCHAEOLOGICAL SURVEY FINDINGS

4.5.1 Visibility

The Project area is primarily utilized for agricultural purposes. As a result, the landscape is relatively flat and unobscured by pavement or buildings. At the time of survey, the ground surface within the Project area afforded 90–100 percent visibility (Figure 4-1). Isolated patches of dead grass obscured ground visibility in some areas. Moderate amounts of modern trash were encountered throughout the Project area. The inner bank of the modern alignment of Peoples Canal was obscured by dense vegetation and had no ground visibility. The canal bottom had excellent visibility (90–100 percent; Figure 4-2). A small portion of the Project area in the southwest corner was enclosed by a chain-link fence and was not accessible for survey (Figure 4-3).

4.5.2 Archaeological Resources

Æ archaeologists surveyed all accessible portions of the Project area, totaling 42.82 acres of intensive coverage, or approximately 99 percent of the total Project area (Figure 4-3). The southeastern corner of the Project area was inaccessible behind a secured fence and could not be surveyed. The portion not surveyed comprised less than 1 acre and was less than 1 percent of the Project area.

Field staff observed one historic-era refuse scatter (AE-4167-01) and one historic-era isolate (AE-4167-ISO-01). AE-4167-01 is a large historical refuse scatter extending across 6 acres in the northeast section of the Project area. Cultural constituents include glass of various colors, broken bottles, ceramic fragments, insulators, wood fragments, bricks, river cobbles with cement mortar attached, heavy metal pipe fragments, miscellaneous metal fragments, a toy marble, and a bottle

Figure 4-1 Survey conditions from the center of the Project area showing 100 percent ground surface visibility, facing west.

Figure 4-2 Survey conditions within and along the modern alignment of Peoples Ditch, facing north.

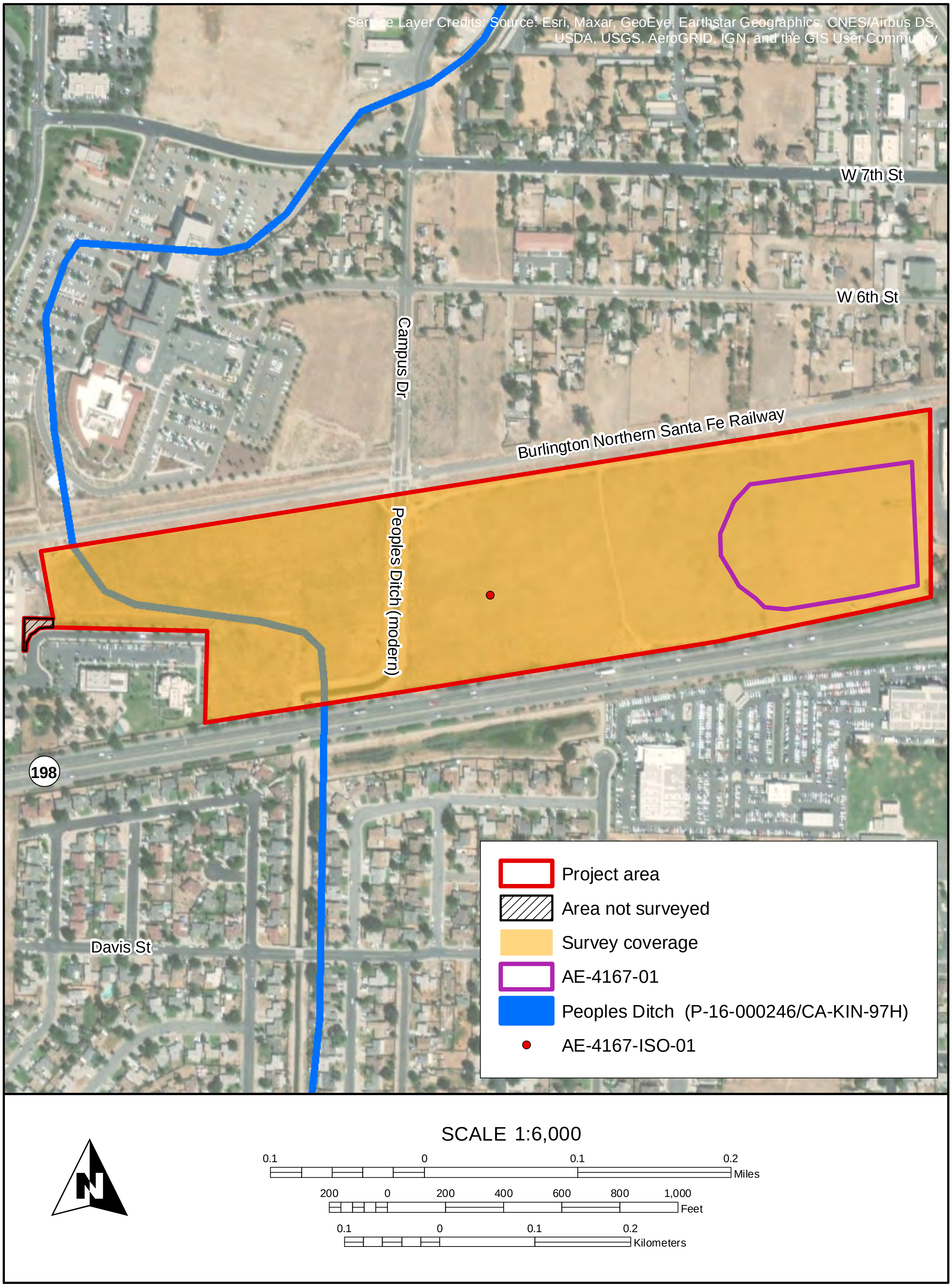

Figure 4-3 Survey coverage and cultural resources in the Project area.

base fragment showing pressure flaking along one edge. A total of 12 temporally diagnostic artifacts were identified; a sample of these are presented in Figure 4-4. The artifacts date to the first half of the twentieth century, suggesting the deposit may be associated with the nonextant historical structure visible on historic-era GLO plats, historical atlas maps, and aerial images. The site appears to have been impacted by previous agricultural activity that would have displaced artifacts within a few feet of their original placement. The condition of the subsurface deposit is unknown as it was not visible during the pedestrian survey.

AE-4167-ISO-01 is an aqua blue glass insulator fragment that was observed approximately 800 feet west of AE-4167-01 (Figure 4-5).

Figure 4-4 Various glass and ceramic artifact fragments and a toy marble from historic site AE-4167-01.

Figure 4-5 Detail view of historical glass insulator fragment (isolated artifact AE-4167-ISO-01).

No prehistoric artifact concentrations, isolated artifacts, features, or evidence of human skeletal material were observed during the survey.

4.5.3 Built Environment Resources

A modern segment of Peoples Ditch (P-16-000246/CA-KIN-97H) and the remnants of its older, now abandoned, route were observed during survey (Figure 4-6). Æ updated the site record to reflect the current condition of the historic-era remnant portion (Appendix D).

The Peoples Ditch was constructed in the 1870s by the Peoples Ditch Company to divert water from the Kings River to agricultural operations in the southern San Joaquin Valley and is still in use today (Jones 2017). According to Google Earth imagery, the historical segment of Peoples Ditch that intersects the Project area was abandoned sometime between 1994 and 2003, along with a segment north of the railroad, west of Campus Drive. At that time, Peoples Ditch was realigned and piped under Campus Drive and the railroad tracks for approximately 1,660 feet. It

Figure 4-6 Remnant scar of historical Peoples Ditch within survey area, facing east.

resurfaces in the Project area just south of the railroad track and continues to flow south in a J-shaped configuration between the railroad and State Route 198, east of its original alignment, before returning to its historical alignment at State Route 198 (see Figure 4-3). This new segment is less than 50 years old. The only remaining evidence of the original alignment of the ditch is its scar on the landscape and the remains of a concrete containment well at the northern end of the abandoned segment.

5
SUMMARY AND RECOMMENDATIONS

Æ provided cultural resource services for the Hanford Place Medical and Mixed-Use Property Project in Kings County, California. The Hanford Group proposes to build 15 structures that would be utilized for medical outpatient clinic services, hospitality, specialized education, retail, medical offices, skilled nursing and assisted living facilities, and multifamily housing. Ground disturbance resulting from proposed Project activities would include grading; trenching for installation of water, sewer, and electrical infrastructure; construction of a roundabout and buildings, structures, and facilities; and excavation of a storm water retention basin. Thus, the proposed Project requires compliance with CEQA.

Under contract to Epic Management Group, Inc., Æ conducted a cultural resource inventory of the Project area to determine if historical resources are present within the Project area. Accordingly, Æ performed background research, obtained a records search from the SSJVIC of the CHRIS, requested a search of the NAHC Sacred Lands File, contacted local Native American representatives identified by the NAHC for outreach purposes, assessed the sensitivity of the Project area for containing paleosols that have potential to contain buried archaeological deposits, and conducted an intensive pedestrian survey of the Project area.

The SSJVIC reported that nine previous cultural resource studies encompassing portions of the Project area occurred from 1981 to 2015, and five additional studies were completed in the surrounding 0.5-mile. The Peoples Ditch (P-16-000246/CA-KIN-97H) is the only previously recorded resource within the Project area. Four additional built environment resources were reported within a 0.5-mile of the Project area (Appendix B). The NAHC's Sacred Lands File search did not identify sacred places within the Project area, and Æ did not receive comments from Native American representatives identified by the NAHC. The buried site sensitivity assessment of the vertical Project area revealed high sensitivity for the presence of anthropogenic paleosols containing buried sites in areas of the Project that have not been disturbed previously by historic-era construction of the People's Ditch or its modern realignment, or by agricultural activities occurring at depths less than 24 inches below the ground surface. Æ's pedestrian survey of the Project area resulted in the identification of one historic-era refuse scatter (AE-4167-01), one historical isolated artifact (AE-4167-ISO-01). Æ additionally updated the existing California Department of Parks and Recreation cultural resource record for the Peoples Ditch to record its remnant historical alignment within the Project area.

To fully comply with CEQA and determine if the Project would cause a substantial adverse change in the significant qualities of a historical resource, Æ recommends additional mapping and subsurface testing of AE-4167-01 to evaluate its eligibility for inclusion in the California Register of Historical Resources, pursuant to California PRC 5024.1. Additional focused subsurface testing in areas not previously disturbed by historic-era activities is recommended to confirm presence/absence of high-sensitivity paleosols that may include intact prehistoric cultural deposits. If intact prehistoric cultural deposits are encountered during subsurface presence/absence testing, Æ recommends further investigation to determine if the deposit retains integrity and is eligible for inclusion in the California Register of Historical Resources. The methods and findings of the additional studies would be presented as an addendum to this report and would include cultural resource management recommendations to guide mitigation of potential adverse effects to any identified historical resources within the Project area.

6
REFERENCES

AhTye, Adam, Stephen Plauson, and James Wetenkamp
2020 *Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report Proposed Hanford Place, Medical and Mixed-Use Property, Hanford, California*. Kleinfelder, Inc., Fresno, California. Prepared for Epic Management Group, Inc., Temecula, California, on behalf of The Hanford Group.

Baloian, Mary Clark, Randy Baloian, Michael J. Moratto, and Barry A. Price
2006 *Cultural Resources Survey and Evaluation on the Sumner Peck Ranch for the Tesoro Viejo Project, Madera County, California*. Applied EarthWorks, Inc., Fresno, California. Prepared for Tesoro Viejo, Inc., Fresno, California.

Barcroft, Joseph (editor)
1933 *Madera County History*. GenWeb, Madera County, California. Originally published in *History of Fresno and Madera Counties, California: Narrative and Biographical*, by Lilbourne Alsip Winchell. A. H. Cawston, Fresno, California.

Clough, Charles W.
1986 The West Side's Twentieth Century Towns. In *Fresno County—in the 20th Century: From 1900 to the 1980s*, Vol. 2, edited by Bobbye Sisk Temple, pp. 111–138. Panorama West Books, Fresno, California.

Clough, Charles W., and William B. Secrest, Jr.
1984 *Fresno County—the Pioneer Years: From the Beginnings to 1900*, edited by Bobbye Sisk Temple. Panorama West Books, Fresno, California.

Cook, Sherburne F.
1955 *The Aboriginal Population of the San Joaquin Valley, California*. University of California Anthropological Records Vol. 16(2). University of California Press, Berkeley and Los Angeles.

1960 *Colonial Expeditions to the Interior of California: Central Valley, 1800–1820*. University of California Anthropological Records Vol. 16(6). University of California Press, Berkeley and Los Angeles.

Dillon, Brian D.
2002 Essays in California Archaeology: A Memorial to Franklin Fenenga. In *California Paleoindians: Lack of Evidence, or Evidence of Lack?*, edited by William J. Wallace and Francis A. Riddell, pp. 110–128. Contributions of the University of California Archaeological Research Facility Vol. 60. University of California Press, Berkeley.

Fredrickson, David A.

1973 *Early Cultures of the North Coast Ranges, California*. Ph.D. dissertation, Department of Anthropology, University of California, Davis.

1974 Cultural Diversity in Early Central California: A View from the North Coast Ranges. *Journal of California Anthropology* 1(1):41–53.

Fredrickson, David A., and Joel W. Grossman

1977 A San Dieguito Component at Buena Vista Lake, California. *Journal of California Anthropology* 4(2):173–190.

Golla, Victor

2011 *California Indian Languages*. University of California Press, Berkeley and Los Angeles.

Hill, Mary

1984 *California Landscape*. California Natural History Guide 48. University of California Press, Berkeley, California.

Jones, Jessica

2017 P-16-000245/CA-KIN-97H (People's Ditch) Primary Record, Linear Feature Record, and Location Map. Applied EarthWorks Inc., Fresno, California. On file, Southern San Joaquin Valley Information Center, California State University, Bakersfield.

JRP Historical Consulting Services, and California Department of Transportation

2000 *Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures*. JRP Historical Consulting Services, Davis, California, and California Department of Transportation, Environmental Program/Cultural Studies Office, Sacramento.

Kibblewhite, Mark, Gergely Tóth, and Tamás Hermann

2015 Predicting the Preservation of Cultural Artefacts and Buried Materials in the Soil. *Science of the Total Environment* 529:249–263.

Kroeber, Alfred L.

1976 *Handbook of the Indians of California*. Dover Publications, New York. Originally published 1925, Bureau of American Ethnology Bulletin 78. Smithsonian Institution, Washington, D.C. Reprinted.

Latta, Frank F.

1999 *Handbook of Yokuts Indians*. 50th anniversary ed. Brewer's Historical Press, Exeter, California, and Coyote Press, Salinas, California.

McGuire, Kelly R., and Alan P. Garfinkel

1980 *Archaeological Investigation in the Southern Sierra Nevada: The Bear Mountain Segment of the Pacific Crest Trail*. U.S. Bureau of Land Management, Cultural Resources Publications, Bakersfield, California.

Menefee, Eugene L., and Fred A. Dodge
1913 *History of Tulare and Kings Counties, California*. Historic Record Company, Los Angeles, California.

Meyer, Jack, D. Craig Young, and Jeffery S. Rosenthal
2010 *A Geoarchaeological Overview and Assessment of Caltrans Districts 6 and 9: Cultural Resources Inventory of Caltrans District 6/9 Rural Conventional Highways*. Far Western Anthropological Research Group, Inc., Davis, California. Submitted to California Department of Transportation, District 6, Fresno.

Mitchell, Annie R.
1976 *The Way It Was: A Colorful History of Tulare County*. Valley Publishers, Fresno, California.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, Orlando, Florida.

Nordhoff, Charles
1874 *California: Health, Pleasure, and Residence*. Harper & Brothers, New York.

Norris, Robert M., and Robert W. Webb
1990 *Geology of California*. 2nd ed. John Wiley & Sons, New York.

Office of Historic Preservation
1990 *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format*. California Department of Parks and Recreation, Sacramento.

Onken, Jill A.
2020 *Geoarchaeological Assessment for the Mowry Bridge Replacement Project, City of Mendota, Fresno County, California*. Prepared for Applied EarthWorks, Inc. and Provost & Pritchard Consulting Group. Submitted to City of Mendota.

Preston, William L.
1981 *Vanishing Landscapes: Land and Life in the Tulare Lake Basin*. University of California Press, Berkeley.

Rapp, George (Rip) Jr., and Christopher L. Hill
2006 *Geoarchaeology: The Earth-Science Approach to Archaeological Interpretation*. 2nd ed. Yale University Press, New Haven, Connecticut.

Riddell, Francis A., and William H. Olsen
1969 An Early Man Site in the San Joaquin Valley, California. *American Antiquity* 34(2):121–130.

Roberts, Robin Michael
2008 *Images of America: Kings County*. Arcadia Publishing, Mount Pleasant, South Carolina.

Rosenthal, Jeffery S., Gregory G. White, and Mark Q. Sutton
2007 The Central Valley: A View from the Catbird's Seat. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 147–163. AltaMira Press, Lanham, Maryland.

Schiffer, Michael B.
1987 *Formation Processes of the Archaeological Record*. University of New Mexico Press, Albuquerque.

Siefkin, Nelson
1999 *Archaeology of the Redtfeldt Mound (CA-KIN-66), Tulare Basin, California*. Master's thesis, Department of Sociology and Anthropology, California State University, Bakersfield.

Silverstein, Michael
1978 Yokuts: Introduction. In *California*, edited by Robert F. Heizer, pp. 446–447. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Soil Survey Staff
1999 *Nord Series*. Official Series Description. Electronic document, https://soilseries.sc.egov.usda.gov/OSD_Docs/N/NORD.html, accessed August 21, 2020. U.S. Department of Agriculture, Natural Resources Conservation Service, National Cooperative Soil Survey.

Thompson, Thomas H.
1892 *Official Historical Atlas Map of Tulare County*. Thos. H. Thompson, Tulare, California.

Vandor, Paul E.
1919 *History of Fresno County, California, with Biographical Sketches*. 2 vols. Historic Record Company, Los Angeles, California.

Wallace, William J.
1978 Southern Valley Yokuts. In *California*, edited by Robert F. Heizer, pp. 448–461. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Waters, Michael R.
1992 *Principles of Geoarchaeology: A North American Perspective*. University of Arizona Press, Tucson.

Weir, Walter W.
1956 *Soils of Madera County, California*. Soil Survey No. 12. Department of Soils and Plant Nutrition, University of California, Berkeley.

APPENDIX A

Personnel Qualifications

Applied EARTHWORKS Inc.

DIANA TERESA DYSTE

Senior Archaeologist

Areas of Expertise

- Cultural resource management
- Ethnography
- Tribal consultation
- Zooarchaeological, paleoethnobotanical, and lithics analysis

Years of Experience

- 20

Education

Ph.D. candidate, Anthropology/ Feminist Studies, University of California, Santa Barbara

M.A., Anthropology (Archaeology/ Cultural Resource Management emphasis), University of California, Santa Barbara, 2010

B.A., Anthropology, University of California, Santa Barbara, 2002

A.A., Liberal Arts and Sciences, Ventura College, 1999

Registrations/Certifications

- Registered Professional Archaeologist 39362477

Permits/Licensure

- Principal Investigator, California BLM Statewide Cultural Resources Use Permit CA-18-22

Professional Affiliations

- American Anthropological Association
- American Cultural Resources Association
- Santa Barbara Museum of Natural History
- Society for American Archaeology
- Society for California Archaeology
- World Archaeological Congress

Professional Experience

2018–	Senior Archaeologist, Applied EarthWorks, Inc., Fresno, California
2015–2018	Interim Cultural Resources Supervisor and Senior Archaeologist/Ethnographer, Aspen Environmental Group
2007–2009	Archaeologist (GS-9), U.S. Department of Agriculture, Los Padres National Forest
2005–2007	Archaeologist (GS-7), U.S. Department of Agriculture, Los Padres National Forest
2004–2005	Archaeological Contractor, Padre, Inc., Ventura, California
2000–2005	Archaeologist (GS-4/5), U.S. Department of Agriculture, Los Padres National Forest

Technical Qualifications

Ms. Dyste has 20 years of experience in cultural resources management and meets the Secretary of the Interior's qualification criteria as an archaeologist. She has extensive experience preparing environmental documents and managing complex projects pursuant to applicable federal, state, and local regulations. Her work includes senior review or prime authorship of cultural resources documents for National Historical Preservation Act Section 106, National Environmental Policy Act, and California Environmental Quality Act compliance, including public and tribal comment and response; development of research designs; design and implementation of cultural resources plans. Ms. Dyste is qualified to conduct archaeological survey, including the supervision of small to large sized field crews, as well as zooarchaeological, paleoethnobotanical, lithics, and ethnographic analyses. She is able to analyze cultural spatial patterns via use of Total Station and Geographic Information Systems software. Ms. Dyste's Assembly Bill 52 and NHPA Section 106 tribal consultation services are informed by her knowledge and training in Native American jurisprudence, cultural sensitivity training, and graduate seminars in Native American environmental law, indigenous research methodologies, and community-based Participatory Action Research with tribal and special interest groups. She has project experience in coastal, highlands, grasslands, desert, and remote mountain settings across the state of California, although her academic region of specialty is in central and southern California with a focus on Salinan, Esselan, northern/interior/coastal Chumash prehistoric and modern political tribal groups. Ms. Dyste is a native Spanish speaker and assists clients with the translation of English to Spanish signage and public notices.

JESSICA JONES

Staff Archaeologist/Project Manager

Areas of Expertise

- Geographic Information Systems (GIS) in archaeology
- Computer-generated maps and graphics
- Archaeological survey and excavation

Years of Experience

- 7

Education

B.A., Anthropology, California State University, Sacramento, 2013

Archaeological Technician Certificate, Anthropology Department, Fresno City College, Fresno, California, 2011

Affiliations

Society for California Archaeology

Professional Experience

2020–	Staff Archaeologist/Project Manager, Applied EarthWorks, Inc. Fresno, California
2017–	Staff Archaeologist/GIS Specialist, Applied EarthWorks, Inc. Fresno, California
2015–2017	Geographic Information Systems (GIS) Technician, Applied EarthWorks, Inc., Fresno, California
2012–2013	Laboratory Technician (volunteer), Archaeological Research Center, California State University, Sacramento
2009–2010	Laboratory Technician (volunteer), Fresno City College, Fresno, California

Technical Qualifications

As a Staff Archaeologist, Ms. Jones performs Native American outreach, archival research, pedestrian archaeological and built environment survey, site recordation and evaluation, and partakes in archaeological excavation for projects throughout the Central Valley and Sierra Nevada foothills. She serves as a primary author or contributor for cultural resource inventory reports and is experienced in the preparation of California Department of Parks and Recreation (DPR) cultural resource record forms (523 series) and California Department of Transportation cultural resource documents. Ms. Jones has managed several water infrastructure improvement projects in the Central Valley and has working knowledge of Section 106 of the National Historic Preservation Act and California Environmental Quality Act regulatory frameworks. Her expertise also includes work as a Geographic Information Systems (GIS) technical specialist. She has extensive experience as a cartographer and spatial data manager for large and small projects involving both prehistoric and historic-era built environment cultural resources, particularly linear resources such as historic-era canal systems and related pumps, basins, and other components. Ms. Jones is a critical component of Æ's digital technology program, responsible for instructing cultural and paleontological staff in the use of ESRI ArcGIS software. Her background also includes extensive experience volunteering in archaeological repositories where she gained expertise in laboratory processing, cataloging, and management of archaeological collections.

Applied EARTHWORKS Inc.

WARD STANLEY

Staff Archaeologist

Areas of Expertise

- California archaeology—Sierra Nevada
- Survey, excavation, and Geographic Information System applications
- Project administration support

Years of Experience

- 10

Education

B.A., Kansas State University, 2008

Permits/Licensure

- Field Director, California BLM Statewide Cultural Resources Use Permit CA-18-22

Registrations/Certifications

Wildland Firefighter Qualified (Arduous)

Professional Experience

2015–	Staff Archaeologist, Applied EarthWorks, Inc., Fresno, California
2011–2017	Archaeological Field Technician/Crew Supervisor, Sierra National Forest and Lassen National Forest
2009–2011	Archaeological Field Technician/Crew Supervisor, Malheur National Forest
2008–2009	Archaeological Field Technician, Plumas National Forest

Technical Qualifications

Mr. Stanley's archaeological experience includes survey, archaeological testing, data recovery excavation, and documentation of both prehistoric and historical resources in the Central Valley and Sierra National Forest in California. He has supervised field crews for several large-scale projects for the Sierra, Lassen, and Malheur National Forests. This work included prefield research, pedestrian survey, site recording, and report preparation. Mr. Stanley is knowledgeable about Section 106 of the National Historic Preservation Act and associated regulations and processes; he also has experience working with local Native American tribes. He is well versed in the use of Geographic Information System (GIS) applications, including those for data gathering and modeling, and has prepared maps using ESRI ArcGIS software for use in technical reports and in the field. In addition to working for the Sierra National Forest, he has served as lead archaeological resource advisor on three separate wildland fires and was responsible for coordinating protection of archaeological resources from suppression efforts. Additionally, he produced assessment damage reports for all fires. For Applied EarthWorks, Mr. Stanley has served as field supervisor for implementation of the Crane Valley Hydroelectric Power Project Historic Properties Management Plan, which includes monitoring of impacts to resources and implementing management measures to avoid or minimize adverse effects to historic properties within the Crane Valley Archaeological District.

CARLOS VAN ONNA

Senior Architectural Historian

Areas of Expertise

- Cultural Resource Management
- Architectural History
- Historic Preservation

Years of Experience

- 8

Education

Ph.D. candidate, Architectural History, Utrecht University, 2013–present

M.A., Architectural History and Historic Preservation, Utrecht University, 2010–2011

B.A., Art History, Utrecht University, 2007–2010

Professional Experience

2019–	Senior Architectural Historian, Applied EarthWorks, Inc., Fresno, California
2017–2019	Editor/Translator, SDI Media, Los Angeles, California
2016–2017	Subcontractor, GPA Consulting, Los Angeles, California
2015–2016	Project Manager, City of Amsterdam, The Netherlands
2014–2015	Visiting Scholar, Columbia University, New York
2011–2014	Advisor on Cultural History and Urban Development, City of Amsterdam, The Netherlands
2010–2011	Intern, Amsterdam Centre for Architecture, The Netherlands

Technical Qualifications

Mr. van Onna has been involved in cultural resources management since 2011. His areas of expertise include built environment investigations, preparation of historic resource evaluation reports, and other required documentation for cultural resource management projects. As a Senior Architectural Historian for Applied EarthWorks, Mr. van Onna meets the Secretary of the Interior's professional qualification standards in architectural history. He has prepared technical reports for historical built environment resources to satisfy compliance requirements under the National Historic Preservation Act (NHPA) Section 106 and the California Environmental Quality Act (CEQA), including significance evaluations and eligibility recommendations for inclusion in the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR). Mr. van Onna has previously worked for the City of Amsterdam, The Netherlands, coordinating its Municipal Landmarks Project and completing numerous built environment surveys, studies, and historical significance assessments for environmental impact reports, zoning plans, and other policy documents. At Applied EarthWorks, he provides guidance and assistance to project managers and staff alongside his core tasks as an architectural historian. Additional skills include archival research, architectural photography, editing, and quality assurance. Through his pursuit of a doctoral degree at Utrecht University, he explores the role of historic preservation in urban public spaces in the United States.

CONFIDENTIAL APPENDIX*
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APPENDIX B

Records Search Results

*Archaeological site location information is exempt from the Freedom of Information Act (FOIA) and California Public Records Act (CPRA).

California
Historical
Resources
Information
System

Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

5/5/2020

Diana Dyste
Applied Earthworks, Inc.
1391 W. Shaw Ave., Suite C
Fresno, CA 93711

Re: Hanford Place Medical and Mixed-Use Property Project in the City of Hanford
Records Search File No.: 20-168

The Southern San Joaquin Valley Information Center received your record search request for the project area referenced above, located on the Hanford USGS 7.5' quad. The following reflects the results of the records search for the project area and the 0.5 mile radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☐ custom GIS maps ☒ shapefiles

Resources within project area:	P-16-000122, 000246
Resources within 0.5 mile radius:	P-16-000120, 000205
Reports within project area:	KI-00028, 00042, 00093, 00100, 00109, 00111, 00238, 00268, 00269
Reports within 0.5 mile radius:	KI-00079, 00094, 00110, 00192, 00310

Resource Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Report Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed

Resource Record Copies: ☒ enclosed ☐ not requested ☐ nothing listed

Report Copies: ☒ enclosed ☐ not requested ☐ nothing listed

Note: PDFs for "Other" Reports were omitted, per the Data Request Form

OHP Built Environment Resources Directory: ☒ enclosed ☐ not requested ☐ nothing listed

Archaeological Determinations of Eligibility: ☐ enclosed ☐ not requested ☒ nothing listed

CA Inventory of Historic Resources (1976): ☐ enclosed ☐ not requested ☒ nothing listed

Caltrans Bridge Survey: Not available at SSJVIC; please see http://www.dot.ca.gov/hq/structur/strmaint/historic.htm

Ethnographic Information: Not available at SSJVIC

Historical Literature: Not available at SSJVIC

Historical Maps: Not available at SSJVIC; please see http://historicalmaps.arcgis.com/usgs/

Local Inventories: Not available at SSJVIC

GLO and/or Rancho Plat Maps: Not available at SSJVIC; please see http://www.glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1 and/or http://www.oac.cdlib.org/view?docId=hb8489p15p;developer=local;style=oac4;doc.view=items

Shipwreck Inventory: Not available at SSJVIC; please see http://www.slc.ca.gov/Info/Shipwrecks.html

Soil Survey Maps: Not available at SSJVIC; please see http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Celeste M. Thomson Digitally signed by Celeste M. Thomson
Date: 2020.05.05 12:34:07 -07'00'

Celeste M. Thomson
Coordinator

Resource List

SSJVIC Record Search 20-168

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-16-000120		Resource Name - Burlington Northern and Santa Fe Railway (formerly Atchison, Topeka, and Santa Fe); Resource Name - CRM TECH 607-7H	Structure	Historic	AH07	2001 (Bai "Tom" Tang, Daniel Ballester, CRM Tech)	
P-16-000122	CA-KIN-000117H	Resource Name - San Joaquin Valley Railroad, Southern Pacific Railroad	Structure, Site	Historic	AH07; HP37	2001 (Bai "Tom" Tang, CRM Tech); 2013 (A. Gardner, L. Bennett, S. Lewis, Far Western Anthropological Research Group, Inc.); 2017 (Jessica Jones, Applied EarthWorks, Inc.)	KI-00109, KI-00245, KI-00310
P-16-000205		Resource Name - 10130 Seventh Avenue, Hanford Vicinity, Kings County; OHP Property Number - 127866; OTIS Resource Number - 570326	Building	Historic	HP02	1999 (Douglas W. Dodd, Caltrans District 6)	
P-16-000246	CA-KIN-000097H	Resource Name - JKI-002; Resource Name - People's Ditch; OTIS Resource Number - 666092	Structure	Historic	HP20	2001 (Bai "Tom" Tang, Daniel Ballester, CRM TECH); 2009 (Joseph Freeman, Jarma Jones, JRP Historical Consulting, LLC); 2017 (Jessica Jones, Applied EarthWorks, Inc.)	KI-00196, KI-00310

Report List

SSJVIC Record Search 20-168

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
KI-00028	NADB-R - 1140863	1995	Hatoff, Brian, Voss, Barb, Waechter, Sharon, Benté, Vance, and Wee, Stephen	Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project	Woodward-Clyde Consultants	16-000067, 16-000068
KI-00042		1981	O'Connor, Denise and Clayton, A.B.	Archaeological Survey Report for an Interchange at 12th Avenue on Route 198, Kings County 06-KIN-198, R16.4/R17.4 06100-178200	Caltrans	
KI-00079		1998	Price, Barry A.	Cultural Resources Assessment for Pacific Bell Mobile Services Facility CV-503-01	Applied EarthWorks Inc.	
KI-00093		2000	Ryan, Christopher	Supplemental Archaeological Survey for te Laguna Irrigation District Transmission Line Improvement Project, Fresno and Kings Counties, California	Applied EarthWorks Inc.	
KI-00094	Submitter - Project Number 27101	2000	Nelson, Wendy J.	Cultural Resources Survey for the Level (3) Communications Long Haul Fiber Optics Project Segment WS04: Sacramento to Bakersfield	Far Western Anthropological Research Group, Inc.	16-000084
KI-00100		2000	Pastron, Allen G. and Brown, Keith R.	Historical and Cultural Resource Assessment Update Exising Telecommunications Facility Site No. CV-503-01 Glendale Ave Kings County, California	Brown and Mills, Inc. Geotechnical and Environmental Consultants.	
KI-00109	Submitter - Contract #675	2002	Love, Bruce and Tang, Bai "Tom"	Historic Property Survey Report: Cross Valley Rail Corridor Project Between the Cities of Visalia and Huron Tulare, Kings, and Fresno Counties, California	CRM TECH	16-000067, 16-000068, 16-000086, 16-000122, 16-000123, 16-000124, 16-000127, 16-000128
KI-00110	Submitter - Contact #675	2002	Love, Bruce and Tang, Bai "Tom"	Archaeological Survey Report: Cross Valley Rail Corridor Project Between the Cities of Visalia and Huron Tulare, Kings, and Fresno Counties, California	CRM TECH	
KI-00111	Submitter - Contract #675	2002	Love, Bruce and Tang, Bai "Tom"	Historic Study Report/Historical Resources Evaluation Report: Cross Valley Rail Corridor Project Between the Cities of Visalia and Huron Tulare, Kings, and Fresno Counties, California	CRM TECH	
KI-00192	Caltrans - 06-Kin-198, PM R16.9 (KP R27.2) EA 06-48750; Submitter - Contract No. 06A0852, Task 22	2007	Lanner, David and Wohlgemuth, Eric	Archaeological Survey Report for the 12th Avenue Interchange on State Route 198, Hanford, Kings County, California	Far Western Anthropological Research Group, Inc.	

Report List

SSJVIC Record Search 20-168

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
KI-00238		2010	Meyer, Jack, Young, D. Craig, and Rosenthal, Jeffrey	Volume I: A Geoarchaeological Overview and Assessment of Caltrans Districts 6 and 9 - Cultural Resources Inventory of Caltrans District 6/9 Rural Conventional Highways - EA 06-0A7408 TEA Grant	Far Western Anthropological Research Group, Inc.	
KI-00238A		2010	Meyer, Jack, Young, D. Craig, and Rosenthal, Jeffrey S.	Volume II: Appendices A Georchaeological Overview and Assessment of Caltrans District 6 and 9 - Cultural Resources Inventory of Caltrans District 6/9 Rural Conventional Highways - EA06-0A7408 TEA Grant	Far Western Anthropological Research Group, Inc.	
KI-00268		2011	Greenwald, Alexandra	Archaeological Survey Report for the California High Speed Train - Fresno to Bakersfield Section	URS Corporation	
KI-00269		2015	Schiffman, Robert A.	Archaeological Evaluation of Areas Selected for Possible Nuclear Power Plants by the LADWP	Bakersfield College	
KI-00310	Other - PM 74000707	2017	Jones, Jessica	Cultural Resources Contstraints Report Kingsburg-Lemoore Reconductor, Kings County, California	Applied EarthWorks, Inc.	16-000122, 16-000128, 16-000129, 16-000246, 16-000447

Historical Topographic Maps and Aerial Images Consulted

Date	Name	Author	Reference	Notes
1934	State Division of Highways	C-3094_z-104	1934 State Division of Highways. Flown by Fairchild Aerial Surveys. Aerial Survey No. C-3094_z-104, http://mil.library.ucsb.edu/ap_indexes/FrameFinder/, accessed April 29, 2020.	Historic residence is in the field in the project area. Southern Pacific Railroad visible. City is primarily agricultural/industrial.
1937	Fresno County Aerial Survey 1937 13-ABJ 67-78	Agricultural Adjustment Administration	1937 Fresno County, California, Aerial Survey 1937 13-ABJ 67-78, http://cdmweb.lib.csufresno.edu/cdm/singleitem/collection/aerial/id/1178, accessed through Map and Aerial Locator Tool (MALT), Henry Madden Library, California State University, Fresno, April 28, 2020.	Historic residence is in the field in the project area. Southern Pacific Railroad visible. City is primarily agricultural/industrial.
1942	Fresno County Aerial Survey 1942 ABJ 8B-157	Agricultural Adjustment Administration	1937 Fresno County, California, Aerial Survey 1942 ABJ 8B-157, http://cdmweb.lib.csufresno.edu/cdm/singleitem/collection/aerial/id/1178, accessed through Map and Aerial Locator Tool (MALT), Henry Madden Library, California State University, Fresno, April 28, 2020.	Historic residence is still shown in the project area. Southern Pacific Railroad visible. City is primarily agricultural/industrial. No other updates to historic landscape.
1926	Hanford, CA 1:31,680	U.S. Geological Survey	1926 Hanford*, Calif.* , 1:31,680 scale. U.S. National Geologic Map Database, Historical Topographic Map Collection (topo View), https://ngmdb.usgs.gov/topoview/, accessed April 27, 2020.	The Peoples Ditch is shown on the westside of the project area. The project area is shown to have been used for agriculture.
1954	Hanford, CA 1:24:000	U.S. Geological Survey	1954 Hanford*, Calif.* , 1:24,000 scale. U.S. National Geologic Map Database, Historical Topographic Map Collection (topoView), https://ngmdb.usgs.gov/topoview/, accessed April 27, 2020.	The Peoples Ditch is shown on the westside of the project area. The project area is shown to have been used for agriculture. No buildings are shown in the project area.
1891	Township 18 South, Range 21 East	General Land Office	1891 General Land Office Survey Plat, Township 18 South, Range 21 East, Mount Diablo, DM ID 380157. U.S. Department of the Interior, Bureau of Land Management General Land Office Records, https://glorecords.blm.gov, accessed April 27, 2020.	No roads or other built environment shown.
1867	Township 18 South, Range 21 East	General Land Office	1867 General Land Office Survey Plat, Township 18 South, Range 21 East, Mount Diablo, DM ID 380161. U.S. Department of the Interior, Bureau of Land Management General Land Office Records, https://glorecords.blm.gov, accessed April 27, 2020.	No roads or other built environment shown.
1989	Township 18 South, Range 21 East	General Land Office	1989 General Land Office Survey Plat, Township 18 South, Range 21 East, Mount Diablo, DM ID 380163. U.S. Department of the Interior, Bureau of Land Management General Land Office Records, https://glorecords.blm.gov, accessed April 27, 2020.	No roads or other built environment shown.

APPENDIX C

Native American Outreach

*Archaeological site location information is exempt from the Freedom of Information Act (FOIA) and California Public Records Act (CPRA).

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

April 22, 2020

Diane Dyste

Applied EarthWorks, Inc.

Via Email to: DDyste@appliedearthworks.com

Re: Hanford Place Medical and Mixed-Use Property Project, Kings County

Dear Ms. Dyste:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez-Lopez

Nancy Gonzalez-Lopez
Staff Services Analyst

Attachment

Native American Heritage Commission
Native American Contacts List
April 22, 2020

Kings River Choinumni Farm Tribe
Stan Alec
3515 East Fedora Avenue
Fresno ,CA 93726
(559) 647-3227 Cell
Foothill Yokuts
Choinumni

Wuksache Indian Tribe/Eshom Valley Band
Kenneth Woodrow, Chairperson
1179 Rock Haven Ct.
Salinas ,CA 93906
kwood8934@aol.com
(831) 443-9702
Foothill Yokuts
Mono
Wuksache

Santa Rosa Rancheria Tachi Yokut Tribe
Leo Sisco, Chairperson
P.O. Box 8
Lemoore ,CA 93245
(559) 924-1278
(559) 924-3583 Fax
Tache
Tachi
Yokut

Table Mountain Rancheria
Leanne Walker-Grant, Chairperson
P.O. Box 410
Friant ,CA 93626
rpennell@tmr.org
(559) 822-2587
(559) 822-2693 Fax
Yokuts

Table Mountain Rancheria
Bob Pennell, Cultural Resources Director
P.O. Box 410
Friant ,CA 93626
rpennell@tmr.org
(559) 325-0351
(559) 325-0394 Fax
Yokuts

Tule River Indian Tribe
Neil Peyron, Chairperson
P.O. Box 589
Porterville ,CA 93258
neil.peyron@tulerivertribe-nsn.gov
(559) 781-4271
(559) 781-4610 Fax
Yokuts

This list is current as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code,Section 5097.94 of the Public Resources Code, or Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans Tribes for the proposed:
Hanford Place Medical and Mixed-Use Property Project, Kings County.

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EXAMPLE

Applied EARTHWORKS Inc.

1391 W. Shaw Ave., Suite C
Fresno, CA 93711-3600
O: (559) 229-1856 | F: (559) 229-2019

August 4, 2020

Leo Sisco
Chairperson
Santa Rosa Rancheria Tachi Yokut Tribe
P.O. Box 8
Lemoore, CA 93245

RE: Hanford Place Medical and Mixed-Use Project in the City of Hanford, Kings County, California.

Dear Mr. Leo Sisco,

Applied EarthWorks, Inc. (Æ) is currently providing cultural resource services to Epic Management Group, Inc. for its Hanford Place Medical and Mixed-Use Project (Project) in the City of Hanford. The 45-acre development would include 15 structures that would cover medical outpatient clinic services, hospitality, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residences. The project would include a round-about over the top of the Peoples Ditch, and a 5-acre infiltration basin. The project is subject to the requirements of the California Environmental Quality Act.

The Project area is within Townships 18 south, Range 21 east, Section 35 of the Hanford, CA USGS quadrangle (see attached map). If you would like more detailed maps, please contact Æ and we would be more than happy to provide them. A search of the Native American Heritage Commission's (NAHC) Sacred Lands File was completed on April 22, 2020. The NA HC reported negative results in the Project area; however, the NAHC provided your contact information as someone who may have specific information about the Project area and vicinity.

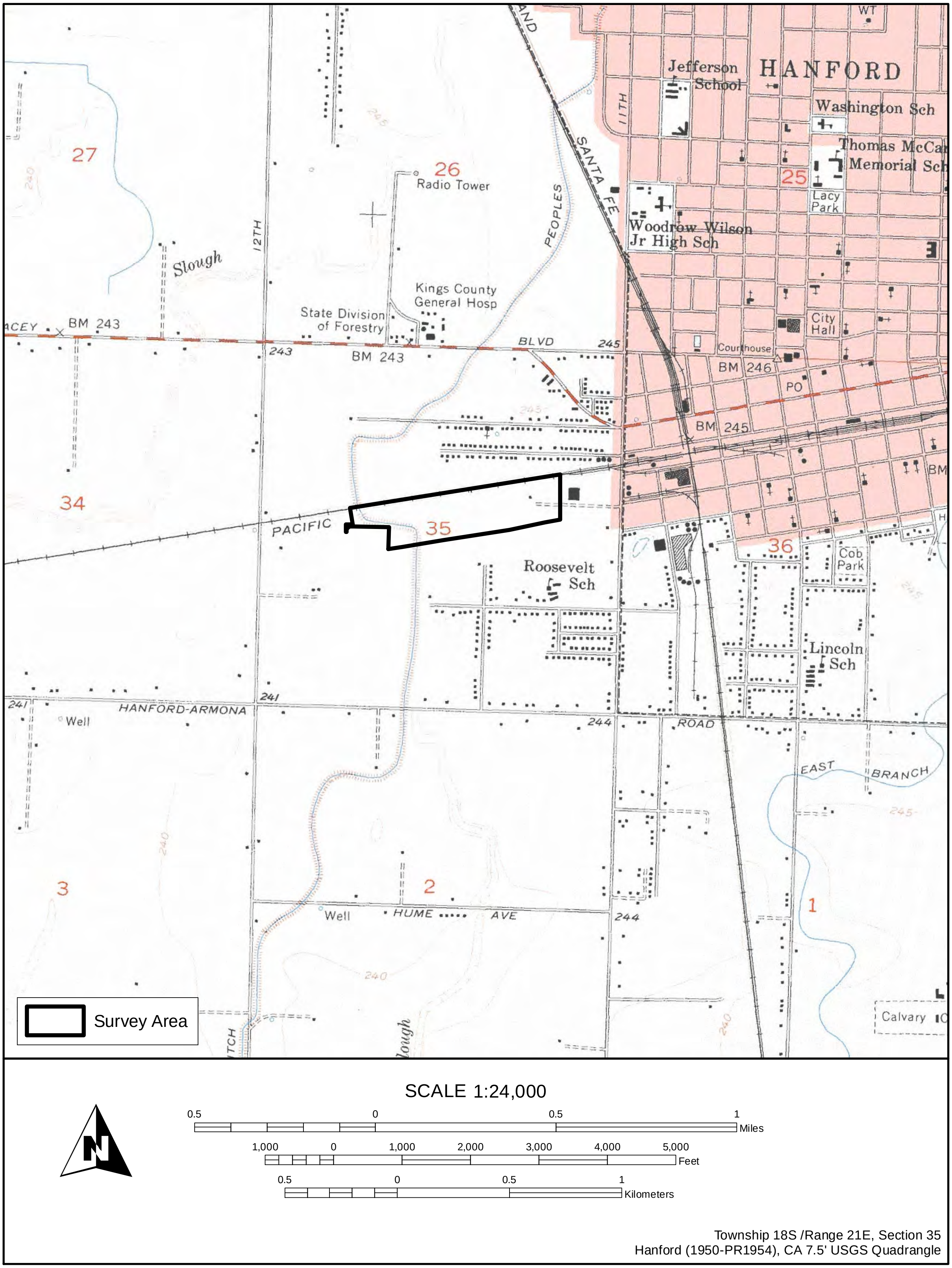
A record search from the Southern San Joaquin Valley Information Center has been performed for the Project, and no previously recorded cultural resources were identified within the Project area. Resources identified within 0.5-mile of the Project area include Peoples Ditch (CA-KIN-97H) and the Southern Pacific Railroad (CA-KIN-00177H). Æ's archaeological and built environment pedestrian survey identified a historic-era refuse scatter and isolated historic-era glass fragment, as well as a previously unrecorded segment of the People's Ditch. No prehistoric archaeologicl sites, features, or isolated artifacts were observed.

Your name and address were provided to us by the NAHC. If you have information on sacred or special sites in the area or if you have an interest in the Project, please call or send a letter to my attention using the address in the header. With your written permission, information shared with Æ about this Project will be included in the technical report documenting this investigation. Pursuant to state and federal laws protecting the confidentiality of archaeological sites and tribal cultural resources will be protected from release to the general public (Pub. Resources Code § 21082.3[c][1]; NHPA Section 304). I can be reached at the office desk at (559) 229-1856 X123, by cell at (559) 907-6028, or by email at ddyste@appliedearthworks.com.

Sincerely,

Diana Dyste,
Senior Archaeologist

encl.: Project Map



NAHC location map for the *Hanford Place Medical and Mixed-Use Property Project - AE4167.*

APPENDIX D

Cultural Resource Records

CONTINUATION SHEET

☐ Continuation ☒ Update

 Resource Name or #: People's Ditch

***P2. Location: a. County:** Kings ☐ **Not for Publication** ☒ **Unrestricted**

b. USGS 7.5′ Quad: Hanford, CA **Date:** 1950, photorev. 1954 T18S, R21E; SE **¼ of** NW **¼ of** Sec. 35 MD **B.M.**

c. Address: N/A

d. UTM:

e. Other Locational Data: From the intersection of 11th Street and West Lacey Blvd. in Hanford, CA, drive west for 0.4 miles on West Lacey Blvd. Turn left (south) onto Campus Drive and proceed for 0.4 miles. At this point the road terminates and the modern segment of the People's Ditch continues south. The remnant of the historical alignment is west of the modern segment and north of State Route 198.

***P3a. Description:** This update includes a 1,327-foot remnant segment of People's Ditch between the Burlington Northern Santa Fe Railway tracks in the north and State Route 198 in the south. According to Google Earth imagery, this segment was abandoned sometime between 1994 and 2003, along with a segment north of the railroad west of Campus Drive. At that time, People's Ditch was realigned and piped under Campus Drive and the railroad tracks for a distance of approximately 1,660 feet. It resurfaces just south of the railroad tracks and continues to flow south in a J-shaped configuration between the railroad and State Route 198 east of its original alignment before crossing under the highway and continuing south parallel to its historical alignment. This new segment is less 50 years old. The ditch's remnant historical segment has been all but erased from the landscape in this area. Remains of a concrete containment well are visible at the northern end of the remnant segment.

***P3b. Resource Attributes:** HP11. Engineering Structure

***P7. Owner and Address:** Peoples Ditch Company, 870 Greenfield Ave, Hanford, CA 93230

***P8. Recorded By:** Carlos van Onna, Applied EarthWorks, Inc., 1391 W. Shaw Ave., Suite C, Fresno, CA 93711

***P9. Date Recorded:** 5/23/2020

***P10. Survey Type:** ☒ Intensive ☐ Reconnaissance ☐ Other **Describe:**

***P11. Report Citation:** Dyste, Diana T., Jessica Jones, Dennis McDougall, Ward Stanley, and Carlos van Onna
2020 *Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for The Hanford Group, c/o Epic Management Group, Inc., Temecula, California.

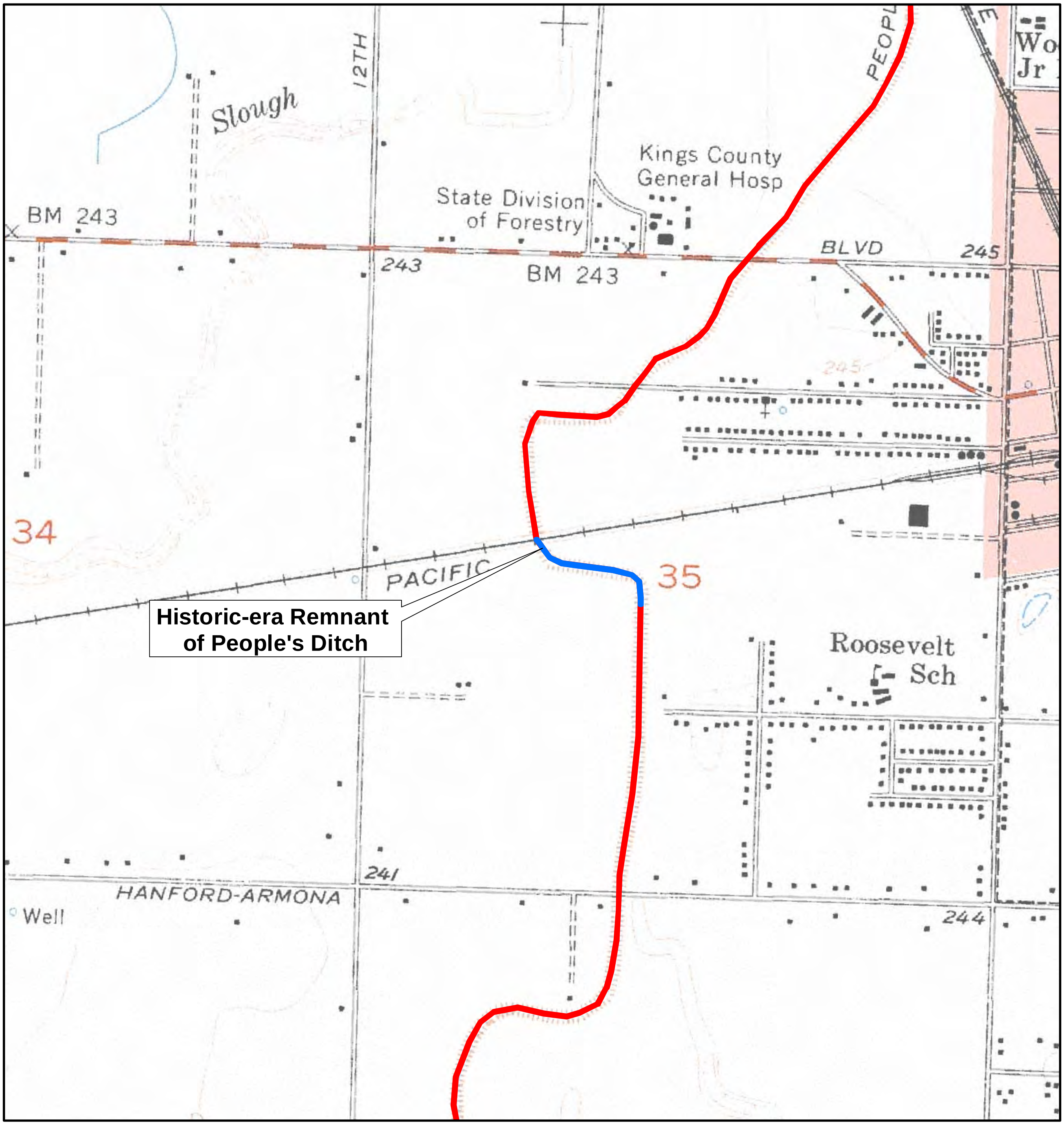
***Attachments:**
☐ NONE ☒ Location Map ☒ Sketch Map ☐ Continuation Sheet
☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record
☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record
☐ Photograph Record ☒ Other (list): Location Map showing route entire ditch

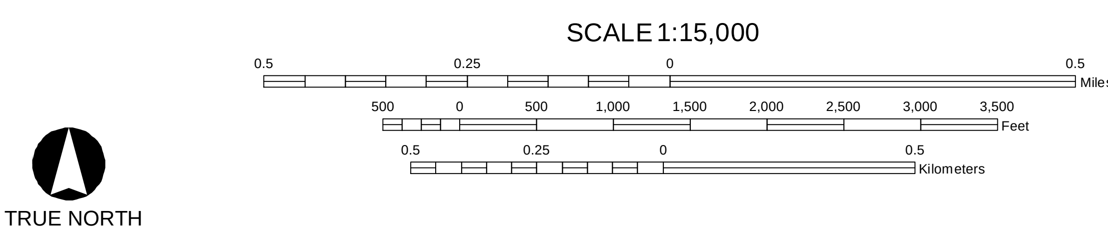
State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary # 16-000246
HRI#
Trinomial CA-KIN-97H

Page 2 **of** 4 **Resource Name or #:** People's Ditch **Scale:** 1:15,000

Map Name: Hanford, CA, USGS 7.5' quadrangle **Date:** 1950 (1954)





State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary # 16-000246
HRI#
Trinomial CA-KIN-97H

Page 3 **of** 4 **Resource Name or #:** People's Ditch **Scale:** 1:15,000

SCALE 1:15,000

0.5 0.25 0 0.5 Miles

500 0 500 1,000 1,500 2,000 2,500 3,000 3,500 Feet

0.5 0.25 0 0.5 Kilometers

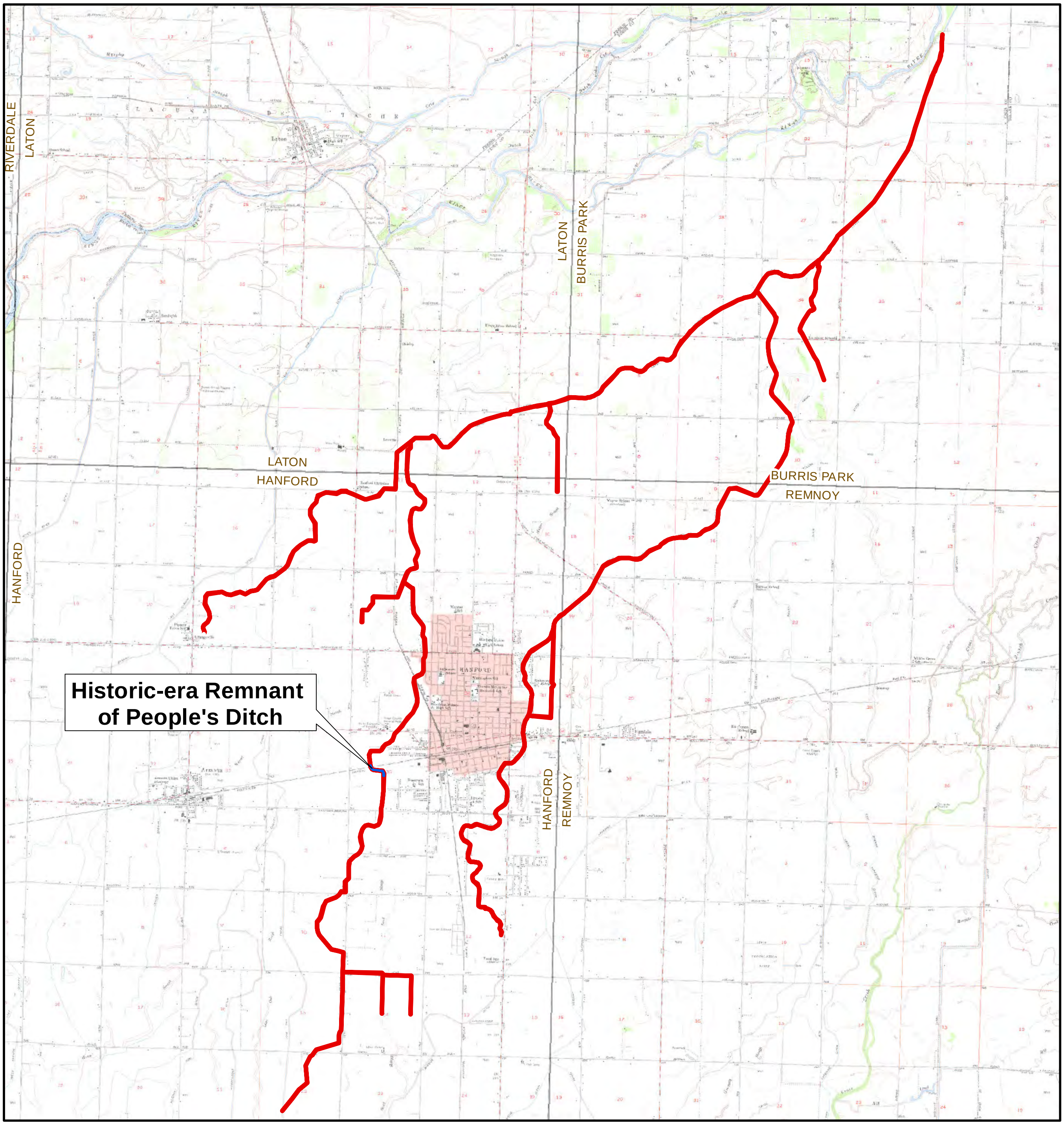
TRUE NORTH

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

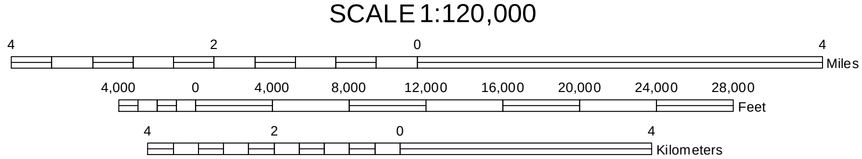
Primary # 16-000246
HRI#
Trinomial CA-KIN-97H

Page 4 **of** 4 **Resource Name or #:** People's Ditch **Scale:** 1:120,000

Map Name: Multiple, CA, USGS 7.5' quadrangle(s) **Date:** Multiple



SCALE 1:120,000



TRUE NORTH

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

 Resource Name or # AE-4167-01

P1. Other Identifier:

***P2. Location: a. County:** Kings County ☒ **Not for Publication** ☐ **Unrestricted**
b. USGS 7.5′ Quad: Hanford, CA **Date:** 1950, photorev.1954 T 18S, R 21E; SW **¼ of** NE **¼ of** Sec. 35 MD **B.M.**
c. Address: n/a
d. UTM: NAD 83, Zone 11; 261204 **mE /** 4022976 **mN**
e. Other Locational Data: From the intersection of 11th Street and West Lacey Blvd. in Hanford, drive west for 0.4 miles on West Lacey Blvd. Turn left (south) on Campus Drive and proceed for 0.4 miles. At this point the road terminates. The site is at 88° at 357 meters (northwest corner of site) in a vacant lot north of State Route 198.

***P3a. Description:** The site is a broad historical refuse scatter extending across 6 acres. It consists of domestic refuse, including, but not limited to, window glass of various colors, broken bottles, ceramic fragments, insulators, wood fragments, bricks, river cobbles with cement mortar attached, heavy metal pipe fragments, miscellaneous metal fragments, a toy marble, and a bottle base fragment showing possible pressure flaking along one edge. The scatter is most dense within the northwest corner of the site. A diffuse scatter of isolated artifacts extends beyond this concentration to the south and east site boundaries. A slight topographic rise is present along the entire northern boundary, which is elevated 2 feet high and then levels off. A total of 12 diagnostic artifacts were observed and recorded. Although not formally dated, the artifacts appear to be from the first half of the twentieth century. A 1937 aerial photograph depicts a residence in the site location (Fresno County, California, Aerial Survey 1937 13-ABJ 67-78, http://cdmweb.lib.csufresno.edu/cdm/singleitem/collection/aerial/id/1178).

***P3b. Resource Attributes:** AH.4

***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☐ Other:

***P5a. Photograph or Drawing:**

P5b. Description of Photo: View of site from the northeast corner, looking west.

***P6. Date Constructed/Age and Sources:** ☐ Prehistoric ☒ Historic ☐ Both

***P7. Owner and Address:**
The Hanford Group
c/o Epic Management Group, Inc. 44045 Margarita Road, Suite #100 Temecula, CA 92592

***P8. Recorded By:** Ward Stanley
Applied EarthWorks, Inc.
1391 W. Shaw Ave., Suite C
Fresno, CA 93711

***P9. Date Recorded:** 5/23/2020

***P10. Survey Type:** ☒ Intensive ☐ Reconnaissance ☐ Other
Describe: Pedestrian survey at 15-meter interval transects.

***P11. Report Citation:** Dyste, Diana T., Jessica Jones, Dennis McDougall, Ward Stanley, and Carlos van Onna
2020 *Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for The Hanford Group, c/o Epic Management Group, Inc., Temecula, California.

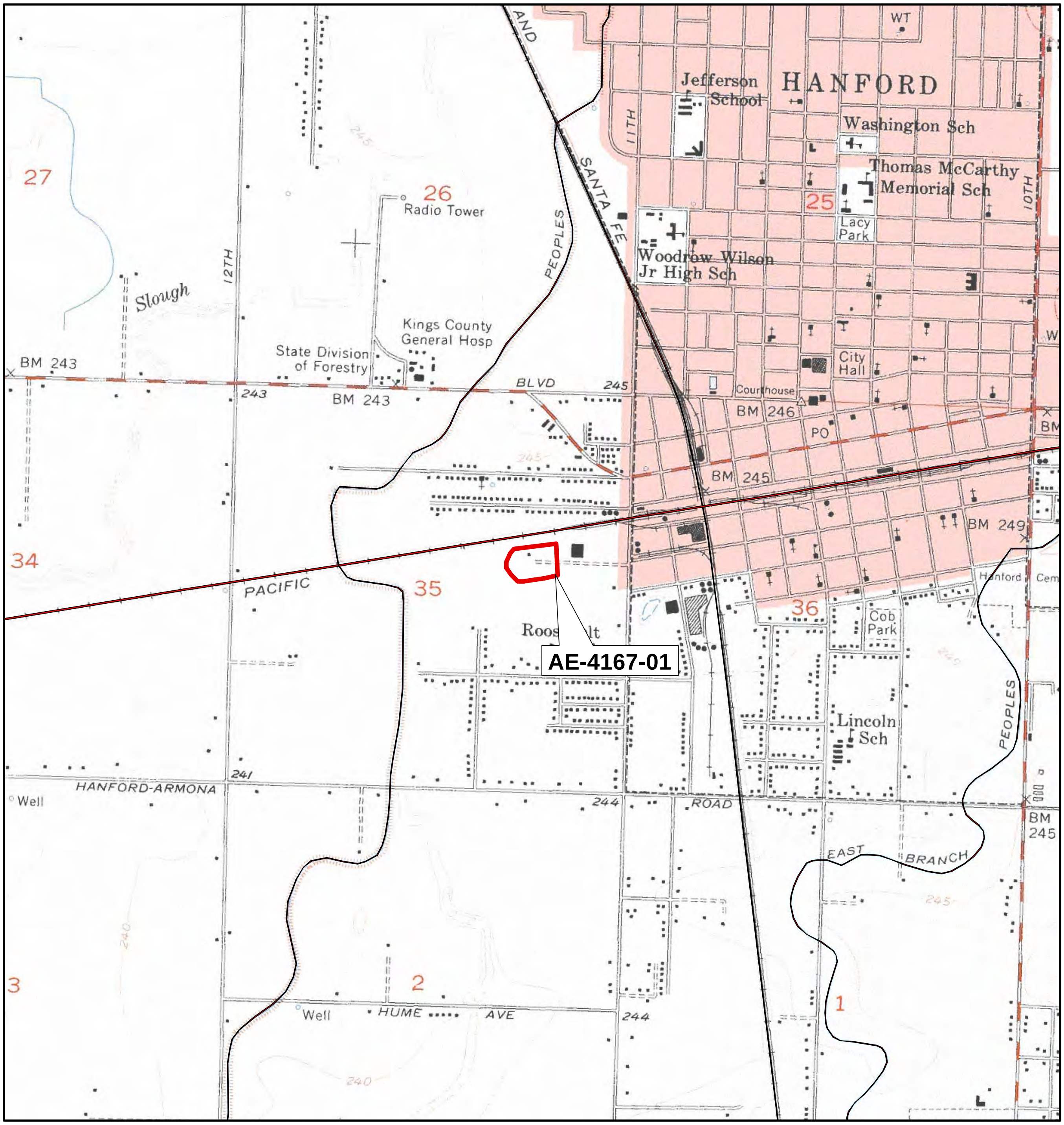
***Attachments:** ☐ NONE ☒ Location Map ☐ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (list):

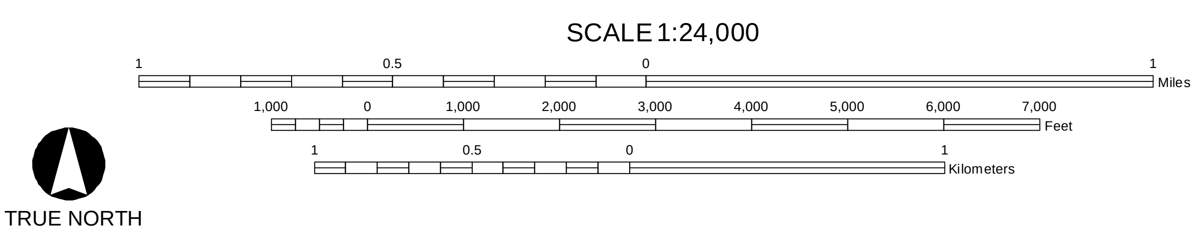
State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #
HRI#
Trinomial

Page 2 **of** 2 **Resource Name or #:** AE-4167-01 **Scale:** 1:24,000

Map Name: Hanford, CA, USGS 7.5' quadrangle **Date:** 1950 (1954)





State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

 Resource Name or # AE-4167-ISO-01

P1. Other Identifier:

*__P2. Location: a. County:__ Kings County ☒ **Not for Publication** ☐ **Unrestricted**

b. USGS 7.5′ Quad: Hanford, CA **Date:** 1950, photorev. 1954 T 18S, R 21E; SW **¼ of** NE **¼ of** Sec. 35 MD **B.M.**

c. Address: N/A

d. UTM: NAD 83, Zone 11; 2610931 **mE /** 4022861 **mN**

e. Other Locational Data: From the intersection of 11th Street and West Lacey Blvd. in Hanford, drive west for 0.4 miles on West Lacey Blvd. Turn left (south) on Campus Drive and proceed for 0.4 miles. At this point the road terminates and the isolated find was located 141° at 146 meters from this point.

***P3a. Description:** The isolated artifact is an aqua blue glass insulator fragment. The insulator was found on the ground surface east of the Peoples Canal. The artifact was collected.

***P3b. Resource Attributes:**

***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☒ Other: Isolate

***P5a. Photograph or Drawing:**

P5b. Description of Photo: Fragmented aqua blue glass insulator.

***P6. Date Constructed/Age and Sources:**
☐ Prehistoric ☒ Historic ☐ Both

*P7. Owner and Address:
The Hanford Group
c/o Epic Management Group, Inc.
44045 Margarita Road, Suite #100
Temecula, CA 92592

***P8. Recorded By:** Ward Stanley
Applied EarthWorks, Inc.
1391 W. Shaw Ave., Suite C
Fresno, CA 93711

***P9. Date Recorded:** 5/23/2020

***P10. Survey Type:** ☒ Intensive
☐ Reconnaissance ☐ Other

Describe: Pedestrian survey at 15-meter interval transects.

***P11. Report Citation:** Dyste, Diana T., Jessica Jones, Dennis McDougall, Ward Stanley, and Carlos van Onna
2020 *Cultural Resource Inventory for the Hanford Place Medical and Mixed-Use Property Project in the City of Hanford, Kings County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for The Hanford Group, c/o Epic Management Group, Inc., Temecula, California.

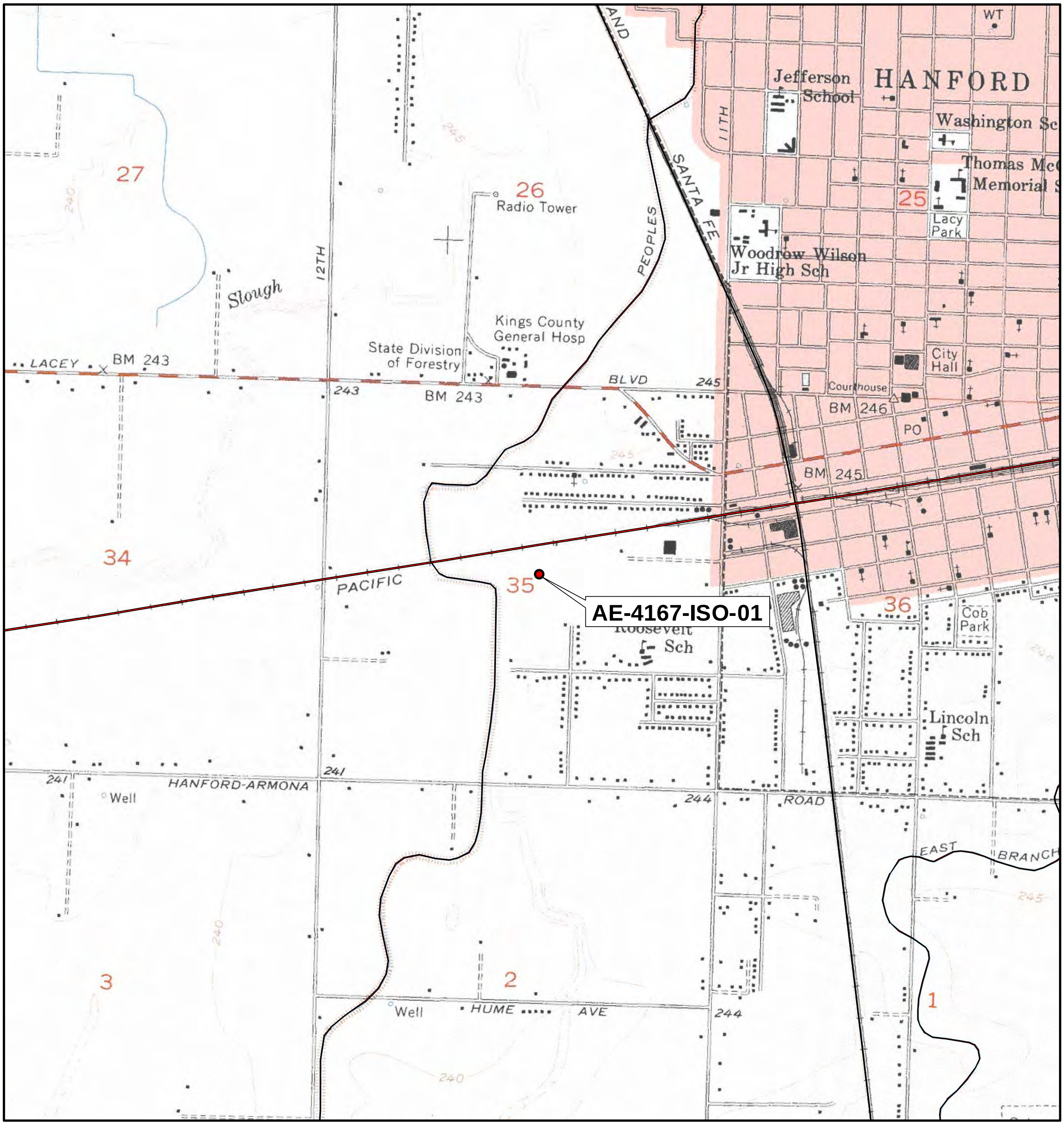
***Attachments:** ☐ NONE ☒ Location Map ☐ Sketch Map ☐ Continuation Sheet
☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record
☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record
☐ Photograph Record ☐ Other (list):

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #
HRI#
Trinomial

Page 2 **of** 2 **Resource Name or #:** AE-4167-ISO-01 **Scale:** 1:24,000

Map Name: Hanford, CA, USGS 7.5' quadrangle **Date:** 1950 (1954)



SCALE 1:24,000

1 0.5 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH

APPENDIX D

PRELIMINARY GEOTECHNICAL INVESTIGATION AND GEOLOGIC AND SEISMIC HAZARDS EVALUATION REPORT

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KLEINFELDER
Bright People. Right Solutions.

June 9, 2020
Kleinfelder Project No.: 20210045.001A

Mr. Burley Wright
Vice President, Development
Epic Management Group, Inc.
44045 Margarita Rd., Suite 100
Temecula, California 92592
Direct: (951) 746-0012
Office: (951) 331-3583

Subject: **Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation Report Propose Hanford Place, Medical and Mixed-Use Property Hanford, California**

Dear Mr. Wright,

The attached report presents the results of Preliminary Geotechnical Investigation and Geologic and Seismic Hazards Evaluation performed for the proposed Hanford Place, Medical and Mixed-Use Property to be located in Hanford, California. The report describes the study, findings, conclusions and recommendations for use in project design.

The primary concern for development of the site is presence of compressible soils residing in the upper approximately 10 feet of native soils across the project site. These soils are subject to hydrocompaction, which is a common soil condition in the Hanford area. Hydrocompactive soil has a loose skeletal structure, which is weakly cemented by soluble salts and/or minor amounts of clay. Increases in soil moisture reduce the interparticle cementation (dry strength) of the soil resulting in a decrease in the volume of the soil structure. This condition can lead to post construction settlement of structures if soils subsequently become wetted. At the present moisture content, the on-site natural soil has sufficient strength to support the proposed preliminary improvements. However, should the soil be subject to post-construction moisture increases, moderate soil compression will likely occur below structures and related site improvements.

The effects of hydrocompactive soil can be mitigated through earthwork excavation and recompaction of the soils. Disposal of the soils is not necessary. From a development perspective, the efforts associated with the additional earthwork to mitigate the hydrocompactive soils will increase site development costs.

Kleinfelder considered an alternative option to mitigate against the settlement of the structures due to hydrocompaction, which involved the use of deep foundation systems (such as drilled pier foundations, auger cast piles, underpinning piers, etc.). However, supporting building structures on deepened foundation systems does not mitigate the occurrence of liquefaction and therefore, would invariably require the use of grade beams and structural slabs in addition to deepened foundations. The deepened foundations, grade beams, and structural would likely be cost prohibitive as compared to conventional grading techniques and therefore was excluded deep foundations as an option.

Kleinfelder appreciates the opportunity to provide geotechnical engineering and geologic services to Epic Management Group, Inc. during the design phase of this project. If there are any questions concerning the information presented in this report, please contact this office at your convenience.

Respectfully submitted,

KLEINFELDER, INC.

Adam AhTye, PE
Project Engineer

James A. Wetenkamp, CEG #2556
Project Engineering Geologist

Stephen P. Plauson, PE, GE
Principle Geotechnical Engineer

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PRELIMINARY GEOTECHNICAL INVESTIGATION AND GEOLOGIC AND SEISMIC HAZARDS EVALUATION REPORT
PROPOSED HANFORD PLACE, MEDICAL AND MIXED-USE PROPERTY
HANFORD, CALIFORNIA
KLEINFELDER PROJECT NO. 20190494.001A

JUNE 9, 2020

Prepared For:

Epic Management Group, Inc.
44045 Margarita Rd., Suite 100
Temecula, California 92592

PRELIMINARY GEOTECHNICAL INVESTIGATION AND GEOLOGIC AND SEISMIC HAZARDS EVALUATION REPORT PROPOSED HANFORD PLACE, MEDICAL AND MIXED-USE PROPERTY HANFORD, CALIFORNIA

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June 9, 2020
Kleinfelder Project No.: 20190494.001A

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1 INTRODUCTION

1.1 GENERAL

This report presents the results of a preliminary geotechnical investigation and geologic and seismic hazards evaluation for the proposed Hanford Place medical and mixed-use property to be located in Hanford, California. The purpose of the investigation was to explore and evaluate the subsurface conditions at the site, identify and assess potential geologic hazards, and develop preliminary geotechnical engineering recommendations to aid in project design. The Site Vicinity Map, presented on Figure 1, shows the location of the project and the Exploration Location Map, presented on Figure 2, shows the approximate boring locations.

This report includes preliminary recommendations related to the geotechnical and geologic aspects of project design. Conclusions and recommendations presented in this report are based on subsurface conditions encountered at the boring locations, as well as the provisions and requirements outlined in the “Additional Services” and “Limitations” Sections of this report. Recommendations presented herein should not be extrapolated to other areas or used for other projects without prior review.

1.2 PROPOSED CONSTRUCTION

An understanding of the project is based on an email correspondence with representatives of the developer’s design team, Zumwalt-Hansen and Associates (Zumwalt) and Epic Management Group, and a conceptual site plan of the proposed building locations. It is understood that approximately 43 acres of undeveloped land are part of a preliminary plan for development of a medical and mixed-use facilities project.

The development is anticipated to include multi-story (up to 4-story) care and treatment facilities, multifamily residential, a hospitality/conference center, 1 to 2 story medical offices and retail buildings, and a storm water infiltration basin. The structures are anticipated to consist of wood, steel, or concrete structures supported on shallow spread foundations and concrete slab-on-grade floors. For the preliminary study, maximum wall and column loads are assumed to be less than 5 kips per foot and 200 kips, respectively.

Appurtenant improvements are anticipated to include off-site asphalt concrete pavements, on-site asphalt and Portland cement concrete pavements, underground utilities, sound walls, hardscape, and landscaping. It is assumed that other improvements may include covered parking and storm water basins. Grading plans were not available at the time of this proposal. However, cuts and fills of up to 3 feet in vertical extent are anticipated to create parking/pad grades and positive site drainage. The infiltration basin is anticipated to be a depth of approx. 15 feet.

The project scope also includes relocating the existing open-cut Peoples Ditch to an underground reinforced concrete pipe. Th exiting ditch is approx. 3.5 deep, measured from the original ground, with approx. 2.5-foot tall embankments. The proposed pipe is anticipated to be a diameter of 5.5 feet and maintain the existing alignment.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of the geotechnical investigation was to explore the site subsurface conditions and develop recommendations and professional opinions to assist in project design. The scope of our services was outlined in Kleinfelder's proposal dated May 21, 2019 and included the following:

- A description of the proposed project, including a vicinity map showing the location of the site, a site plan showing the locations of the exploration points for this study, and a geologic cross-section
- A description of the site surface and subsurface conditions encountered during the field investigation, including boring logs
- A summary of the field exploration and laboratory testing program
- Comments on depth to groundwater and potential impact on design and construction
- Recommendations for site preparation and earthwork grading, including a discussion concerning the use of on-site soils for engineered fill
- Recommendations for conventional foundation design, including available bearing capacity of foundation soil for sustained and total combined loading and estimated settlement
- Recommendations for frictional coefficient and passive pressure for resistance of lateral loads

- Recommendations to aid in design of concrete slabs-on-grade, including modulus of subgrade reaction
- Recommendations for earth retaining structures
- Recommendations to aid in design of pier/pole foundations for miscellaneous sign, light, and canopy structures
- Recommendations for asphalt and Portland cement concrete pavement sections paced on a range of truck traffic indexes
- Discussion of the general corrosion characteristics of the site soils, and
- Comments to aid in the design of site drainage.

The purpose of the geologic and seismic hazards assessment is to identify and assess potential geologic and seismic hazards at the site. We understand that the facility does not fall under the jurisdiction of the California Office of Statewide Health Planning and Development (OSHPD); however, to meet the standard of care for medical facilities this report has been prepared in accordance with the requirements for such studies set forth by the Essential Services Buildings Seismic Safety Act of 1986 and defined in the California Code of Regulations, Title 24, 2019 California Building Code (CBC) using guidelines outlined by the California Geological Survey (CGS). In addition to these documents, this report is prepared in accordance with the guidelines established in the following documents:

- CGS Note 48 (Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings),
- CGS Note 44 (Recommended Guidelines for Preparing Engineering Geologic Reports),
- CGS Note 42 (Guidelines to Geologic/Seismic Reports),
- CGS Special Publication 42 (Fault Rupture Hazard Zones in California),
- CGS Note 41 (Guidelines for Reviewing Geologic Reports), and
- CGS Special Publication 117A (Guidelines for Evaluating and Mitigating Seismic Hazards in California).

The geologic and seismic hazards evaluation includes the following items:

- Research and review of pertinent geologic, geotechnical, and seismologic publications and maps covering the site and vicinity in Kleinfelder's library;
- Evaluation of geologic conditions including the results of the boring and laboratory testing of soil samples completed during the geotechnical investigation;
- Estimate of Site Class per Table 1613A.5.2 of 2019 CBC;
- Provide seismic design parameters per Chapter 1613A of 2019 CBC;
- Conclusions regarding fault rupture, ground accelerations, and ground failure potential;
- Conclusions regarding the potential for liquefaction, seismic settlement and compaction, flooding, tsunamis, seiches, seismically induced landsliding, lurching and lateral spreading; and
- Preparation of this written report for the site with conclusions and recommendations as required regarding geologic and seismic hazards.

The references reviewed for compilation of this report are listed in the "References" section of this report. Observations and conclusions presented herein specifically exclude the assessment of environmental characteristics, particularly those involving hazardous substances.

2 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

The field exploration, conducted on April 20 and 21, 2020 consisted of drilling nine (9) exploratory test borings. The test borings were drilled with a CME-75 truck-mounted drill rig utilizing hollow stem auger techniques. The borings were advanced to depths ranging from approximately 16.5 to 51.5 feet below the existing ground surface (bgs). Additionally, seven (7) bulk samples of the near surface soils in areas of proposed pavements were collected for R-value testing. The approximate locations of the test borings and R-values are indicated on the Exploration Location Map, Figure 2.

The soils encountered in the borings were visually classified in the field and a continuous log was recorded. Relatively undisturbed samples were collected from the test borings at selected depths by driving a 2.5-inch I.D. split barrel sampler containing brass liners into the undisturbed soil with a 140-pound automatic hammer free falling a distance of 30 inches and having an energy efficiency rating of 89 percent. In addition, samples of the subsurface material were obtained using a 1.5-inch I.D. standard penetrometer, driven 18 inches in accordance with American Society for Testing and Materials (ASTM) D1586 test procedures. The sampler was used without liners. Resistance to sampler penetration was noted on the boring logs as the number of blows per foot over the last 12 inches of sampler penetration. The blow counts listed in the boring logs have not been corrected for the effects of overburden pressure, rod length, sampler size, or hammer efficiency. Bulk samples were also obtained from auger cuttings at one boring location.

2.2 FIELD AND LABORATORY TESTING

Penetration rates, determined in general accordance with ASTM D1586, were used to aid in evaluating the consistency, relative density, compression and strength characteristics of the foundation soils. Extensive experience in the central and southern San Joaquin Valley has shown correlations and design methodologies utilizing the standard penetration test (SPT) data best defines performance in the local unsaturated soil.

Laboratory tests were performed on selected samples to evaluate certain physical characteristics. The following laboratory tests were used to develop the design geotechnical parameters:

- Unit weight (ASTM D2937)
- Moisture content (ASTM D2216)
- Amount of Material in Soils Finer Than the No. 200 Sieve (ASTM D1140)
- Atterberg Limits (ASTM D4318)
- Collapse Potential (ASTM D5333)
- Direct Shear (ASTM 3080)
- Modified Proctor (ASTM D1557)
- Soluble Sulfate Content (California Test Method No. 417)
- Soluble Chloride Content (California Test Method No. 422)
- pH and Minimum Resistivity (California Test Method No. 532)
- R-Value (ASTM D2844)

The dry density and moisture content test results are shown on the boring logs in Appendix A. The soluble sulfate, soluble chloride, pH and minimum resistivity are discussed in the "Corrosion Potential" section (Section 6.7). The remaining test results are provided in Appendix B.

3 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The project site consists of approximately 43 acres of undeveloped land located between 11th and 12th Avenues, and Highway 198 and Union Pacific railroad tracks. The western approx. third and eastern approx. two thirds of the site are currently divided by Peoples Ditch, an open-cut canal traversing the site. It is understood that the People's Ditch is anticipated to be converted to an underground reinforced concrete pipe within the project limits. Based on Google Earth imagery, it appears Peoples Ditch traversed the site along the western boundary of the project site. This alignment was abandoned circa early- to mid-2000s, coincident with the construction of the Adventist Health Medical Center located north, north-west of the project site.

At the time of field reconnaissance, the project site supported a moderate growth of annual grasses and weeds. The project site appeared to be relatively flat and at the same relative elevation of the nearby roads. It is understood the project site is periodically plowed for fire hazard mitigation.

At the time of the investigation, loose sediments within Peoples Ditch was probed to a depth of approximately 2 to 2.5 feet below the ditch bottom.

3.2 EARTH MATERIALS

The following description provides a general summary of the subsurface conditions encountered during the field exploration and as further evaluated through the laboratory testing program. For a more thorough description of the actual conditions encountered at specific boring locations, refer to the boring logs presented in Appendix A. The soils were classified according to the Unified Soil Classification System (ASTM D2487).

The subsurface soils consist Holocene aged Great Valley fan deposits. The general soil profile encountered by the subsurface exploration consisted primarily of silty sand and sandy silt to depth of approximately 10 to 15 feet bgs underlain by laterally discontinuous layers of silty clay, sandy silt, silty sand, and poorly graded sand. The granular soils had a relative consistency of medium dense to very dense and the fine-grained soils had a relative consistency of stiff to very stiff.

Geologic cross sections, interpreted from the test borings, are presented on Figure 6. The site geology and locations of the cross sections are presented on Figure 3.

3.3 GROUNDWATER CONDITIONS

Groundwater was not encountered in the explorations. However, perched water was encountered within boring B-7 at a depth of approximately 45 feet bgs at the time of investigation. It is anticipated that the observed groundwater at the time of drilling was a perched on a dense layer of silty clay. Research utilizing the California Department of Water Resources (DWR) Water Data Library website indicate groundwater levels to be greater than 50 feet bgs in 2011 (Well No. 18S21E34B002M) located approximately ½ mile northwest of the site. Additional research utilizing the DWR website indicated that the historic high groundwater depth was recorded at 15 feet in the late 1960's. However, a steady decline in the depth to groundwater can be observed to current depths shown on the DWR website.

It is possible that groundwater conditions at the site could change at some time in the future due to variations in rainfall, groundwater withdrawal, regional agricultural production, construction activities, groundwater recharge practices, or other factors not apparent at the time our test borings were performed. However, groundwater is not anticipated to impact design or construction. Considering the elevated groundwater levels in the early 1970's due to reservoir management practices (15 feet) and elevated groundwater levels in the mid-1980's due to precipitation (51 feet), it is suggested that the high groundwater level of 15 feet will not realistically occur in the future. It is understood that recharge programs such as Sustainable Groundwater Management Act (SGMA) may increase the current groundwater levels. However, it is anticipated the City will limit the amount of recharge and subsequent rise in groundwater due to potential damage to underground infrastructure. Therefore, Kleinfelder recommends a design high groundwater depth to be 25 feet bgs.

4 GEOLOGIC AND SEISMIC CONDITIONS

4.1 REGIONAL GEOLOGY

The proposed facility lies in the southern portion of the Great Valley geomorphic province near its boundary with the Sierra Nevada geomorphic province in Central California. The filling of a large structural trough or downwarp in the underlying bedrock formed the Great Valley province of California. The trough is situated between the Sierra Nevada Range on the east and the Coast Range on the west. Both of these mountain ranges were initially formed by uplifts, which occurred during the Jurassic and Cretaceous periods (greater than 65 million years ago). Renewed uplift began in the Sierra Nevada during late Tertiary time and is continuing today. The trough, which underlies the Valley, is asymmetrical with the greatest depth of sediments near the western margin. The sediments, which fill the trough, originated as erosional material from the adjacent mountains and foothills. The upper and youngest sediments in the basin are continental deposits consisting of alluvial fan deposits and flood-basin, lake, and marsh deposits. Figure 5 provides a detailed regional geologic map of the area by the California Geologic Survey (CGS) (Geologic Map of California, v. 2.0, 2010).

4.2 AREA AND SITE GEOLOGY

The majority of the native sediments in the project area have been mapped (Fresno geologic sheet) by CGS (Geologic Map of California, Fresno Sheet, Matthews and Burnett 1965). The site is located within the Holocene age Recent Alluvial Fan Deposits in the Great Valley (map symbol Qf). The soil subgrade characteristics encountered during the field investigation (i.e. soil type, blow count, etc.) appear to be consistent with this mapped unit. Figure 4 presents a site-specific geologic map of the project. The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) has mapped the soils on the entire project site as Nord Complex (149). Based on the map unit description of the NRCS, soils designated with map units of 149 consist of alluvial deposits derived from igneous rock sources which corresponds to Unified Soil Classification group symbol of SM (Silty Sand) and ML (Sandy Silt).

4.3 FAULTS LOCAL TO THE PROPOSED SITE

Based on the information provided in the California Geological Survey Special Publication 42 (CGS, 2018), the site is not located within a State-designated Alquist-Priolo Earthquake Fault Zone, where site-specific studies addressing the potential for surface fault rupture are required. No known active faults traverse the site. The project site is situated within a region traditionally characterized by few active faults and a low to moderate potential for seismic activity.

An active fault is a fault that has experienced seismic activity during historic time (since roughly 1800) or exhibits evidence of surface displacement during Holocene time (CGS, 2018). The terms "sufficiently active" and "well-defined" are used by the CGS as criteria for zoning faults under the Alquist-Priolo Earthquake Fault Act. A "sufficiently active fault" is a fault that shows evidence of Holocene surface displacement along one or more of its segments and branches, while a "well-defined fault" is a fault whose trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The definition "inactive" generally implies that a fault has not been active since the beginning of the Pleistocene Epoch (older than 2.6 million years).

Locations of the significant active and well-defined faults are shown on Figure 7. The site is located approximately 94 km east from the San Andreas fault and 42 km east of the Great Valley fault. A major seismic event on these fault segments may cause significant ground shaking at the site.

4.4 SIGNIFICANT FAULTS

The faults within 100 km of the site, and their seismic parameters are listed in Table 4.4-1. For faults with multiple segmentation scenarios, Kleinfelder has only listed parameters for the scenario rupturing the most segments (i.e., the most severe scenario). The locations of the faults, presented on Figure 7, and associated parameters, presented on Table 4.4-1, are based on the USGS 2008 National Seismic Hazard Maps (Petersen et al., 2008). The maximum earthquake magnitudes presented in this table are based on the moment magnitude scale developed by Kanamori (1977).

Table 4.4-1
Significant Faults

Fault Name	Fault Length (km)	Closest Distance[1] (km)	Maximum Earthquake Magnitude[2]	Slip Rate (mm/yr)
Great Valley 14	24	42	7.2	1.5
Great Valley 13	32	45	7.1	1.5
Great Valley 12	17	62	6.4	1.5
Great Valley 11	24	73	6.6	1.5
San Andreas	245	85	8.0	34
San Juan	68	91	7.1	1.5
Great Valley 10	22	95	6.5	1.5

[1]Closest distance to the potential rupture.

[2]*Moment magnitude*: An estimate of an earthquake's magnitude based on the seismic moment (measure of an earthquake's size utilizing rock rigidity, amount of slip, and area of rupture).

Table 4.4-1 represents the scenarios of rupturing all the segments for these faults. Other rupture scenarios can be found in Field et al. (2008).

4.5 HISTORICAL SEISMICITY

The project site and vicinity are located in an area characterized by historically low seismicity. A number of earthquakes have occurred within a 100 km radius of the site during historic time (since 1800). Some of the significant regional earthquake events include the 1857 (M7.9) Fort Tejon earthquake, located approximately 90 km to the southwest of the site; the 1983 (M6.7) Coalinga earthquake, located about 59 km to the southwest; and the 1922 (M6.5) Parkfield earthquake, located about 83 km to the southwest.

Epicenters of some significant earthquakes (M ≥ 4.0) within the vicinity of the site are shown on Figure 7. The earthquake database used in the search contains in excess of 5,500 seismic events and covers the period from 1800 through May 2020. The earthquake database is primarily comprised of an earthquake catalog for the State of California prepared by the CGS (formerly Division of Mines and Geology, DMG). The catalog contains earthquake records from January 1, 1900 through December 31, 1974. Updates prepared by the CGS in 1979 and 1982 extend the coverage through 1982. In addition to the CGS updates, the data for earthquakes that occurred during the period between 1910 through May 2020 has been obtained from a composite catalog by the Advanced National Seismic System (ANSS). The ANSS catalog is a worldwide earthquake catalog which is created by merging the master earthquake catalogs from contributing ANSS member networks and then removing duplicate events, or non-unique solutions from the same event. The ANSS network includes the Northern and Southern California Seismic Networks, the Pacific Northwest Seismic Network, the University of Nevada, Reno Seismic Network, the University of Utah Seismographic Stations, and the United States National Earthquake Information Service. The earthquake database also consists of earthquake records between 1800 and 1900 from Seeburger and Bolt (1976) and Toppozada et al. (1978, 1981). In addition, we have also utilized the data from DMG Map Sheet 49 (Toppozada et al., 2000).

The parameters used to define the limits of the historical earthquake search include geographical limits (within 100 km of the site), dates (1800 through May 2020), and magnitudes ($M \geq 4$). A summary of the results of the historical search is presented in Table 4.5-1.

Table 4.5-1
Historical Seismicity

Time Period (1800 to May 2020)	220+ years
Maximum Magnitude[1]	7.9
Approximate distance to nearest historical $M \geq 4$ earthquake	20 km
Number of events exceeding magnitude 4 within search area	170

[1]Moment magnitude

4.6 SOIL SITE CLASS

Based on the borings in the above referenced report, the supplemental borings performed, and a review of the geologic conditions within the vicinity of the project site, Site Class D would be appropriate for the seismic design of the new facility using the 2019 California Building Code (CBC). The parameters provided below are based on the 2019 CBC. The 2019 CBC is based on the 2018 International Building Code (IBC) and ASCE 7-16. For a 2019 CBC based design, the estimated Maximum Considered Earthquake (MCE) mapped spectral accelerations for 0.2 second and 1 second periods (SS and S1), associated soil amplification factor (Fa), and mapped peak ground acceleration (PGA) are presented in Table 4.6-1. Corresponding site modified (SMS) and design (SDS) spectral accelerations, PGA modification coefficient (FPGA), PGAM, risk coefficients (CRS and CR1), and long-period transition period (TL) are also presented in the table below. Presented values were estimated using Section 1613.3 of the 2019 California Building Code (CBC), chapters 11 and 22 of ASCE 7-16, and the Structural Engineers Association of

California (SEAOC) and California Office of Statewide Health Planning and Development (OSHPD) U.S. seismic design maps.

Table 4.6-1
2019 CBC/ASCE 7-16 seismic design parameters

Parameter	Value[1]	ASCE 7-16 Reference
Latitude	36.321241°	-
Longitude	-119.664210°	-
S_S	0.750g	Fig 22-1
S_1	0.271g	Fig 22-2
Site Class	D	Table 20.3-1
F_a	1.200	Table 11.4-1
F_v	NA	Table 11.4-2, Supplement 1
PGA	0.325g	Fig 22-9
S_{MS}	0.900g	Eq. 11.4-1
S_{M1}	NA	Eq. 11.4-2
S_{DS}	0.600g	Eq. 11.4-3
S_{D1}	NA	Eq. 11.4-4
F_{PGA}	1.275	Table 11.8-1
PGA_M	0.414g	Eq. 11.8-1
C_{RS}	0.922	Fig 22-18A
C_{R1}	0.927	Fig 22-19A
T_L	12 seconds	

[1]N/A* = Not Applicable (refer to explanation below)

It should be noted that Section 11.4.8 of ASCE 7-16 requires a site-specific ground motion hazard analysis be performed for Site Class D sites with S_1 values greater than or equal to 0.2g unless structural design exceptions are taken. The subject site meets these criteria. We understand that CGS will assume the structural design exceptions will not be taken and that a site-specific ground motion hazard analysis will be performed. If exceptions are taken, then an F_V value of 2.058 can be used only to calculate the T_S, S_{M1}, and S_{D1} values and only for the purpose of invoking the exceptions in Section 11.4.8 of ASCE 7-16. The calculated S_{M1} and S_{D1} values based on the F_V value of 2.058 shall not be used for any other calculations. The structural engineer is required to prepare a letter for submittal to OSHPD and CGS that confirms the exceptions will be taken, otherwise if the exceptions are not taken, a site-specific ground motion hazard analysis will be required.

4.7 POTENTIAL SEISMIC HAZARDS

A discussion of specific seismic hazards that could impact the site is included below. The hazards considered include: surface fault rupture; liquefaction and seismic settlement; lateral spreading; dynamic compaction; and cyclic softening.

4.7.1 Surface Fault Rupture

Earthquakes are caused by the sudden displacement of earth along faults with a consequent release of stored strain energy. The fault slippage can often extend to the ground surface where it is manifested by sudden and abrupt relative ground displacement. Damage resulting from fault rupture occurs where structures are located astride the fault traces that move. The subject site is not located within, nor is it adjacent to, a state designated Alquist-Priolo Earthquake Fault Zone (CGS, 2018). Based on the reviewed geologic/seismologic reports and maps, no known active, or potentially active faults cross or project toward the site. Therefore, the potential for fault-related surface rupture at the site is considered very low.

4.7.2 Liquefaction and Seismic Settlement

A common secondary hazard of strong ground shaking is the potential for soil liquefaction. Liquefaction describes a phenomenon in which saturated soil loses shear strength and deforms as a result of increased pore water pressure induced by strong ground shaking during an earthquake. Dissipation of the excess pore pressures will produce volume changes within the liquefied soil layer, which can manifest at the ground surface as settlement of structures, floating of buried structures, failure of retaining walls, lateral migration (lateral spreading), and extensional ground cracking of liquefied material. Factors known to influence liquefaction include soil type, structure, geologic age, grain size, relative density, confining pressure, depth to groundwater, and the intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated, loose, sandy soils.

Saturated granular sediments can experience liquefaction if subject to seismically induced ground motion of sufficient intensity and duration. Liquefaction analysis used procedures by Youd et. Al. (2001) and considered the relative density and fines content of the granular settlement. The liquefaction analysis also included screening for the potential for liquefaction utilizing the moisture content and Plasticity Index of fine grained non-cohesive and cohesive soils in accordance with procedures set forth in Seed e. al. (2003). The analysis considered a historic high groundwater depth of 25 feet bgs, ground acceleration (PGA_M) of 0.414g, and earthquake moment magnitude Mw = 6.21.

A screening analysis was not performed for the potential of cyclic liquefaction occurring in the fine grained soils encountered within the boring but were included in the liquefaction analysis for conservatism. Therefore, the coarse and fine grained soil layers were evaluated for potential liquefaction using the cyclic liquefaction analysis model by Seed (2003). Liquefaction analysis performed on the fine grained and granular sediments indicates that liquefaction and seismically induced settlement may occur in the poorly graded sand layers encountered in borings B-6 at depths between 30 to 33 feet and 40 to 43 feet bgs. Also, liquefaction and seismically included settlement may occur in poorly graded sand layers and deeper silty clay layers encountered in boring B-7 at depths between 38 to 40 feet and 46 to 51.5 feet bgs. However, due to the significant thickness of non-liquefiable overburden soil with moderate to high density, bearing loss is not likely to occur.

Seismically induced settlement due to liquefaction was evaluated to be 0.4 inches by Seed (2003) and 0.1-inch by Idriss and Boulanger (2008) in boring B-6 and 1.5 inches by Seed (2003) and 0.5 inches by Idriss and Boulanger (2008) in boring B-7. The general guidelines of the CGS indicate the differential seismically induced settlement between adjacent supports in a building would be about one-half the total settlement. This would result in an average differential settlement between adjacent supports of approximately 0.15-inch in boring B-6 and 0.5 inches in boring B-7. The anticipated differential settlements are low to moderate and are anticipated to be within the tolerance of the proposed structures and will not result in significant damage or collapse. We assume the structural engineer can accommodate this amount of settlement; therefore, no ground modification for mitigation against liquefaction and/or settlement is recommended.

4.7.3 Lateral Spreading

Lateral spreading is a movement in a nearly horizontal soil zone (usually attributable to liquefaction) that causes the overlying soil mass to shift down a gentle slope or toward a free face such as incised water bodies. Because the site and surrounding areas have generally insignificant topographic relief and the site is not likely to experience significant liquefaction, the potential for lateral spreading is considered very low.

4.7.4 Dynamic Compaction

Dry, loose sands and non-plastic silts may experience some dynamic compaction resulting in surface settlement when subjected to cyclic application of loads such as ground shaking from near-by-seismic events. Given the subsurface conditions encountered above groundwater, it is estimated (Tokimatsu and Seed, 1987) seismic settlement of the non-saturated soil at the site is anticipated to be less than ¾-inch for analysis based on soil encountered in Borings B-6 and B-7 for both the current groundwater and historic high groundwater conditions.

4.7.5 Cyclic Softening

While liquefaction describes a phenomenon in which saturated “sand-like” (or cohesionless) soils loose strength during an earthquake, cyclic softening describes the loss of strength of “clay-like” (or cohesive) soils during an earthquake. Various researchers agree that plasticity index (PI) is useful in determining if a soil behaves clay-like or sand-like; however, the value of PI for which a clay behaves like a sand is not agreed upon. For this investigation, we have relied upon the methods presented in Idriss and Boulanger (2008) which indicates that soils with a PI ≥7 behave like a clay. Based on the results of our field and laboratory investigation, and the depth to groundwater, no soft soils susceptible to cyclic softening were encountered at the site.

4.8 POTENTIAL GEOLOGIC HAZARDS

The following discusses potential geologic hazards that could impact construction at the project site, including: flooding; expansive soils; hydrocompaction; corrosive soils; regional subsidence; naturally occurring asbestos; and radon. Other geologic hazards such as landslide and volcanic eruption are not considered a potential hazard at this site.

4.8.1 Flooding

4.8.1.1 Tsunamis, Seiches, Earthquake Induced Flooding

Tsunamis are sea waves of unusual size that occur from significant earthquakes either under the ocean floor or adjacent to shorelines and can travel great distances to impact low-lying communities and developments. Considering that the Coast Range protects the site from the sea, the potential to be affected by a tsunami is nil.

A seiche is a free or standing wave oscillation that occurs in a confined body of water, such as a reservoir or lake. Earthquake-generated ground waves, which have a period that matches the natural period of the lake or reservoir, may cause the water to oscillate, which can cause damage to shore line improvements. The Kings County General Plan (KCGP) indicates that earthquake-induced seiches are not considered a risk within the vicinity of the project site.

4.8.1.2 Potential for Dam Failure

According to the KCGP, two major dams could cause substantial flooding in Kings County in the event of a failure: Pine Flat and Terminus Dams. The project site is located within an area of potential flooding due to dam failure of Pine Flat Dam (see Figure 9). However, the KCGP does not state the potential inundation depth in the event of failure of Pine Flat Dam. The project site is not located within potential flooding of the Terminus Dam.

4.8.1.3 Flood Insurance Rate Maps

According to the Federal Emergency Management Agency (FEMA), the majority of the project site lies within a Zone X flood designation (Map Number 06031C0185C, dated June 16, 2009) indicating areas of minimal flood hazard (see Figure 8). As such, the civil designer should plan site grades accordingly.

4.8.2 Expansive Soils

Expansive soils were not encountered within the borings drilled for this study. Furthermore, based on review of soil survey by the NRCS, expansive soil was not identified within the project area. Expansive soils are not anticipated within the influence of foundation systems or zone of cyclic moisture changes therefore, will not dictate the need for special grading or special footing and concrete slab-on-grade design.

4.8.3 Hydrocompaction (Soil Collapse)

Our experience has found that some of the alluvial soils in the San Joaquin Valley are subject to hydrocompaction. Hydrocompactive soil has a relatively loose skeletal structure, which is weakly cemented by soluble salts or a slight clay mineral content. Moisture increase breaks down the inter-particle cementation causing a collapse of the skeletal structure. The significant loss in soil volume can result in settlement of overlying structures. The project geotechnical exploration and associated laboratory testing identified the in-place relative density of the subsurface soil was relatively low and compression characteristics were moderate. Based on laboratory testing, post saturation of four soil samples (Borings B-3 at 1-foot, B-9 at 2 feet, B-1 at 5.5 feet, and B-7 at 7.5 feet bgs) obtained from the site had compression characteristics that were low to moderate (18pprox.. 2.0 to 5.0 percent compression upon induction with a normal load equal to 1,000 to 2,000 psf), indicating a possibility of collapse potential.

4.8.4 Corrosive Soils

Kleinfelder has completed laboratory testing to provide data regarding corrosivity of onsite soils. Our scope of services does not include corrosion engineering and, therefore, a detailed analysis of the corrosion test results is not included in this report. A qualified corrosion engineer should be retained to review the test results and design protective systems that may be required. Kleinfelder may be able to provide those services. However, the results of the laboratory testing regarding corrosivity can be seen in Section 6.7.

4.8.5 Regional Subsidence

Land subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. The KCGP does not identify subsidence within Kings County; however, the KCGP acknowledges soils particularly subject to subsidence include those with high silt or clay content and a high water table. Due to the significant depth to groundwater withdraw in the San Joaquin Valley, the occurrence of subsidence is typically regional and unlikely to affect isolated locations, as such, the potential for damaging differential settlement of the proposed new structures due to subsidence is very low.

4.8.6 Naturally-Occurring Asbestos

CGS Open File Report 2000-019 (Churchill and Hill, 2000) indicates the most proximal ultramafic bedrock likely to contain naturally occurring asbestos (NOA) is located approximately 35 miles east of the site. The project site is underlain by fluvial and alluvial deposits derived from Sierra Nevada and foothills which may contain small amounts of NOA. However, NOA is not likely to be a significant risk at the site.

4.9 Radon Gas

Radon gas is a naturally occurring colorless, tasteless, and odorless radioactive gas that forms in soils from the decay of trace amounts of uranium that are naturally present in soils. Radon enters buildings from the surrounding soil through cracks or other openings in foundations, floors over crawlspaces, or basement walls. Once inside a building, radon can become trapped and concentrate to become a health hazard unless the building is properly ventilated to remove radon. Long-term exposure to elevated levels of radon increases one's risk of developing lung cancer.

The U.S. Environmental Protection Agency (EPA) recommends that all homes (or structures intended for human occupancy) be tested for radon whatever their geographic location. The U.S. EPA recommends that action be taken to reduce radon in structures with an average annual level higher than four picocuries per liter (4.0pCi/l).

The California Department of Health Services (2016) performed 88 tests within Kings County (last updated on February 2016) where the project site is located. Of the 88 tests, 10 reported a minimum of four (4) picocuries per liter.

The noted testing is not intended to represent the entire county area for determining which buildings have excessive indoor radon levels. In addition to geology, indoor radon levels can be influenced by local variability in factors such as soil permeability and climatic conditions, and by factors such as building design, construction, condition, and usage. Consequently, building specific radon levels can only be determined by indoor radon testing. No warranty as to actual radon levels at specific sites in Kings County is expressed or implied by the noted test results. Consideration should be given to consult a radon specialist to provide appropriate tests and recommendations to review Radon gas concerns.

5 EARTHWORK

5.1 GENERAL

Based on the results of the various field and laboratory testing, and the geotechnical analysis conducted by Kleinfelder, it is geotechnically feasible to develop the site using conventional grading and foundation construction techniques.

5.2 HYDROCOMPACTION

The near surface soils to a depth of about 10 feet bgs are subject to moderate hydrocompaction. Hydrocompactive soil has a loose skeletal structure, which is weakly cemented by soluble salts and/or minor amounts of clay. Increases in soil moisture reduce the interparticle cementation (dry strength) of the soil resulting in a decrease in the volume of the soil structure. This condition can lead to post construction settlement of structures if soils subsequently become wetted.

At the present moisture content, the on-site natural soil has sufficient strength to support the proposed preliminary improvements. However, should the soil be subject to post-construction moisture increases, minor to moderate soil compression will likely occur. The amount of compression will be dependent upon imposed loads, depth of moisture increase, and the amount of moisture increase. The potential post construction settlement in building areas due to the presence of these hydrocompactive soils is anticipated to range from approximately 2.7 to 3.6 inches for strip footings supporting loads up to 5 kips per lineal foot and approximately 3.5 to 4.0 inches for column footings supporting loads up to 200 kips. These settlements include an assumed 12 inches of building pad fill above the current site grade and the bottom of footings founded at a depth of 18 inches below the assumed building pad elevation. Based on past experience and the variability of future moisture increase, the potential settlement could be totally differential over a distance of about 15 feet. The collapse potential test data indicated that most of the post construction settlement is due to overburden pressure of the existing in-place soil. Therefore, should moisture levels increase in the upper 10 feet, post construction settlement below hardscape areas (i.e. driveways, sidewalks, pavements, etc.) is anticipated to be approximately 1.8 inches due to the self-weight of the in-place soil. Most of the settlement below buildings and site improvements occurs between depths of approximately 5 and 10 feet bgs.

For preliminary purposes, it is assumed future structures may not tolerate the potential post construction settlement described above. Consequently, mitigating the potential effect of these soils will be necessary to support foundations. Over-excavation is an effective means of mitigating the potential settlement due to hydrocompaction. Excavation and recompaction of the hydrocompactive soils is recommended to a depth of 7 feet below existing grade and to a distance of at least 10 feet beyond the perimeter of the planned buildings and surrounding improvements (i.e. hardscape, planters, awnings, etc.) that could be sensitive to settlement. The perimeter of the overexcavated areas should be sloped at a gradient of 1.5:1 H:V, or flatter, to provide a transition between deep and shallow excavated areas. The recompaction depth of 7 feet may be accomplished by a combination of overexcavation and scarification depths. For example: the contractor may choose to overexcavate the soil to a depth of 5.5 feet bgs scarify the exposed soil to a depth of 18 inches, moisture condition to at, or above optimum moisture and compacted with a vibratory open hub ring compactor (e.g. Rex compactor) capable of compacting thicker lifts. If conventional sheepsfoot drum compactors are utilized, the scarified depth would need to be decreased and overexcavation depth increased to achieve the overall recompaction depth of 7 feet. The excavated soil could be used as engineered fill (refer to Section 5.4.1). With these recommendations, the post construction settlement due to hydrocompaction below structures would be reduced to approximately 1-inch.

Site improvements outside of the building envelopes described above (e.g. general hardscape, pavements, utilities, etc.) would also be subject to settlement due to hydrocompaction under the self-weight of the overburden soil and surface improvements. The total depth of overexcavation plus scarification and recompaction is 7 feet to reduce settlement below site improvements to less than 1-inch. However, the depth of earthwork to mitigate hydrocompactive soil to protect surface improvements outside of the building envelopes may be cost prohibitive. Therefore, consideration could be given to supporting these improvements on partial overexcavation and recompaction to a depth of 18 inches to provide uniform bearing support only without mitigating the potential total settlement of 1.8 inches.

With the above earthwork mitigation recommendations, controlling infiltration into the subgrade soils is very important in reducing the chance for post construction settlement. Sources of water or moisture intrusion would likely be limited to rainfall and runoff from the roof of proposed buildings, landscape irrigation, and utility leaks/failures. To aid in reducing potential saturation of subgrade soils, roof run-off is encouraged to be piped to the storm drain system and landscape irrigation be held to a minimum and use only sufficient water to sustain and promote plant growth (e.g. drip irrigation).

If site grades will be raised more than 1-foot above existing site grade, Kleinfelder should be contacted to provide further recommendations as additional over-excavation of the hydrocompactive soil below improvements may be warranted due to higher surcharge loads and greater settlement than estimated above.

If the described amount of remaining post construction settlement after overexcavation and recompaction exceeds the tolerance of structures and surface improvements or the settlement presents an adverse risk to the developer, then the hydrocompactive soils would require recompaction to a depth of 10 feet bgs.

5.3 SITE PREPARATION

5.3.1 Stripping

At the time of the reconnaissance, the project site was covered with a moderate growth of seasonal grasses and weeds. All surface vegetation, organic material, and any miscellaneous surface obstructions (including pavement) should be removed from the project area, prior to any site grading. It is anticipated stripping of surface vegetation could involve the upper 2 to 3 inches. Surface strippings should not be incorporated into fill unless they can be sufficiently blended to result in an organic content less 3 percent by weight (ASTM D2974).

5.3.2 Disturbed Soil, Undocumented Fill, and Subsurface Obstructions

Initial site grading should include a reasonable search to locate any disturbed soil, undocumented fill soils and underground structures (such as irrigation pipes) or utilities that may exist within the area of construction. Any such obstructions should be removed from the project area. Undocumented fill or loose soil should be excavated and may be reused provided it meets the applicable requirements for engineered fill (see Section 5.4). Any disturbed soil, pockets of soft or loose soils, void spaces created by burrowing animals or undocumented fill, which are encountered, should be excavated to expose firm native material.

At the time of the investigation, loose sediments within Peoples Ditch was probed to a depth of approximately 2 to 2.5 feet below the ditch bottom. All vegetation, soft sediments, organic material, and debris should be removed from the ditch profile and bottom to expose firm unyielding soil conditions. The exposed subgrade should be approved prior to placement of pipe bedding and or pipeline construction.

5.3.3 Over-excavation and Scarification

Over-excavation is typically reserved for soils that, in their natural state, will not provide adequate bearing for structures. The native soils are hydrocomapactive and could lead to non-uniform bearing conditions and differential settlement of the proposed building improvements. Therefore, mitigation by over-excavation and recompaction is recommended to mitigate potential post construction settlement below structures and site improvements. The perimeter of overexcavated areas should be sloped and benched to receive fill in accordance with Section 5.4.2.

The recompaction depths discussed below may be accomplished by a combination of overexcavation, scarification, and recompaction. The depth of scarification and recompaction is dependent on the ability of the equipment to successfully moisture condition and compact the scarified zone and may be adjusted buy the contractor for compatibility of the equipment provided the overall re compaction depth specified is met.

Note that the overexcavation and scarification depths described herein are minimum depths. If additional depths of earthwork are specified in the Project Plans and Specifications or by the developer, the contractor shall perform the required overexcavation and recompaction to meet the more stringent requirements.

Building Envelope

After performing removals described in Sections 5.3.1 and 5.3.2, the planned buildings and surrounding improvements (i.e. hardscape, planters, awnings, etc.) that are sensitive to settlement should be over-excavated to a minimum depth of 5.5 feet bgs. The bottom of the excavation should be scarified to a depth of 18 inches, moisture conditioned, and recompacted as described in Section 5.4. The lateral limits of the over-excavation should include the building area and extend at least 10 feet beyond the perimeter of the outer lines of the foundations and surrounding improvements (i.e. hardscape, planters, awnings, etc.). The excavated soil may be reused as engineered fill when placed, moisture conditioned, and compacted as described in Section 5.4.

Outside Building Envelope

After performing removals described in Sections 5.3.1 and 5.3.2, site improvements outside the building envelope described in Section 5.2 Hydrocompaction, areas to receive surface improvements (e.g. general hardscape, pavements, utilities, etc.) should be over-excavated to a depth of 1-foot bgs. The bottom of the excavation should be scarified to a depth of 6 inches, moisture conditioned, and recompacted as described in Section 5.4. The lateral limits of the over-excavation in planned foundation areas should include the surface improvements area and extend at least 3 feet beyond the perimeter of improvements. The excavated soil may be reused as engineered fill when placed, moisture conditioned, and compacted as described in Section 5.4.

5.4 ENGINEERED FILL

5.4.1 Materials

All engineered fill soils should be nearly free of organic or other deleterious debris and less than 3 inches in maximum dimension. The native soil materials, exclusive of debris, may be used as engineered fill provided they contain less than 3 percent organics by weight (ASTM D2974).

Recommended requirements for any imported soil to be used as engineered fill, as well as applicable test procedures to verify material suitability, are provided on Table 5.4-1.

Table 5.4-1
Soil Materials Test Procedures

Gradation		Test Procedures	
Sieve Size	**Percent Passing**	**ASTM[1]**	**Caltrans[2]**
76 mm (3 inch)	100	C136	202
19 mm (¾ inch)	80 – 100	C136	202
No. 4	70 – 100	C136	202
No. 200	20 – 70	C136	202
Plasticity			
Liquid Limit	Plasticity Index		
< 25	< 12	D4318	204
Expansion Index			
< 20		D4829	-
Soluble Sulfates			
< 2000 ppm		-	417
Soluble Chloride			
<300 ppm		-	422
Resistivity			
>1000 ohm-cm		-	532

Notes:
[1] American Society for Testing and Materials Standards (latest edition)
[2] State of California, Department of Transportation, Standard Test Methods (latest edition)

Any imported fill materials to be used for engineered fill should be sampled and tested by a representative of the project Geotechnical Engineer prior to being transported to the site.

5.4.2 Benching

Where fill will be placed on slopes steeper than 5:1 (H:V), it will be necessary to bench the slope to receive fill as successive filling operations are performed. Benches should be constructed approximately every 1.5 feet (slope height less than 5 feet) or every 2.5 feet (slope height greater than 5 feet) of vertical fill thickness. Benching should begin at one bench height above the toe of the slope. Where fill will be placed in small pits or excavations, benching is not required, however, all loose soil should be removed from the invert and sides and the area made dish-shaped to receive fill. Any loose soil excavated during site preparation may be used as fill, provided it meets the requirement for engineered fill.

Compaction equipment should provide kneading effort (e.g. with sheeps foot rollers) to enhance uniformity and minimize stratification.

5.4.3 Compaction Criteria

Soils used for engineered fill should be uniformly moisture conditioned to at, or above optimum moisture, placed in horizontal lifts less than 8 inches in loose thickness, and compacted to at least 90% relative compaction. Disking and/or blending may be required to uniformly moisture-condition soils used for engineered fill. The specified compaction shall be increased to at least 95% relative compaction in the top 12 inches of the subgrade soil in pavement areas as indicated in Section 6.5, Pavements.

5.4.4 Construction Considerations

Should site grading be performed during or subsequent to wet weather, near-surface site soils may be significantly above optimum moisture content. These conditions could hamper equipment maneuverability and efforts to compact site soils to the recommended compaction criteria. Disking to aerate, chemical treatment, replacement with drier material, stabilization with a geotextile fabric or grid, or other methods may be required to mitigate the effects of excessive soil moisture and facilitate earthwork operations. Any consideration of chemical treatment (e.g. lime) to facilitate construction would require additional soil chemistry evaluation and could affect landscape areas and some construction materials (e.g. aluminum).

If construction is performed during dry, hot or windy weather, it may be necessary to periodically apply surface watering to counter evaporative loss or re-establish moisture prior to constructing slabs (see Section 6.3.1).

5.5 TEMPORARY EXCAVATIONS

5.5.1 General

All excavations must comply with applicable local, State, and Federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety is generally the responsibility of the contractor, who shall also be solely

responsible for the means, methods, and sequencing of construction operations. The information below is provided as a service to the client. Under no circumstances should the information provided be interpreted to mean that Kleinfelder is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

5.5.2 Excavations and Slopes

The contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, State, and/or Federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the owner, contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

All excavations should be constructed and maintained in conformance with current OSHA requirements (29 CFR Part 1926). The on-site soils are best represented by OSHA Type C soil.

5.5.3 Construction Considerations

Heavy construction equipment, building materials, excavated soil, and vehicular traffic should be kept sufficiently away from the top of any excavation to prevent any unanticipated surcharging. If it is necessary to encroach upon the top of an excavation, Kleinfelder can provide comments on slope gradients or loads on shoring to address surcharging, if provided with the geometry. Shoring, bracing, or underpinning required for the project (if any), should be designed by a professional engineer registered in the State of California.

During wet weather, earthen berms or other methods should be used to prevent runoff water from entering all excavations. All runoff should be collected and disposed of outside the construction limits.

5.6 PIPELINE AND TRENCH BACKFILL

5.6.1 Materials

Pipe embedment zone backfill (i.e., bedding, haunching, pipe zone and initial backfill per ASTM D2321) should consist of soil compatible with design requirements for the specific types of pipes. It is recommended the project designer or pipe supplier develop the final material specifications based on planned pipe types, bedding conditions, tolerable deflection and other factors beyond the scope of this study. Randomly excavated on-site soil from the predominate site profile will likely be a combination of Class III and IVa material per ASTM D2321.

With respect to the design of the Peoples Ditch pipeline, Kleinfelder recommends a minimum Type 2 installation and use of select bedding and haunching material consisting of Category II (GM, SM, GC, and SC with less than 20 percent passing the #200 sieve). The thickness of the bedding (inches) should is based on the outer diameter $D_0/24$.[1]

Trench zone backfill (i.e., material placed between the pipe zone backfill and finished subgrade) may consist of native soil that meets the requirements for engineered fill.

5.6.2 Compaction Criteria

All trench backfill should be placed and compacted in accordance with recommendations provided above for engineered fill. Reduced compaction (85% minimum) could be specified for trench zone backfill in non-structural areas. Mechanical compaction is recommended; ponding or jetting should not be used.

Table 5.6-1 provides estimated geotechnical parameters for designers to consider in evaluating pipe zone backfill criteria that is compatible with pipe types and deformation tolerances.

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[1] *Concrete Pipe Design Manual, American Concrete Pipe Association*

Table 5.6-1
Pipe Zone Backfill Parameters

Soil Stiffness Modulus (psi)			Backfill Density (pcf)	
E'_n (Trench Sidewall)	E'_b (Backfill)		85% Compaction	90% Compaction
	85% Compaction	90% Compaction		
3000	900	1350	118	125

E'_n represents the modulus for the undisturbed natural soil and is based on relative density data by Howard (1996). E'_b is the modulus for backfill derived from random excavation of on-site soil and is based on data by Hartley and Duncan (1982) and Watkins and Anderson (2000). The design E' will be dependent upon the pipe diameter and trench width, which dictates the relative influence of E'_n and E'_b. Methods by Howard (1996) are suggested for evaluating the design E'. Kleinfelder can furnish a recommended design E', if provided with pipe diameter and specifications for trench construction.

In evaluating the maximum load (W_d) on pipes, a $k\mu'$ (k=0.31 and μ'=0.62) of 0.19 can be used in determining the load coefficient factor C_d.

5.6.3 Pipeline Thrust

The lateral thrust on pipelines can be resisted by friction between the pipe and native or imported backfill soil and lateral bearing on thrust blocks. The allowable frictional resistance between the pipe and backfill comprised of on-site soil or select import sand backfill is provided in Table 5.6-2.

Table 5.6-2
Frictional Coefficients

Pipe Material	Allowable Frictional Coefficient	
	Sustained Loading	Test Loading
Smooth Plastic or Steel (native soil or imported sand backfill)	0.19	0.23

The lateral load on shallow thrust blocks (block height greater than 70 percent of depth to center of pipeline) poured against undisturbed soil can be resisted by the passive lateral bearing provided in Table 6.1-3. The estimated horizontal deflection in Table 6.1-3 would also be applicable to shallow thrust blocks.

5.7 ESTIMATED VOLUME LOSS

Based on the in-place densities obtained from the test borings and the Modified Proctor tests, it is estimated the volume loss from cut to fill in the upper 5 feet across the proposed project area may range from about 5 percent to 22 percent, depending on the relative compaction achieved. Table 5.7-1 provides the estimated volume loss due to recompaction of the near surface soils of the site to relative compaction levels of 90 and 95 percent for engineered fill below improvement areas.

The volume loss associated with recompaction was based on an average maximum dry density of 123 lbs/ft^3 and an average compaction during construction of 2 percent above the required compaction levels of 90 and 95 percent. The estimated volume loss considers the in-place density in the upper 5 feet of the site soils. Volume loss within the deeper portions of the proposed improvements are anticipated to equal, or less.

Table 5.7-1
Average Volume Loss

Depth (ft)	Average Volume Loss	
	92% Compaction	97% Compaction
0 – 5	12.5	17.0

The calculations for developing estimates of an earthwork factor are based on very limited data, and caution should be exercised in the application of this factor in cost estimating and volume calculations. The volume of material tested for in-place density is commonly as small as one ten-thousandth of one percent of the total volume of material to be excavated. Subjective assumptions must be made to perform the calculations, which can affect the accuracy of the results. These include the anticipated relative compaction of the material when placed as fill and uniformity of the materials. In addition, the volume loss estimates in Table 5.7-1 are based only on undisturbed density tests and two (2) Modified Proctor tests and do not consider other forms of loss (e.g. stripping, grubbing, spillage, wastage, or subsidence), which can be substantial.

6 DESIGN RECOMMENDATIONS

6.1 SPREAD FOUNDATIONS

6.1.1 General

The proposed structures may be supported by conventional shallow footings supported on approved properly engineered fill. The following preliminary recommendations are based on the assumption that the recommendations in Section 5, "Earthwork", have been implemented. Recommendations regarding the geotechnical aspects of building design are presented below.

6.1.2 Allowable Vertical Bearing Pressures and Settlements

Generally, two geotechnical issues determine the design bearing pressure for conventional spread footing foundations: (1) strength of the foundation soil and (2) tolerable settlement. The on-site soil in its current condition has enough strength to support the proposed improvements. However, due to the hydrocompactive soils present at the site, the available bearing capacity should be limited to reduce the anticipated settlement of the proposed improvements. Table 6.1-1 provides the net allowable bearing pressures for use in foundation design.

Table 6.1-1
Available Allowable Bearing

	Available Allowable Bearing (psf)
Static Loading	1500
Total Combined Loading	3000
Unfactored Ultimate Bearing	4000

The above values are appropriated for design using the Basic and Alternate Load Combinations in Section 1605.3 of the 2019 CBC.

Analysis, based on Schmertmann, determined the following estimate static settlement based on a range of assumed structural loads. The settlement assumes the sustained load on the footings is equal to 80 percent of the net bearing pressure. Settlement is expected to occur primarily throughout the construction process.

Table 6.1-2
Estimated Settlement

Footing Type	Loading (DL +LL)	Estimated Settlement (inch)
Strip	To 5.0 kip/ft	Less than 0.25
Square	50 kips	Less than 0.25
	100 kips	0.50
	200 kips	0.85

The differential settlement between similarly loaded footings would equal approximately half of the anticipated settlement represented in Table 6.1-2. The post construction settlement due to hydrocompaction if the soils subsequently become saturated would be differential over a distance of approximately 15 feet. Therefore, the total differential settlement between foundations would be the sum of the differential settlement between footings from Table 6.1-2 plus the differential settlement due to hydrocompaction after earthwork mitigation discussed in Section 5.2.

If deemed necessary by the design engineer, Kleinfelder can provide the estimated settlement for other loading conditions. The design bearing pressures are net values so the weight of embedded concrete does not need to be included in the foundation loading.

A modulus of subgrade reaction, K_l (B_p = 1 foot), of 315 pci can be used for undisturbed on-site soil and 315 pci can be used for engineered fill. If the fill thickness is less than 2 feet, a composite K_l, could be evaluated. It should be noted the subgrade modulus reflects the response of the subgrade under primarily elastic conditions and small deflections. It is not a characteristic intended to define soil compressibility (settlement) or load-bearing capacity.

6.1.3 Lateral Resistance

Lateral loads applied to foundations can be resisted by a combination of lateral bearing and frictional resistance. The allowable lateral bearing and frictional coefficient for the foundations are presented in Table 6.1-3.

Table 6.1-3
Passive Pressures and Frictional Coefficients

	Allowable		Ultimate
	Static	Total Combined	
Frictional Coefficient	0.42	0.50	0.62
Passive Pressure (psf/ft of depth)	290	387	580
Lateral Translation Needed to Develop Passive Pressure	0.003D	0.006D	0.018D

Note: D is the footing depth

If the deflection resulting from the strain necessary to develop the passive pressure is with structural tolerance, the passive pressure and frictional resistance can be used in combination. Otherwise, additional passive pressure values could be provided based on tolerable deflection. The allowable values already incorporate a factor of safety and, as such, would be compared directly to the driving loads. If analytical approaches require the input of a safety factor, the ultimate values would be used.

6.2 EARTH RETAINING STRUCTURES

The lateral earth pressure against retaining structures will be dependent upon the ability of the wall to deflect. Presented in Table 6.2-1 is the active, at-rest and braced lateral earth pressure for level on-site soil. The active pressure is applicable to walls able to translate to 0.0005 radians at the top or bottom. The at-rest soil pressure is applicable to retaining structures that are fully fixed against both rotation and translation. Walls restrained from translation at the top and bottom, but able to deflect 0.0005 radian between restrained points should be designed for the braced lateral pressure. The at-rest pressures are applicable to walls fully fixed against translation or rotation. The at-rest pressures include the Jaky solution for normally consolidated soil plus consideration for the locked-in pressure associated with the pre-stressing due to backfill compaction (over-consolidation).

Table 6.2-1
Lateral Earth Pressure

Loading Conditions	Lateral Earth Pressures
Active Pressure (psf/ft of depth)	38
Braced Pressure (psf)	25 H
At-Rest Pressure (psf/ft of depth)	84

H in the expression represents the retained height in feet (measured from finished grade to bottom of footing). The earth pressures presented above assume saturated conditions. The earth pressures do not include hydrostatic pressures; therefore, wall should be adequately drained to prevent the build-up of hydrostatic pressure.

Retaining wall foundation design can utilize the passive pressures and sliding resistance given in Table 6.1-3 and allowable bearing capacity given in Section 6.1-1. When utilizing the available allowable bearing capacities of Table 6.1-1, the value for static loading would represent the average bearing for the footing and the value for total combined loading would represent the allowable maximum toe pressure.

6.3 CONCRETE SLABS-ON-GRADE

6.3.1 Subgrade Preparation

Any building slabs-on-grade should be supported on engineered fill placed as described in Section 5 of this report. The slab subgrade, to a depth of 12 inches, should have a moisture content of at least optimum immediately prior to pouring the slab or placing a vapor retarding membrane.

6.3.2 Capillary and Moisture/Vapor Break

Considering the soil type and regional groundwater depth, a capillary break (i.e. clean sand or gravel layer) is not necessary.

If the building contains component which might be adversely affected by moisture, it is recommended that the slab subgrade be covered by vapor retarding membrane, such as 10-mil polyorfin. If design should incorporate a gravel subgrade layer, the membrane should have a minimum thickness of 15-mil. The subgrade surface should be smooth and care should be exercised to avoid tearing, ripping, or otherwise puncturing the vapor retarding membrane. If the vapor retarding membrane becomes torn or disturbed, it should be removed and replaced or properly patched. It is recommended consideration be given to placing concrete directly on the vapor retarding membrane. If desired by designers, the vapor retarding membrane could be covered with approximately 1 to 2 inches of saturated surface dry (SSD), relatively clean sand to protect it during construction. Concrete should not be placed if sand overlying the vapor barrier has been allowed to attain a moisture content greater than about 5% (due to precipitation or excessive moistening). Excessive water beneath interior floor slabs could result in future significant vapor transmission through the slab, adversely affecting moisture-sensitive floor coverings and the indoor environment.

It should be noted that, although the slab support discussed above is currently the industry standard, this system might not be completely effective in preventing floor slab moisture vapor transmission problems. This system will not necessarily assure that floor slab moisture transmission rates will meet floor-covering manufacturer standards and that indoor humidity levels will not inhibit mold growth. A qualified specialist(s) with knowledge of slab moisture protection systems, flooring design and other potential components that may be influenced by moisture, should address these post-construction conditions separately. The purpose of a geotechnical study is to address subgrade conditions only, and consequently, it does not evaluate future potential conditions.

6.3.3 Conventional Slab Design

There are no geotechnical considerations (e.g. expansive soil), which would require special design of slabs. Therefore, the thickness and reinforcement of slabs-on-grade should be determined by structural considerations and should be designed by the project structural engineer or building designer. A modulus of subgrade reaction, K_1 (B_p = 1 foot), of 315 pci may be used for elastic analysis of slabs on at least 8 inches of properly compacted native or similar soil.

Slab concrete should have good density, a low water/cement ratio, and proper curing to promote a low porosity. It is recommended the water/cement ratio not exceed 0.45 to minimize vapor transfer.

Consideration should be given to construction/control joint spacing and/or some form of reinforcement of exterior slabs to aid in crack control.

6.4 PIER/POLE FOUNDATIONS

6.4.1 Allowable Vertical Axial Capacity and Settlement

Structures such as light poles, signs, canopies, etc., can be supported by pier/pole foundations. Should design incorporate the use of pier/pole foundations, Table 6.4-1 provides expressions for the allowable and ultimate axial capacity using friction to resist axial loads. If the design of the pier/pole foundations includes end bearing to resist axial loads, the design may utilize the bearing capacity expressions given in Table 6.2-1, up to an allowable bearing capacity of 1,500 psf for static loading (D.L. + long term L.L.). The end bearing capacity may be increased 50 percent for total combined loading (D.L. + L.L. + transient loading, such as wind or seismic).

Table 6.4-1
Allowable Axial Capacity

	Frictional Resistance for Vertical Loads in Compression (lbs)
Static Loading	50 DL[2]
Total Combined Loading	65 DL[2]
Unfactored Ultimate Capacity	100 DL[2]

Note: 1) D is pier diameter in feet and L is embedment length in feet.
2) The allowable uplift resistance would be 70 percent of the compressional resistance.

The total settlement of friction piers designed in accordance with the above recommendations should be less than 0.002 times the pier diameter in inches. If design incorporates end bearing to resist axial loading, the estimated settlement would increase to approximately 0.018 times the pier diameter in inches. The concrete mix and reinforcement for drilled pier/caisson foundations should be designed by the project structural engineer.

6.4.2 Lateral Resistance

Methods by ASHTO and Caltrans can be used to evaluate the lateral capacity of pier footings. The allowable passive pressure to resist lateral loads on isolated piers for use in these methods may be taken as 510 psf per foot of depth of embedment. The passive pressure may be increased by one-third for the total combined loads, including wind and seismic. The passive pressure values already consider arching and, as such, should not be increased further.

The allowable passive pressure provided above would not be appropriate for use in place of the values given in Table No. 1806.2 of the 2019 California Building Code (CBC) if pier foundation design utilizes the pole formulas in the CBC. If design uses the pole formulas in the CBC, the appropriate class of material in Table 1806.2 would be No. 4 (Silty Sand). Based on the strength of the on-site soils, a lateral bearing pressure of 170 psf/ft of embedment below the site grade may be used in place of the value given in Table 1806.2.

The passive pressure only considers soil strength. Tolerable pier deflection may govern the design lateral resistance. If provided with pier geometry, lateral load, and loading eccentricity, Kleinfelder can provide the estimated pier head deflection.

6.4.3 Design and Construction Considerations

Prior to placing steel or concrete, footing excavations should be cleaned of all debris, loose or soft soil, and water. All footing excavations should be observed by the project Geotechnical Engineer just prior to placing steel or concrete. The purpose of these observations is to check that the bearing soils actually encountered in the foundation excavations are similar to those assumed in analysis and to verify the recommendations contained herein are implemented during construction.

6.5 PAVEMENT DESIGN

6.5.1 General

The subgrade R-value for the on-site soil was evaluated in the laboratory on seven (7) near surface soil samples taken throughout the project site. The locations of the tested R-values were chosen in areas of proposed pavements based on a preliminary site plan. The laboratory tests were performed in conformance to Caltrans Test Method 301 and were evaluated based on stabilometer and expansion dial readings. The soil tested revealed that expansion pressure generally governs the design R-value. The R-value test results included in Appendix B indicate the R-value by exudation and includes the expansion pressures. The design R-value is dictated by expansion pressure and Traffic Index (TI). Consequently, the design R-value varies with Traffic Index.

Detailed vehicular load and frequency information is not available for the on-site pavements. Traffic within the project site is anticipated to consist of access for automobiles, trash collection, and delivery truck traffic. Consequently, a range of pavement sections have been provided for the on-site based on Traffic Indexes (T.I.'s) of 4.5 through 8.0. These traffic design assumptions should be reviewed for compatibility with the actual development, and revised pavement sections developed, as necessary.

6.5.2 Flexible Pavement

The preliminary flexible pavement design recommendations presented below are based upon the California Department of Transportation (Caltrans) design procedures. The flexible asphalt concrete pavement sections associated with the assumed T.I.'s and design R-value for on-site asphalt pavements are summarized in Table 6.5-1.

Table 6.5-1
Recommended Minimum Pavement Sections

Traffic Index	Design R-Value (Expansion)	Asphalt Concrete	Aggregate Base (Min. R-value: 78)	Aggregate Subbase (Min. R-value: 50)
4.5	11	2.5"	8.5" 2.0"	- 7.0"
5	12	3.0"	8.5" 2.0"	- 7.0"
5.5	13	3.0"	10.5" 3.0"	- 8.0"
6.0	14	3.5"	11.0" 3.5"	- 8.0"
6.5	16	4.0"	11.5" 3.5"	- 8.5"
7.0	17	4.0"	12.5" 4.5"	- 9.0"
7.5	18	4.5"	13.0" 5.0"	- 9.0"
8.0	19	5.0"	13.5" 5.0"	- 9.5"

The design criteria assume a 20-year design period and that normal maintenance (crack sealing, etc.) is performed. The traffic index is a measure of the volume of truck traffic that will be applied to a pavement section in the design life. The allowable average daily truck traffic (ADTT) for the assumed traffic indexes is presented in Table 6.5-2.

Table 6.5-2
Average Daily Truck Traffic

Traffic Index	2-Axle Vehicle	or	3-Axle Vehicle	or	5-Axle Vehicle
4.5	2.2		0.8		0.2
5.0	5.2		2.0		0.5
5.5	11.6		4.3		1.1
6.0	24.1		9.0		2.4
6.5	47.3		17.7		4.7
7.0	88.1		33.0		8.8
7.5	157.3		59.0		15.8
8.0	270.6		101.5		27.1

The flexible pavement should conform to, and be placed in accordance with, Caltrans Standard Specification (2019). The aggregate base (Class 2) should comply with Section 26 of the Caltrans Standard Specifications. The aggregate subbase (Class 2) should comply with the specifications in Section 25. The aggregate base, aggregate subbase, and upper 12 inches of subgrade should be compacted to 95 percent relative compaction as determined by Caltrans Test Method No. 216 (dry weight comparison) or ASTM D1557 test procedures. The upper 12 inches of pavement subgrade should be moisture conditioned to at, or above optimum moisture content.

6.5.3 Moisture Considerations

The pavement design should consider both the vehicular loading, as well as the environmental factors. The vehicular loading will depend on the amount and type of traffic anticipated for the pavement design life. Environmental factors include the potential for moisture variations beneath the pavement structural section. It is recommended that all pavement areas conform to the following criteria:

- All trench backfill should be properly placed and adequately compacted to provide a stable subgrade.
- Adequate drainage should be provided to prevent ponding of surface water which could saturate the subgrade soil.

- A periodic maintenance program should be incorporated to include sealing cracks and other measures.
- Any concrete curbs and gutters should extend to the subgrade.

6.5.4 Construction Considerations

In the event unstable (pumping) subgrades are encountered within planned pavement areas, it is recommended a heavy, rubber-tired vehicle (typically a loaded water truck) be used to test the load/deflection characteristics of the finished subgrade materials. It is recommended this vehicle have a minimum rear axle load (at the time of testing) of 16,000 pounds with tires inflated to at least 65 psi pressure. If the tested surface shows a visible deflection extending more than 6 inches from the wheel track at the time of loading, or a visible crack remains after loading, corrective measures should be implemented. Such measures could include disking to aerate, chemical treatment, replacement with drier material, or other methods. It is recommended Kleinfelder be retained to assist in developing which method (or methods) would be applicable for this project.

6.5.5 Construction Observation and Testing

It is recommended that all earthwork during construction be monitored by a representative from Kleinfelder, including site preparation, placement of all engineered fill and trench backfill, construction of slab and pavement subgrades. The purpose of these services would be to provide Kleinfelder the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

6.6 CORROSION POTENTIAL

Kleinfelder has completed laboratory testing to provide data regarding corrosivity of onsite soils. Our scope of services does not include corrosion engineering and, therefore, a detailed analysis of the corrosion test results is not included in this report. A qualified corrosion engineer should be retained to review the test results and design protective systems that may be required. Kleinfelder may be able to provide those services.

Laboratory chloride concentration, sulfate concentration, pH, and electrical resistivity tests were performed on near-surface composite soil samples from the upper 3 feet of Boring B-6 and B-7. The results of the tests are summarized in Table 6.6-1. If fill materials will be imported to the project site, similar corrosion potential laboratory testing should be completed on the imported material.

Table 6.6-1
Soil Corrosion Potential Laboratory Test Results

Boring	Depth, Feet	Material	Minimum Resistivity, ohm-cm	pH	Water-Soluble Ion Concentration, ppm	
					Chloride	Sulfate
B-6	0 to 3	Silty Sand	24,900	7.32	3.9	0.2
B-7	0 to 3	Sandy Silt	17,400	7.77	30.7	37.5

The following summary is provided with respect to the results presented in Table 6.7-1 and applicable references. Not that the 2019 CBC refers to ACI 318, Section 4.2, for corrosion exposure potential for concrete in contact with soils.

- The measured saturated minimum resistivity values indicates the soil is “moderately corrosive” to buried ferrous metals. These correlations are based on Corrosion Basics, 2nd edition, Roberge, 2006.

- A water-soluble chloride content of less than 500 ppm is generally considered non-corrosive to reinforced concrete. The samples tested had 3.9 and 30.7 ppm soluble Chloride contents. According to the American Concrete Institute (ACI) 318-08, Table 4.2.1, the Exposure Severity and Class for corrosion protection of reinforcement are “Not Applicable” and “C0” if the concrete is dry or protected from moisture, and “Moderate” and “C1” if the concrete is exposed to moisture but not to external sources of chlorides. For both classes, concrete should have a minimum compressive strength of 2,500 psi and there is no restriction on the maximum water cement ratio used. If concrete is exposed to moisture and an external source of chlorides, the Exposure Severity and Class for corrosion protection of reinforcement are “Severe” and “C2”. For C2 or Severe conditions concrete should have a minimum compressive strength of 5,000 psi and a maximum water cement ratio of 0.40.

- According to the American Concrete Institute (ACI) 318-08, Table 4.2.1, the Exposure Severity is "not applicable" and the Exposure Class is "S0" for soils with a water soluble sulfate content of less than 1,000 ppm. According to Table 4.3.1 of ACI 318-08, for an Exposure Class of "S0", there is no specification for maximum water cement ratio, and concrete should have a minimum compressive strength of 2,500 psi.

The provided preliminary corrosion tests are only an indicator of potential soil corrosivity for the sample tested. Kleinfelder's scope of work did not include corrosion engineering. If more detailed information is required, it is recommended a competent corrosion engineer be retained to evaluate the corrosion potential of the site to proposed improvements, to recommend further testing as required, and to provide specific corrosion mitigation methods appropriate for the project.

6.7 SITE DRAINAGE

6.7.1 General

It is important that drainage away from the improvements be provided to prevent ponding and/or saturation of the soils in the vicinity of foundations, concrete slabs-on-grade, or pavements. Poor surface drainage could cause reduced subgrade support. The site should be graded to carry surface water away from the improvements and convey it to proper discharge points. Proper drainage needs to be a partnering between design and maintenance of the facility.

The development should incorporate the basis for good drainage. This includes:

- Sufficient pad height to allow for proper drainage.

- Defined drainage gradients away from the structures to points of conveyance, such as drainage swales and/or area drains and discharge pipe.

- Roof downspouts connected to proper areas of discharge.

The maintenance personnel must maintain the established drainage by not blocking or obstructing gradients away from structures without providing some alternative drainage means (e.g. area drains and subsurface pipes). If planter areas are established near the structures, it is important to prevent surface run-off from entering the planter. Where planted areas are adjacent to the structures, care must be taken not to over irrigate and to maintain a leak-free sprinkler piping system. Consideration should be given to use of low volume emitter irrigation systems for planters. Well-maintained low-volume emitter irrigation (drip system) is best suited for planters adjacent to structures. Watering practices must strive to use only sufficient water to sustain and promote plant growth.

6.7.2 On-Site Infiltration Basin

The proposed infiltration basin to be located on the east end of the site may be a source of moisture infiltration that could trigger hydrocompaction of the foundation soils and subsequent settlement. As such, if the hydrocompactive soils are to remain without recompaction to minimize post construction settlement due to hydrocompaction, then it is recommended that the pond design incorporate dry wells to direct and infiltrate storm water at a depth below 10 feet from the existing site grade.

7 ADDITIONAL SERVICES

7.1 ADDITIONAL ENGINEERING INVESTIGATIONS

As the planning evolves to conceptual and eventual design, detailed design-level Geotechnical Investigation Report(s) and additional soil borings should be conducted that are site specific and address the loading conditions and development schemes for the final designs.

7.2 PLANS AND SPECIFICATIONS REVIEW

It is recommended Kleinfelder conduct a general review of plans and specifications to evaluate that the earthwork and foundation recommendations have been properly interpreted and implemented during design. In the event Kleinfelder is not retained to perform this recommended review, no responsibility will be assumed for misinterpretation of the recommendations.

7.3 CONSTRUCTION OBSERVATION AND TESTING

It is recommended that all earthwork during construction be monitored by a representative from Kleinfelder, including site preparation, placement of all engineered fill and trench backfill, construction of slab and pavement subgrades, and all foundation excavations. The purpose of these services would be to provide Kleinfelder the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

8 LIMITATIONS

Recommendations contained in this report are based on the field observations and subsurface explorations, laboratory tests, and present knowledge of the proposed construction. It is possible that soil conditions could vary between or beyond the points explored. If soil conditions are encountered during construction that differ from those described herein, Kleinfelder should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction changes from that described in this report, the recommendations provided should also be reviewed.

This report has been prepared in substantial accordance with the generally accepted geotechnical engineering practice, as it exists in the general area at the time of the study. No warranty or guarantee, express or implied, is intended or provided. The recommendations provided in this report are based on the assumption that Kleinfelder will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with the recommendations.

This report may be used only by the Epic Management Group, Inc. and their designated representatives for the purposes stated, within a reasonable time from its issuance, but in no event later than one year (without review) from the date of the report. Land use, site conditions or other factors may change over time, and additional work may be required with the passage of time. Any other party who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

9 REFERENCES

Advanced National Seismic System, ANSS. http://www.quake.geo.berkeley.edu/cnss

American Society of Civil Engineers (ASCE), 2016, Minimum Design Loads for Buildings and other Structures

Bryant, W.A. and Hart, E.W. (2007), Fault-Rupture Hazard Zones in California: Department of Conservation, California Geological Survey, Special Publication 42, Interim Revision 2007

California Building Code, CBC (2019), California Building Standards Commission

California Geological Survey (1998), General Guidelines for Reviewing Geologic Reports: CGS Note 41.

California Geological Survey (2008), Guidelines for Evaluating and Mitigating Seismic Hazards in California: DMG Special Publication 117.

California Geological Survey (2019), Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings, CGS Note 48.

California Department of Conservation Division of Mines and Geology (1986), Guidelines for Geologic/Seismic Reports, DMG Note 42.

California Department of Conservation Division of Mines and Geology (1987), Guidelines for Preparing Engineering Geologic Reports: DMG Note 44.

Churchill, R.K. and Hill, R.L., 2000, A General Location Guide for Ultramafic Rocks in California: Areas More Likely to Contain Naturally Occurring Asbestos, Division of Mines and Geology, DMG Open-File Report 2000-19.

Felzer, K. (2008), "Appendix I: Calculating California Seismicity Rates," USGS Open File Report 2007-1437I, CGS Special Report 203I, SCEC Contribution #1138I, Version 1.0.

Field, E., Dawson, T., Ellsworth, W., Felzer, V., Frankel, A., Gupta, V., Jordan, T., Parsons, T., Petersen, M., Stein, R., Weldon, R., and Wills, C., 2008, The Uniform California

Earthquake Rupture Forecast, Version 2 (UCERF 2): U.S. Geological Survey Open-File Report and California Geological Survey Special Report 203, 97 p

Idriss, I.M. and Boulanger, R.W. (2008). Soil Liquefaction During Earthquakes, EERI, MNO-12, Oakland, CA

Kanamori, H. (1977), “The Energy Release in Great Earthquakes,” Journal of Geophysical Research, Vol. 82, pp. 2981-2987

Matthews, R.A., and Burnett, J.L., (1965), “Geologic Map of the Fresno Sheet,” California Division of Mines and Geology Regional Geologic Map Series, scale 1:250,000

Miller, C.D., 1989, “Potential Hazards from Future Volcanic Eruptions in California,” U.S. Geological Survey Bulletin 1847

Petersen, Mark D., Frankel, Arthur D., Harmsen, Stephen C., Mueller, Charles S., Haller, Kathleen M., Wheeler, Russell L., Wesson, Robert L., Zeng, Yuehua, Boyd, Oliver S., Perkins, David M., Luco, Nicolas, Field, Edward H., Wills, Chris J., and Rukstales, Kenneth S. (2008), “Documentation for the 2008 Update of the United States National Seismic Hazard Maps,” Open-File Report 2008–1128, United States Geological Survey, Denver, CO: available at website:

http://pubs.usgs.gov/of/2008/1128/.

Poland, J.F., Ireland, R.L., and Riley, F.S. (1984), “Land subsidence in the San Joaquin Valley, California, as of 1980,” USGS Numbered Series, Studies of land subsidence, pp. 437-I

Seeburger, D.A. and Bolt, B.A. (1976), “Earthquakes in California, 1769-1927,” Seismicity Listing Prepared for National Oceanic and Atmospheric Administration, University of California, Berkeley

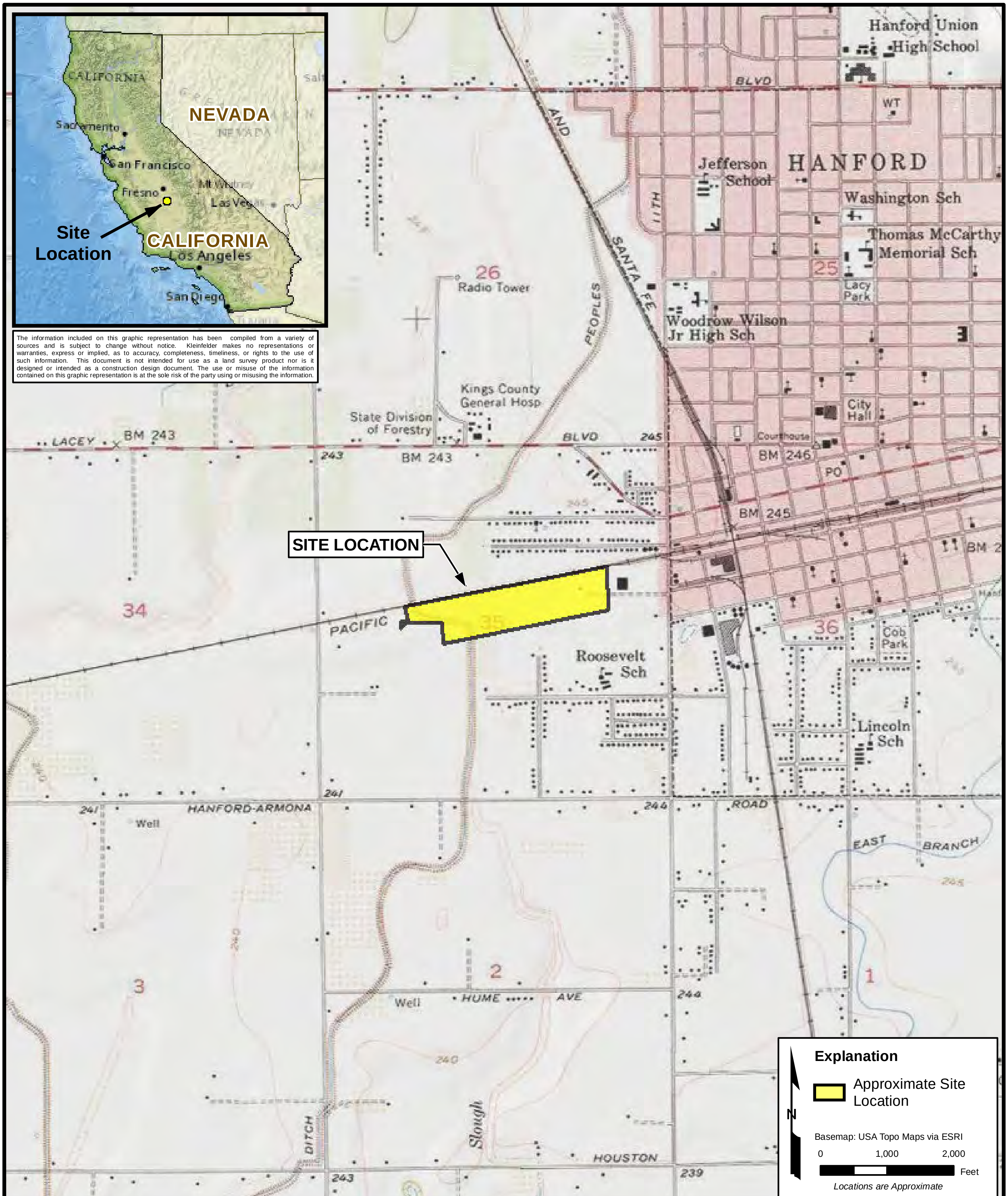
Tokimatsu, K. and Seed, H.B. (1987), “Evaluation of Settlements in Sands Due to Earthquake Shaking,” Journal of Geotechnical Engineering, American Society of Civil Engineering, Vol. 113, No. 8, pp. 861-878, August

Toppozada, T., Branum, D., Petersen, M., Hallstrom, C., Cramer, C., and Reichle, M. (2000), “Epicenters of and Areas Damaged by M ≥ 5 California Earthquakes, 1800-1999,” CDMG Map Sheet 49

Toppozada, T.R., Real, C.R., and Parke, D.L. (1981), "Preparation of Isoseismal Maps and Summaries of Reported Effects for Pre-1900 California Earthquakes," California Division of Mines and Geology Open File Report 81-11 SAC, pp. 182

Toppozada, T.R., Parke, D.L., and Higgins, C.T. (1978), "Seismicity of California, 1900-1931," California Division of Mines and Geology Special Report 135, pp. 39

FIGURES



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FILE NAME: Figure_1.mxd	

SITE VICINITY MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE

1

N

200 100 0 200

APPROXIMATE SCALE (feet)

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EXPLANATION

B-9 APPROXIMATE BORING LOCATION

R-7 APPROXIMATE R-VALUE LOCATION

REFERENCE: BASE MAP PROVIDED BY ZUMWALT HANSEN, INC., DATED 09/24/19

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DATE:	05/2020
REVISED:	05/2020

EXPLORATION LOCATION MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE

2

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LAYOUT: 2

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APPROXIMATE SCALE (feet)

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EXPLANATION

B-9 APPROXIMATE BORING LOCATION

R-7 APPROXIMATE R-VALUE LOCATION

B — B' CROSS-SECTION LOCATION

GEOLOGIC UNITS

Qf FAN DEPOSITS

REFERENCE: BASE MAP PROVIDED BY ZUMWALT HANSEN, INC., DATED 09/24/19

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PROJECT: 20210045	SITE PLAN AND GEOLOGY MAP	FIGURE
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CHECKED BY CE	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	3
DATE: 05/2020		
REVISED: 05/2020		

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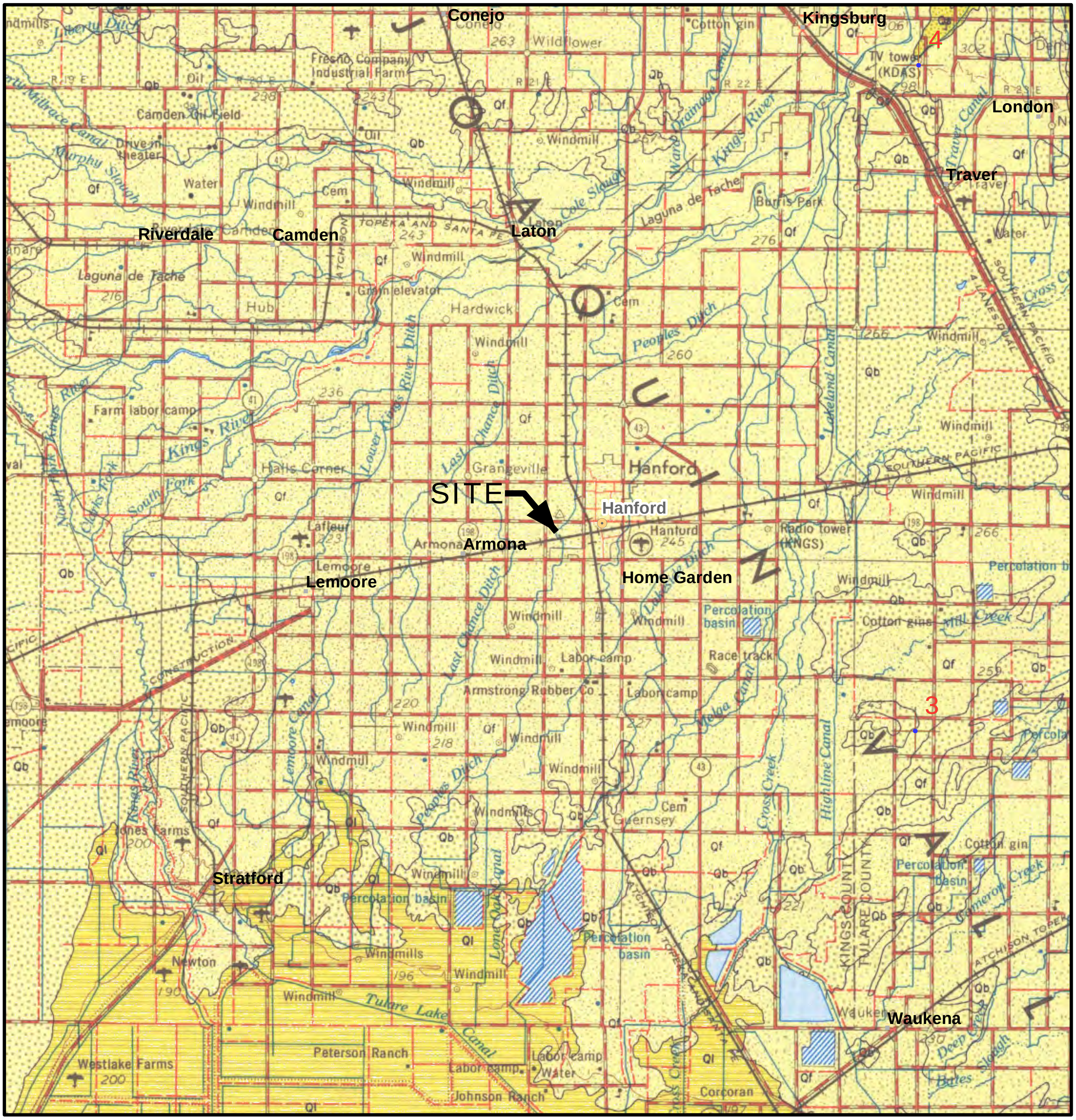

Qf Fan deposits

Qb Basin deposits

Ql Quaternary lake deposits

0 1 2 4 Miles

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REFERENCE:
Matthews, R.A., and Burnett, J.L., Geologic Map of California:
Fresno sheet, California Division of Mines and Geology, 1965, 1:250,000.

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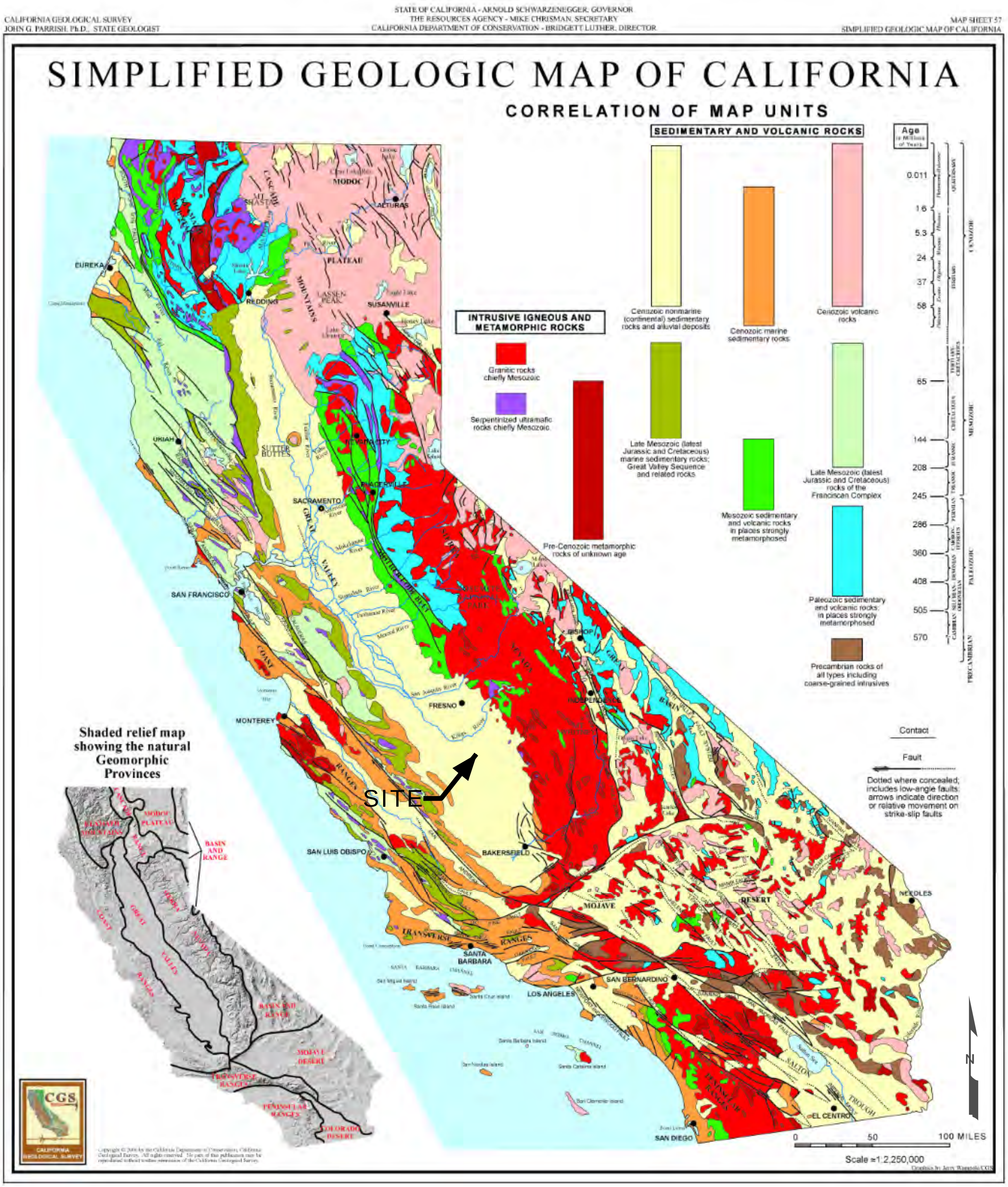
AREA GEOLOGY MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE 4



REFERENCE:
Simplified Geologic Map of California, California, a digital map sheet 57, Graphics by Jerry Wampole/CGS, dated 2006

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FILE NAME:	Figure_5.mxd

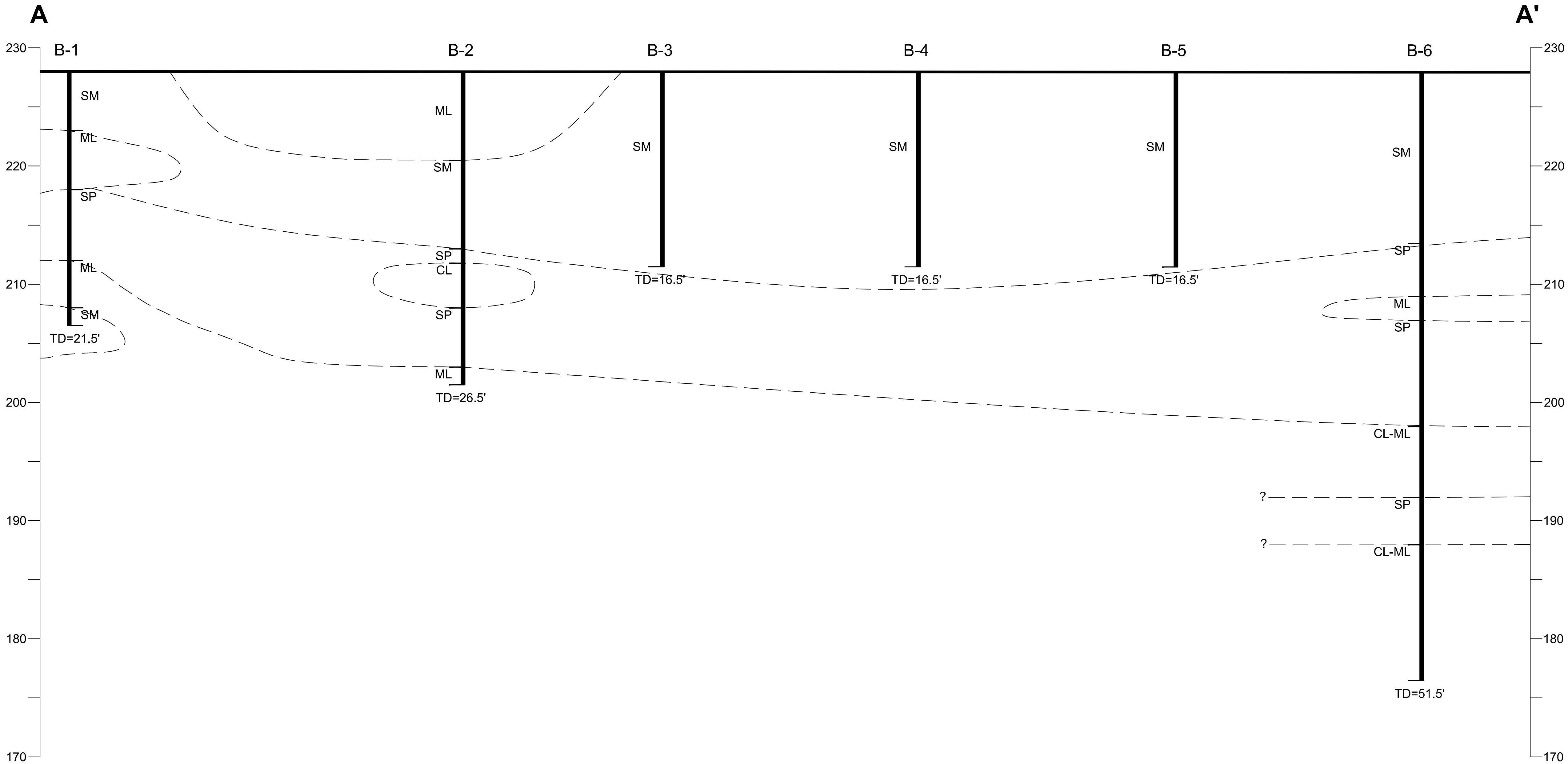
REGIONAL GEOLOGIC MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE
5

PLOTTED: 6/1/2020 11:29 AM BY: dean fahrney

CAD FILE: U:\Projects\CADD\CADD 2021\20210045\20210045_Hanford.dwg LAYOUT: 6



200 100 0 200
HORIZONTAL SCALE (feet)

10 5 0 10
VERTICAL SCALE (feet)

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PROJECT:	20210045
DRAWN BY	DMF
CHECKED BY	AA
DATE:	06/2020
REVISED:	06/2020

CROSS-SECTION A-A'

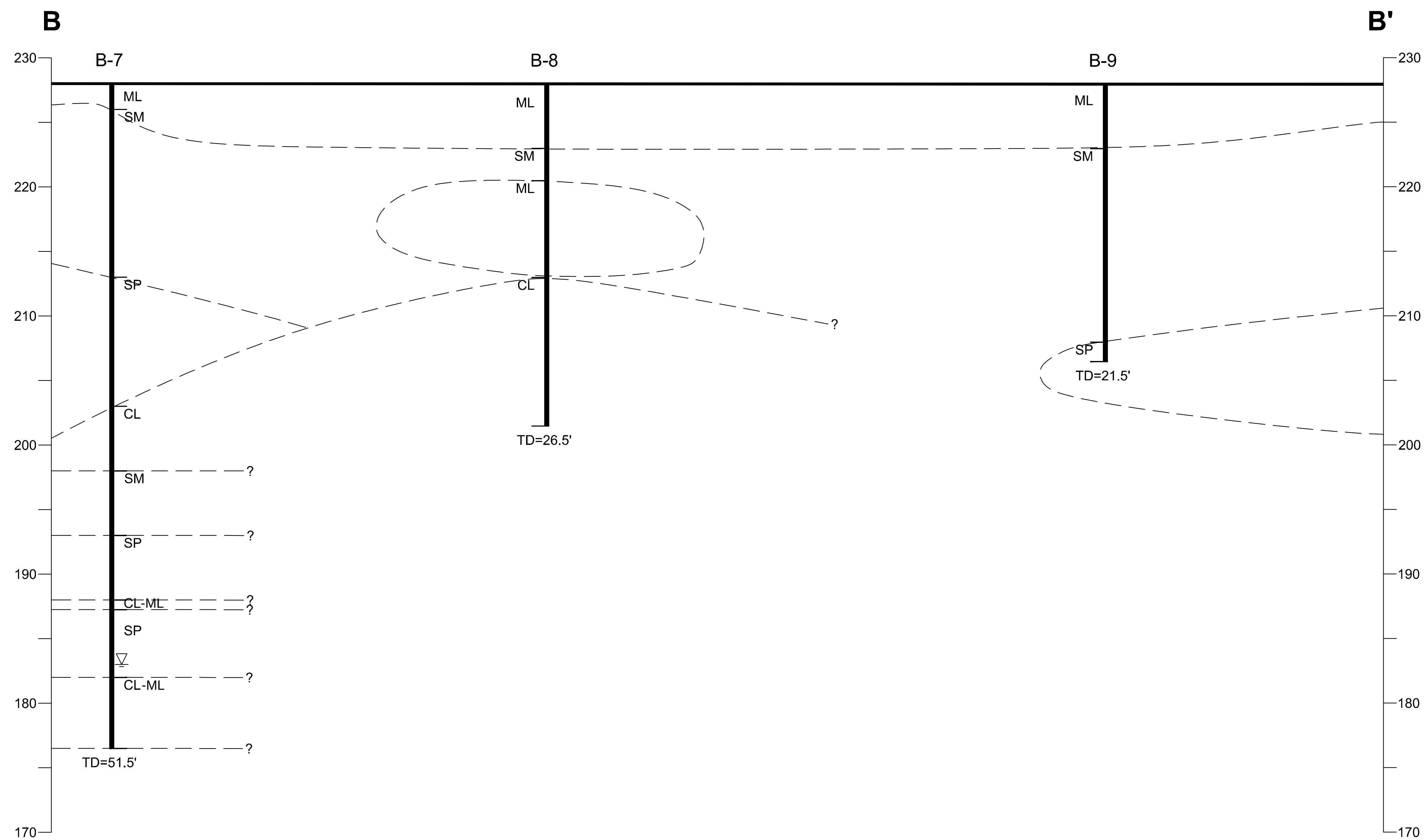
PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

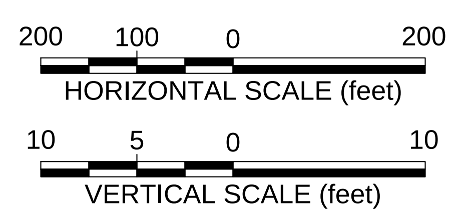
FIGURE

6

PLOTTED: 6/1/2020 11:41 AM BY: dean fahrney

CAD FILE: U:\Projects\CADD\CADD 2021\20210045\20210045_Hanford.dwg LAYOUT: 7





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PROJECT:	20210045
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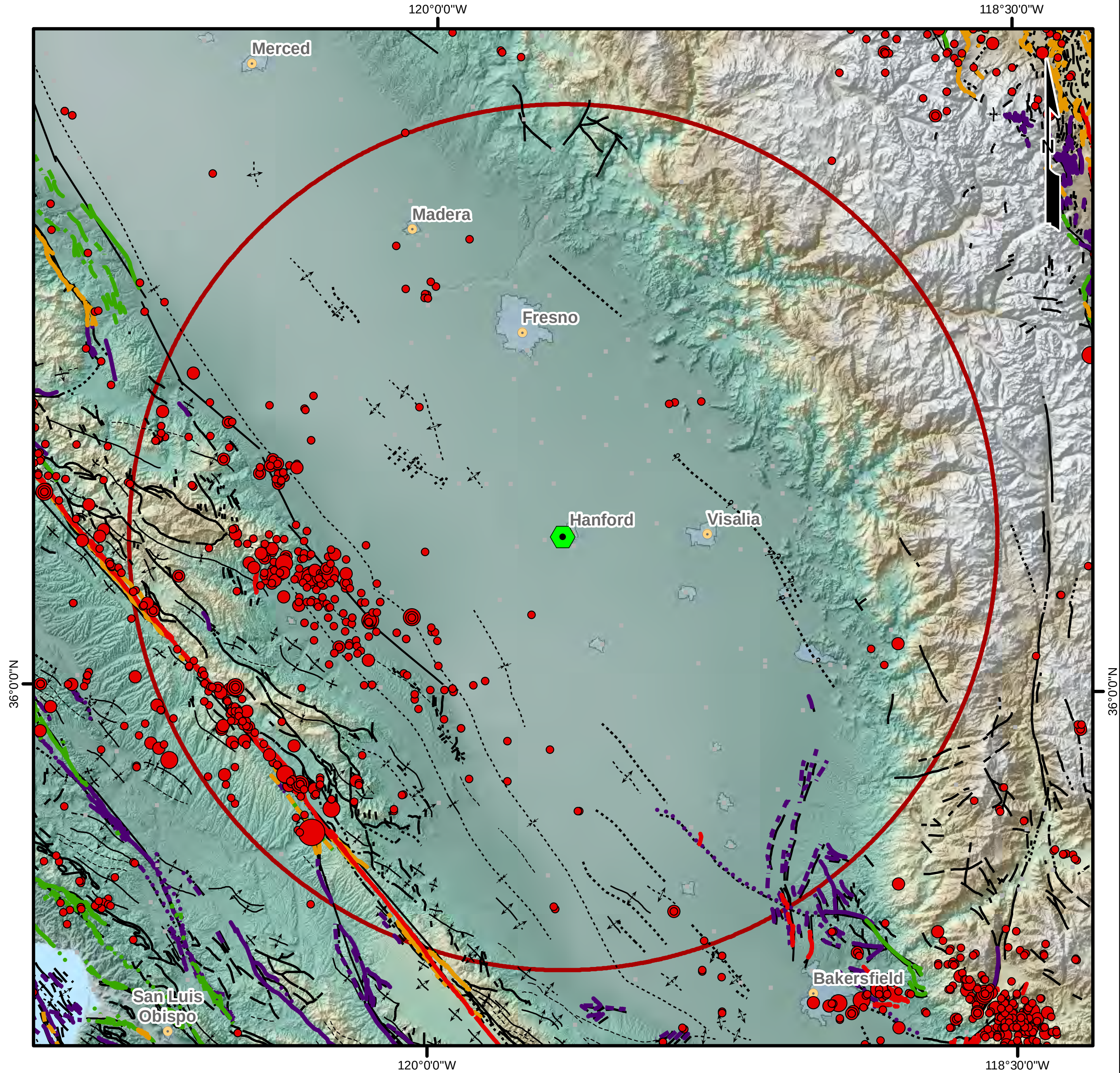
DATE:	06/2020
REVISED:	06/2020

CROSS-SECTION B-B'

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE

7



Faulting Legend

Quaternary Faults (Bryant, 2005; USGS, 2009)

Historic displacement (< 200 years)
- Mapped Fault Location
- Dashed where Approximated
- Concealed

Holocene displacement (< 11,000 years)
- Mapped Fault Location
- Dashed where Approximated
- Concealed

Late Quaternary displacement (< 750,000 years)
- Mapped Fault Location
- Dashed where Approximated
- Concealed

Quaternary displacement (< 1,600,000 years)
- Mapped Fault Location
- Dashed where Approximated
- Concealed

Pre-Quaternary Geologic Structures (CGS, 2000)
- fault, approx. located
- fault, approx. located, queried
- fault, certain
- fault, concealed
- fault, concealed, queried
- fault, inferred, queried

ANSS Earthquakes

Magnitude
- 4.0 - 4.9
- 5.0 - 5.9
- 6.0 - 6.9
- 7.0 - 7.9
- 8.0 - 8.9

35 17.5 0 35
Kilometers

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FILE NAME:	Figure_8.mxd

REGIONAL FAULT MAP AND EARTHQUAKE EPICENTERS (1800 - MAY 2020)

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE

8

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D Boundary

CBRS and OPA Boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)—(A) Cross section line

(23)- - - - -(23) Transect line

97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 10 and 11

600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone IV (FIPSZONE 0404), Lambert Conformal Conic Projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 — River Mile

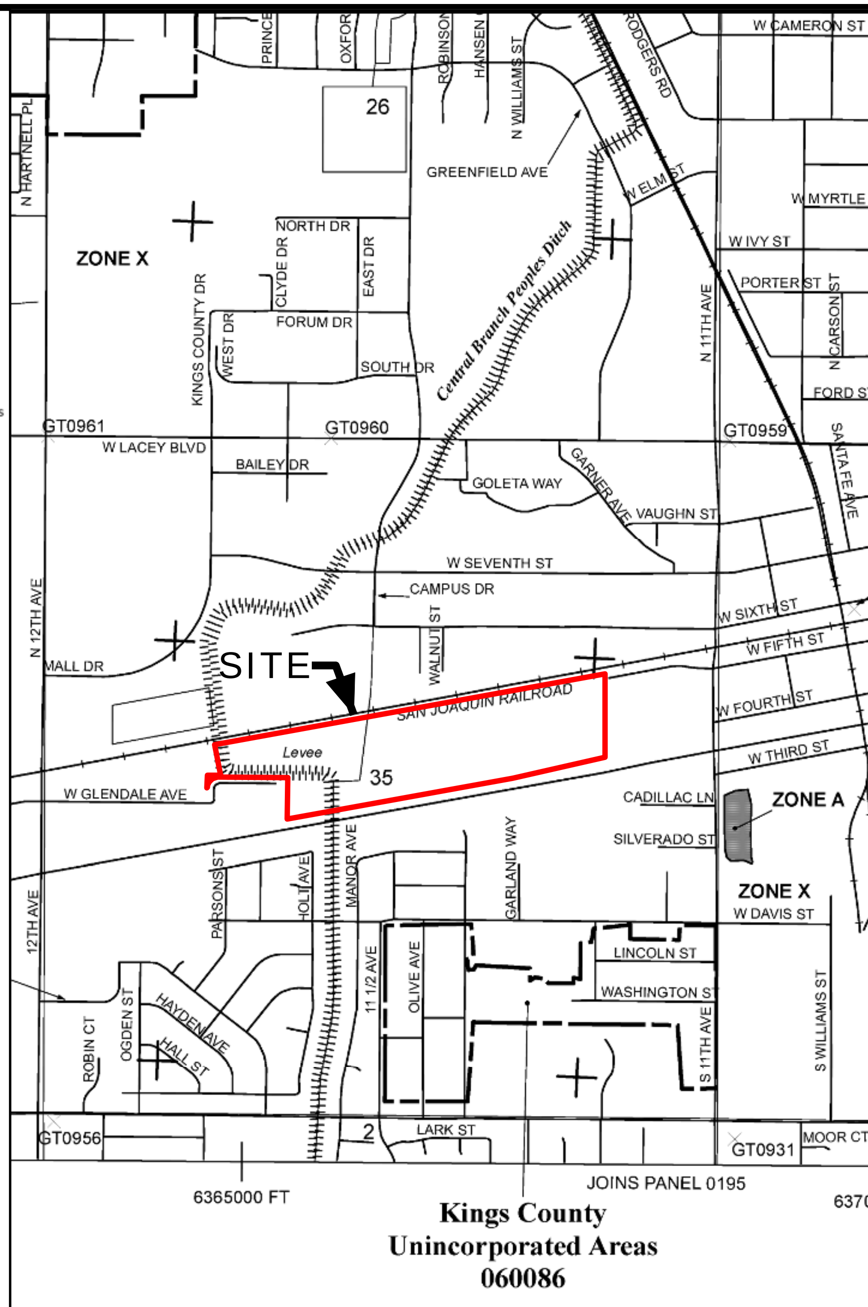
MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD
INSURANCE RATE MAP PANEL
JUNE 16, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



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REFERENCE:
FEMA Flood Insurance Rate map, Kings County, California, Map # 06031C0185C, dated 2009

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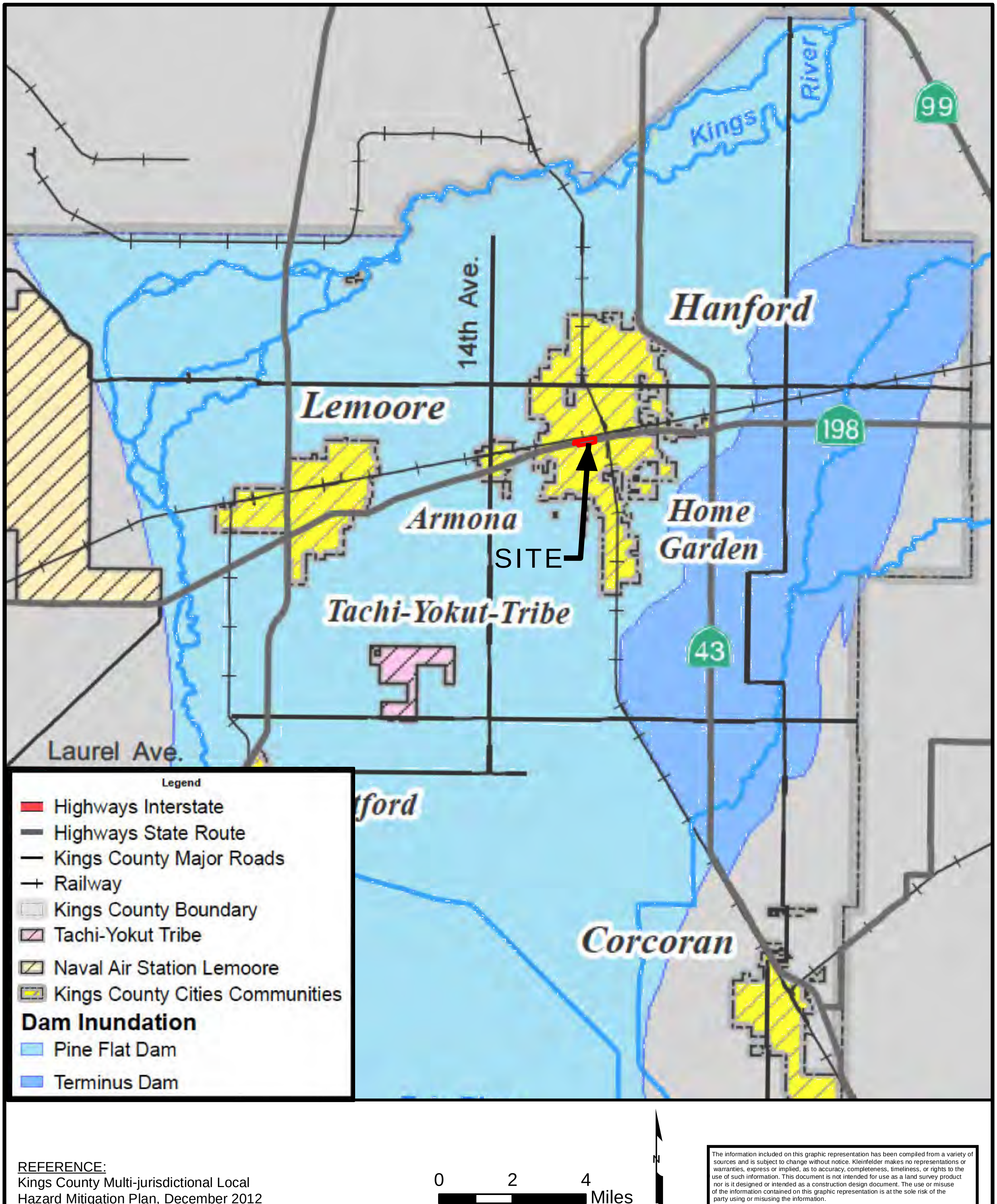
PROJECT NO.	20210045
DRAWN:	JUNE 2020
DRAWN BY:	RA
CHECKED BY:	AA
FILE NAME:	Figure_9.mxd

FEMA FLOOD MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE

9



REFERENCE:
Kings County Multi-jurisdictional Local Hazard Mitigation Plan, December 2012

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FILE NAME:	Figure_10.mxd

DAM INUNDATION MAP

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

FIGURE
10

APPENDIX A

SAMPLE/SAMPLER TYPE GRAPHICS

- BULK SAMPLE
- CALIFORNIA SAMPLER (3 in. (76.2 mm.) outer diameter)
- STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

GROUND WATER GRAPHICS

- WATER LEVEL (level where first observed)
- WATER LEVEL (level after exploration completion)
- WATER LEVEL (additional levels after exploration)
- OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

WOH - Weight of Hammer
WOR - Weight of Rod

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

Major Division	Subdivision	Fines	Criteria	Group Symbol	Description
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	**GRAVELS** (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVEL WITH <5% FINES	Cu≥4 and 1≤Cc≤3	**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu<4 and/ or 1>Cc>3	**GP**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5% TO 12% FINES	Cu≥4 and 1≤Cc≤3	**GW-GM**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
				GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu<4 and/ or 1>Cc>3	**GP-GM**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
				GP-GC	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH > 12% FINES		**GM**	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
				GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (Half or more of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu≥6 and 1≤Cc≤3	**SW**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu<6 and/ or 1>Cc>3	**SP**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5% TO 12% FINES	Cu≥6 and 1≤Cc≤3	**SW-SM**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
				SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu<6 and/ or 1>Cc>3	**SP-SM**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
				SP-SC	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH > 12% FINES		**SM**	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
				SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES

Major Division	Subdivision	Group Symbol	Description
FINE GRAINED SOILS (Half or more of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)	**ML**	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid Limit 50 or greater)	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.

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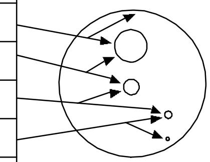
PROJECT NO.: 20210045.001A	GRAPHICS KEY	APPENDIX
DRAWN BY:	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-1
CHECKED BY:		
DATE:		

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12 in. (304.8 mm.)	>12 in. (304.8 mm.)	Larger than basketball-sized
Cobbles		3 - 12 in. (76.2 - 304.8 mm.)	3 - 12 in. (76.2 - 304.8 mm.)	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3 in. (19 - 76.2 mm.)	3/4 -3 in. (19 - 76.2 mm.)	Thumb-sized to fist-sized
	fine	#4 - 3/4 in. (#4 - 19 mm.)	0.19 - 0.75 in. (4.8 - 19 mm.)	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)	Sugar-sized to rock salt-sized
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029 in. (<0.07 mm.)	Flour-sized and smaller



SECONDARY CONSTITUENT

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT - N_{60} (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Thumb will penetrate more than 1 inch (25 mm). Extrudes between fingers when squeezed.
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1000	Thumb will penetrate soil about 1 inch (25 mm). Remolded by light finger pressure.
Medium Stiff	4 - 8	0.5 ≤ PP <1	1000 - 2000	Thumb will penetrate soil about 1/4 inch (6 mm). Remolded by strong finger pressure.
Stiff	8 - 15	1 ≤ PP <2	2000 - 4000	Can be imprinted with considerable pressure from thumb.
Very Stiff	15 - 30	2 ≤ PP <4	4000 - 8000	Thumb will not indent soil but readily indented with thumbnail.
Hard	>30	4 ≤ PP	>8000	Thumbnail will not indent soil.

REACTION WITH HYDROCHLORIC ACID

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT-N_{60} (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	<4	<4	<5	0 - 15
Loose	4 - 10	5 - 12	5 - 15	15 - 35
Medium Dense	10 - 30	12 - 35	15 - 40	35 - 65
Dense	30 - 50	35 - 60	40 - 70	65 - 85
Very Dense	>50	>60	>70	85 - 100

FROM TERZAGHI AND PECK, 1948

PLASTICITY

DESCRIPTION	LL		PI
Non-Plastic	NP	Either the LL or the PI (or both) may be used to describe the soil plasticity. The ranges of numbers shown here do not imply that the LL ranges correlate with the PI ranges for all soils.	NP
Low	< 30		< 15
Medium	30 - 50		15 - 25
High	> 50		> 25

LL is from Casagrande, 1948. PI is from Holtz , 1959.

STRUCTURE

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. thick, note thickness.
Laminated	Alternating layers of varying material or color with the layer less than 1/4-in. thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.

ANGULARITY

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

Date Begin - End:	4/20/2020	**Drilling Company:**	Moore Twining		**BORING LOG B-1**
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

Depth (feet)	Graphical Log	FIELD EXPLORATION Surface Condition: Grass & Weeds Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	LABORATORY RESULTS Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		Silty SAND (SM): medium dense, brown, moist, fine to medium-grained		BC=7 12 14		37	2.4	108.6					
5		**Sandy SILT (ML)**: medium stiff, reddish brown, moist		BC=5 6 6		17	4.8	88.1					**Consolidation**
10		**Poorly Graded SAND (SP)**: medium dense, light brown, moist, fine-grained		BC=6 13 11		35							
15				BC=3 1 2		4							
		Sandy SILT (ML): stiff, reddish brown, moist, low plasticity		BC=7 11 14		36	10.9	107.9					
20		**Silty SAND (SM)**: medium dense, gray with brown, moist, fine-grained		BC=7 8 10		26							
25													
30													

The boring was terminated at approximately 21.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A DRAWN BY: AA CHECKED BY: ES DATE: 6/4/2020	BORING LOG B-1 PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	APPENDIX A-3 PAGE: 1 of 1

Date Begin - End:	4/20/2020	**Drilling Company:**	Moore Twining		**BORING LOG B-2**
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

FIELD EXPLORATION / LABORATORY RESULTS

Surface Condition: Grass & Weeds

Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		Sandy SILT (ML): medium stiff, light brown, moist, low plasticity											
				BC=6 6 9		22				60			
5		hard		BC=25 27 25		75							
		Silty SAND (SM): medium dense, light brown, moist, fine-grained		BC=6 7 8		22							
10				BC=8 10 11		30	6.5	98.8					
15		**Poorly Graded SAND (SP)**: medium dense, grayish brown, moist, fine-grained		BC=3 3 3		9							
		Sandy Lean CLAY (CL): medium stiff, dark brown, moist, low to medium plasticity											
20		**Poorly Graded SAND (SP)**: medium dense, gray, moist, fine-grained		BC=8 9 12		30							
25		**Sandy SILT (ML)**: medium stiff, gray, moist, non-plastic to low plasticity		BC=8 7 9		23							
30													

The boring was terminated at approximately 26.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A DRAWN BY: AA CHECKED BY: ES DATE: 6/4/2020	BORING LOG B-2 PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	APPENDIX A-4 PAGE: 1 of 1

BORING LOG B-3

Date Begin - End:	4/20/2020	**Drilling Company:**	Moore Twining		
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

Depth (feet)	Graphical Log	FIELD EXPLORATION: Surface Condition: Grass & Weeds / Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	LABORATORY RESULTS: Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0		**Silty SAND (SM)**: medium dense, yellowish brown, moist, fine-grained, pinholes		BC=10 9 10		27							**Consolidation** **Direct Shear=** Peak Cohesion: 740 psf Peak Friction Angle: 27.0° Peak Tangent Angle: 0.52
5				BC=8 12 13		36	3.2	96.0					
10		light grayish brown		BC=10 11 13		35							
15		reddish brown		BC=7 8 10		26							

The boring was terminated at approximately 16.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A	BORING LOG B-3	APPENDIX
	DRAWN BY: AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-5
	CHECKED BY: ES		
	DATE: 6/4/2020		PAGE: 1 of 1

BORING LOG B-4

Date Begin - End:	4/21/2020	**Drilling Company:**	Moore Twining		
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

FIELD EXPLORATION / LABORATORY RESULTS

Surface Condition: Grass & Weeds

Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		Silty SAND (SM): medium dense, light brown, moist, fine-grained, non-plastic, pinholes											
				BC=10 14 15		42							
5				BC=6 9 14		33	3.5	95.5					
10		dense, brown		BC=31 32 35		96							
15		medium dense, reddish brown		BC=3 8 7		22							

The boring was terminated at approximately 16.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:

20

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PROJECT NO.: 20210045.001A		BORING LOG B-4	APPENDIX
DRAWN BY:	AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-6
CHECKED BY:	ES		
DATE:	6/4/2020		PAGE: 1 of 1

BORING LOG B-5

Date Begin - End:	4/21/2020	**Drilling Company:**	Moore Twining		
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

Surface Condition: Grass & Weeds

Depth (feet)	Graphical Log	Lithologic Description (FIELD EXPLORATION)	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%) (LABORATORY RESULTS)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0		**Silty SAND (SM)**: medium dense, brown, moist, fine-grained, non-plastic, pinholes											
~3.5				BC=18 19 20		56	4.8	101.5					
5				BC=9 13 15		40	6.6	94.9					
10		light brown		BC=11 7 7		20							
15		dense		BC=11 20 24		63							

The boring was terminated at approximately 16.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A	BORING LOG B-5	APPENDIX
	DRAWN BY: AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-7
	CHECKED BY: ES		
	DATE: 6/4/2020		PAGE: 1 of 1

Date Begin - End:	4/21/2020	**Drilling Company:**	Moore Twining		**BORING LOG B-6**
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

Depth (feet)	Lithologic Description (Surface Condition: Grass & Weeds)	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
	Silty SAND (SM): medium dense, brown, moist, fine-grained, non-plastic, pin holes and organics										**ASTM D1557 Method A=** Max. Dry Unit Wt.: 121.8 pcf Opt. Water Content: 9.8%
		BC=7 4 8		17	5.0	97.3					
5		BC=3 5 6		16							
		BC=14 11 13		35	3.1	95.9					
10	reddish brown	BC=2 2 4		9							
15	**Poorly Graded SAND (SP)**: medium dense, grayish brown, moist	BC=8 9 11		29							
	Sandy SILT (ML): stiff, dark brown, moist										
20		BC=2 4 8		17				70			
	Poorly Graded SAND (SP): medium dense, grayish brown, moist, fine-grained										
25		BC=13 8 25		48	1.9	100.9					
30	**SILTY CLAY (CL-ML)**: medium stiff, dark gray, moist, medium plasticity	BC=7 8 10		26					24	7	

FIELD EXPLORATION / LABORATORY RESULTS

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DATE: 6/4/2020

BORING LOG B-6

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX
A-8

Date Begin - End:	4/21/2020	Drilling Company:	Moore Twining		**BORING LOG B-6**
Logged By:	J. Green	Drill Crew:			
Hor.-Vert. Datum:	Not Available	Drilling Equipment:	CME-75	Hammer Type - Drop:	140 lb. Auto - 30 in.
Plunge:	-90 degrees	Drilling Method:	Hollow Stem Auger	Hammer Efficiency:	86.4%
Weather:	Not Available	Auger Diameter:	8 in. O.D.	Hammer Cal. Date:	5/14/2019

Surface Condition: Grass & Weeds

Depth (feet)	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			BC=9 13 25		55							
	Poorly Graded SAND (SP): medium dense, light brownish gray, moist, fine-grained, non-plastic											
40	**Sandy SILTY CLAY (CL-ML)**: very stiff, dark gray, moist, low to medium plasticity, fine-grained sand		BC=6 8 11		27					26	7	
45			BC=8 13 19		46	2.9	99.6					
50			BC=11 12 14		37							

The boring was terminated at approximately 51.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:

55

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65

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DATE: 6/4/2020

BORING LOG B-6

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX

A-8

BORING LOG B-7

Date Begin - End: 4/20/2020
Logged By: J. Green
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Not Available

Drilling Company: Moore Twining
Drill Crew:
Drilling Equipment: CME-75
Drilling Method: Hollow Stem Auger
Auger Diameter: 8 in. O.D.

Hammer Type - Drop: 140 lb. Auto - 30 in.
Hammer Efficiency: 86.4%
Hammer Cal. Date: 5/14/2019

FIELD EXPLORATION / LABORATORY RESULTS

Surface Condition: Grass & Weeds

Depth (feet)	Lithologic Description	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0	**Sandy SILT (ML)**: light brown, moist, non-plastic, fine-grained sand										**ASTM D1557 Method A=** Max. Dry Unit Wt.: 124.8 pcf Opt. Water Content: 8.5%
2	**Silty SAND (SM)**: medium dense, light brown, moist, fine-grained, non-plastic to low plasticity	BC=28 15 25		58	4.5	111.0					
5		BC=5 6 11		24	6.3	94.6					
7.5		BC=7 9 12		30	7.9	97.8					**Consolidation**
10		BC=4 6 7		19							
15	**Poorly Graded SAND (SP)**: medium dense, gray with light orange, moist, fine to medium-grained	BC=5 2 2		6							
20	reddish brown	BC=10 13 11		35							
25	**Lean CLAY (CL)**: very stiff, gray, moist, medium plasticity, trace fine-grained sand	BC=3 5 11		23							
30	**Silty SAND (SM)**: dense, brown, moist, fine-grained, non-plastic to low plasticity	BC=24 26 34		86	11.6	112.9					

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DATE: 6/4/2020

BORING LOG B-7

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX
A-9

Date Begin - End: 4/20/2020	**Drilling Company:** Moore Twining		
Logged By: J. Green	**Drill Crew:**		
Hor.-Vert. Datum: Not Available	**Drilling Equipment:** CME-75	**Hammer Type - Drop:** 140 lb. Auto - 30 in.	
Plunge: -90 degrees	**Drilling Method:** Hollow Stem Auger	**Hammer Efficiency:** 86.4%	
Weather: Not Available	**Auger Diameter:** 8 in. O.D.	**Hammer Cal. Date:** 5/14/2019	

Surface Condition: Grass & Weeds

Depth (feet)	Lithologic Description	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
	Poorly Graded SAND (SP): medium dense, light gray, moist, fine-grained	BC=11 13 16		42							
40	**Silty CLAY (CL-ML)**: hard, light brown, moist, low plasticity	BC=20 25 31		81							
	Poorly Graded SAND (SP): dense, light gray, moist, fine-grained										
45 ▽	wet	BC=5 7 9		23							
	Silty CLAY (CL-ML): very stiff, dark greenish gray, wet, low plasticity										
50		BC=10 11 15		37	28.3						

Depth scale: 40, 45, 50, 55, 60, 65

The boring was terminated at approximately 51.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Perched groundwater was observed at approximately 45 ft. below ground surface during drilling.

GENERAL NOTES:

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PROJECT NO.: 20210045.001A		BORING LOG B-7	APPENDIX
DRAWN BY:	AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-9
CHECKED BY:	ES		
DATE:	6/4/2020		PAGE: 2 of 2

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Date Begin - End:	4/20/2020	**Drilling Company:**	Moore Twining		**BORING LOG B-8**
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

Depth (feet)	Graphical Log	FIELD EXPLORATION: Lithologic Description (Surface Condition: Grass & Weeds)	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	LABORATORY RESULTS: Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
0		**SILT (ML)**: medium dense, light brown, moist, fine-grained, non-plastic to low plasticity, pinholes											
				BC=9 11 12		33	5.1	100.3					**Direct Shear=** Peak Cohesion: 133.33 psf Peak Friction Angle: 30.5° Peak Tangent Angle: 0.57
5		**Silty SAND (SM)**: medium dense, light brown, moist, low plasticity, weakly to moderately cemented, pinholes		BC=9 11 15		37							
		Sandy SILT (ML): very stiff, brown, moist, fine-grained, low plasticity		BC=18 21 17		55	2.4	99.5					
10		stiff		BC=4 4 5		13							
15		**Sandy Lean CLAY (CL)**: medium stiff, dark brown, moist, low to medium plasticity		BC=3 4 8		17	20.6	104.6					
20		stiff, gray		BC=8 8 9		24							
25				BC=7 10 25		50							

The boring was terminated at approximately 26.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:

30

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PROJECT NO.: 20210045.001A		BORING LOG B-8	APPENDIX
DRAWN BY:	AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-10
CHECKED BY:	ES		
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gINT FILE: Klf_gint_master_2021 PROJECT NUMBER: 20210045.001A OFFICE FILTER: FRESNO
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2021.GLB [CLIENT_CT_LITH_ORDER_KLF_FORMAT]

Date Begin - End:	4/20/2020	Drilling Company:	Moore Twining		**BORING LOG B-9**
Logged By:	J. Green	**Drill Crew:**			
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	CME-75	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger	**Hammer Efficiency:**	86.4%
Weather:	Not Available	**Auger Diameter:**	8 in. O.D.	**Hammer Cal. Date:**	5/14/2019

FIELD EXPLORATION / LABORATORY RESULTS

Surface Condition: Grass & Weeds

Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	N_{60} Value	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		Sandy SILT (ML): very stiff, grayish brown, moist, non-plastic											
				BC=9 12 17		42	7.1	92.0		57			**Consolidation**
5		**Silty SAND (SM)**: medium dense, grayish brown, moist, fine-grained, non-plastic		BC=7 7 9		23							
10		brown		BC=7 18 23		59							
15		reddish brown		BC=6 6 11		24							
20		**Poorly Graded SAND (SP)**: dense, gray, moist, fine-grained, non-plastic		BC=25 26 28		78							

25

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The boring was terminated at approximately 21.5 ft. below ground surface. The boring was backfilled with auger cuttings on April 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A	BORING LOG B-9	APPENDIX
	DRAWN BY: AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	A-11
	CHECKED BY: ES		
	DATE: 6/4/2020		PAGE: 1 of 1

APPENDIX B

Exploration ID	Depth (ft.)	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
					Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
B-1	3.0	SILTY SAND (SM)	2.4	108.6							
B-1	5.0	SANDY SILT (ML)	4.8	88.1							
B-1	6.0	SANDY SILT (ML)	4.7	106.4							**Consolidation**
B-1	17.0	SANDY SILT (ML)	10.9	107.9							
B-2	2.0	SANDY SILT (ML)					60				
B-2	10.0	SILTY SAND (SM)	6.5	98.8							
B-3	1.0	SILTY SAND (SM)	6.9	96.8							**Consolidation**
B-3	1.5	SILTY SAND (SM)									**Direct Shear=**
											Peak Cohesion: 740 psf
											Peak Friction Angle: 27.0°
											Peak Tangent Angle: 0.52
B-3	5.0	SILTY SAND (SM)	3.2	96.0							
B-4	5.0	SILTY SAND (SM)	3.5	95.5							
B-5	3.0	SILTY SAND (SM)	4.8	101.5							
B-5	5.0	SILTY SAND (SM)	6.6	94.9							
B-6	0.0 - 0.5	SILTY SAND (SM)									**ASTM D1557 Method A=**
											Maximum Dry Unit Weight: 121.8 pcf
											Optimum Water Content: 9.8%
B-6	2.0	SILTY SAND (SM)	5.0	97.3							
B-6	7.5	SILTY SAND (SM)	3.1	95.9							
B-6	20.0	SANDY SILT (ML)					70				
B-6	25.0	POORLY GRADED SAND (SP)	1.9	100.9							
B-6	30.0	SILTY CLAY (CL-ML)						24	17	7	
B-6	40.0	SANDY SILTY CLAY (CL-ML)						26	19	7	
B-6	45.0	SANDY SILTY CLAY (CL-ML)	2.9	99.6							
B-7	0.0 - 2.0	SANDY SILT (ML)									**ASTM D1557 Method A=**
											Maximum Dry Unit Weight: 124.8 pcf
											Optimum Water Content: 8.5%

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic

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PROJECT NO.: 20210045.001A

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DATE:

LABORATORY TEST RESULT SUMMARY

PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA

APPENDIX

B-1

Exploration ID	Depth (ft.)	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
					Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
B-7	2.0	SILTY SAND (SM)	4.5	111.0							
B-7	6.0	SILTY SAND (SM)	6.3	94.6							
B-7	7.5	SILTY SAND (SM)	7.9	97.8							**Consolidation**
B-7	30.0	SILTY SAND (SM)	11.6	112.9							
B-7	50.0	SILTY CLAY (CL-ML)	28.3								
B-8	2.0	SILT (ML)	5.1	100.3							**Direct Shear=**
											Peak Cohesion: 133.33 psf
											Peak Friction Angle: 30.5°
											Peak Tangent Angle: 0.57
B-8	7.5	SANDY SILT (ML)	2.4	99.5							
B-8	15.0	SANDY LEAN CLAY (CL)	20.6	104.6							
B-9	2.0	SANDY SILT (ML)	7.1	92.0			57				**Consolidation**
RV-1	0.0 - 3.0	SILTY SAND (SM)									**R-Value=** 70
RV-2	0.0 - 3.0	SILTY SAND (SM)									**R-Value=** 63
RV-3	0.0 - 3.0	SANDY SILT (ML)									**R-Value=** 41
RV-4	0.0 - 3.0	SANDY SILT (ML)									**R-Value=** 53
RV-5	0.0 - 3.0	SILT (ML)									**R-Value=** 14
RV-6	0.0 - 3.0	SILTY SAND (SM)									**R-Value=** 62
RV-7	0.0 - 3.0	SANDY SILT (ML)									**R-Value=** 21

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic

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PROJECT NO.: 20210045.001A

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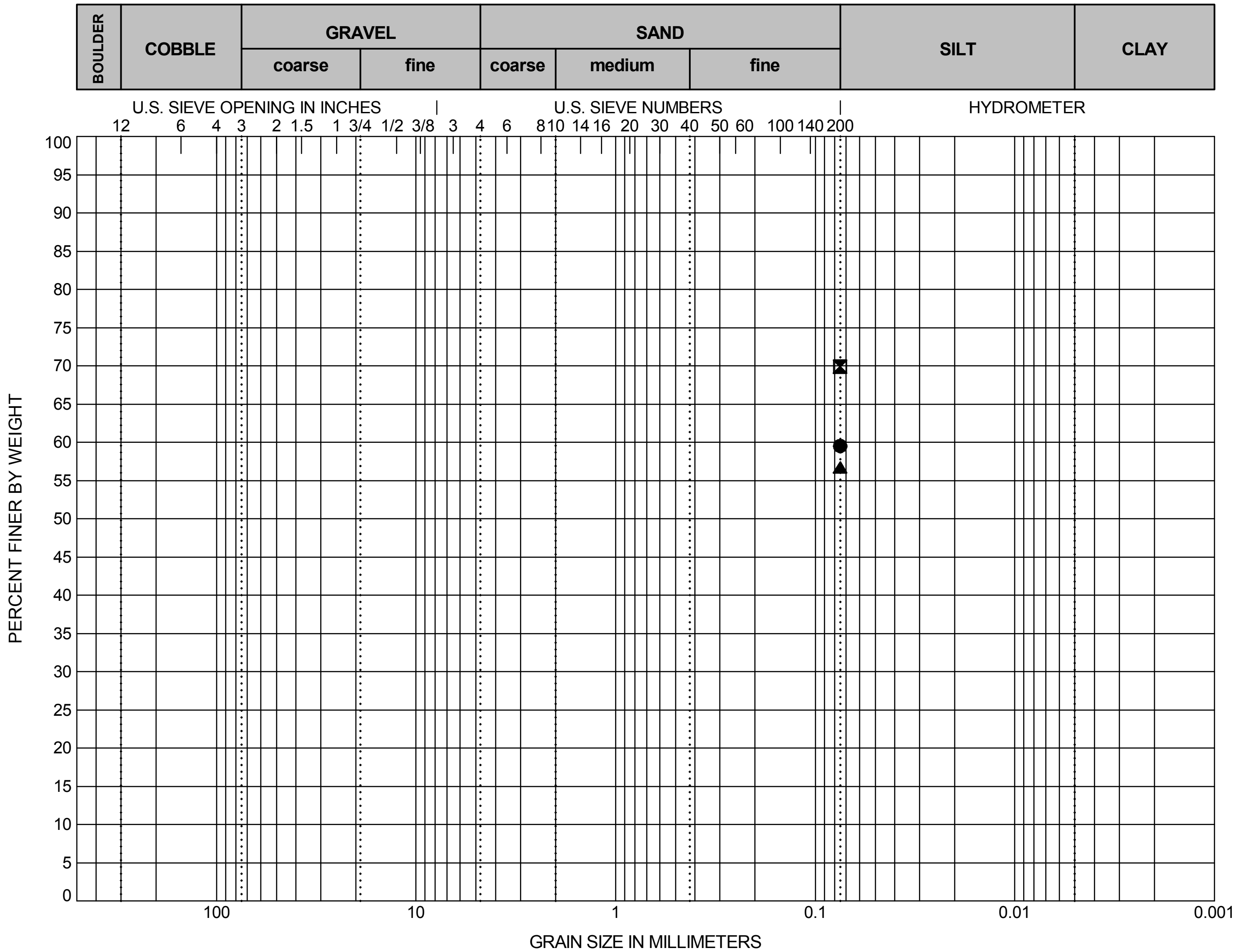
LABORATORY TEST RESULT SUMMARY

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX

B-2



Exploration ID		Depth (ft.)	Sample Description	LL	PL	PI
●	B-2	2	SANDY SILT (ML)	NM	NM	NM
⧗	B-6	20	SANDY SILT (ML)	NM	NM	NM
▲	B-9	2	SANDY SILT (ML)	NM	NM	NM

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt	%Clay
●	B-2	2	0.075	NM	NM	NM	NM	NM			60	NM	NM
⧗	B-6	20	0.075	NM	NM	NM	NM	NM			70	NM	NM
▲	B-9	2	0.075	NM	NM	NM	NM	NM			57	NM	NM

Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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PROJECT NO.: 20210045.001A
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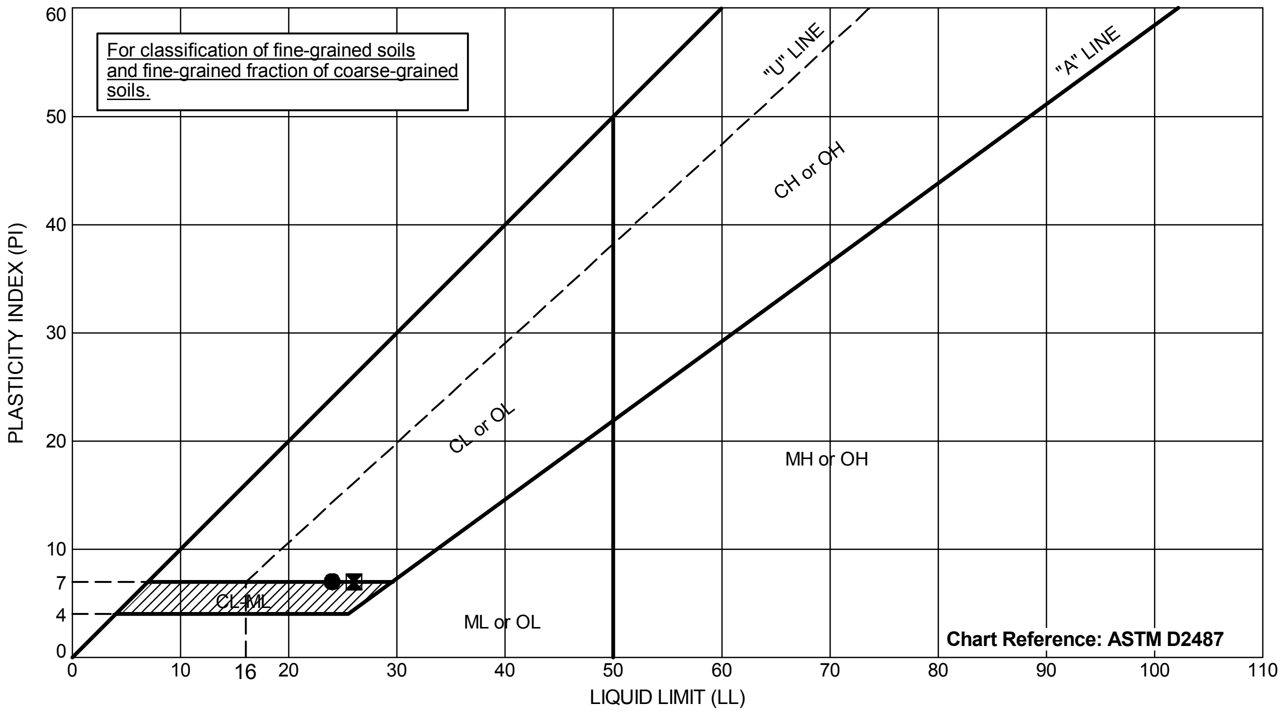
CHECKED BY: ES
DATE: 6/4/2020

SIEVE ANALYSIS

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX

B-3



	Exploration ID	Depth (ft.)	Sample Description	Passing #200	LL	PL	PI
●	B-6	30	SILTY CLAY (CL-ML)	NM	24	17	7
⧗	B-6	40	SANDY SILTY CLAY (CL-ML)	NM	26	19	7

Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NM = Not Measured

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PROJECT NO.: 20210045.001A
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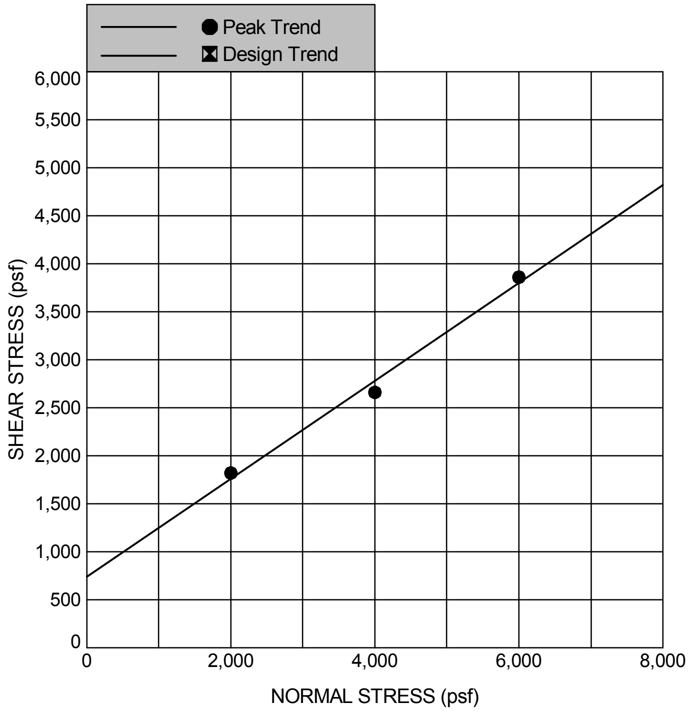
DATE: 6/4/2020

ATTERBERG LIMITS

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX

B-4



Exploration ID	Depth (ft.)	Sample Description
B-3	1.5	SILTY SAND (SM)

Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
NM	NM	NM	NM	NM	2.65

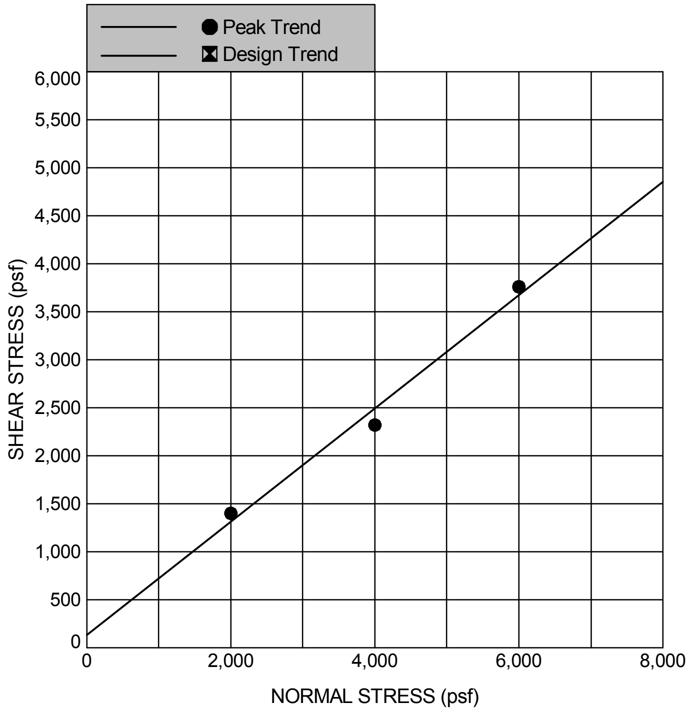
	Specimen No.	Water Content (%)	Dry Unit Weight (pcf)	Saturation (%)	Void Ratio	Area (in^2)	Height (in)
Initial	1	6.1	94.7	21.6	0.746	4.60	0.96
	2	6.2	95.6	22.5	0.730	4.60	0.96
	3	7.0	95.5	25.5	0.731	4.60	0.96
At Test	**Specimen No.**	**Water Content (%)**	**Dry Unit Weight (pcf)**	**Saturation (%)**	**Void Ratio**	**Area (in^2)**	**Height (in)**
	1	25.3	105.5	26.7	0.621	4.60	0.89
	2	23.8	111.4	26.5	0.559	4.60	0.87
	3	22.7	111.7	25.4	0.539	4.60	0.85

Specimen No.	Peak Shear Stress (psf)	Design Shear Stress (psf)	Horizontal Displacement (in)	Normal Stress (psf)	Strain Rate (in/min)
1	1820		0.2600	2000	0.002
2	2660		0.4000	4000	0.002
3	3860		0.2600	6000	0.002

Results	Cohesion (psf)	Friction ϕ (deg)	Tan ϕ (deg)
Peak	740	27.02	0.52
Design			

Testing perfomed in general accordance with ASTM D3080.
NP = Nonplastic
NM = Not Measured

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A DRAWN BY: AA CHECKED BY: ES DATE: 6/4/2020	DIRECT SHEAR PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	APPENDIX B-5



Exploration ID	Depth (ft.)	Sample Description
B-8	2	SILT (ML)

Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
NM	NM	NM	NM	NM	2.65

	Specimen No.	Water Content (%)	Dry Unit Weight (pcf)	Saturation (%)	Void Ratio	Area (in^2)	Height (in)
Initial	1	6.2	98.6	24.4	0.677	4.60	0.96
	2	5.4	96.6	20.3	0.711	4.60	0.96
	3	5.6	101.3	23.3	0.633	4.60	0.96
At Test	Specimen No.	Water Content (%)	Dry Unit Weight (pcf)	Saturation (%)	Void Ratio	Area (in^2)	Height (in)
	1	22.4	108.6		0.591	4.60	0.97
	2	22.2	112.9		0.530	4.60	0.86
	3	20.9	116.3		0.497	4.60	0.88

Specimen No.	Peak Shear Stress (psf)	Design Shear Stress (psf)	Horizontal Displacement (in)	Normal Stress (psf)	Strain Rate (in/min)
1	1400		0.4000	2000	0.002
2	2320		0.4000	4000	0.002
3	3760		0.3800	6000	0.002

Results	Cohesion (psf)	Friction ϕ (deg)	Tan ϕ (deg)
Peak	133.33	30.54	0.57
Design			

Testing perfomed in general accordance with ASTM D3080.
NP = Nonplastic
NM = Not Measured

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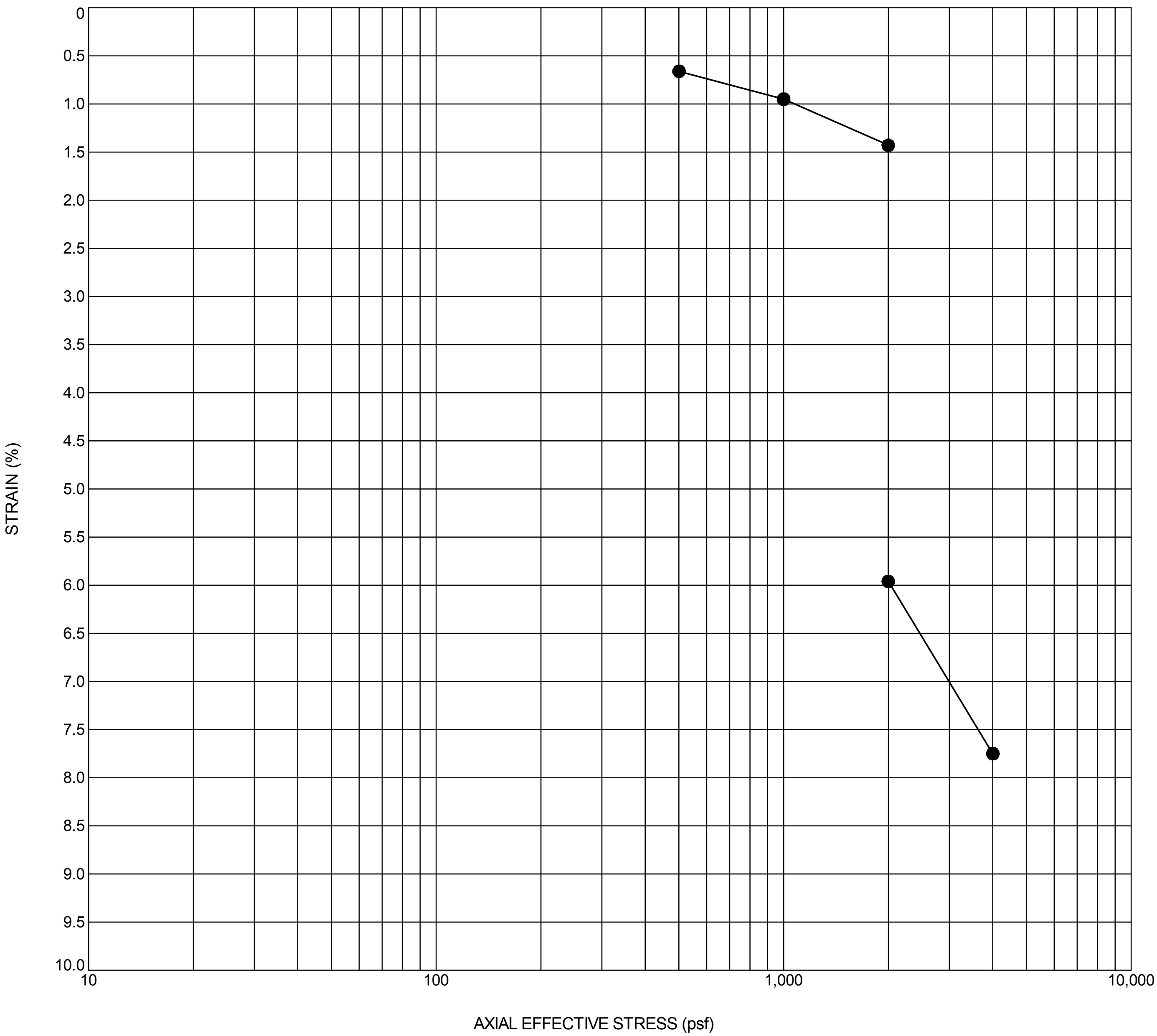
PROJECT NO.: 20210045.001A		DIRECT SHEAR	APPENDIX
DRAWN BY:	AA	PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	B-6
CHECKED BY:	ES		
DATE:	6/4/2020		



Exploration ID	Depth (ft.)	Sample Description
B-1	6	SANDY SILT (ML)

	Sample Condition Type	Sample Diameter (mm)	Height (mm)	Water Content (%)	Dry Unit Wt. (pcf)	Wet Unit Wt. (pcf)	Saturation (%)	Void Ratio	Specific Gravity (Assumed)	Passing #200	LL	PL	PI
Initial		2.4	25.4	4.7	106.4	111.4	4.7	0.880	2.65	NM	NM	NM	NM
Final		NM	0.9	20.7	111.3	134.3	20.7	0.730	2.65				

Testing performed in general accordance with ASTM D2435 Method A.
NP = Nonplastic
NM = Not Measured

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PROJECT NO.: 20210045.001A

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CHECKED BY: ES

DATE: 6/4/2020

ONE DIMENSIONAL CONSOLIDATION TEST

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX

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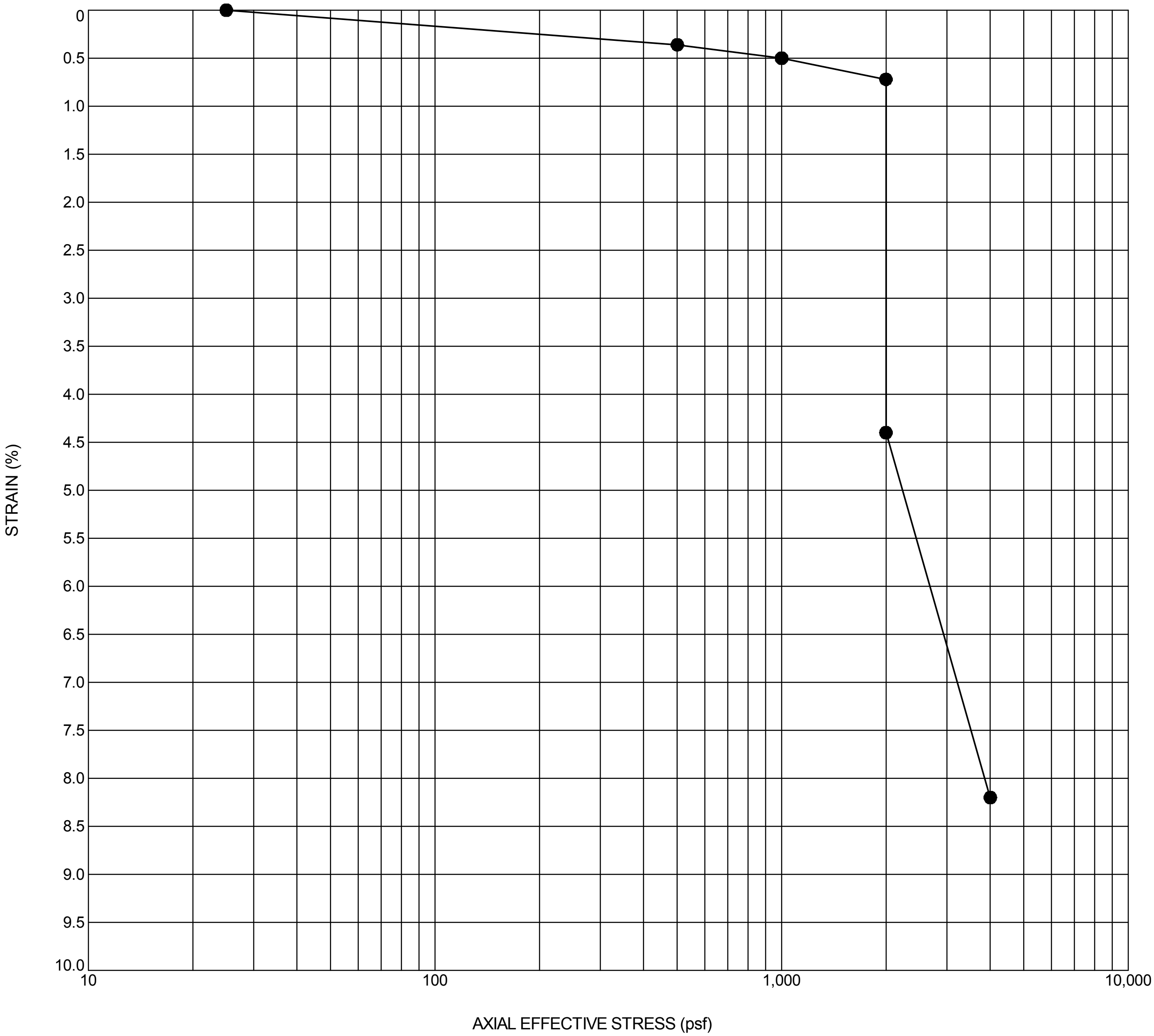
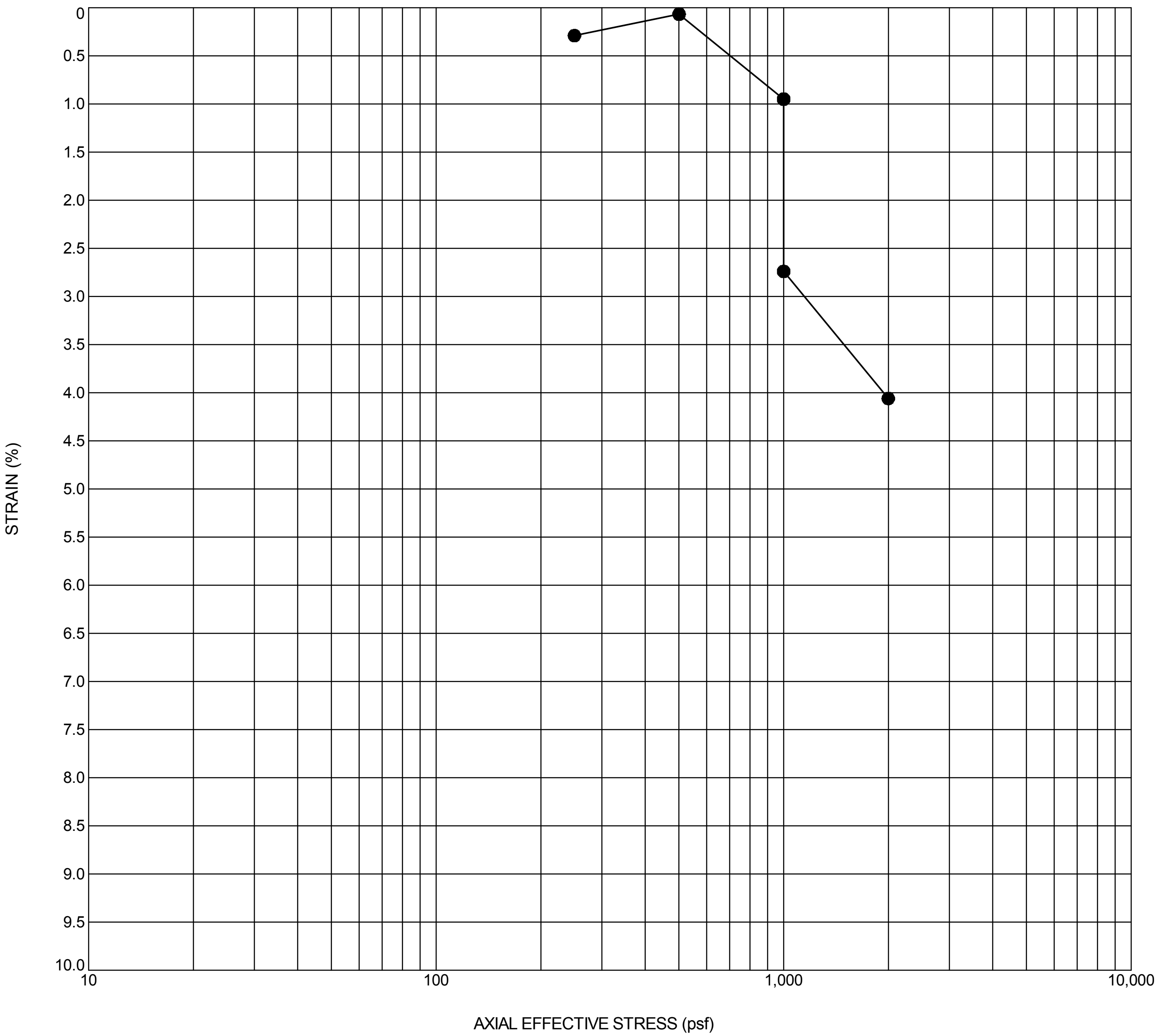


Exploration ID	Depth (ft.)	Sample Description
B-3	1	SILTY SAND (SM)

	Sample Condition Type	Sample Diameter (mm)	Height (mm)	Water Content (%)	Dry Unit Wt. (pcf)	Wet Unit Wt. (pcf)	Saturation (%)	Void Ratio	Specific Gravity (Assumed)	Passing #200	LL	PL	PI
Initial		61.5	25.4	6.9	96.8	103.4	25.7	0.710	2.65	NM	NM	NM	NM
Final		61.5	25.4	21.2	104.3	126.4	97.0	0.570	2.65				

Testing performed in general accordance with ASTM D2435 Method A.
NP = Nonplastic
NM = Not Measured

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A DRAWN BY: AA CHECKED BY: ES DATE: 6/4/2020	ONE DIMENSIONAL CONSOLIDATION TEST PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	APPENDIX B-8 PAGE: 1 of 2



Exploration ID	Depth (ft.)	Sample Description
B-7	7.5	SILTY SAND (SM)

	Sample Condition Type	Sample Diameter (mm)	Height (mm)	Water Content (%)	Dry Unit Wt. (pcf)	Wet Unit Wt. (pcf)	Saturation (%)	Void Ratio	Specific Gravity	Passing #200	LL	PL	PI
Initial		NM	NM	7.9	97.8	105.5	NM	NM	NM	NM	NM	NM	NM
Final		NM	NM	25.9	101.9	128.3	NM	NM	NM				

Testing performed in general accordance with ASTM D2435 Method A.
NP = Nonplastic
NM = Not Measured

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DATE: 6/4/2020

ONE DIMENSIONAL CONSOLIDATION TEST

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

APPENDIX
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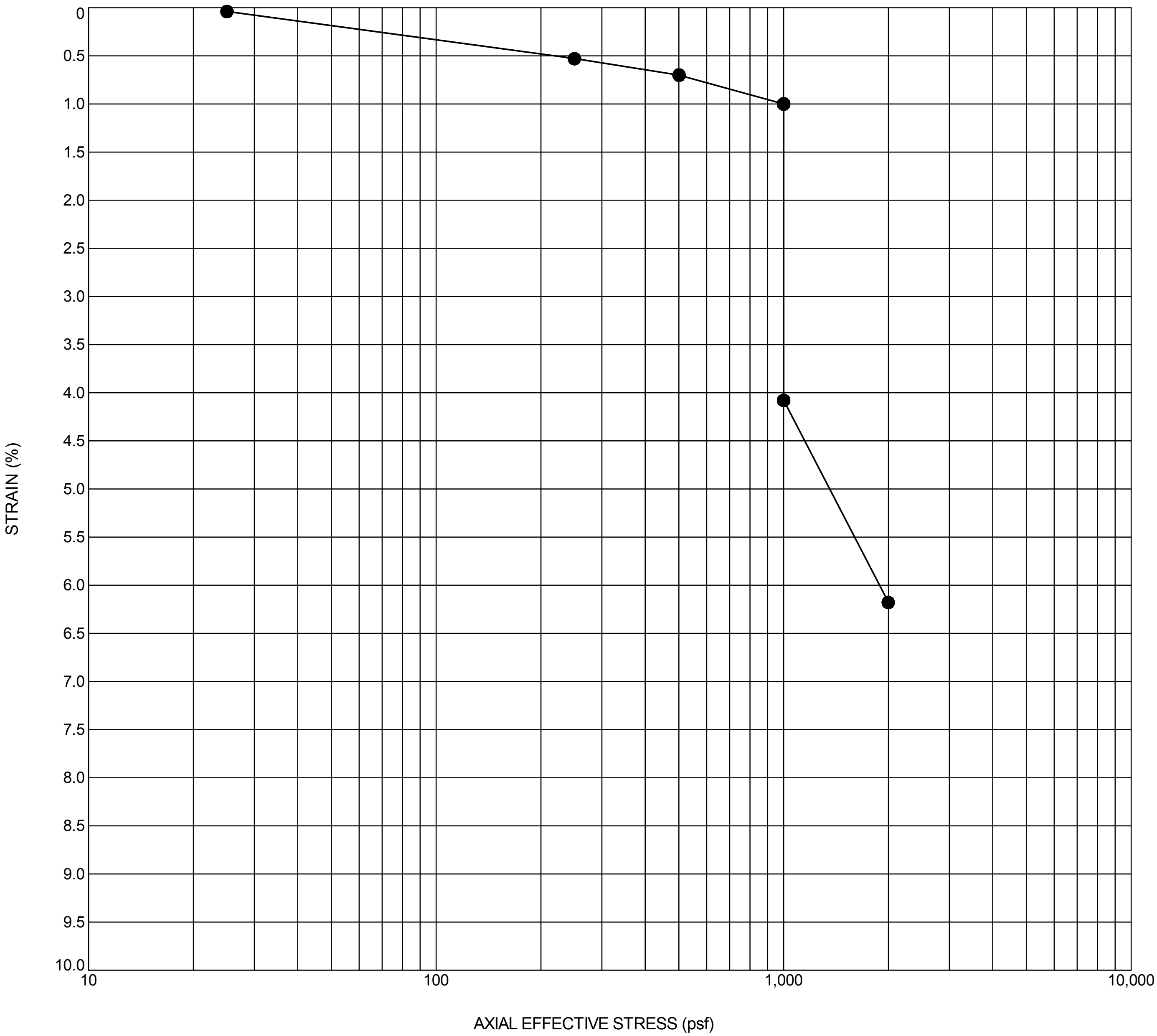

Exploration ID	Depth (ft.)	Sample Description
B-9	2	SANDY SILT (ML)

	Sample Condition Type	Sample Diameter (mm)	Height (mm)	Water Content (%)	Dry Unit Wt. (pcf)	Wet Unit Wt. (pcf)	Saturation (%)	Void Ratio	Specific Gravity (Assumed)	Passing #200	LL	PL	PI
Initial		61.5	25.4	7.1	92.0	98.5	23.6	0.800	2.65	57	NM	NM	NM
Final		61.5	23.9	24.3	98.5	122.4	94.1	0.690	2.65				

Testing performed in general accordance with ASTM D2435 Method A.
NP = Nonplastic
NM = Not Measured

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ONE DIMENSIONAL CONSOLIDATION TEST

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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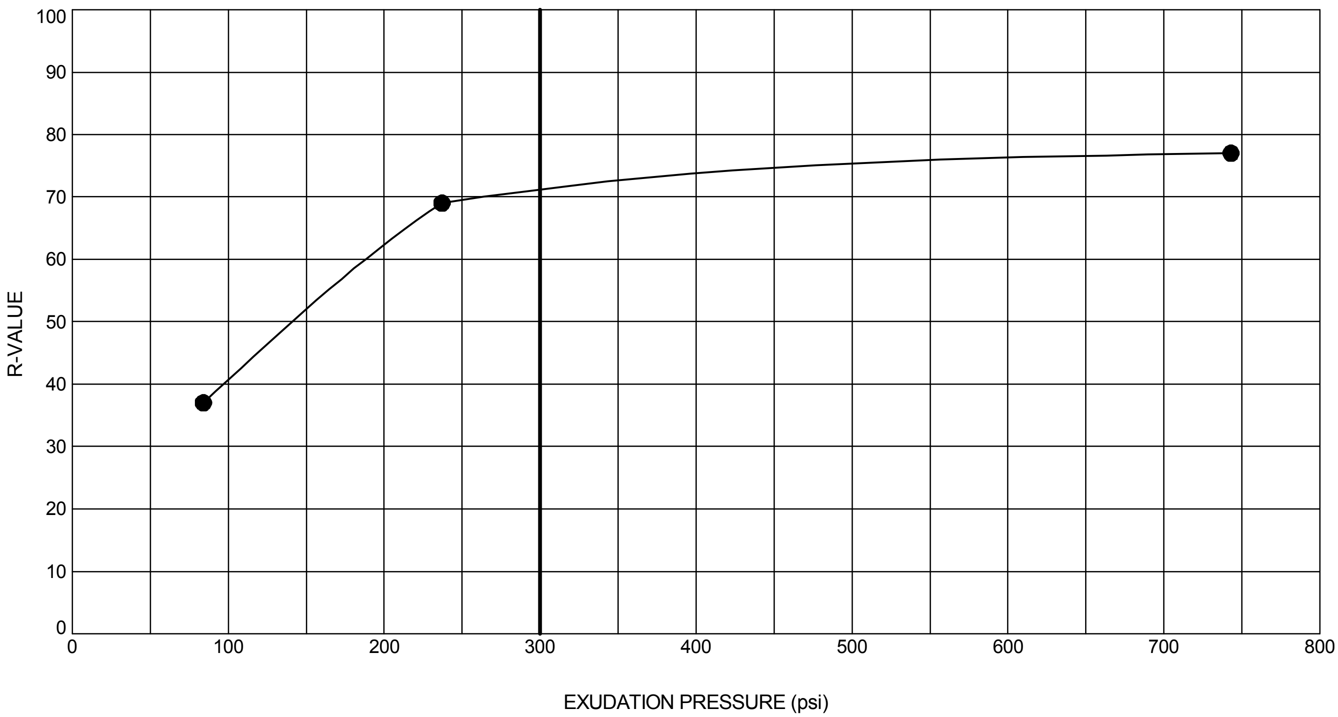

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-1	0 - 3	SILTY SAND (SM)	70

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	10.9	118.3	229	743	77
2	13.1	116.3	22	84	37
3	12.2	116.1	134	237	69

Testing performed in general accordance with ASTM D2844.

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PROJECT NO.: 20210045.001A
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DATE: 6/4/2020

R-VALUE

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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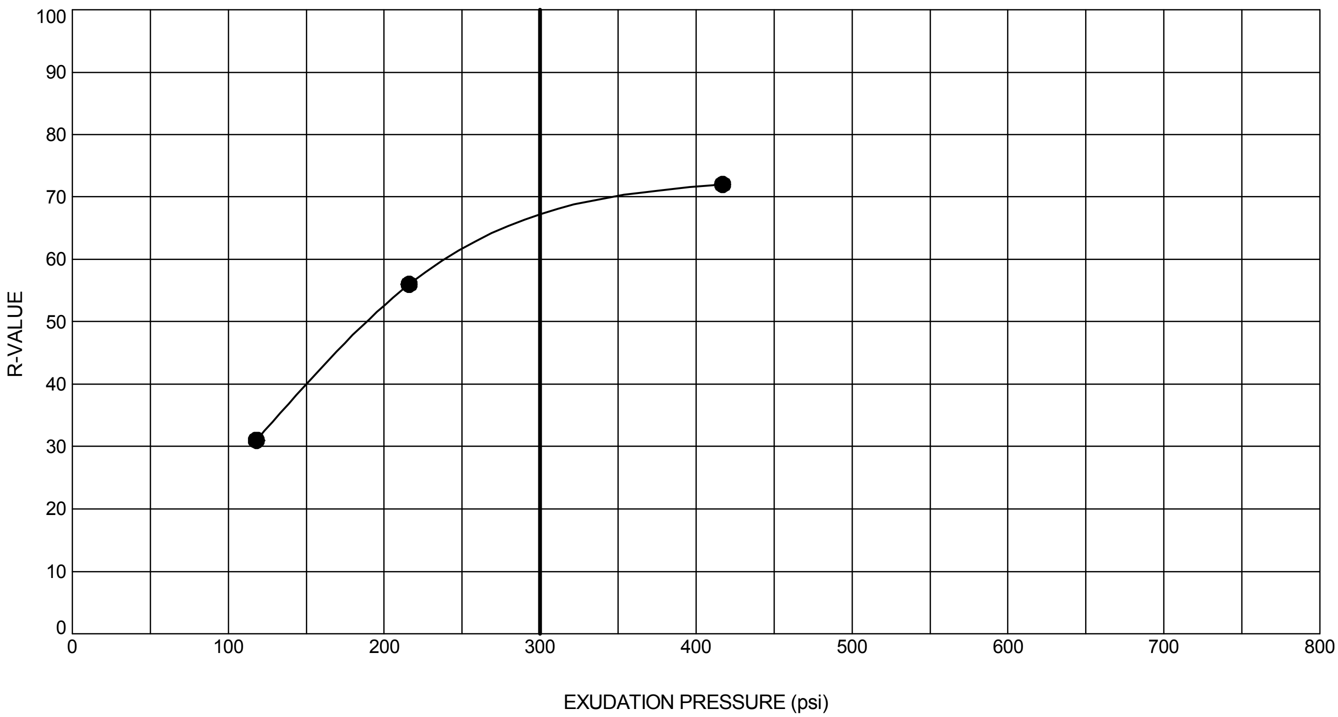

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-2	0 - 3	SILTY SAND (SM)	63

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	10.3	121.4	178	417	72
2	12.0	119.5	4	118	31
3	11.1	120.7	48	216	56

Testing performed in general accordance with ASTM D2844.

KLEINFELDER
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PROJECT NO.: 20210045.001A

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R-VALUE

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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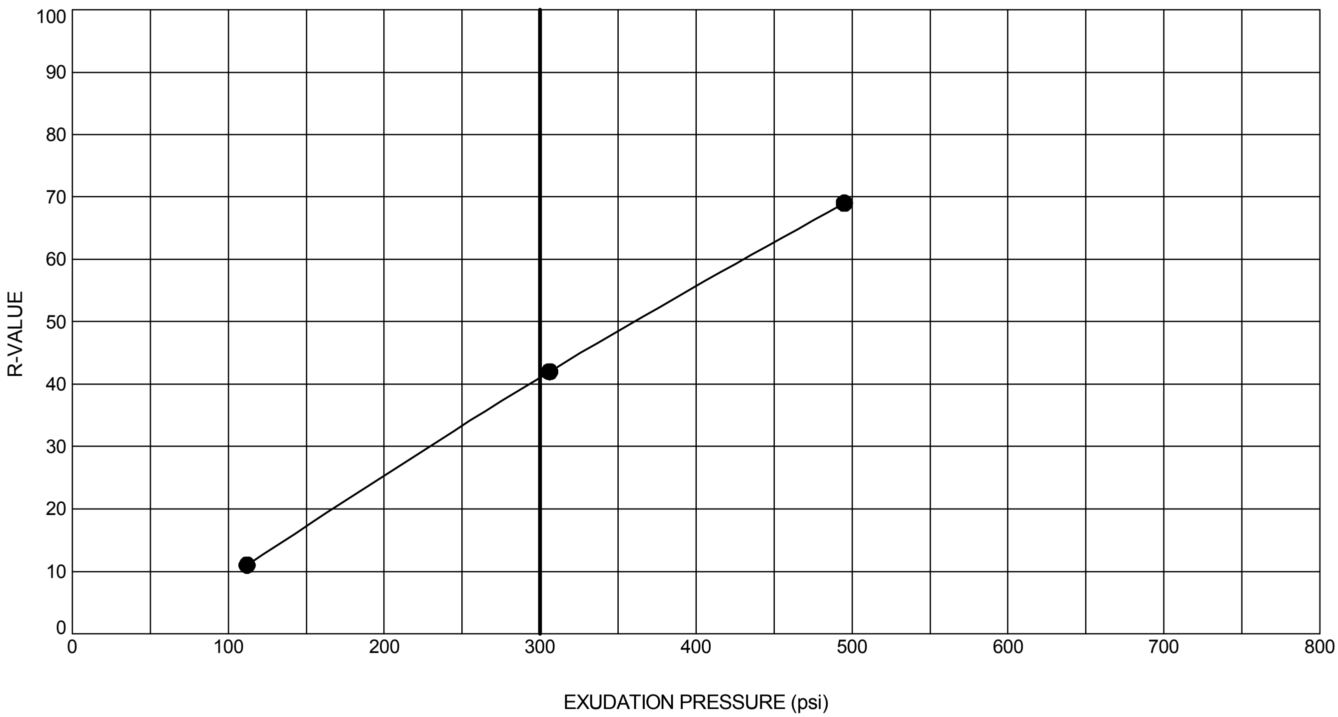

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-3	0 - 3	SANDY SILT (ML)	41

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	13.7	115.8	26	112	11
2	12.0	122.1	186	306	42
3	11.1	122.5	325	495	69

Testing performed in general accordance with ASTM D2844.

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MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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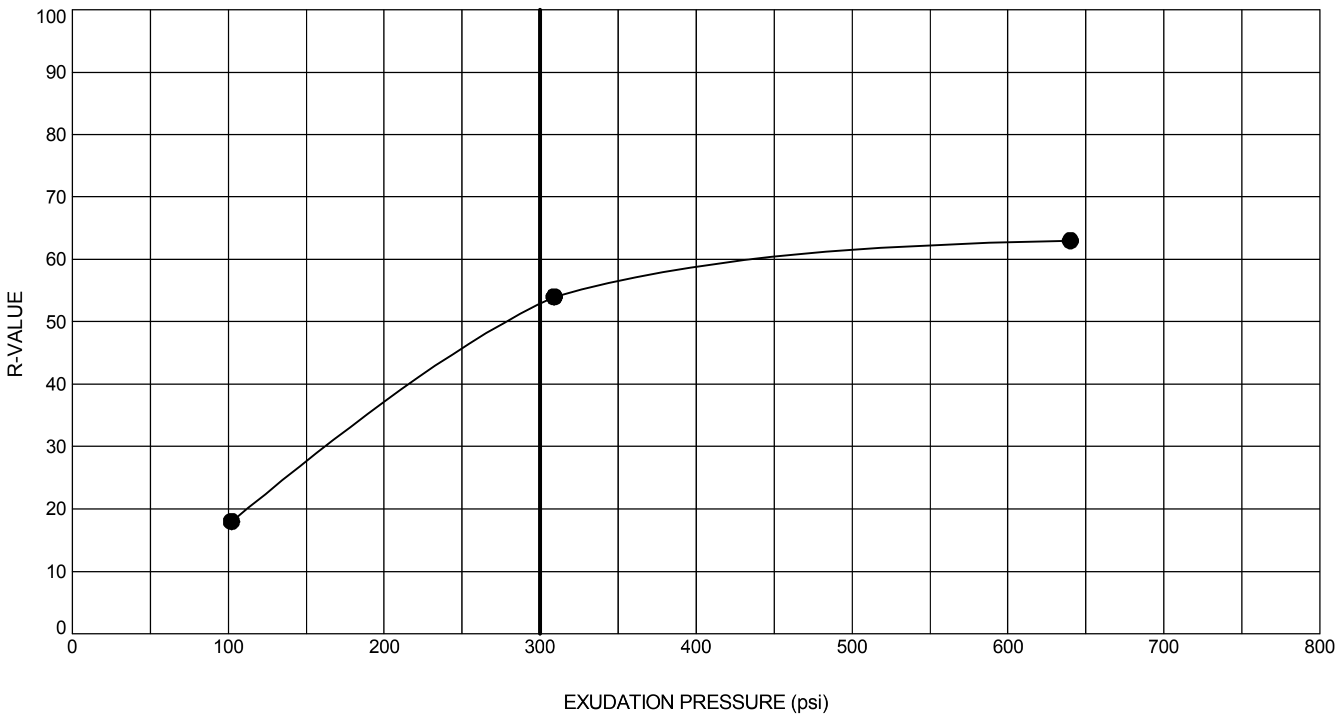

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-4	0 - 3	SANDY SILT (ML)	53

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	11.8	118.6	450	309	54
2	13.6	118.1	147	102	18
3	11.4	121.4	688	640	63

Testing performed in general accordance with ASTM D2844.

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R-VALUE

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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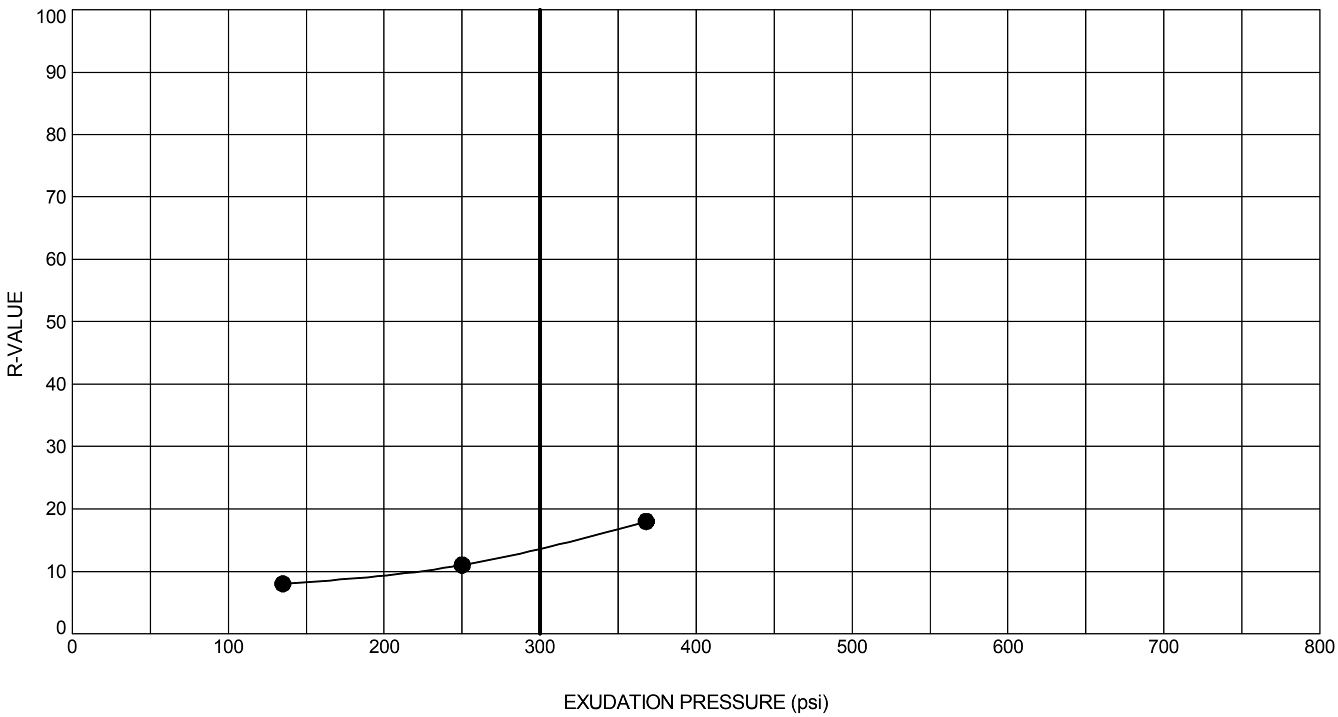

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-5	0 - 3	SILT (ML)	14

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	13.8	117.3	208	368	18
2	14.7	114.5	121	250	11
3	15.5	112.6	61	135	8

Testing performed in general accordance with ASTM D2844.

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R-VALUE

PROPOSED HANFORD PLACE
MEDICAL & MIXED-USE PROPERTY
HANFORD, CALIFORNIA

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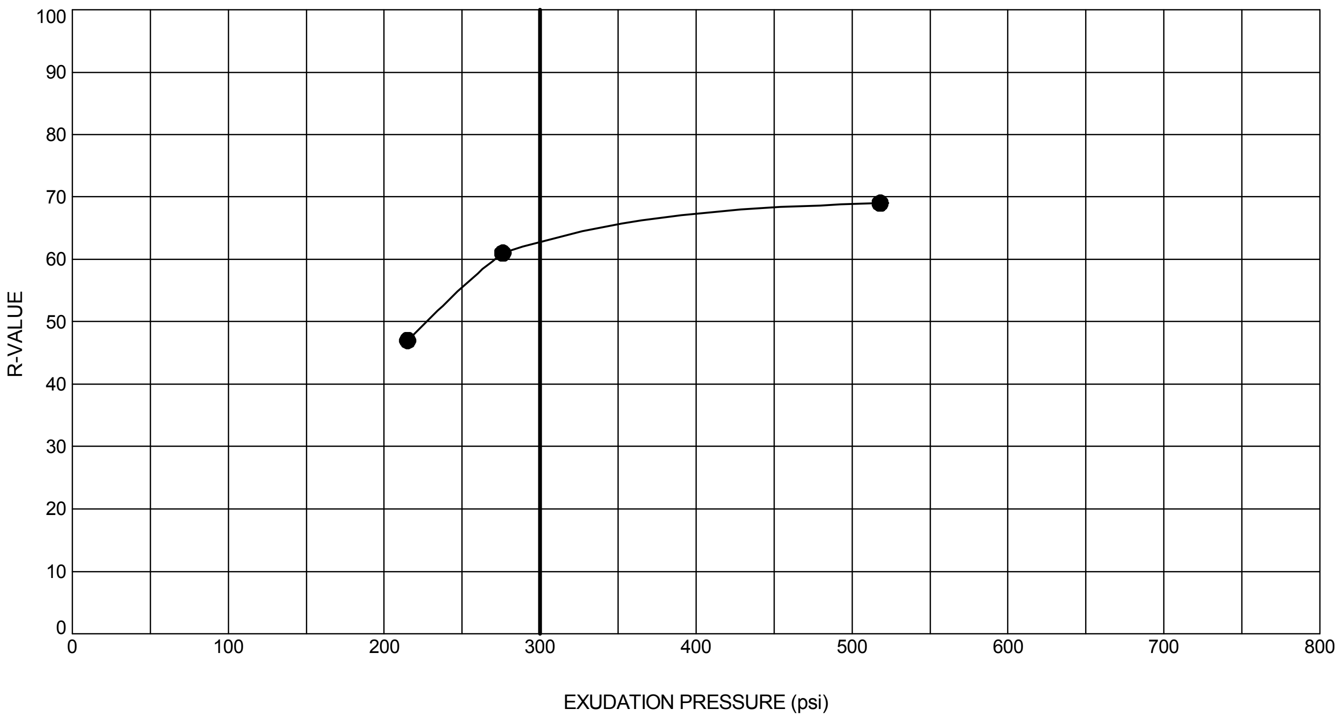

Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-6	0 - 3	SILTY SAND (SM)	62

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	12.6	116.4	178	215	47
2	11.8	117.5	368	518	69
3	12.2	117.0	255	276	61

Testing performed in general accordance with ASTM D2844.

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PROJECT NO.: 20210045.001A

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R-VALUE

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HANFORD, CALIFORNIA

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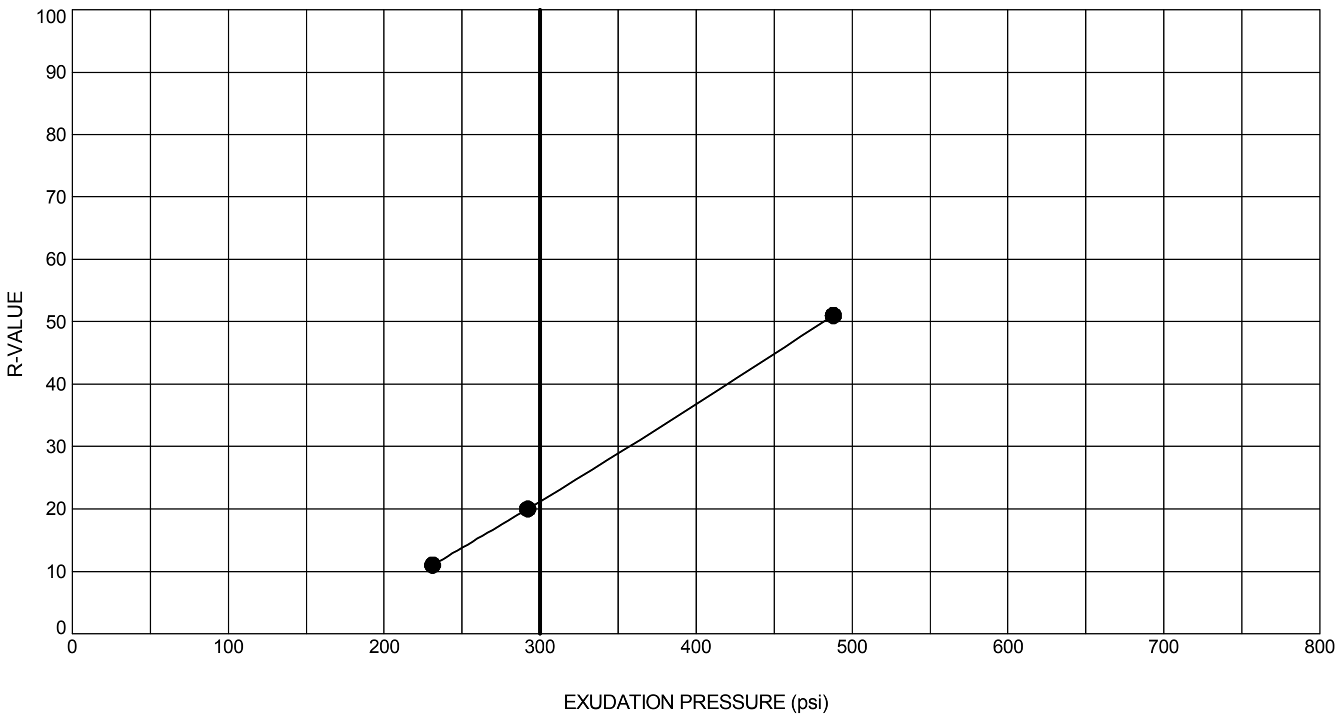


Exploration ID	Depth (ft.)	Sample Description	R-Value @ 300 psi Exudation Pressure
RV-7	0 - 3	SANDY SILT (ML)	21

Specimen No.	Moisture at Time of Test (%)	Dry Unit Weight (pcf)	Expansion Pressure (psi)	Exudation Pressure (psi)	Corrected Resistance Value
1	14.0	116.8	104	292	20
2	14.8	113.4	39	231	11
3	13.1	115.2	299	488	51

Testing performed in general accordance with ASTM D2844.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20210045.001A DRAWN BY: AA CHECKED BY: ES DATE: 6/4/2020	R-VALUE PROPOSED HANFORD PLACE MEDICAL & MIXED-USE PROPERTY HANFORD, CALIFORNIA	APPENDIX B-17

APPENDIX C

Liquefaction Analysis
Dry Sand Settlement Analysis

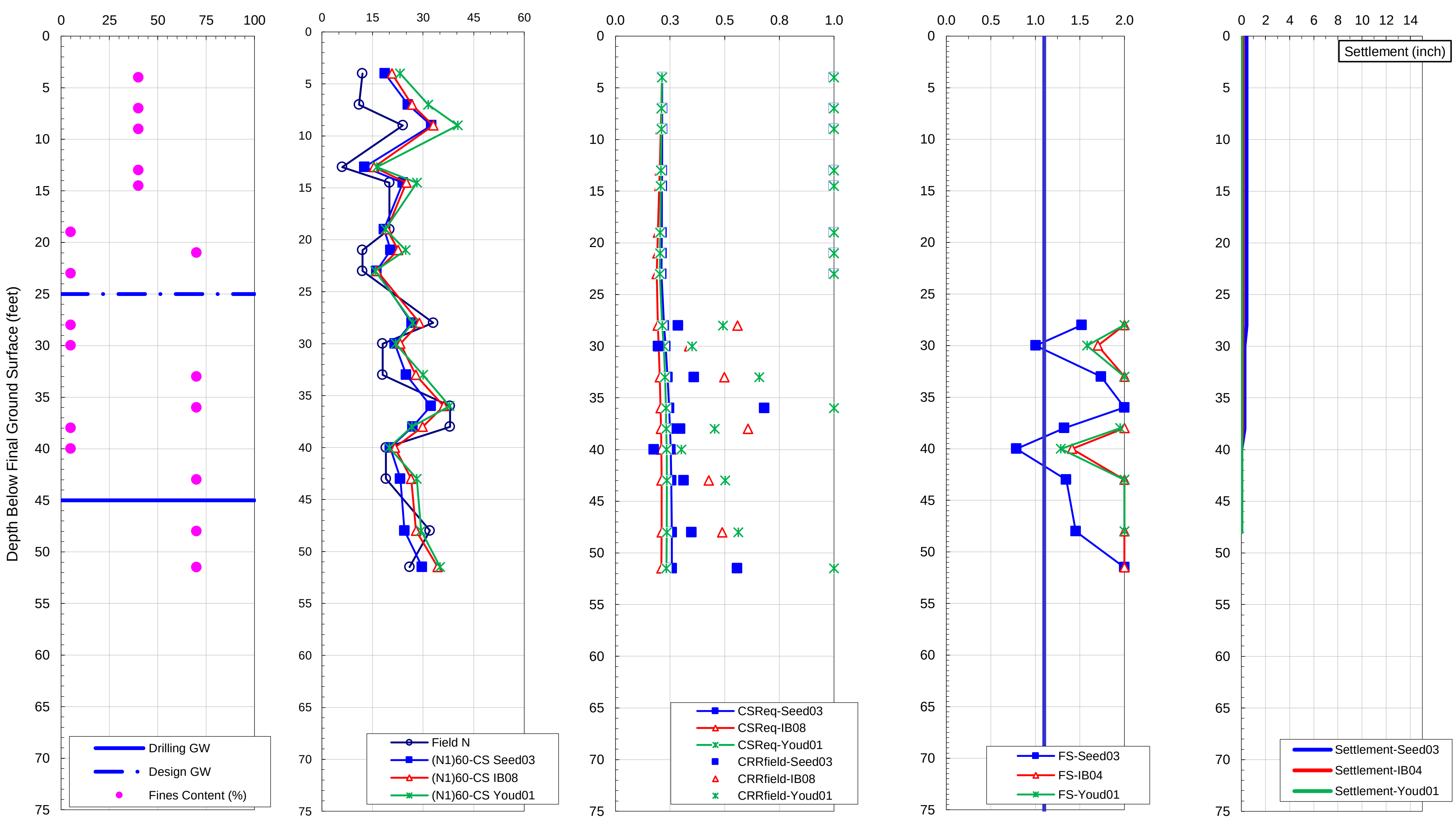
Boring ID: **B-6 (5% in 50 yrs)**

M_w= **6.2**
PGA= **0.33g**

Groundwater Depth During Drilling (ft) = **45.0 ft**
Design Groundwater Depth (ft) = **25.0 ft**

Existing Ground Elevation = **100.0 ft**
Final Ground Elevation = **100.0 ft**

Ana. by: A AhTye
Checked by: S. Plauson



1. $(N_1)_{60\text{-}CS}$ capped at 60; 2. CRRfield = 1 for non-liquefiable soils; 3. FS is capped at 2.0 for liquefiable soils and not plotted for non-liquefiable soils including soils above G.W.T.

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1330 Broadway, #1200
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t: 510628 9000 f: 510 628 9009

Project Name: **Hanford Place**
Project No.: **20210045**
Project Location: **Hanford, CA**

LIQUEFACTION ANALYSIS

Date 5/26/2020

FIGURE A-1

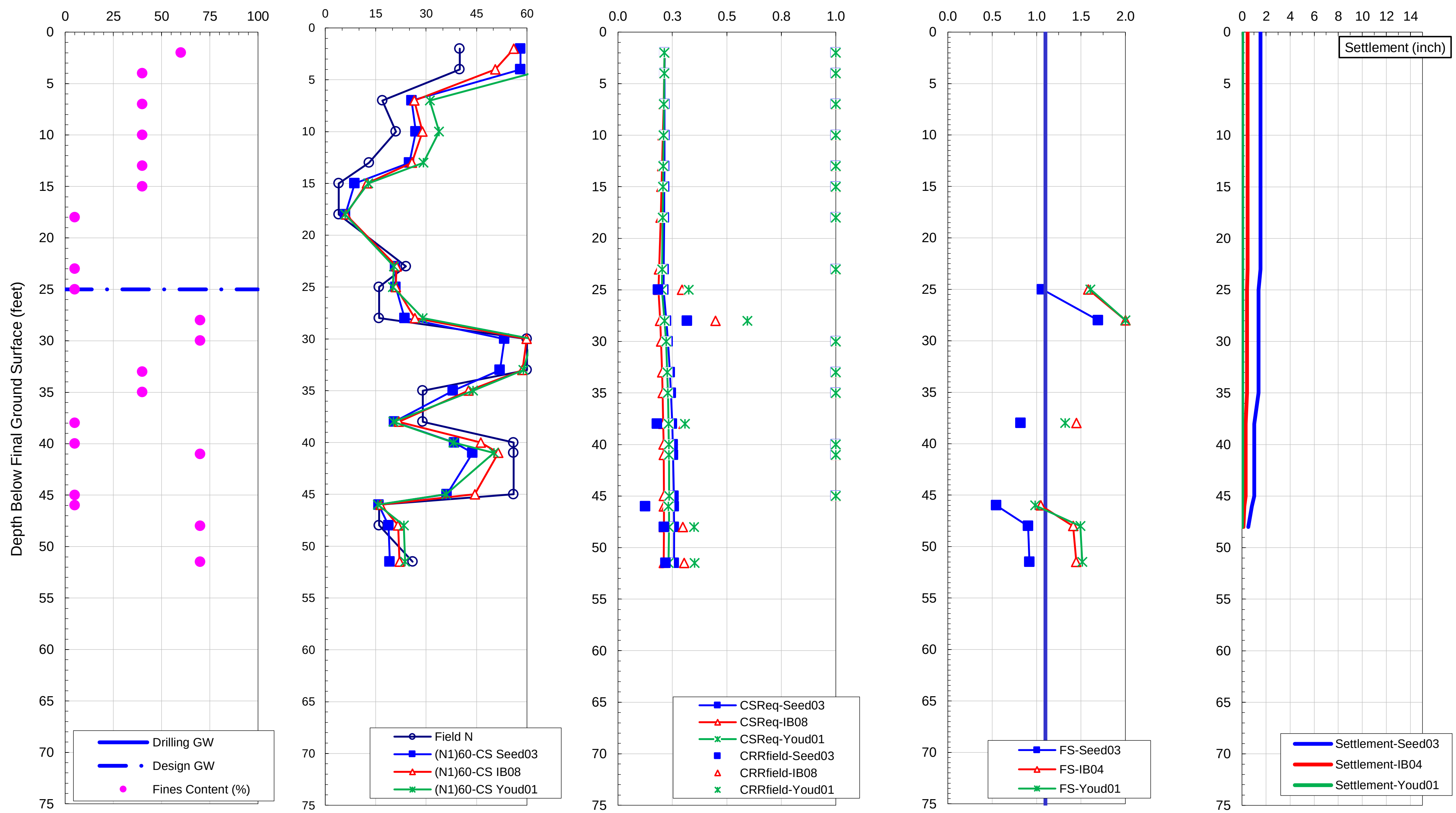
Boring ID: **B-7 (5% in 50 yrs)**

M_w= **6.2**
PGA= **0.33g**

Groundwater Depth During Drilling (ft) = **100.0 ft**
Design Groundwater Depth (ft) = **25.0 ft**

Existing Ground Elevation = **100.0 ft**
Final Ground Elevation = **100.0 ft**

Ana. by: A AhTye
Checked by: S. Plauson



1. $(N_1)_{60\text{-}CS}$ capped at 60; 2. CRRfield = 1 for non-liquefiable soils; 3. FS is capped at 2.0 for liquefiable soils and not plotted for non-liquefiable soils including soils above G.W.T.

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Project Name: **Hanford Place**
Project No.: **20210045**
Project Location: **Hanford, CA**

LIQUEFACTION ANALYSIS

Date 5/26/2020

FIGURE A-1

Seismic Settlement of Dry Sands
Tokimatsu & Seed (1987)

Project No. 20210045
Project Name Hanford Place
Analysis by A. AhTye

M = 6.21 Moment Magnitude (Use Modal value)
PHA = 0.33 g (Peak horizontal acceleration; use PGA_M)
γ = 105 pcf (unit weight of soil)
Ko = 0.47 (at-rest coefficient)

Boring	Depth at middle of sampler (ft)	Layer Thickness (ft)	Soil Classification	Anticipated Fines Content (%)	r_d	σ_0 (psf)	σ'_m (psf)	σ'_m (tsf)	N (blows/ft)	SAMPLER TYPE (1) SPT w/out liners (2) SPT w/ liners (3) MC (4) CAL	Sampler Correction, C_S	Overbuden Correction, C_N	Fine Content Correction	N_1 (blows/ft)	Gmax (psf)	Effective Shear Strain, γ_{eff} (Geff/Gmax)	Effective Shear Strain, γ_{eff} (from Fig. 11)	Effective Shear Strain, γ_{eff} (%)	Volumetric Strain (from Figure 13) (%)	Results: Seismic Settlement for M7.5 (in)	Seismic Settlement for M5.25 (in)	Seismic Settlement for M6 (in)	Seismic Settlement for M6.75 (in)	Seismic Settlement for M8.5 (in)
B-6	2	4	SM	40	0.996	210	135.8	0.0679	12	4	0.65	1.70	3.2	16	592866	7.56E-05	1.2E-04	1.2E-02	0.0200	0.019	0.01	0.01	0.02	0.02
	5.5	3	SM	40	0.988	577.5	373.45	0.186725	11	1	1.1	1.70	3.2	24	1111278	1.10E-04	3.0E-04	3.0E-02	0.0220	0.016	0.01	0.01	0.01	0.02
	8	2	SM	40	0.983	840	543.2	0.2716	24	4	0.65	1.54	3.2	27	1403068	1.26E-04	3.0E-04	3.0E-02	0.0200	0.010	0.00	0.01	0.01	0.01
	11	4	SM	40	0.976	1155	746.9	0.37345	6	1	1.1	1.32	3.2	12	1247366	1.94E-04	4.0E-04	4.0E-02	0.0800	0.077	0.03	0.05	0.07	0.10
	13.75	1.5	SM	40	0.970	1443.75	933.625	0.4668125	20	4	0.65	1.18	3.2	19	1616265	1.86E-04	4.0E-04	4.0E-02	0.0420	0.015	0.01	0.01	0.01	0.02
	16.75	4.5	SP	5	0.964	1758.75	1137.325	0.5686625	20	4	0.65	1.07	1.0	15	1658342	2.19E-04	6.0E-04	6.0E-02	0.1000	0.108	0.04	0.06	0.09	0.14
	20	2	ML	70	0.957	2100	1358	0.679	12	1	1.1	0.98	4.8	18	1920095	2.24E-04	5.0E-04	5.0E-02	0.0600	0.029	0.01	0.02	0.02	0.04
	22	2	SP	5	0.952	2310	1493.8	0.7469	12	1	1.1	0.93	1.0	13	1830635	2.58E-04	5.2E-04	5.2E-02	0.1000	0.048	0.02	0.03	0.04	0.06
	25.5	5	SP	5	0.939	2677.5	1731.45	0.865725	33	4	0.65	0.86	1.0	20	2241470	2.41E-04	5.0E-04	5.0E-02	0.0500	0.060	0.02	0.04	0.05	0.08
	29	2	SP	5	0.924	3045	1969.1	0.98455	18	1	1.1	0.81	1.0	17	2284078	2.64E-04	4.8E-04	4.8E-02	0.0600	0.029	0.01	0.02	0.02	0.04
	31.5	3	CL-ML	70	0.911	3307.5	2138.85	1.069425	18	1	1.1	0.78	4.8	20	2518920	2.57E-04	4.8E-04	4.8E-02	0.0500	0.036	0.01	0.02	0.03	0.05
	34.5	3	CL-ML	70	0.893	3622.5	2342.55	1.171275	38	4	0.65	0.74	4.8	23	2758949	2.52E-04	5.0E-04	5.0E-02	0.0480	0.035	0.01	0.02	0.03	0.04
	37	2	SP	5	0.878	3885	2512.3	1.25615	38	4	0.65	0.72	1.0	19	2661855	2.75E-04	5.0E-04	5.0E-02	0.0500	0.024	0.01	0.01	0.02	0.03
	39	2	SP	5	0.866	4095	2648.1	1.32405	19	1	1.1	0.70	1.0	16	2571947	2.96E-04	6.0E-04	6.0E-02	0.0900	0.043	0.02	0.03	0.04	0.05
	41.5	3	CL-ML	70	0.845	4357.5	2817.85	1.408925	19	1	1.1	0.68	4.8	19	2830935	2.79E-04	6.0E-04	6.0E-02	0.0700	0.050	0.02	0.03	0.04	0.06
	45.5	5	CL-ML	70	0.805	4777.5	3089.45	1.544725	32	4	0.65	0.65	4.8	18	2927213	2.82E-04	6.0E-04	6.0E-02	0.0700	0.084	0.03	0.05	0.07	0.11
	49.75	3.5	CL-ML	70	0.763	5223.75	3378.025	1.6890125	26	1	1.1	0.62	4.8	22	3281460	2.60E-04	5.0E-04	5.0E-02	0.0480	0.040	0.02	0.02	0.03	0.05
																				0.723	0.29	0.43	0.61	0.90

MAG 6.21 0.4841688
Double the value for bi-directional shaking
Select= 1/4 for M 6.21
6 6.75

(use to read Fig. 11) — σ'_m (tsf)
(use to read Fig. 13) — N_1
(use to read Fig. 11) — γ_{eff} (Geff/Gmax)
(use to read Fig. 13) — γ_{eff} (%)

Seismic Settlement of Dry Sands
Tokimatsu & Seed (1987)

Project No. 20210045
Project Name Hanford Place
Analysis by A. AhTye

M = 6.21 Moment Magnitude (Use Modal value)
PHA = 0.33 g (Peak horizontal acceleration; use PGA_M)
γ = 105 pcf (unit weight of soil)
Ko = 0.47 (at-rest coefficient)

Boring	Depth at middle of sampler (ft)	Layer Thickness (ft)	Soil Classification	Anticipated Fines Content (%)	r_d	σ_0 (psf)	σ'_m (psf)	σ'_m (tsf)	N (blows/ft)	SAMPLER TYPE (1) SPT w/out liners (2) SPT w/ liners (3) MC (4) CAL	Sampler Correction, C_S	Overbuden Correction, C_N	Fine Content Correction	N_1 (blows/ft)	Gmax (psf)	Effective Shear Strain, γ_{eff} (Geff/Gmax)	Effective Shear Strain, γ_{eff} (from Fig. 11)	Effective Shear Strain, γ_{eff} (%)	Volumetric Strain (from Figure 13) (%)	Results: Seismic Settlement for M7.5 (in)	Seismic Settlement for M5.25 (in)	Seismic Settlement for M6 (in)	Seismic Settlement for M6.75 (in)	Seismic Settlement for M8.5 (in)
B-7	1	2	ML	60	0.998	105	67.9	0.03395	40	4	0.65	1.70	4.4	49	601419	3.74E-05	5.0E-05	5.0E-03	0.0014	0.001	0.00	0.00	0.00	0.00
	3	2	SM	40	0.993	315	203.7	0.10185	40	4	0.65	1.70	3.2	47	1033043	6.50E-05	8.5E-05	8.5E-03	0.0015	0.001	0.00	0.00	0.00	0.00
	5.5	3	SM	40	0.988	577.5	373.45	0.186725	17	4	0.65	1.70	3.2	22	1082734	1.13E-04	2.0E-04	2.0E-02	0.0180	0.013	0.01	0.01	0.01	0.02
	8.5	3	SM	40	0.982	892.5	577.15	0.288575	21	4	0.65	1.50	3.2	24	1378851	1.36E-04	2.1E-04	2.1E-02	0.0150	0.011	0.00	0.01	0.01	0.01
	11.5	3	SM	40	0.975	1207.5	780.85	0.390425	13	1	1.1	1.29	3.2	22	1556529	1.62E-04	2.8E-04	2.8E-02	0.0220	0.016	0.01	0.01	0.01	0.02
	14	2	SM	40	0.970	1470	950.6	0.4753	4	1	1.1	1.17	3.2	8	1250115	2.45E-04	7.0E-04	7.0E-02	0.2000	0.096	0.04	0.06	0.08	0.12
	16.5	3	SP	5	0.964	1732.5	1120.35	0.560175	4	1	1.1	1.07	1.0	6	1197738	2.99E-04	1.0E-03	1.0E-01	0.4000	0.288	0.12	0.17	0.24	0.36
	20.5	5	SP	5	0.955	2152.5	1391.95	0.695975	24	4	0.65	0.96	1.0	16	1881705	2.34E-04	5.5E-04	5.5E-02	0.0800	0.096	0.04	0.06	0.08	0.12
	24	2	SP	5	0.946	2520	1629.6	0.8148	16	1	1.1	0.89	1.0	17	2062830	2.48E-04	5.0E-04	5.0E-02	0.0700	0.034	0.01	0.02	0.03	0.04
	26.5	3	CL	70	0.935	2782.5	1799.35	0.899675	16	1	1.1	0.85	4.8	20	2292102	2.43E-04	5.0E-04	5.0E-02	0.0500	0.036	0.01	0.02	0.03	0.05
	29	2	CL	70	0.924	3045	1969.1	0.98455	60	4	0.65	0.81	4.8	36	2941437	2.05E-04	3.2E-04	3.2E-02	0.0220	0.011	0.00	0.01	0.01	0.01
	31.5	3	SM	40	0.911	3307.5	2138.85	1.069425	60	4	0.65	0.78	3.2	34	2982532	2.17E-04	3.5E-04	3.5E-02	0.0160	0.012	0.00	0.01	0.01	0.01
	34	2	SM	40	0.896	3570	2308.6	1.1543	29	1	1.1	0.75	3.2	27	2885595	2.38E-04	4.5E-04	4.5E-02	0.0330	0.016	0.01	0.01	0.01	0.02
	36.5	3	SP	5	0.881	3832.5	2478.35	1.239175	29	4	0.65	0.72	1.0	15	2434437	2.97E-04	6.0E-04	6.0E-02	0.1000	0.072	0.03	0.04	0.06	0.09
	39	2	SP	5	0.866	4095	2648.1	1.32405	56	4	0.65	0.70	1.0	26	3066023	2.48E-04	4.4E-04	4.4E-02	0.0320	0.015	0.01	0.01	0.01	0.02
	40.5	1	CL	70	0.855	4252.5	2749.95	1.374975	56	4	0.65	0.69	4.8	30	3250254	2.40E-04	4.5E-04	4.5E-02	0.0280	0.007	0.00	0.00	0.01	0.01
	43	4	SP	5	0.830	4515	2919.7	1.45985	56	4	0.65	0.67	1.0	25	3169449	2.54E-04	4.5E-04	4.5E-02	0.0320	0.031	0.01	0.02	0.03	0.04
	45.5	1	SP	5	0.805	4777.5	3089.45	1.544725	16	1	1.1	0.65	1.0	12	2572161	3.21E-04	7.0E-04	7.0E-02	0.1300	0.031	0.01	0.02	0.03	0.04
	47	2	CL	70	0.790	4935	3191.3	1.59565	16	1	1.1	0.64	4.8	16	2847252	2.94E-04	5.8E-04	5.8E-02	0.0800	0.038	0.02	0.02	0.03	0.05
	49.75	3.5	CL	70	0.763	5223.75	3378.025	1.6890125	26	4	0.65	0.62	4.8	15	2883048	2.96E-04	5.5E-04	5.5E-02	0.0800	0.067	0.03	0.04	0.06	0.08
																				0.890	0.36	0.53	0.76	1.11

MAG 6.21 0.59637504
Double the value for bi-directional shaking
Select= 1/4 for M 6.21
6 6.75

(use to read Fig. 11)
(use to read Fig. 13)
(use to read Fig. 11)
(use to read Fig. 13)

APPENDIX E

ACOUSTICAL ANALYSIS

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ACOUSTICAL ANALYSIS

HANFORD PLACE
HANFORD, CALIFORNIA

WJVA Report No. 20-016

PREPARED FOR

THE HANFORD GROUP/EPIC MANAGEMENT GROUP
4405 MARGARITA ROAD, SUITE 100
TEMECULA, CALIFORNIA 92592

PREPARED BY

WJV ACOUSTICS, INC.
VISALIA, CALIFORNIA

MAY 12, 2021

1. INTRODUCTION

Project Description:

The proposed project would develop a medical and mixed-use development and would construct fifteen (15) buildings consisting of medical outpatient clinic services, hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses, as well as a bio infiltration basin, associated open space, circulation and parking, and infrastructure improvements.

The proposed project would include the following: a 22,525-square-foot ambulatory surgery center; a 12,445-square-foot specialty clinic; two 12,445-square-foot medical office buildings; a 12,445- square-foot psychiatric health facility; a 10,000-square-foot, a four-story 105-room hotel with a conference center and pool; a 35,000-square-foot nursing college; four 15,55-square-foot strip retail buildings; two 15,000-square-foot retail/drive-through/medical commercial buildings; a 54,611- square-foot skilled nursing facility; a 34,480-square-foot memory care facility; a three-story 90-unit multi-family apartment; two 11,000 medical/commercial buildings; and a 5-acre bio infiltration basin.

Environmental Noise Assessment:

This environmental noise assessment has been prepared to determine if significant noise impacts will be produced by the project and to describe mitigation measures for noise if significant impacts are determined. The environmental noise assessment, prepared by WJV Acoustics, Inc. (WJVA), is based upon the project Site Plan provided by the applicant (Figure 1), traffic data provided by VRPA Technologies, Inc. and a project site visit on May 5-6, 2021. Revisions to the Site Plan, project traffic information or other project-related information available to WJVA at the time the analysis was prepared may require a reevaluation of the findings and/or recommendations of the report.

Appendix A provides definitions of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported in this analysis are A-weighted sound pressure levels in decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighted sound levels, as they correlate well with public reaction to noise. Appendix B provides examples of sound levels for reference.

2. THRESHOLDS OF SIGNIFICANCE

The CEQA Guidelines apply the following questions for the assessment of significant noise impacts for a project:

a. Would the project result in 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. Would the project result in 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?

a. Noise Level Standards

CITY OF HANFORD

General Plan

The City of Hanford Noise Element of the General Plan[1] (adopted April 2017) provides generalized Noise Goals and Policies for various noise sources and land uses, related to development within the City. These noise goals and policies are provided below.

Noise Goals

- Goal H7: Protection from the harmful and annoying effect of excessive noise.

- Goal H8: Protection of the City's economic base by preventing incompatible land uses from encroaching upon existing or planned noise-producing uses.

Major Noise Sources

- Policy H39 Aircraft Noise: Evaluate proposed development proposals against the land use policies of the Kings County Airport Land Use Compatibility Plan.

- Policy H40 Ground Transportation Noise: Limit the effects of vehicle noise generation by designating truck routes, limiting vehicle speeds, standards relating to vehicle noise emission levels and muffler systems.

- Policy H41 Interior Noise Exposure: Adopt State Noise Insulation Standards (California Code of Regulations, Title 24) and Chapter 35 of the Uniform Building Code (UBC) concerning interior noise exposure for new single, multi-family housing, hotels and motels.

- Policy H42 Noise Evaluation for New Development: Evaluate proposed development proposals against existing and future noise levels from ground transportation noise sources.

- Policy H43 Non-Transportation Noise: Mitigate noise created by non-transportation noise sources so as not to exceed the maximum allowable interior and exterior noise level standards.

Noise Exposure

- Policy H45 Minimizing Noise for Residences in Mixed-use Developments: Require mixed-use projects to minimize noise exposure within the indoor areas of residential areas through design and construction techniques such as separating residential space from mechanical equipment, loading bays, and parking lots, and through management and operating procedures.

The 2017 General Plan does not provide specific noise standards applicable to development projects. Therefore, WJVA consulted with City staff who provided the noise level standards from the City's 2002 General Plan. The standards provided in the 2002 General Plan are the same as those provided in the Kings County General Plan, and will be considered the applicable standards for this project.

The 2002 General Plan provided noise level compatibility standards for transportation and non-transportation (stationary) noise sources. Table 1 provides the City of Hanford 2002 General Plan noise standards for transportation noise sources and Table 2 provides the City of Hanford 2002 General Plan noise standards for non-transportation (stationary) noise sources.

For transportation noise sources, the General Plan sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level (L_{dn}) or CNEL. The L_{dn} represents the time-weighted energy average noise level for a 24-hour day, with a 10 dB penalty added to noise levels occurring during the nighttime hours (10:00 p.m.-7:00 a.m.). The L_{dn} represents cumulative exposure to noise over an extended period of time and are therefore calculated based upon *annual average* conditions. For non-transportation (stationary) noise sources, the General plan sets noise compatibly standards in terms of the L_{max} (maximum) and L_{eq} (equivalent sound level) metrics.

TABLE 1

CITY OF HANFORD
MAXIMUM ALLOWABLE NOISE EXPOSURE
TRANSPORTATION NOISE SOURCES

Land Use	Outdoor Activity Areas[a] L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB[b]
Residential	60[c]	45	--
Transient Lodging	60[c]	45	--
Hospitals, Nursing Homes	60[c]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60[c]	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

Notes:

a 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.

b As determined for a typical worst case hour during periods of use.

c Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 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.

Source: City of Hanford 2002 General Plan

TABLE 2

CITY OF HANFORD
NOISE-LEVEL PERFORMANCE STANDARDS FOR NEW PROJECTS AFFECTED BY OR INCLUDING NON-TRANSPORTATION (STATIONARY) NOISE SOURCES

Category	Noise-Level Descriptor	Exterior Noise Level Standard (Applicable at Property Line)		Interior Noise Level Standard	
		Daytime	Nighttime	Daytime	Nighttime
Residential	L_{eq} L_{max}	50 70	45 65	40 60	35 55
Transient Lodging Hospitals, Nursing Homes	L_{eq} L_{max}	--	--	40 60	35 55
Theaters, Auditoriums, Music Halls	L_{eq}	--	--	35	35
Churches, Meeting Halls	L_{eq}	--	--	40	40
Office Buildings	L_{eq}	--	--	45	--
Schools, Libraries, Museums	L_{eq}	--	--	45	--
Playgrounds, Neighborhood Parks	L_{eq}	65	--	--	--

Notes:

Notes: Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

Source: City of Hanford 2002 General Plan

State of California

There are no state noise standards that are applicable to the project.

Federal Noise Standards

There are no federal noise standards that are applicable to the project.

b. Construction Noise and Vibration

Section 9.10.060(10) (Noises Prohibited) of the City of Hanford Municipal Code[2] provides limitations on hours of construction. The Municipal codes states that the following is prohibited:

> *The construction, demolition, alteration or repair of any building or the excavation of streets and highways other than between the hours of 7:00 a.m. and 8:00 p.m.*

Additional guidance can be provided by section 14-8.02A of the California Department of Transportation (Caltrans) Standard Specifications document which suggests that construction equipment should *not exceed 86 dBA* L_{max} *at a distance of 50 feet from job site activities from 9 p.m. to 6 a.m.*

There are no state or federal standards that specifically address construction vibration. Some guidance is provided by the Caltrans Transportation and Construction Vibration Guidance Manual[3]. The Manual provides guidance for determining annoyance potential criteria and damage potential threshold criteria. These criteria are provided below in Table 3 and Table 4, and are presented in terms of peak particle velocity (PPV) in inches per second (in/sec).

TABLE 3

GUIDELINE VIBRATION ANNOYANCE POTENTIAL CRITERIA

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.1
Severe	2.0	0.4

Source: Caltrans

TABLE 4

GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile, historic buildings, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans

3. SETTING

The proposed Hanford Place Mixed-Use project site is situated north of State Route 198 (SR 198) in the southwest section of the City of Hanford. The project site is generally bound by SR 198 to the south, San Joaquin Valley Railroad (SJVR) to the north, and existing retail shopping center to the east, with a mini-storage facility and former amusement/water park located west of the project site.

The project consists of approximately 43 acres and is currently undeveloped land. In addition to the above-described adjacent land uses, there are existing residential land uses located to the north (across the SJVR line) and the south (across SR 198), along with a car dealership, hotel and other retail and commercial land uses as well.

a. Background Noise Level Measurements

Existing noise levels in the project vicinity are dominated by traffic noise along SR 198 and other local roadways as well railroad operations associated with the San Joaquin Valley Railroad (SJVR) and occasional aircraft overflights associated with Lemoore Naval Air Station and other local airports and airstrips. Measurements of existing ambient noise levels in the project vicinity were conducted between May 5, 2021 and May 6, 2021. Long-term (24-hour) ambient noise level measurements were conducted at two (2) locations (sites LT-1 and LT-2) within and adjacent to the project site. Ambient noise levels were measured for a period of 48 continuous hours at monitoring site LT-1 and LT-2.

Ambient noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL 820 sound level analyzers equipped with Bruel & Kjaer (B&K) Type 4176 ½" microphones. The monitors were calibrated with a B&K Type 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment complies with applicable specifications of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters.

Site LT-1 was located within the central portion of the project site, approximately 300 feet from the centerline of SR 198. Site LT-1 was exposed to traffic noise associated with vehicles on SR 198, as well as train operations along the SJVR line and occasional aircraft overflights. Site LT-2 was located near the northern portion of the project site, adjacent to the existing residential land uses, and approximately fifty (50) feet from the SJVR line. The locations of the long-term noise monitoring sites are provided on Figure 2.

Measured hourly energy average noise levels (L_{eq}) at site LT-1 ranged from a low of 56.8 dB between 1:00 a.m. and 2:00 a.m. on May 5th to a high of 68.2 dBA between 8:00 a.m. and 9:00 a.m. on May 6th. Hourly maximum (L_{max}) noise levels at site LT-1 ranged from 69.4 to 96.4 dBA. Residual noise levels at the monitoring site, as defined by the L_{90}, ranged from 43.3 to 64.1 dBA. The L_{90} is a statistical descriptor that defines the noise level exceeded 90% of the time during each hour of the sample period. The L_{90} is generally considered to represent the residual (or background) noise level in the absence of identifiable single noise events from traffic, aircraft and other local noise sources. The measured L_{dn} value at site LT-1 for May 5th and May 6th was 68.8 dB L_{dn} and 68.9 dB L_{dn}, respectively. Figure 3 graphically depicts hourly variations in ambient noise levels at site LT-1 for each of the two monitoring days. Table 5 provides the measured hourly noise levels at ambient noise monitoring site LT-1, in terms of the City's noise standards (as described above in Table 2).

TABLE 5

SUMMARY OF 24-HOUR AMBIENT NOISE MEASUREMENT DATA, SITE LT-1
HANFORD PLACE
MAY 5 & 6, 2021

Time	A-Weighted Decibels, dBA			
	May 5, 2021		May 6, 2021	
	L_{eq}	L_{max}	Leq	Lmax
0:00:00	57.0	71.4	56.9	74.7
1:00:00	56.8	69.6	57.0	81.1
2:00:00	58.1	75.4	58.1	76.4
3:00:00	57.6	81.4	57.9	72.3
4:00:00	62.4	81.1	62.7	69.9
5:00:00	65.5	76.4	64.8	72.8
6:00:00	66.0	77.7	66.0	83.6
7:00:00	66.4	76.2	66.1	76.0
8:00:00	65.2	83.2	65.0	77.0
9:00:00	64.2	79.9	67.5	75.5
10:00:00	67.4	82.0	64.5	79.6
11:00:00	63.7	86.8	63.4	83.4
12:00:00	61.1	88.0	63.1	77.1
13:00:00	63.2	77.3	63.4	73.5
14:00:00	64.0	82.5	63.9	74.9
15:00:00	66.2	81.8	66.1	76.2
16:00:00	66.0	79.4	66.5	74.8
17:00:00	65.9	78.0	66.4	82.8
18:00:00	63.7	69.4	66.1	80.4
19:00:00	63.1	77.3	65.2	83.2
20:00:00	63.2	79.8	63.0	77.7
21:00:00	63.6	79.1	62.3	75.4
22:00:00	61.5	77.0	61.8	87.2
23:00:00	58.1	75.6	59.6	79.1
Daytime (7 am to 10 pm) Average (Range)	64.5 (61.1-67.4)	81.0 (69.4-90.4)	65.0 (62.3-68.2)	79.1 (73.5-96.4)
Nighttime (10 pm to 7 am) Average (Range)	60.3 (56.8-66.0)	76.2 (69.6-81.4)	60.5 (56.9-66.0)	77.5 (69.9-87.2)

Source: WJV Acoustics, Inc.

Measured hourly energy average noise levels (L_{eq}) at site LT-2 ranged from a low of 42.9 dB between midnight and 1:00 a.m. on May 5th to a high of 75.2 dBA between 8:00 a.m. and 9:00 p.m. on May 6th. Hourly maximum (L_{max}) noise levels at site LT-2 ranged from 61.3 to 113.2 dBA.

Residual noise levels at the monitoring site, as defined by the L_{90}, ranged from 68.7 to 57.0 dBA. The measured L_{dn} value at site LT-2 for May 5th and May 6th was 67.6 dB L_{dn} and 64.9 dB L_{dn}, respectively. Figure 4 graphically depicts hourly variations in ambient noise levels at site LT-2 for each of the two monitoring days. Table 6 provides the measured hourly noise levels at ambient noise monitoring site LT-2, in terms of the City's performance standards (as described above in Table 2).

TABLE 6

SUMMARY OF 24-HOUR AMBIENT NOISE MEASUREMENT DATA, SITE LT-2
HANFORD PLACE
MAY 5 & 6, 2021

Time	A-Weighted Decibels, dBA			
	May 5, 2021		May 6, 2021	
	L_{eq}	L_{max}	Leq	Lmax
0:00:00	54.7	67.6	42.9	62.8
1:00:00	49.7	66.9	44.3	61.3
2:00:00	51.8	62.4	46.7	63.7
3:00:00	48.5	65.2	48.3	63.0
4:00:00	55.8	81.2	54.5	72.8
5:00:00	61.3	78.6	62.6	82.8
6:00:00	57.6	67.0	58.7	74.5
7:00:00	59.8	79.5	56.0	74.7
8:00:00	59.0	83.1	75.2	113.2
9:00:00	57.2	74.2	56.1	74.8
10:00:00	77.5	106.8	56.5	78.6
11:00:00	59.7	82.8	57.8	84.1
12:00:00	57.7	77.6	60.2	83.9
13:00:00	55.5	77.2	58.4	81.3
14:00:00	56.5	72.7	54.7	69.9
15:00:00	55.7	72.9	60.0	86.2
16:00:00	56.7	73.9	56.8	77.7
17:00:00	75.9	104.9	55.8	72.4
18:00:00	56.1	73.4	56.2	73.1
19:00:00	57.6	80.1	56.8	84.3
20:00:00	56.5	76.2	54.0	68.6
21:00:00	57.1	76.4	55.9	65.2
22:00:00	56.8	79.2	53.6	63.7
23:00:00	53.8	69.0	53.6	69.2
Daytime (7 am to 10 pm) Average (Range)	59.9 (55.5-77.5)	80.8 (72.7-106.8)	58.0 (54.0-75.2)	79.2 (65.2-113.2)
Nighttime (10 pm to 7 am) Average (Range)	54.4 (48.5-61.3)	70.8 (62.4-81.2)	51.7 (42.9-62.6)	68.2 (61.3-82.8)

Source: WJV Acoustics, Inc.

Additionally, short-term (15-minute) ambient noise level measurements were conducted at four (4) locations (Sites ST-1 through ST-4). Two (2) individual measurements were taken at each of the four short-term sites to quantify ambient noise levels in the morning and afternoon hours. The locations of the long-term and short-term noise monitoring sites are shown in Figure 2.

Table 7 summarizes short-term noise measurement results. The noise measurement data included energy average (L_{eq}) maximum (L_{max}) as well as five individual statistical parameters. Observations were made of the dominant noise sources affecting the measurements. The statistical parameters describe the percent of time a noise level was exceeded during the measurement period. For instance, the L_{90} describes the noise level exceeded 90 percent of the time during the measurement period, and is generally considered to represent the residual (or background) noise level in the absence of identifiable single noise events from traffic, aircraft and other local noise sources.

Short-term noise measurements were conducted for 15-minute periods at each of the four sites. Sites ST-1 was located near the northeast portion of the project site, in the vicinity of existing retail/commercial land uses adjacent to the project site. Site ST-2 was located near the project site access point along Campus Drive. Site ST-3 was located near the northwestern portion of the project site, in the parking lot of Adventist Health Hospital. Site ST-4 was located at the intersection of Campus Drive and 7th Street, north of the project site. The overall noise measurement data indicate that noise in the project vicinity is highly influenced by vehicular traffic and noise associated with landscaping activities, retail/commercial activities and other sources typical of residential land uses (barking dogs, roosters, birds, voices, etc.).

TABLE 7

SUMMARY OF SHORT-TERM NOISE MEASUREMENT DATA
HANFORD PLACE
MAY 5 & 6, 2021

Site	Time	A-Weighted Decibels, dBA							Sources
		L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}	L_{90}	
ST-1	7:35 a.m.	51.8	56.0	54.7	53.5	52.3	51.6	50.1	TR, V, R
ST-1	4:25 p.m.	53.7	62.1	55.4	54.1	53.3	52.0	49.8	TR, D, AC
ST-2	8:05 a.m.	62.6	76.3	72.0	68.1	61.1	53.0	50.3	TR, AG
ST-2	4:45 p.m.	56.7	62.3	55.0	54.1	53.2	49.7	48.5	TR
ST-3	8:30 a.m.	51.9	70.1	55.0	52.0	49.9	49.3	48.2	TR, V, B
ST-3	5:10 p.m.	52.1	66.6	54.7	52.2	48.9	47.8	47.0	TR, AC
ST-4	8:50 a.m.	60.3	77.0	69.6	63.4	59.1	55.3	50.8	TR, B, D
ST-4	5:30 p.m.	61.4	74.2	71.0	65.2	60.7	56.3	51.4	TR, AC, D

TR: Traffic AC: Aircraft AG: Agricultural Activities V: Voices B: Birds D: Barking Dogs R:Rooster
Source: WJV Acoustics, Inc.

4. NOISE IMPACTS TO OFF-SITE SENSITIVE RECEPTORS, AND MITIGATION MEASURES

a. Project Traffic Noise Impacts on Existing Noise-Sensitive Land Uses Outside Project Site (Less Than Significant)

WJVA utilized the FHWA Traffic Noise Model[4] to quantify expected project-related increases in traffic noise exposure along roadways in the project vicinity. The FHWA Model is a standard analytical method used by state and local agencies for roadway traffic noise prediction. The model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within ±1.5 dB. To predict L_{dn} values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Average Daily Traffic (ADT) volumes for the analyzed receptor locations were provided by the project traffic consultant, VRPA Technologies, Inc[5]. Truck percentages and the day/night distribution of traffic were estimated by WJVA, based upon previous studies conducted in the project vicinity since project-specific data were not available from government sources. The Noise modeling assumptions used to calculate project traffic noise are provided as Appendix C.

Traffic noise exposure levels for specific scenarios were calculated based upon the FHWA Model and the above-described model inputs and assumptions. Project-related significant impacts would occur if an increase in traffic noise associated with the project would result in noise levels exceeding the City's applicable noise level standards at the location(s) of sensitive receptors. For the purpose of this analysis a significant impact was also assumed to occur if traffic noise levels were to increase by 3 dB at sensitive receptor locations where noise levels already exceed the City's applicable noise level standards (without the project), as 3 dB generally represents the threshold of perception in change for the human ear.

The City's exterior noise level standard for residential land uses is 60 dB L_{dn} (an exterior noise exposure of up to 65 dB L_{dn} is allowed in instances where it is not possible to reduce noise exposure in outdoor activity areas to 60 L_{dn} or less using a practical application of available noise reduction measures.). Traffic noise was modeled at seven (7) receptor locations. The seven modeled receptors are located at roadway setback distances representative of the sensitive receptors (residences) along each analyzed roadway segment. The receptor locations are described below and provided graphically on Figure 5.

- R-1: Residential land use located approximately 90 feet from the centerline of Lacey Blvd.
- R-2: Residential land use located approximately 60 feet from the centerline of 7th St.
- R-3: Residential land use located approximately 95 feet from the centerline of 7th St.
- R-4: Residential land use located approximately 60 feet from the centerline of 6th St.
- R-5: Residential land use located approximately 100 feet from the centerline of Campus Dr.

- R-6: Residential land use located approximately 95 feet from the centerline of 7th St.
- R-7: Residential land use located approximately 90 feet from the centerline of 6th St.

Existing Conditions

Table 8 provides Existing and Existing Plus Project traffic noise exposure levels at the seven analyzed receptor locations. The receptor locations are representative of existing residential land uses located along the analyzed roadway segments.

TABLE 8

PROJECT-RELATED INCREASES IN TRAFFIC NOISE, dB, L_{dn}
HANFORD PLACE
EXISTING CONDITIONS

Modeled Receptor	Existing	Existing Plus Project	Change (Maximum)	Significant Impact?
R-1	63	63	0	No
R-2	62	62	0	No
R-3	58	59	+1	No
R-4	55	58	+3	No
R-5	51	51	0	No
R-6	59	59	0	No
R-7	52	52	0	No

Source: WJV Acoustics, Inc.
VRPA Technologies, Inc.

Reference to Table 8 indicates that project-related traffic would not result in noise levels at any sensitive receptors to exceed the City's noise level standard, nor result in an increase of 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project.

Cumulative 2042 Conditions

Table 9 provides Cumulative 2042 traffic noise exposure levels at the seven analyzed representative receptor locations, and also provides what the project contribution would be to Cumulative 2042 traffic noise exposure conditions.

TABLE 9 PROJECT CONTRIBUTION TO CUMULATIVE TRAFFIC NOISE, dB, L_{dn} HANFORD PLACE CUMULATIVE CONDITIONS				
Modeled Receptor	Cumulative Conditions Without Project Contribution	Cumulative Conditions	Project Contribution	Significant Impact?
R-1	64	64	0	No
R-2	64	64	0	No
R-3	60	60	0	No
R-4	56	59	+3	No
R-5	53	53	0	No
R-6	61	61	0	No
R-7	54	54	0	No

Source: WJV Acoustics, Inc.
VRPA Technologies, Inc.

Reference to Table 9 indicates that the project's contribution to Cumulative 2042 traffic noise exposure levels at the modeled representative receptor locations would not result in noise levels to exceed the City's noise level standard, nor result in an increase of 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project. Consequently, the project contribution to cumulative noise levels would be less than considerable and the project would not have a significant cumulative impact.

Noise levels described in Table 8 and Table 9 do not take into account any site-specific acoustic shielding that may be provided by existing sound walls, buildings or intervening topography, and should therefore be considered a worst-case assessment of traffic noise exposure at the analyzed receptor locations.

b. Proposed Impacts From Operational On-Site Sources (Less Than Significant With Mitigation)

The project would include a variety of medical buildings, hotel and conference center, medical instruction facilities, retail/drive thru buildings, commercial buildings and a multi-family apartment building. A wide variety of noise sources can be associated with these land use designations. The noise levels produced by such sources can also be highly variable and could potentially impact existing off-site and proposed on-site sensitive receptors. Typical examples of stationary noise sources associated with such land uses include:

- HVAC/Mechanical equipment
- Truck deliveries
- Parking lot activities (closing of car doors and trunks, stereos, alarms etc.)
- Drive Thru operations

Mechanical Equipment
It is assumed that the project would include roof-mounted HVAC units on the proposed buildings. The heating, ventilating, and air conditioning (HVAC) requirements for the buildings would likely require the use of multiple packaged roof-top units. For the purpose of noise and aesthetics, roof-mounted HVAC units are typically shielded by means of a roof parapet. WJVA has conducted reference noise level measurements at numerous commercial and retail buildings with roof-mounted HVAC units, and associated noise levels typically range between approximately 45-50 dB at a distance of 50 feet from the building façade.

For this project, the closest residential property lines to any potential roof-mounted HVAC equipment would be located at a minimum setback distance of 200 feet. Taking into account the standard rate of noise attenuation with increased distance from a point source (-6 dB/doubling of distance), noise levels associated with the operation of roof-mounted HVAC units would be approximately 33-38 dB at the closest sensitive receptor property line. Such levels do not exceed any City of Hanford noise level standard or exceed existing (without project) ambient noise levels.

Truck Movements
At the time of this analysis, a specific truck access route (or routes) had not been designated. However, trucks would access the project site by one of three (3) access points, Glendale Avenue from the west, Campus Drive from the north or 5th Street from the east. It is assumed that truck deliveries would occur at various times and locations throughout the overall project area. Precise details on truck deliveries were not known at the time of this analysis.

WJVA has conducted measurements of the noise levels produced by slowly moving trucks for a number of studies. Such truck movements would be expected to produce noise levels in the range of 65 to 71 dBA at a distance of 100 feet. The range in measured truck noise levels is due to differences in the size of trucks, their speed of movement and whether they have refrigeration units in operation during the pass-by.

If truck movements were to access the project site via the 5th Street access point, truck movements could occur as close as approximately 130 feet from the closest residential property lines to the north. At this distance, noise levels associated with truck movements would produce maximum noise levels in the range of approximately 63 to 69 dB. Such noise levels do not exceed the City's daytime (7:00 a.m. to 10:00 p.m.) noise level standard of 70 dB L_{max}, but could potentially exceed the City's nighttime (10:00 p.m. to 7:00 a.m.) noise level standard of 65 dB L_{max}. It should be noted that existing ambient noise levels in the vicinity of the future 5th Street access point (noise monitoring site LT-2) exceeded the City's nighttime 65 dB L_{max} standard during twelve of the eighteen nighttime hours measured over the two-day monitoring period.

Potential Impact:
Noise levels associated with truck movements could exceed the City's 65 dB L_{max} nighttime noise level standard at the residential property lines north of the 5th Street access point, if truck deliveries were to occur between the nighttime hours of 10:00 p.m. to 7:00 a.m.

Mitigation Measures:
Noise levels associated with nighttime (10:00 p.m. to 7:00 a.m.) truck movements could be mitigated by applying the following condition:

- Require truck movements occurring during nighttime hours of 10:00 p.m. to 7:00 a.m. to use the Glendale Avenue access point only.

Parking Lot Activities
Noise due to traffic in parking lots is typically limited by low speeds and is not usually considered to be significant. Human activity in parking lots that can produce noise includes voices, stereo systems and the opening and closing of car doors and trunk lids. Such activities can occur at any time. The noise levels associated with these activities cannot be precisely defined due to variables such as the number of parking movements, time of day and other factors. It is typical for a passing car in a parking lot to produce a maximum noise level of 60 to 65 dBA at a distance of 50 feet, which is comparable to the level of a raised voice.

For this project, parking would be dispersed throughout the overall project area. The closest proposed parking areas would be located at least 150 feet from the closest existing residential property lines to the north. At his distance, maximum (L_{max}) parking lot vehicle movements would be expected to be approximately 51 to 56 dB. Such levels would not exceed any of the City's applicable noise levels standards or exceed existing ambient noise levels at the closest residential land uses. Due to existing elevated ambient noise levels at the closest sensitive receptor locations (residential land uses north of the project site), noise levels associated with parking lot activities would generally not be audible over existing (without project) noise levels.

Drive Thru Retail
The proposed project would include two (2) retail areas that would likely include drive thru operations. While the exact tenants and type of retail store was not known at this time, it is assumed that amplified speech would be incorporated into drive thru operations.

In order to assess potential project noise levels associated with drive-thru operations, WJVA utilized reference noise levels measured at a Wendy's drive-thru restaurant located on South Mooney Boulevard in Visalia. Measurements were conducted during the early afternoon of July 11, 2011 between 12:45 p.m. and 1:45 p.m. using the previously-described noise monitoring equipment.

The microphone used by customers to order food and the loudspeaker used by employees to confirm orders are both integrated into a menu board that is located a few feet from the drive-thru lane at the approximate height of a typical car window. Vehicles would enter the drive-thru lane from the west and then turn to the north along the east side of the restaurant.

Reference noise measurements were obtained at a distance of approximately 40 feet from the menu board containing the microphone/loudspeaker system at an angle of about 45° toward the rear of the vehicle being served. This provided a worst-case exposure to sound from the loudspeaker system since the vehicle was not located directly between the loudspeaker and measurement location. Cars were lined up in the access lane during the noise measurement period indicating that the drive-through lane was operating at or near a peak level of activity.

Each ordering cycle was observed to take approximately 60 seconds including vehicle movements. A typical ordering cycle included 5-10 seconds of loudspeaker use with typical maximum noise levels in the range of 60-62 dBA at the 40 foot-reference location. Vehicles moving through the drive-thru lane produced noise levels in the range of 55-60 dBA at the same distance. Vehicles parked at the ordering position (between the menu board and measurement site) were observed to provide significant acoustic shielding during the ordering sequence. The effects of such shielding are reflected by the noise measurement data. Noise levels were measured to approximately 60 dB L_{eq} at the measurement site, and included noise from all sources, including the loudspeaker, vehicle movements and HVAC equipment.

The closest noise-sensitive receptors (residential land uses) to the proposed retail drive thru operations are located approximately 190 feet to the north. At this setback distance, noise levels associated with drive thru retail operations would be expected to produce noise levels of approximately 47-49 dB L_{max} and approximately 46 dB L_{eq}. Potential project-related noise exposure at that locations of the closest residential land uses was calculated based upon the above-described reference noise measurement data, the existing sound walls and the normal rate of sound attenuation over distance for a “point” noise source (6 dB/doubling of distance).

It is unknown if nighttime operations would occur at the drive thru retail locations. The above-described noise level of 46 dB L_{eq} at the closest residential property line assumes the drive thru would be in constant operation, and should therefore we consider a worst-case assessment of drive thru noise levels. While drive thru operational noise levels (46 dB L_{eq}) slightly exceed the City’s nighttime noise level standard of 45 dB L_{eq}, such levels are below existing (without project) nighttime ambient noise levels at the residential property lines, and would therefore not be considered a significant impact.

c. Noise from Construction (Less Than Significant With Mitigation)

Construction noise would occur at various locations within the project site through the buildout period and at locations where off-site infrastructure improvements may be required. Existing sensitive receptors could be located as close as 150 feet from construction activities. Table 10 provides typical construction-related noise levels at distances of 100 feet, 200 feet, and 300 feet.

Construction noise is not considered to be a significant impact if construction is limited to the allowed hours and construction equipment is adequately maintained and muffled. The City of Hanford limits hours of construction to occur only between the hours of 7:00 a.m. to 8:00 p.m. Construction noise impacts could result in annoyance or sleep disruption for nearby residents if nighttime operations were to occur or if equipment is not properly muffled or maintained.

TABLE 10 TYPICAL CONSTRUCTION EQUIPMENT MAXIMUM NOISE LEVELS, dBA			
Type of Equipment	100 Ft.	200 Ft.	300 Ft.
Concrete Saw	84	78	74
Crane	75	69	65
Excavator	75	69	65
Front End Loader	73	67	63
Jackhammer	83	77	73
Paver	71	65	61
Pneumatic Tools	79	73	69
Dozer	76	70	66
Rollers	74	68	64
Trucks	80	72	70
Pumps	74	68	64
Scrapers	81	75	71
Portable Generators	74	68	64
Backhoe	80	74	70
Grader	80	74	70

Source: FHWA
Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman, 1987

Potential Impact:
A noise impact could occur if construction activities do not incorporate appropriate mitigation measures and best management practices.

Mitigation Measures:
Noise levels associated with construction activities may be effectively mitigated by incorporating noise mitigation measures and appropriate best management practices. The following mitigation measures and best management practices should be applied during periods of project construction.

- Per the City of Hanford Municipal Code, construction activities should not occur outside the hours of 7:00 a.m. to 8:00 p.m.
- All construction equipment shall be properly maintained and muffled as to minimize noise generation at the source.
- Noise-producing equipment shall not be operating, running, or idling while not in immediate use by a construction contractor.
- All noise-producing construction equipment shall be located and operated, to the extent possible, at the greatest possible distance from any noise-sensitive land uses.

- Locate construction staging areas, to the extent possible, at the greatest possible distances from any noise-sensitive land uses.

- Signs shall be posted at the construction site and near adjacent sensitive receptors displaying hours of construction activities and providing the contact phone number of a designated noise disturbance coordinator.

d. Vibration Impacts (Less Than Significant)

The dominant sources of man-made vibration are sonic booms, blasting, pile driving, pavement breaking, demolition, diesel locomotives, and rail-car coupling. None of these activities are anticipated to occur with construction or operation of the proposed project. Vibration from construction activities could be detected at the closest sensitive land uses, especially during movements by heavy equipment or loaded trucks and during some paving activities (if they were to occur). Typical vibration levels at distances of 100 feet and 300 feet are summarized by Table 11. These levels would not be expected to exceed any significant threshold levels for annoyance or damage, as provided above in Table 3 and Table 4.

TABLE 11

TYPICAL VIBRATION LEVELS DURING CONSTRUCTION

	PPV (in/sec)	
Equipment	**@ 100´**	**@ 300´**
Bulldozer (Large)	0.011	0.006
Bulldozer (Small)	0.0004	0.00019
Loaded Truck	0.01	0.005
Jackhammer	0.005	0.002
Vibratory Roller	.03	0.013
Caisson Drilling	.01	0.006

Source: *Caltrans*

After full project build out, it is not expected that ongoing operational activities will result in any vibration impacts at nearby sensitive uses. Activities involved in trash bin collection could result in minor on-site vibrations as the bin is placed back onto the ground. Such vibrations would not be expected to be felt at the closest off-site sensitive uses. Additional mitigation is not required.

5. NOISE IMPACTS TO PROPOSED ON-SITE SENSITIVE RECEPTORS, AND MITIGATION MEASURES

The project includes proposed sensitive receptors (residential land uses, transient lodging, nursing homes, offices, etc.) that could be impacted by exterior and interior noise exposure associated with existing transportation noise sources (SR 198 and SJVR line). The applicable exterior and interior noise level standards for such land uses are provided above as Table 1.

a. Project Transportation Noise Impacts on Proposed On-Site Noise-Sensitive Land Uses (Less Than Significant With Mitigation)

Exterior Noise Exposure

Exterior noise exposure within the project site is dominated by vehicle traffic associated with State Route 198 to the south and railroad operations associated with the San Joaquin Valley Railroad line to the north. Noise levels measured at ambient noise monitoring sites LT-1 and LT-2 indicate that overall project site noise exposure is approximately 65-70 dB L_{dn}.

The exterior noise level standard applicable to the above-described sensitive receptors is 60 dB L_{dn}. The General Plan also states that where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/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.

Exterior noise level compatibility standards for transportation noise sources are applied at the outdoor activity areas of sensitive receptors. Outdoor activity areas typically include backyards of single-family residential uses and outdoor common use areas (pools, BBQ/picnic areas, playgrounds, etc.) as well as individual patios, balconies and decks of multi-family residential uses and transient lodging land uses. The exact locations of such outdoor activity areas were not known at the time of this analysis; however, the project site plan (Figure 1) provides preliminary locations of pool areas for both the apartment development and the hotel development. Other proposed sensitive receptors (memory care facility, assisted living facility, skilled nursing facility, etc.) may also include outdoor activity areas, at which this exterior noise level standard would apply.

Potential Impact:

Transportation noise exposure levels would be expected to exceed the City's 60 dB L_{dn} exterior noise level standard at outdoor activity areas associated with the multi-family apartment land use and the hotel land use. Additionally, depending on the locations (if included into final project design) of any outdoor activity areas associated with other noise-sensitive land uses (as defined above in Table 1), transportation noise exposure levels could exceed the City's exterior noise level standard at such land uses as well.

Mitigation Measures:
Based upon project site noise exposure (approximately 65-70 dB L_{dn}) and the preliminary locations of the apartment and hotel pool areas (outdoor activity areas), mitigating exterior noise levels at these locations to at or below 60 dB L_{dn} would likely not be feasible. However, a preliminary analysis using a sound wall insertion loss model indicates that a sound wall constructed to a minimum height of six-and-a-half (6.5) feet above ground level constructed around the two pool areas (apartment and hotel land uses) would mitigate exterior noise levels to below 65 dB L_{dn} within these outdoor activity areas.

Other proposed sensitive receptors (memory care facility, assisted living facility, skilled nursing facility, etc.) may also include outdoor activity areas, at which this exterior noise level standard would apply. The potential locations of outdoor activity areas associated with these land uses was not known at the time of this analysis. However, a similarly constructed sound wall around such uses would reduce noise levels to below 65 dB L_{dn}. Such noise levels are allowed by the City.

Interior Noise Exposure
As described above, exterior project site noise exposure throughout the overall project area is approximately 65-70 dB L_{dn}, as a result of varying levels of proximity to both State Route 198 and the San Joaquin Valley Railroad line. Additionally, peak hour exterior noise levels would be approximately 70 dB L_{eq} at the exterior of the office land uses to the north and the nursing college to the south. Interior noise level standards applicable to the project site vary, based upon proposed land uses. These interior noise level standards applicable to the project are:

- 45 dB L_{dn}: Multi-family apartment, Hotel, skilled nursing facility, memory care facility, assisted living facility, and any additional facility where people are residing and sleep disturbance is considered.

- 45 db L_{eq}: Office buildings, Nursing College (as determined for a typical worst case hour during periods of use)

Based upon the above-described exterior noise exposure levels and applicable interior noise level standards, the proposed construction measures must be capable of providing approximately 25 dB of outdoor-to-indoor noise level reduction (NLR) (70-45=25).

Generally speaking, construction measures complying with current building code standards would typically be expected to provide approximately 20-25 dB of outdoor-to-indoor NLR, provided windows and doors can remain closed for sound insulation purposes. However, additional sound attenuation measures may be required in conditions where the exterior façade consists of large portions of window or storefront glazing assemblies. Once construction plans are developed, an acoustical consultant should review to determine if additional interior noise level mitigation measures may be required.

Potential Impact:
Interior noise level standards applicable to the project's proposed noise-sensitive land uses are described above. Exterior exposure levels at the exterior facades of proposed noise-sensitive land uses would be in the range of approximately 60-75 dB L_{dn} and 70 dB L_{eq} (peak hour). Depending

on final construction design, interior noise levels could potentially exceed the various applicable noise level standards of 45 dB L_{dn} and 45 dB L_{eq}.

Mitigation Measures:
Once building-specific construction plans become available, interior noise levels should be reviewed and calculated by a qualified acoustical consultant to determine if additional noise attenuation mitigation measures are required to comply with interior noise level standards.

b. Noise Impacts from Nearby Airports or Airstrips (No Impact)

The Project site is located approximately 1.5 miles west of Hanford Municipal Airport. WJVA has reviewed the Kings County Airport Land Use Compatibility Plan[6] to determine if the project would result in any noise compatibility concerns associated with airport operations. No portion of the project site is contained within any airport noise contours, and would therefore not result in any noise compatibility issues. The Hanford Municipal Airport noise contours are provided as Figure 6.

6. IMPACT SUMMARY

This impact summary addresses only the noise impacts determined to be "potentially significant" and summarizes the mitigation measures that would be required to reduce noise levels to a "less than significant" level or states that the impact may be significant an unavoidable. Potential impacts and correlating mitigation measures are described in detail above, and summarized below.

Potential Impact:
Noise levels associated with truck movements could exceed the City's 65 dB L_{max} nighttime noise level standard at the residential property lines north of the 5th Street access point, if truck deliveries were to occur between the nighttime hours of 10:00 p.m. to 7:00 a.m.

Mitigation Measures:
Noise levels associated with nighttime (10:00 p.m. to 7:00 a.m.) truck movements could be mitigated by implementing the following condition:

- Require truck movements occurring during nighttime hours to use the Glendale Avenue access point only.

Potential Impact:
A noise impact could occur if construction activities do not incorporate appropriate mitigation measures and best management practices.

Mitigation Measures:
Noise levels associated with construction activities may be effectively mitigated by incorporating noise mitigation measures and appropriate best management practices. The following mitigation measures and best management practices should be applied during periods of project construction.

- Per the City of Hanford Municipal Code, construction activities should not occur outside the hours of 7:00 a.m. to 8:00 p.m.
- All construction equipment shall be properly maintained and muffled as to minimize noise generation at the source.
- Noise-producing equipment shall not be operating, running, or idling while not in immediate use by a construction contractor.

- All noise-producing construction equipment shall be located and operated, to the extent possible, at the greatest possible distance from any noise-sensitive land uses.

- Locate construction staging areas, to the extent possible, at the greatest possible distances from any noise-sensitive land uses.

- Signs shall be posted at the construction site and near adjacent sensitive receptors displaying hours of construction activities and providing the contact phone number of a designated noise disturbance coordinator.

Potential Impact:
Transportation noise exposure levels would be expected to exceed the City's 60 dB L_{dn} exterior noise level standard at outdoor activity areas associated with the multi-family apartment land use and the hotel land use. Additionally, depending on the locations (if included into final project design) of any outdoor activity areas associated with other noise-sensitive land uses (as defined above in Table 1), transportation noise exposure levels could exceed the City's exterior noise level standard at such land uses as well.

Mitigation Measures:
Based upon project site noise exposure (approximately 65-70 dB L_{dn}) and the preliminary locations of the apartment and hotel pool areas (outdoor activity areas), mitigating exterior noise levels at these locations to at or below 60 dB L_{dn} would likely not be feasible. However, a preliminary analysis using a sound wall insertion loss model indicates that a sound wall constructed to a minimum height of six-and-a-half (6.5) feet above ground level constructed around the two pool areas (apartment and hotel land uses) would mitigate exterior noise levels to below 65 dB L_{dn} within these outdoor activity areas. Such noise levels are allowed by the City.

Other proposed sensitive receptors (memory care facility, assisted living facility, skilled nursing facility, etc.) may also include outdoor activity areas, at which the exterior noise level standard would apply. The potential locations of outdoor activity areas associated with these land uses was not known at the time of this analysis. However, a similarly constructed sound wall around such uses would reduce noise levels to below 65 dB L_{dn}.

Potential Impact:
Interior noise level standards applicable to the project's proposed noise-sensitive land uses are described above. Exterior exposure levels at the exterior facades of proposed noise-sensitive land uses would be in the range of approximately 60-75 dB L_{dn} and 70 dB L_{eq}. Depending on final construction design, interior noise levels could potentially exceed the various applicable noise level standards of 45 dB L_{dn} and 45 dB L_{eq}.

Mitigation Measures:
Based upon the above-described exterior noise exposure levels and applicable interior noise level standards, the proposed construction measures must be capable of providing approximately 25 dB of outdoor-to-indoor noise level reduction (NLR) (70-45=25).

Generally speaking, construction measures complying with current building code standards would typically be expected to provide approximately 20-25 dB of outdoor-to-indoor NLR, provided windows and doors can remain closed for sound insulation purposes. However, additional sound attenuation measures may be required in conditions where the exterior façade consists of large portions of windows and/or storefront glazing assemblies. Once construction plans are developed, an acoustical consultant should review to determine if additional interior noise level mitigation measures may be required. Such measures would typically include the incorporation of sound-rated (higher STC) windows and assemblies.

7. SOURCES CONSULTED

1. *City of Hanford 2035 General Plan*, April 2017

2. *City of Hanford Municipal Code*, 2016

3. California Department of Transportation, *Transportation and Construction Vibration Guidance Manual,* September 2013.

4. Federal Highway Administration, *Traffic Noise Model, Version 2.5,* April 14, 2004

5. Hodges & Shutt*, Kings County Airport Land Use Compatibility Plan*, July 1994

FIGURE 1: PROJECT SITE PLAN

LSA

FIGURE 3

NOT TO SCALE

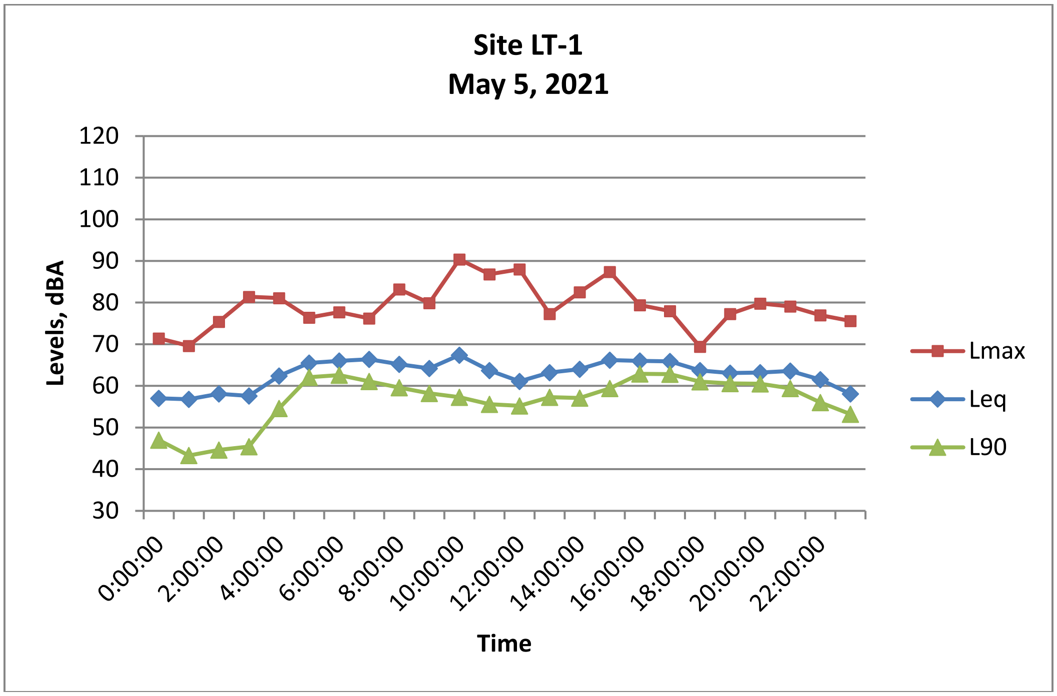
Hanford Place Project
Hanford, Kings County, California
Site Plan

SOURCE: LANGDON WILSON INTERNATIONAL, 2020.

FRE10\P:\EPI2001 Hanford Place\PRODUCTS\Figure_3.ai (4/22/2020)

FIGURE 2: PROJECT VICINITY AND AMBIENT NOISE MONITORING SITES

FIGURE 3: HOURLY NOISE LEVELS AT SITE LT-1



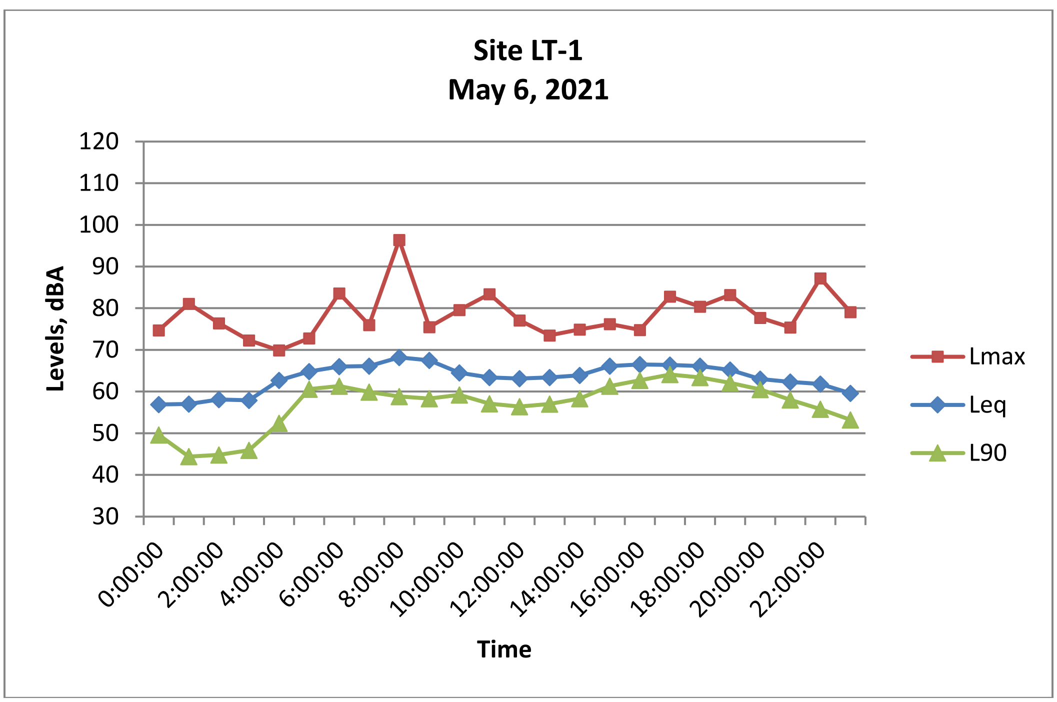
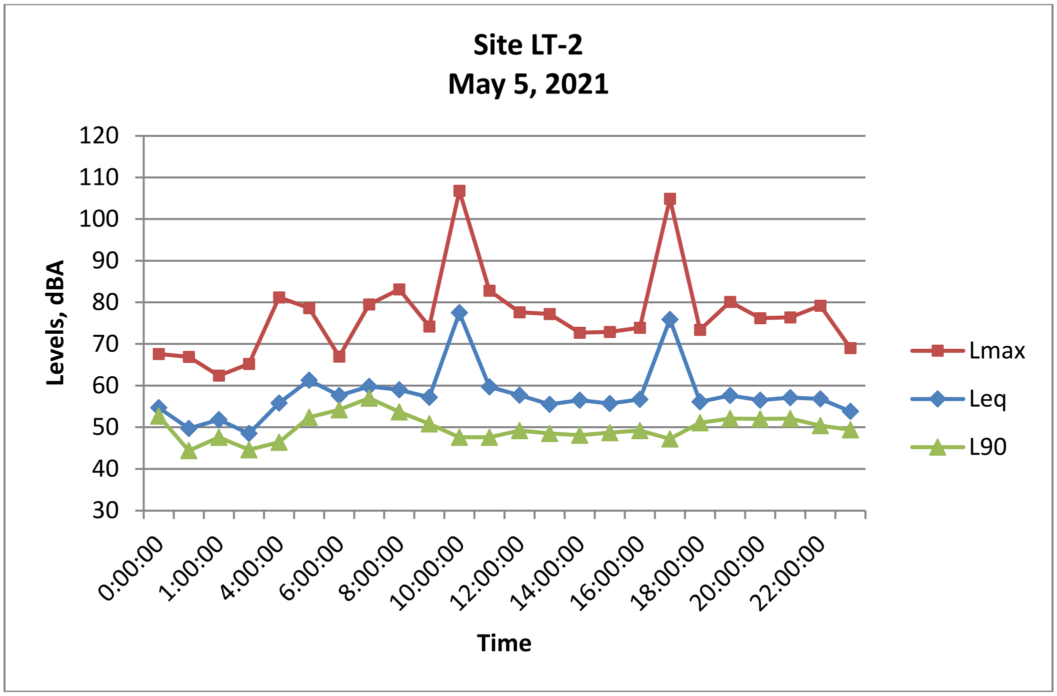


FIGURE 4: HOURLY NOISE LEVELS AT SITE LT-2



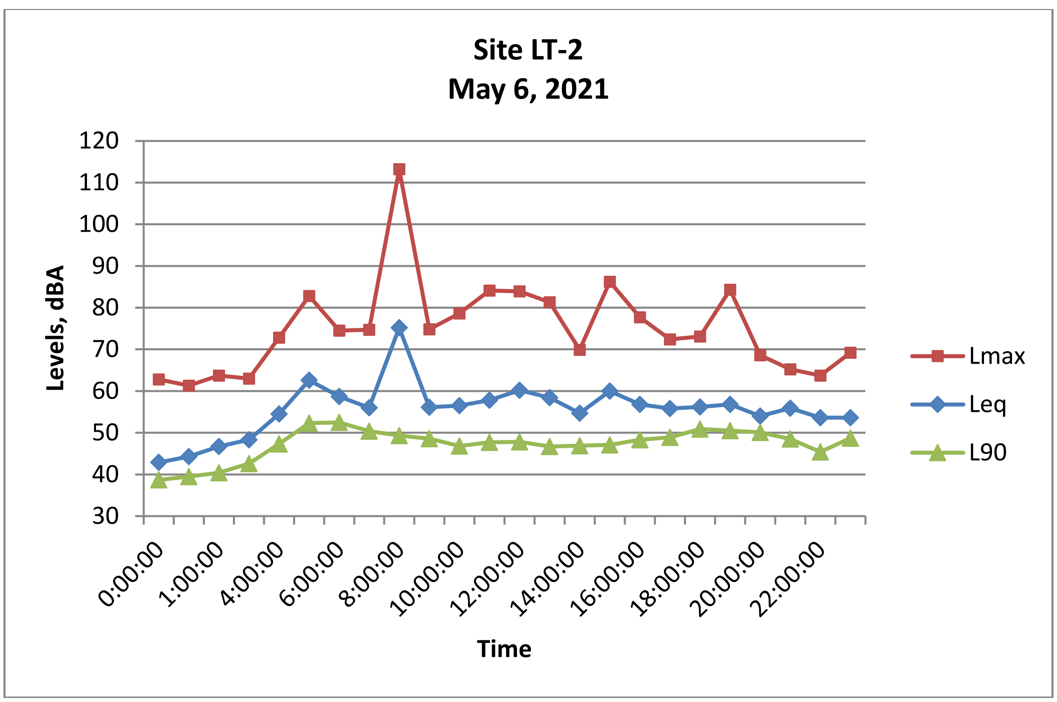
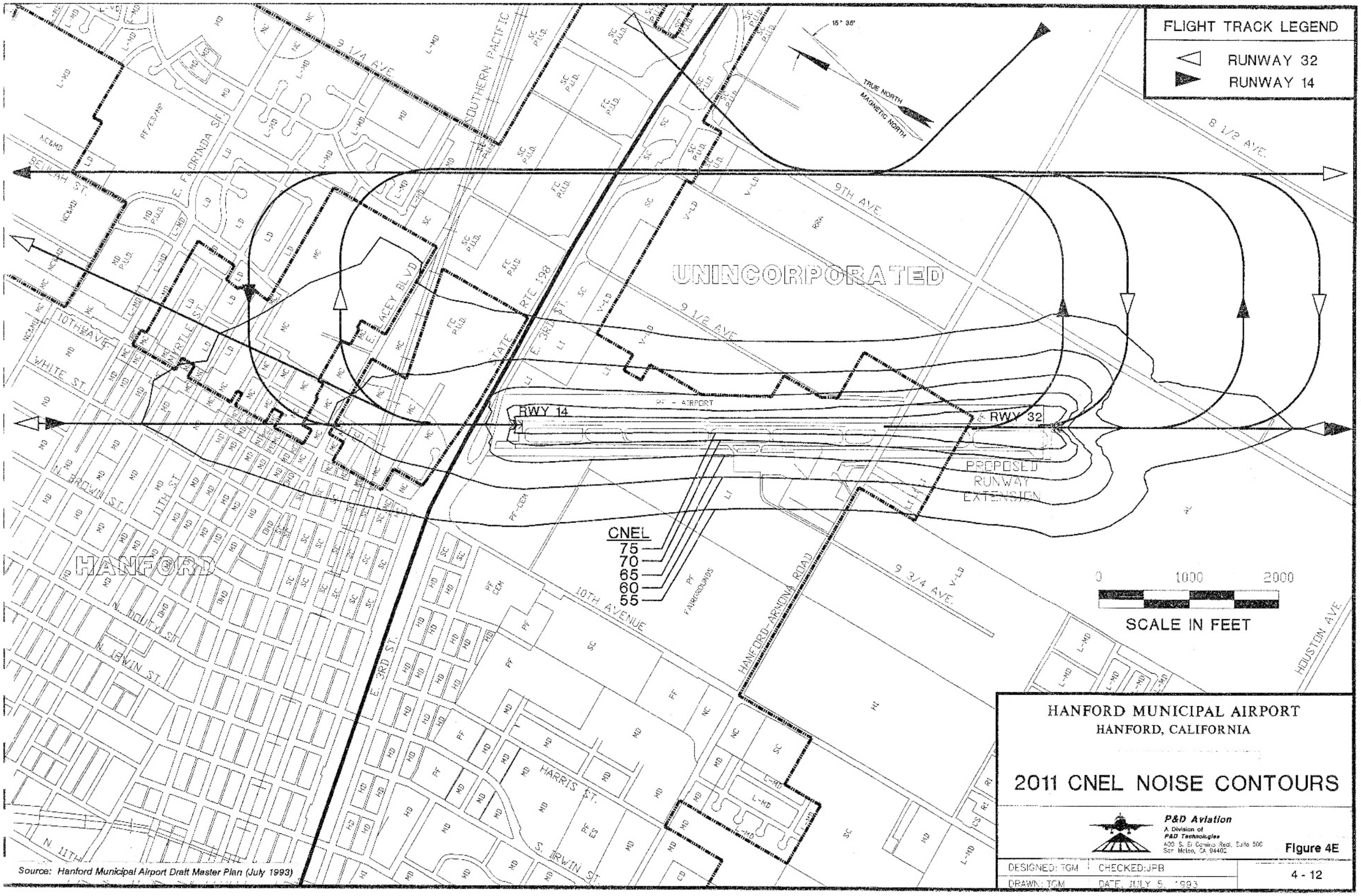


FIGURE 5: MODELED TRAFFIC NOISE RECEPTOR LOCATIONS

FIGURE 6: HANFORD MUNICIPAL AIRPORT NOISE CONTOURS



APPENDIX A-1

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

DECIBEL, dB: A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

DNL/L_{dn}: Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

NOTE: The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.

L_{max}: The maximum noise level recorded during a noise event.

L_n: The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). For example, L_{10} equals the level exceeded 10 percent of the time.

ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS: Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

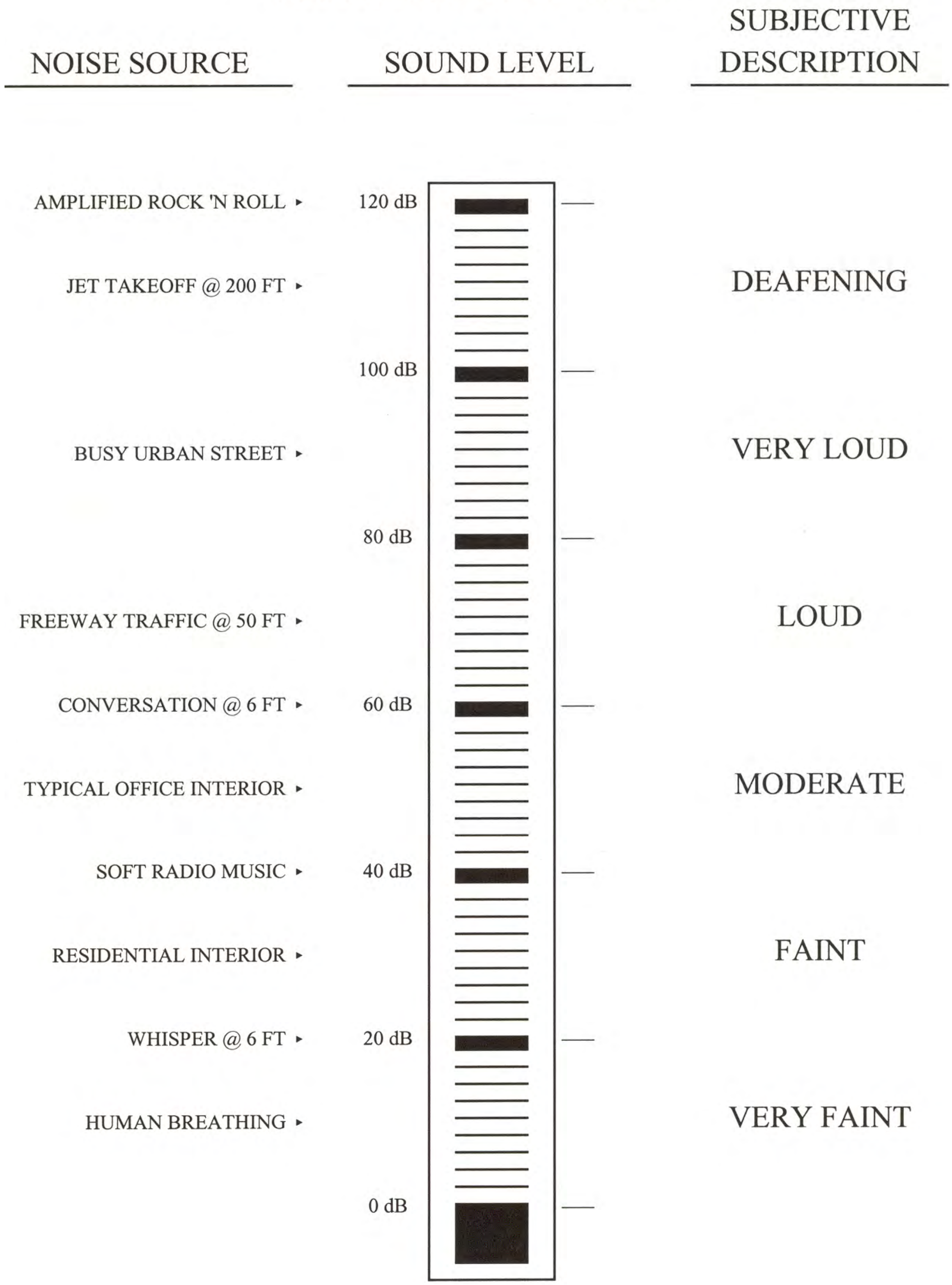
NOISE LEVEL REDUCTION (NLR): The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of "noise level reduction" combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.

SEL or SENEL: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

SOUND LEVEL: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

SOUND TRANSMISSION CLASS (STC): The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B
EXAMPLES OF SOUND LEVELS



APPENDIX C

TRAFFIC NOISE MODELING CALCULATIONS

WJV Acoustics, Inc
FHWA-RD-77-108
Calculation Sheets
May 7, 2021

Project #: 20-016
Description: Existing
Ldn/Cnel: Ldn
Site Type: Soft

Contour Levels (dB): 60 | 65 | 70 | 75

Segment	Roadway Name	Segment Description	ADT	%Day	%Evening	%Night	%Med	%Heavy	Speed	Distance	Offset
1	R-1	Lacey e/o Campus	18730	90		10	2	1	35	90	
2	R-2	7th w/o Campus	8230	90		10	2	1	35	60	
3	R-3	7th e/o Campus	7430	90		10	2	1	35	95	
4	R-4	Campus n/o 6th	1580	90		10	2	1	35	60	
5	R-5	6th e/o Campus	1420	90		10	2	1	35	100	
6	R-6	7th w/o 11th	8430	90		10	2	1	35	95	
7	R-7	6th w/o 11th	1740	90		10	2	1	35	90	

WJV Acoustics, Inc
FHWA-RD-77-108
Calculation Sheets
May 7, 2021

Project #: 20-016
Description: Existing + project
Ldn/Cnel: Ldn
Site Type: Soft

Contour Levels (dB) 60 | 65 | 70 | 75

Segment	Roadway Name	Segment Description	ADT	%Day	%Evening	%Night	%Med	%Heavy	Speed	Distance	Offset
1	R-1	Lacey e/o Campus	19470	90		10	2	1	35	90	
2	R-2	7th w/o Campus	8600	90		10	2	1	35	60	
3	R-3	7th e/o Campus	7800	90		10	2	1	35	95	
4	R-4	Campus n/o 6th	3810	90		10	2	1	35	60	
5	R-5	6th e/o Campus	1420	90		10	2	1	35	100	
6	R-6	7th w/o 11th	8430	90		10	2	1	35	95	
7	R-7	6th w/o 11th	1740	90		10	2	1	35	90	

WJV Acoustics, Inc
FHWA-RD-77-108
Calculation Sheets
May 7, 2021

Project #: 20-016
Description: 2042 No Pojrect
Ldn/Cnel: Ldn
Site Type: Soft

Contour Levels (dB): 60 | 65 | 70 | 75

Segment	Roadway Name	Segment Description	ADT	%Day	%Evening	%Night	%Med	%Heavy	Speed	Distance	Offset
1	R-1	Lacey e/o Campus	26180	90		10	2	1	35	90	
2	R-2	7th w/o Campus	12730	90		10	2	1	35	60	
3	R-3	7th e/o Campus	11490	90		10	2	1	35	95	
4	R-4	Campus n/o 6th	2460	90		10	2	1	35	60	
5	R-5	6th e/o Campus	2190	90		10	2	1	35	100	
6	R-6	7th w/o 11th	13030	90		10	2	1	35	95	
7	R-7	6th w/o 11th	2690	90		10	2	1	35	90	

WJV Acoustics, Inc
FHWA-RD-77-108
Calculation Sheets
May 7, 2021

Project #: 20-016
Description: 2042 + Pojrect
Ldn/Cnel: Ldn
Site Type: Soft

Contour Levels (dB): 60 | 65 | 70 | 75

Segment	Roadway Name	Segment Description	ADT	%Day	%Evening	%Night	%Med	%Heavy	Speed	Distance	Offset
1	R-1	Lacey e/o Campus	26920	90		10	2	1	35	90	
2	R-2	7th w/o Campus	13100	90		10	2	1	35	60	
3	R-3	7th e/o Campus	11860	90		10	2	1	35	95	
4	R-4	Campus n/o 6th	4470	90		10	2	1	35	60	
5	R-5	6th e/o Campus	2190	90		10	2	1	35	100	
6	R-6	7th w/o 11th	13400	90		10	2	1	35	95	
7	R-7	6th w/o 11th	2690	90		10	2	1	35	90	

APPENDIX F

TRAFFIC IMPACT STUDY

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DRAFT

Hanford Place Development

Traffic Impact Study
December 2020

Prepared by:
VRPA Technologies, Inc.
4630 W. Jennifer, Suite 105
Fresno, CA 93722
Project Manager: Georgiena Vivian

VRPA TECHNOLOGIES, INC.

Hanford Place Development
Traffic Impact Study

Study Team

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Executive Summary

This Traffic Impact Study (TIS) has been prepared for the purpose of analyzing traffic conditions related to the Hanford Place Development (Project). The various components of the Project are detailed in Table E-1 below. The Project site is generally bound to the north by the San Joaquin Valley Railroad, to the east by commercial land uses, to the south by State Route 198, and to the west by commercial land uses. Regional access to the site is provided by State Route 198, which is located adjacent to the southern border of the project site.

The vacant project site is comprised of four parcels and is located between State Route 198 and the San Joaquin Valley Railroad in the City of Hanford (City), in Kings County (Kings). 5th Street cuts through the project site in an east/west direction and Campus Drive cuts through the project in a north/south direction. In addition, the Peoples Ditch runs through the project site.

The city of Hanford is located 30 miles south of the City of Fresno and 20 miles west of the City of Visalia. Hanford was incorporated in 1891 and is the county seat of Kings County. Hanford is located in the northern portion of Kings County at an elevation of 249 feet above sea level. The city has a total area of 16.6 square miles, all of which is land not covered by water. The only natural watercourse is Mussel Slough, remnants of which still exist on the city's western edge. The People's Ditch, an irrigation canal dug in the 1870s, traverses Hanford from north to south.

Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout. In addition, the proposed project would provide 1,466 parking spaces throughout the project site.

The TIS completed for the Project includes level of service (LOS) analysis for the following traffic scenarios.

- ✓ Existing Conditions
- ✓ Existing Plus Project
- ✓ Near-Term Plus Project
- ✓ Cumulative Year 2042 Without Project
- ✓ Cumulative Year 2042 Plus Project

Table E-1
Project Components

PROJECT COMPONENTS	SIZE/UNIT	DESCRIPTION
Ambulatory Surgery Center	22,525 sf	This facility is used to handle approximately 25 surgical procedures per day. There will be approximately 12 employees. This only operates weekdays.
Specialty Clinic	12,445 sf	This will be an Office of Statewide Health Planning and Development's (OSHPD) 3 facility, which in turn will approve advanced scope for medical care (i.e.: radiology/oncology. This will be a Monday-Saturday facility.
Medical Office Building	24,890 sf	This will be standard weekday medical offices.
Psychiatric Health Facility	12,445 sf	This is a psychiatric health care facility. This will consist of 24 patients who stay an average of 5 days. There will be approximately 10 employees and this use will operate 24/7. There will be approximately 4 admissions/discharges per day all done via ambulance.
Hotel & Conference Center	105 Rooms	This will be a standard traffic count for hotels and will be a limited service hotel. The conference center will be used on an average of 2 times per week including weekends.
Nursing College	35,000 sf	This is a m-sat operation. The School hosts 4 classes per scheduling window and offer three scheduling windows per day. Average class length is 2.5 hours. Average student enrollment is 8 students per class. Total classes of 12 per day and start at 8am and finish at 930pm.
Skilled Nursing Facility	54,611 sf	Skilled nursing facility with average of 1.5 admits per day and 1 discharge per day. Staff ratio of 1:6 with a total of 59 beds. It is a 24/7 operation and there are usually approximately 20 visitors/service provider visits per day. No patients/residents have access to vehicles
Memory Care	34,480 sf	Like above SNF, however longer length of stay (average stay of 45 days) so less vehicle traffic inbound and outbound. Same staff ratio and same visit count by visitors/service providers.
Assisted Living Facility	34,380 sf	Limited use of vehicles for residents. On average ¼ of residents have vehicles parked full time at facility. Majority of residents use facilities bus transportation. This is 24/7 as well and staff ratio is 1:8.
Multi-Family Apartment	90 Units	Standard
Medical/Commercial	114,000 sf	This will be standard weekday medical offices.

IMPACTS

Intersections

Table E-2 provides the intersection level of service analysis for the study intersections considering the study scenarios discussed above. Potential mitigation measures are discussed below. Results of the analysis show that the Project will contribute to an unacceptable LOS at five (5) of the study intersections when comparing the Cumulative Year 2042 scenarios.

Segments

Table E-3 shows roadway segments that are expected to fall short of desirable operating conditions for various scenarios. Potential mitigation measures are discussed below. Results of the analysis also show that the Project will result in a cumulative impact at two (2) of the study roadway segments when comparing the Cumulative Year 2042 scenarios.

Table E-2
Intersection Operations

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
1. 12th Avenue / Glendale Avenue	Two-Way Stop Sign	D	AM	22.7	C	30.2	D	**37.2**	**E**	**74.4**	**F**	**154.4**	**F +**
			PM	**100.4**	**F +**	**184.6**	**F +**	**269.9**	**F +**	**++**	**F**	**++**	**F +**
2. 12th Avenue / SR 198 WB Ramps	Signalized	-- [1]	AM	13.8	B	13.7	B	14.5	B	18.8	B	19.9	B
			PM	17.8	B	19.4	B	23.0	C	64.5	E	75.1	E
3. 12th Avenue / SR 198 EB Ramps	Signalized	-- [1]	AM	11.9	B	12.5	B	12.7	B	13.2	B	13.7	B
			PM	13.0	B	13.6	B	14.3	B	19.0	B	20.1	C
4. Campus Drive / Lacey Boulevard	Signalized	D	AM	25.0	C	25.2	C	25.4	C	25.7	C	25.5	C
			PM	28.0	C	29.2	C	31.4	C	52.2	D	52.9	D
5. Campus Drive / 7th Street	All-Way Stop Sign	D	AM	9.9	A	11.9	B	12.6	B	12.1	B	15.0	B
			PM	15.6	C	23.7	C	31.8	D	**92.9**	**F**	**146.9**	**F**
6. Campus Drive / 6th Street	Two-Way Stop Sign	D	AM	10.4	B	13.3	B	13.6	B	10.7	B	13.1	B
			PM	10.6	B	13.9	B	14.3	B	11.5	B	14.7	B
7. 11th Avenue / Lacey Boulevard	Signalized	D	AM	20.4	C	20.3	C	21.0	C	25.3	C	25.9	C
			PM	27.5	C	28.5	C	31.6	C	49.9	D	52.7	D
8. 11th Avenue / 7th Street	Signalized	D	AM	18.9	C	18.9	B	19.7	B	24.2	C	24.4	C
			PM	28.8	C	29.0	C	31.8	C	**55.6**	**E**	**57.6**	**E**
9. 11th Avenue / 6th Street	Two-Way Stop Sign	D	AM	12.6	B	12.7	B	13.3	B	17.1	C	17.3	C
			PM	17.4	C	18.1	C	20.6	C	**74.3**	**F**	**83.6**	**F**
10. 11th Avenue / 5th Street	Signalized	D	AM	4.9	A	9.6	A	9.7	A	6.5	A	10.7	B
			PM	12.1	B	18.1	B	19.5	B	23.8	C	42.3	D
11. 11th Avenue / 4th Street-SR 198 WB On Ramp	Signalized	-- [1]	AM	12.0	B	15.3	B	15.9	B	16.4	B	20.8	C
			PM	12.7	B	14.6	B	15.6	B	21.0	C	28.4	C
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	Signalized	-- [1]	AM	18.6	B	21.0	C	22.9	C	27.0	C	30.2	C
			PM	25.1	C	30.6	C	35.4	D	76.3	E	97.4	F

DELAY is measured in seconds
LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized and all-way stop intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

1 - With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation imrovements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance will be used in determining the need for roadway improvements on Caltrans facilities.
\+ Meets peak hour signal warrants.
++ Delay Exceeds 300 seconds.

Table E-3
Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS
Lacey Boulevard													
12th Avenue to Campus Drive	4 Lanes Divided	D	AM	855	C	919	C	990	C	1,322	C	1,386	C
			PM	1,693	C	1,767	C	1,907	C	2,617	D	2,691	D
Campus Drive to 11th Avenue	4 Lanes Divided	D	AM	963	C	1,027	C	1,107	C	1,489	C	1,553	C
			PM	1,873	C	1,947	C	2,101	C	2,896	D	**2,970**	**E**
7th Street													
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	346	D	378	D	407	D	535	D	567	D
			PM	743	D	780	D	841	D	**1,149**	**E**	**1,186**	**E**
6th Street													
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	127	C	127	C	137	C	196	C	196	C
			PM	142	C	142	C	154	C	220	C	220	C
Glendale Avenue													
East of 12th Avenue	2 Lanes Undivided	D	AM	130	C	323	C	334	D	201	C	394	D
			PM	163	C	385	D	399	D	252	C	474	D
5th Avenue													
West of 11th Avenue	2 Lanes Undivided	D	AM	101	C	359	D	367	D	156	C	414	D
			PM	464	D	760	D	799	D	717	D	1,014	D
Campus Drive													
Lacey Bouloevard to Glendale Avenue	2 Lanes Undivided	D	AM	251	C	380	D	400	D	388	D	517	D
			PM	393	D	541	D	574	D	608	D	756	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

MITIGATION

As discussed above, the potentially significant impacts resulting from the Project relate to the generation of unacceptable LOS at various intersections and road segments in the long term. Considering the criteria provided in Section 1.3 and the results presented above, the following improvements are recommended to alleviate project-specific impacts.

INTERSECTIONS

- ✓ 12th Avenue at Glendale Avenue
  No Recommended improvements.

  Installation of a traffic signal would alleviate level of service deficiencies at the intersection for all study scenarios. However, providing a traffic signal at this location is not practical given the close spacing of adjacent intersections. In lieu of the traffic signal, dual right turn lanes for the eastbound and westbound approaches to the intersection should be considered to alleviate queuing at the eastbound and westbound approaches.

- ✓ Campus Drive at 7th Street
  Recommended improvements to achieve acceptable levels of service:
  - Cumulative Year 2042 Plus Project scenario:
    - Install Traffic Signal

  The improvements identified above for the Cumulative Year 2042 Plus Project scenario are sufficient to meet the City of Hanford's acceptable LOS standard of 'D'.

- ✓ 11th Avenue at 7th Street
  No Recommended improvements.

  Providing additional turning movement lanes along 11th Avenue and 7th Street is not possible due to design constraints or infeasible/impractical due to the presence of commercial development that currently exists along the north and south side of 7th Street.

- ✓ 11th Avenue at 6th Street
  No Recommended improvements.

  This intersection is forecasted to operate at unacceptable LOS 'F' (PM) under Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project conditions; however, this intersection does not meet the peak hour traffic signal warrant because the minor approaches do not carry enough traffic to justify signalization. Therefore, no improvements are recommended for the Project's contribution of traffic at the intersection for the Cumulative Year 2042 Plus Project condition.

- ✓ 12th Avenue at SR 198 WB Ramps
  No Recommended improvements.

Providing additional turning movement lanes at the 12th Avenue and SR 198 WB Ramps intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the north side of the SR 198 WB Ramps. As noted in Section 1.3, Caltrans no longer uses level of service to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

✓ 11th Avenue at 3rd Street-SR 198 EB Off Ramp
No Recommended improvements.

Providing additional turning movement lanes at the 11th Avenue and 3rd Street-SR 198 EB Off Ramp intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the south side of 3rd Street and the SR 198 EB Off Ramp. As noted in Section 1.3, Caltrans no longer uses level of service to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

ROADWAY SEGMENTS

✓ Lacey Boulevard between Campus Drive and 11th Avenue
No Recommended improvements.

Providing additional travel lanes along Lacey Boulevard is not possible due to design constraints or infeasible/impractical due to the presence of retail development that currently exists along the north and south side of Lacey Boulevard. In addition, accommodating additional travel lanes along Lacey Boulevard could result in the elimination of parking along Lacey Boulevard.

✓ 7th Street between Campus Drive and 11th Avenue
Recommended improvements:

- Cumulative Year 2042 Plus Project scenario:
  - Restripe to provide two-way left turn lane with removal of parking as necessary

Providing additional travel lanes along 7th Street is not possible due to right-of-way constraints.

Post-Mitigation Level of Significance

The level of service resulting from the potential improvements identified above is shown in Tables E-4 and E-5.

This section documents the Project's fair-share responsibility towards the costs of improvements that are identified for the Cumulative Year 2042 scenario. The City of Hanford and the applicant have determined that the payment of the City's impact fees will satisfy the Project's obligations to pay for an equitable share of the improvements.

The formulas used to calculate the equitable share responsibility to City of Hanford facilities is as follows:

Equitable Share = (Project Trips)/(Future Year Plus Project Traffic)

Table E-6 shows the Project's equitable fair share responsibility on a percentage basis for improvements to City of Hanford facilities as described above. The equitable fair share responsibility shown in Table E-6 is the result of LOS enhancements related to capacity.

Table E-4
Intersection Operations with Mitigation

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS
1. 12th Avenue / Glendale Avenue	Two-Way Stop Sign	D	AM	30.2	D	**37.2**	**E [2]**	**154.4**	**F [2]**
			PM	**184.6**	**F [2]**	**269.9**	**F [2]**	**++**	**F [2]**
2. 12th Avenue / SR 198 WB Ramps	Signalized	-- [1]	AM					19.9	B
			PM					75.1	E [3]
5. Campus Drive / 7th Street	Signalized	D	AM					12.8	B
			PM					20.4	C
8. 11th Avenue / 7th Street	Signalized	D	AM					24.4	C
			PM					**57.6**	**E [3]**
9. 11th Avenue / 6th Street	Two-Way Stop Sign	D	AM					17.3	C
			PM					**83.6**	**F [4]**
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	Signalized	-- [1]	AM					30.2	C
			PM					97.4	F [3]

DELAY is measured in seconds
LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized and all-way stop intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

1 - With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation imrovements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance will be used in determining the need for roadway improvements on Caltrans facilities. **The recommended improvements are for informational purposes only and would allow for the intersection to meet the City of Hanford LOS criteria.**

2 Installation of a traffic signal would alleviate LOS deficiencies at the intersection. A traffic signal is not recommended given the close spacing of adjacent intersections.

3 Improvements to the intersection aren't recommended given the presence of abutting commercial development at the intersection.

4 Intersection does not meet the peak hour traffic signal warrant.

++ Delay Exceeds 300 seconds.

Table E-5

Table E-5
Segment Operations with Mitigation

STREET SEGMENT	TARGET LOS	PEAK HOUR	CUMULATIVE YEAR 2042 PLUS PROJECT	
			VOLUME	LOS
Lacey Boulevard				
Campus Drive to 11th Avenue	D	AM	1,553	C
		PM	**2,970**	**E ***
7th Street				
Campus Drive to 11th Avenue	D	AM	567	D
		PM	**1,186**	**E ***

* Capacity Increasing Improvements to the roadway segment aren't recommended given the presence of abutting commercial development.

Table E-6
Cumulative Year 2042 Equitable Share Responsibility

INTERSECTION	PEAK HOUR	PROJECT TRIPS	CUMULATIVE YEAR 2042 PLUS PROJECT	FAIR SHARE PERCENTAGE
Campus Drive / 7th Street	AM	193	1,098	17.6%
	PM	223	1,830	12.2%
ROADWAY SEGMENT				
7th Street between Campus Drive and 11th Avenue	AM	32	567	5.6%
	PM	37	1,186	3.1%

1.0 Introduction

1.1 Description of the Region/Project

This Traffic Impact Study (TIS) has been prepared for the purpose of analyzing traffic conditions related to the Hanford Place Development (Project). The various components of the Project are detailed in Table 1-1 below. The Project site is generally bound to the north by the San Joaquin Valley Railroad, to the east by commercial land uses, to the south by State Route 198, and to the west by commercial land uses. Regional access to the site is provided by State Route 198, which is located adjacent to the southern border of the project site. Figure 1-1 shows the site's regional context. Figure 1-2 shows the Project location within the City of Hanford.

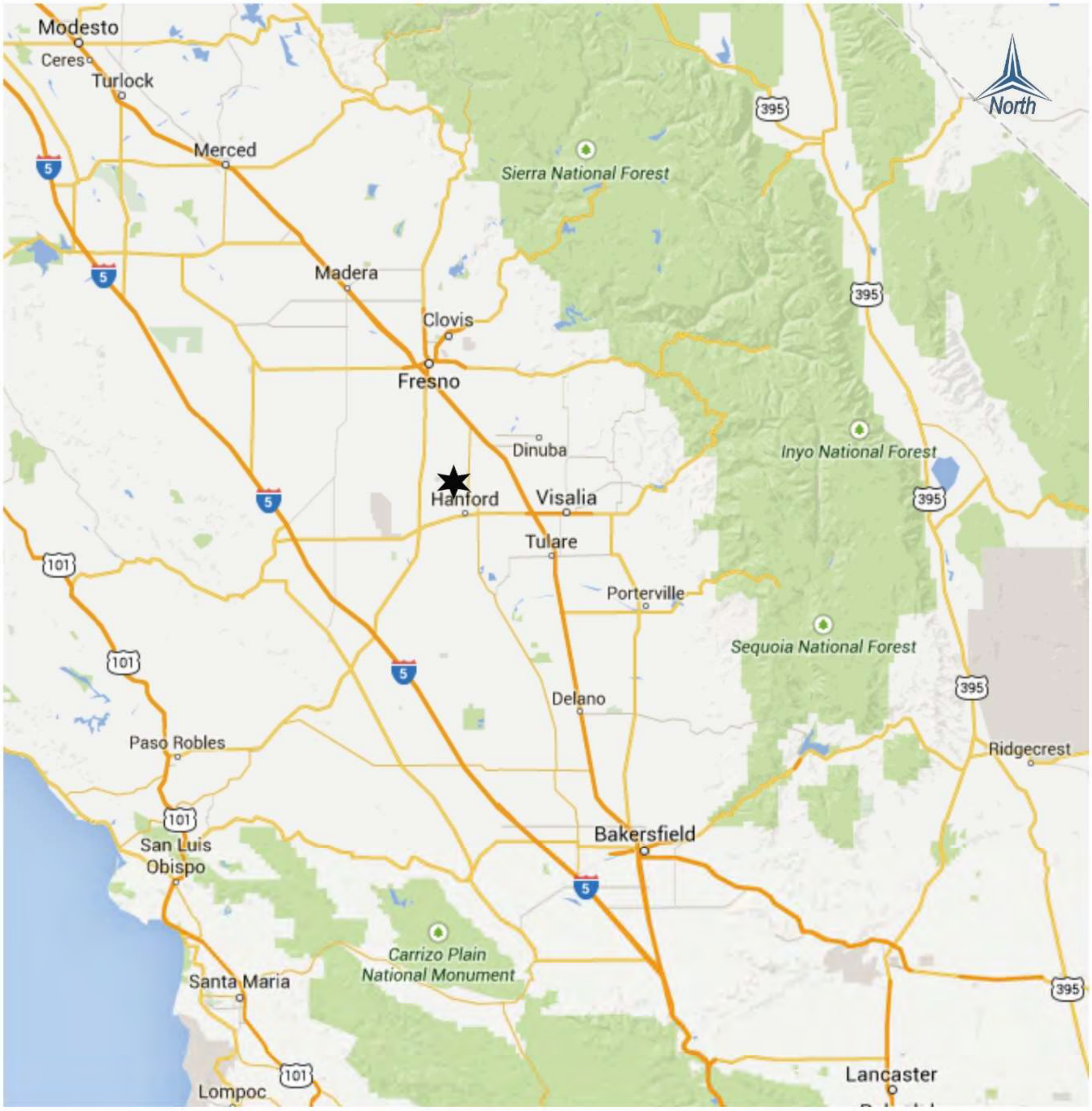
The vacant project site is comprised of four parcels and is located between State Route 198 and the San Joaquin Valley Railroad in the City of Hanford (City), in Kings County (Kings). 5th Street cuts through the project site in an east/west direction and Campus Drive cuts through the project in a north/south direction. In addition, the Peoples Ditch runs through the project site.

Table 1-1
Project Components

PROJECT COMPONENTS	SIZE/UNIT	DESCRIPTION
Ambulatory Surgery Center	22,525 sf	This facility is used to handle approximately 25 surgical procedures per day. There will be approximately 12 employees. This only operates weekdays.
Specialty Clinic	12,445 sf	This will be an Office of Statewide Health Planning and Development's (OSHPD) 3 facility, which in turn will approve advanced scope for medical care (i.e.: radiology/oncology. This will be a Monday-Saturday facility.
Medical Office Building	24,890 sf	This will be standard weekday medical offices.
Psychiatric Health Facility	12,445 sf	This is a psychiatric health care facility. This will consist of 24 patients who stay an average of 5 days. There will be approximately 10 employees and this use will operate 24/7. There will be approximately 4 admissions/discharges per day all done via ambulance.
Hotel & Conference Center	105 Rooms	This will be a standard traffic count for hotels and will be a limited service hotel. The conference center will be used on an average of 2 times per week including weekends.
Nursing College	35,000 sf	This is a m-sat operation. The School hosts 4 classes per scheduling window and offer three scheduling windows per day. Average class length is 2.5 hours. Average student enrollment is 8 students per class. Total classes of 12 per day and start at 8am and finish at 930pm.
Skilled Nursing Facility	54,611 sf	Skilled nursing facility with average of 1.5 admits per day and 1 discharge per day. Staff ratio of 1:6 with a total of 59 beds. It is a 24/7 operation and there are usually approximately 20 visitors/service provider visits per day. No patients/residents have access to vehicles
Memory Care	34,480 sf	Like above SNF, however longer length of stay (average stay of 45 days) so less vehicle traffic inbound and outbound. Same staff ratio and same visit count by visitors/service providers.
Assisted Living Facility	34,380 sf	Limited use of vehicles for residents. On average ¼ of residents have vehicles parked full time at facility. Majority of residents use facilities bus transportation. This is 24/7 as well and staff ratio is 1:8.
Multi-Family Apartment	90 Units	Standard
Medical/Commercial	114,000 sf	This will be standard weekday medical offices.

Hanford Place Development
Regional Location

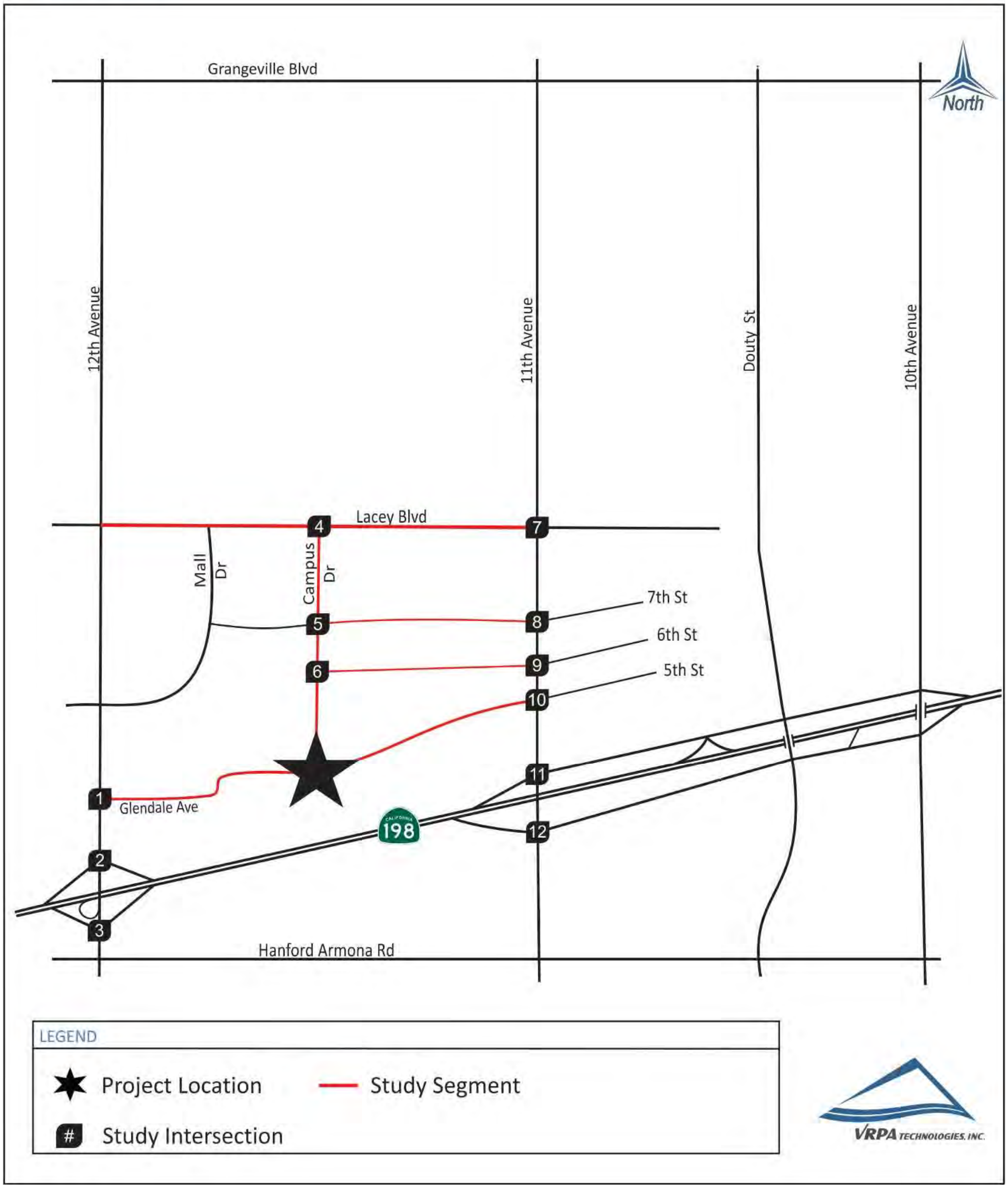
Figure 1-1



LEGEND
★ Project Location

Hanford Place Development
Project Location

Figure 1-2



1.1.1 *Project Access*

Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout. In addition, the proposed project would provide 1,466 parking spaces throughout the project site.

1.1.2 *Study Area*

The study intersections and roadway segments included in this TIS are listed below and shown in Figure 1-2. The study area outlined below was developed in consultation with City of Hanford staff.

Intersections

- ✓ 12th Avenue / Glendale Avenue
- ✓ 12th Avenue / SR 198 WB Ramps
- ✓ 12th Avenue / SR 198 EB Ramps
- ✓ Campus Drive / Lacey Boulevard
- ✓ Campus Drive / 7th Street
- ✓ Campus Drive / 6th Street
- ✓ 11th Avenue / Lacey Boulevard
- ✓ 11th Avenue / 7th Street
- ✓ 11th Avenue / 6th Street
- ✓ 11th Avenue / 5th Street
- ✓ 11th Avenue / 4th Street-SR 198 WB On Ramp
- ✓ 11th Avenue / 3rd Street-SR 198 EB Off Ramp

Segments

- ✓ Lacey Boulevard
  - 12th Avenue to Campus Drive
  - Campus Drive to 11th Avenue

- ✓ 7th Street
  - Campus Drive to 11th Avenue

- 6th Street
    - Campus Drive to 11th Avenue

- Glendale Avenue
    - East of 12th Avenue

- 5th Avenue
    - West of 11th Avenue

- Campus Drive
    - Lacey Boulevard to Glendale Avenue

1.1.3 *Study Scenarios*

The TIS completed for the Project includes level of service (LOS) analysis for the following traffic scenarios.

- Existing Conditions
- Existing Plus Project
- Near-Term Plus Project
- Cumulative Year 2042 Without Project
- Cumulative Year 2042 Plus Project

1.2 Methodology

When preparing a TIS, guidelines set by affected agencies are followed. In analyzing street and intersection capacities the Level of Service (LOS) methodologies are applied. LOS standards are applied by transportation agencies to quantitatively assess a street and highway system's performance. In addition, safety concerns are analyzed to determine the need for appropriate mitigation resulting from increased traffic near sensitive uses, the need for dedicated ingress and egress access lanes to the project, and other evaluations such as the need for signalized intersections or other improvements. Guidelines incorporated in the Highway Capacity Manual (HCM), 6th Edition, published in 2016 were also used in the development of this TIS.

1.2.1 *Intersection Analysis*

Intersection LOS analysis was conducted using the Synchro software program. Synchro supports HCM methodologies and is deemed an acceptable program by City of Hanford staff for assessment of traffic impacts. Levels of Service can be determined for both signalized and unsignalized intersections.

Tables 1-2 and 1-3 indicate the ranges in the amounts of average delay for a vehicle at signalized and unsignalized intersections for the various levels of service ranging from LOS "A" to "F".

The signalized LOS standards applied to calculate intersection LOS are in accordance with the current edition of the HCM. Intersection turning movement counts and roadway geometrics used to develop LOS calculations were obtained from field review findings and count data provided from the traffic count sources identified in Section 2.1.

When an unsignalized intersection does not meet acceptable LOS standards, the investigation of the need for a traffic signal shall be evaluated. The latest edition of the California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) introduces standards for determining the need for traffic signals. The California MUTCD indicates that the satisfaction of one or more traffic signal warrants does not in itself require the installation of a traffic signal. In addition to the warrant analysis, an engineering study of the current or expected traffic conditions should be conducted to determine whether the installation of a traffic signal is justified. The California MUTCD Peak Hour Warrant (Warrant 3) was used to determine if a traffic signal is warranted at unsignalized intersections that fall below current LOS standards.

1.2.2 *Roadway Segment Analysis*

According to the HCM, LOS is categorized by two parameters of traffic: uninterrupted and interrupted flow. Uninterrupted flow facilities do not have fixed elements such as traffic signals that cause interruptions in traffic flow. Interrupted flow facilities do have fixed elements that cause an interruption in the flow of traffic, such as stop signs and signalized intersections along arterial roads. A roadway segment is defined as a stretch of roadway generally located between signalized or controlled intersections.

Segment LOS is important in order to understand whether the capacity of a roadway can accommodate future traffic volumes. Table 1-4 provides a definition of segment LOS. The performance criteria used for evaluating volumes and capacities on the road and highway system for this study were estimated using the Modified HCM-Based LOS Tables which are widely accepted throughout the central valley, including Kings County. The tables consider the capacity of individual road and highway segments based on numerous roadway variables (design speed, passing opportunities, signalized intersections per mile, number of lanes, saturation flow, etc.). These variables were identified and applied to reflect segment LOS conditions. Street segment capacity was determined using information shown in Table 1-5 which comes from the Modified Arterial Level of Service Tables included in Appendix A.

Table 1-2
Signalized Intersections
Level of Service Definitions
(Highway Capacity Manual)

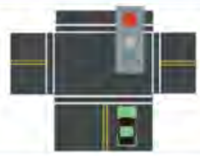
LEVEL OF SERVICE	DEFINITION	AVERAGE TOTAL DELAY (sec/veh)
A	Describes operations with very low delay. This level of service occurs when there is no conflicting traffic for a minor street. 	**≤ 10.0**
B	Describes operations with moderately low delay. This level generally occurs with a small amount of conflicting traffic causing higher levels of average delay. 	**> 10.0 - 20.0**
C	Describes operations with average delays. These higher delays may result from a moderate amount of minor street traffic. Queues begin to get longer. 	**> 20.0 - 35.0**
D	Describes a crowded operation, with below average delays. At level D, the influence of congestion becomes more noticeable. Longer delays may result from shorter gaps on the mainline and an increase of minor street traffic. The queues of vehicles are increasing. 	**> 35.0 - 55.0**
E	Describes operations at or near capacity. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor gaps for the minor street to cross and large queues. 	**> 55.0 - 80.0**
F	Describes operations that are at the failure point. This level, considered to be unacceptable to most drivers, often occurs with over- saturation, that is, when arrival flow rates exceed the capacity of the intersection. Insufficient gaps of suitable size exist to allow minor traffic to cross the intersection safely. 	**> 80.0**

Table 1-3
Unsignalized Intersections
Level of Service Definitions
(Highway Capacity Manual)

LEVEL OF SERVICE	DEFINITION	AVERAGE TOTAL DELAY (sec/veh)
A	No delay for stop-controlled approaches. 	0 - 10.0
B	Describes operations with minor delay. 	> 10.0 - 15.0
C	Describes operations with moderate delays. 	> 15.0 - 25.0
D	Describes operations with some delays. 	> 25.0 - 35.0
E	Describes operations with high delays and long queues. 	> 35.0 - 50.0
F	Describes operations with extreme congestion, with very high delays and long queues unacceptable to most drivers. 	> 50.0

Table 1-4
Roadway Segment
Level of Service Definitions
(Highway Capacity Manual)

LEVEL OF SERVICE	DEFINITION
A	Represents free flow. Individual vehicles are virtually unaffected by the presence of others in the traffic stream. 
B	Is in the range of stable flow, but the presence of other vehicles in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver. 
C	Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual vehicles becomes significantly affected by interactions with other vehicles in the traffic stream. 
D	Is a crowded segment of roadway with a large number of vehicles restricting mobility and a stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience. 
E	Represents operating conditions at or near the level capacity. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement. 
F	Is used to define forced or breakdown flow (stop-and-go gridlock). This condition exists when the amount of traffic approaches a point where the amount of traffic exceeds the amount that can travel to a destination. Operations within the queues are characterized by stop and go waves, and they are extremely unstable. 

Table 1-5
Peak Hour Two-Way Volumes

		Level of Service			
Lanes	Division	B	C	D	E
2	Undivided	*	324	1,125	1,521
2	Divided	*	340	1,181	1,597
4	Undivided	77	2,083	2,763	2,890
4	Divided	81	2,205	2,925	3,060
6	Divided	135	3,339	4,401	4,617

* Cannot be achieved using table input value defaults.

1.3 Policies to Maintain Level of Service

1.3.1 *City of Hanford*

An important goal is to maintain acceptable levels of service along the highway, street, and road network. To accomplish this, the City of Hanford adopts minimum levels of service to control congestion that may result as new development occurs.

The City of Hanford General Plan Circulation Element states: "The City of Hanford has adopted an overall LOS standard of C with peak hour LOS standard of D acceptable in some instances. Due to the nature of the roadway system, improvements to existing developed areas are extremely difficult. As a result, there may be instances where a lower LOS is acceptable."

The City of Hanford General Plan Objective CI 2 states: "Provide timely and effective means of programming and constructing street and highway improvements to maintain an overall Level of Service of "C", with a peak hour Level of Service of "D" as defined in the Highway Capacity Manual (published by the Transportation Research Board of the National Research Council) or better unless the City's design considerations or other public health, safety, or welfare factors determine otherwise."

The City of Hanford General Plan Policy CI 2.2 states: "Street improvements shall be prioritized with emphasis on current and forecasted service levels. Roadways experiencing or forecasted to experience conditions less than Level-of-Service "D" shall require improvements, unless the City's design considerations or other public health, safety or welfare factors determine otherwise."

1.3.2 *California Department of Transportation (Caltrans)*

With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation improvements. Instead, the focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the

Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance was used in determining the need for roadway improvements on Caltrans facilities.

1.4 VMT Analysis

Senate Bill 743 (SB 743) went into effect throughout California on July 1, 2020. This legislation changed the performance measure for CEQA transportation studies from level of service to vehicle miles traveled (VMT). An assessment of potential VMT impacts associated with the Project is provided in Chapter 3 to address changes in CEQA requirements.

Since the City of Hanford has not adopted methodologies or thresholds for VMT analyses related to SB 743, the VMT analysis was conducted using statewide guidance provided by the Governor's Office of Planning and Research (OPR) in the their Technical Advisory on Evaluating Transportation Impacts in CEQA (OPR, December 2018). OPR recommends comparing project VMT/capita and VMT/employee to regional averages to determine the level of significance of project impacts. VMT/capita and VMT/employee values for the project as well as regional averaged were obtained from an online VMT analysis tool provided by the Kings County Association of Governments (KCAG).

2.0 Existing Conditions

2.1 Existing Traffic Counts and Roadway Geometrics

The first step toward assessing Project traffic impacts is to assess existing traffic conditions. Existing traffic counts were estimated considering the Kings County Association of Governments (KCAG) travel model and historic traffic counts in the study area given the on-going COVID-19 pandemic. Following is the methodology used for the development of existing traffic counts:

- ✓ A comparison of the KCAG base year and future year travel model showed that the growth in the study area is approximately 2% per year. The 2% per year growth rate was applied to historical ADT counts collected in the study area to estimate Year 2020 pre-COVID conditions.

- ✓ The estimated pre-COVID year 2020 ADT values (obtained using the 2% per year growth rate) were compared to October 2020 ADT values. Results of the comparison indicated that traffic counts taken in October 2020 ADT (i.e. during COVID) should be increased by a factor of 1.30 to estimate 2020 pre-COVID levels.

- ✓ Where intersection turning movement counts in years prior to 2020 are available, a 2% per year growth rate was applied to estimate year 2020 conditions.

- ✓ Where intersection turning movement counts are not available in years prior to 2020, a factor of 1.3 was applied to the October 2020 turning movement counts collected in the study area.

Traffic count data worksheets are provided in Appendix B.

2.2 Existing Functional Roadway Classification System

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the type of service they are intended to provide. Fundamental to this process is the recognition that individual streets and highways do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads.

The following are general descriptions of the roadway types shown in the City of Hanford Circulation Element:

- ✓ **State Freeways and Highways** – There are two state facilities serving the Hanford Planning Area, State Highway 198 and State Highway 43. The segment of State Highway 198, which passes through the Planning Area, is considered a freeway. State Highway 43 is a two-lane facility and functions as an arterial and major transportation route between Hanford and Fresno to the north and Corcoran to the south.

- ✓ **Arterial** – Hanford's arterial street pattern is generally one-mile spacing between the existing arterials. Exceptions to this spacing include Third, Fourth, Sixth and Seventh Streets, which are in the downtown area and provide for both mobility (to and through downtown), as well as access. These streets do not meet the right-of-way requirements or improvement standards for arterial streets; however, they function as arterial streets.

  - **Lacey Boulevard**
  - **12th Avenue**
  - **11th Avenue**

- ✓ **Collectors** – The streets shown below are designated as Collector streets, with their own set of development criteria. Similar to some Arterials, Collector streets have evolved from heavy use as opposed to formal development standards. Because of this, some streets may be designated Collectors, but not have all of the improvements required for new Collectors such as right-of-way width, travel way paving, and limited access.

  - **Campus Drive**
  - **7th Street**
  - **Glendale Avenue**
  - **5th Street**

- ✓ **Local Streets** – Roadways that provide access to individual homes and businesses. Local streets have one lane in each direction. Local streets connect single family homes and other uses not appropriate adjacent to major roadways, to the arterial-collector network.

2.3 Affected Streets and Highways

Street and highway intersections and segments near and adjacent to the Project site were analyzed to determine levels of service utilizing HCM-based methodologies described previously. The study intersections and street and highway segments included in this TIS are listed below. Counts were taken on Wednesday, July 18, 2018.

Intersections

- ✓ 12th Avenue / Glendale Avenue
- ✓ 12th Avenue / SR 198 WB Ramps
- ✓ 12th Avenue / SR 198 EB Ramps
- ✓ Campus Drive / Lacey Boulevard
- ✓ Campus Drive / 7th Street
- ✓ Campus Drive / 6th Street
- ✓ 11th Avenue / Lacey Boulevard
- ✓ 11th Avenue / 7th Street
- ✓ 11th Avenue / 6th Street

- 11th Avenue / 5th Street
- 11th Avenue / 4th Street-SR 198 WB On Ramp
- 11th Avenue / 3rd Street-SR 198 EB Off Ramp

Segments

- Lacey Boulevard
    - 12th Avenue to Campus Drive
    - Campus Drive to 11th Avenue

- 7th Street
    - Campus Drive to 11th Avenue

- 6th Street
    - Campus Drive to 11th Avenue

- Glendale Avenue
    - East of 12th Avenue

- 5th Avenue
    - West of 11th Avenue

- Campus Drive
    - Lacey Boulevard to Glendale Avenue

The existing lane geometry at study area intersections is shown in Figure 2-1. Figures 2-2 and 2-3 show existing traffic volumes for the AM and PM peak hours in the study area.

2.4 Level of Service

2.4.1 *Intersection Capacity Analysis*

All intersection LOS analyses were estimated using Synchro 10 Software. Various roadway geometrics, traffic volumes, and properties (peak hour factors, storage pocket length, etc) were input into the Synchro 10 Software program to accurately determine the travel delay and LOS for each Study scenario. The intersection LOS and delays reported represent the 6th Edition HCM outputs. Synchro assumptions, listed below, show the various Synchro inputs and methodologies used in the analysis.

- **Lane Geometry**
    - Storage lengths for turn lanes for existing intersections were obtained from aerial photos and rounded to the nearest 25 feet
    - VRPA conducted a field study of the specified intersections and segments to verify lane

geometry and intersection control as well as to obtain other pertinent data such as signal timing and phasing, where applicable.

- **Traffic Conditions**
  - Peak hour factors (PHF) for each intersection approach was obtained from traffic counts in the study area and were utilized for Existing Conditions, Existing Plus Project, and Near-term (Opening Year) Plus Project conditions. For all future scenarios, a PHF of 0.92 was applied unless the existing PHF was greater than 0.92
  - Heavy vehicle percentages were based on the HCM default
  - Roadway link speed limits were observed in the field and input into the Synchro network to determine roadway link speeds
  - Queuing conditions for left and right-turn lanes at all study intersections was based upon Section 400 of Caltrans' Highway Design Manual

Results of the analysis show that the 12th Avenue at Glendale Avenue intersection currently exceeds the City of Hanford's minimum level of service criteria during the PM peak hour. Table 2-1 shows the intersection LOS for the existing conditions. Synchro 10 (HCM 6th Edition) Worksheets are provided in Appendix C.

2.4.2 *Queuing Analysis*

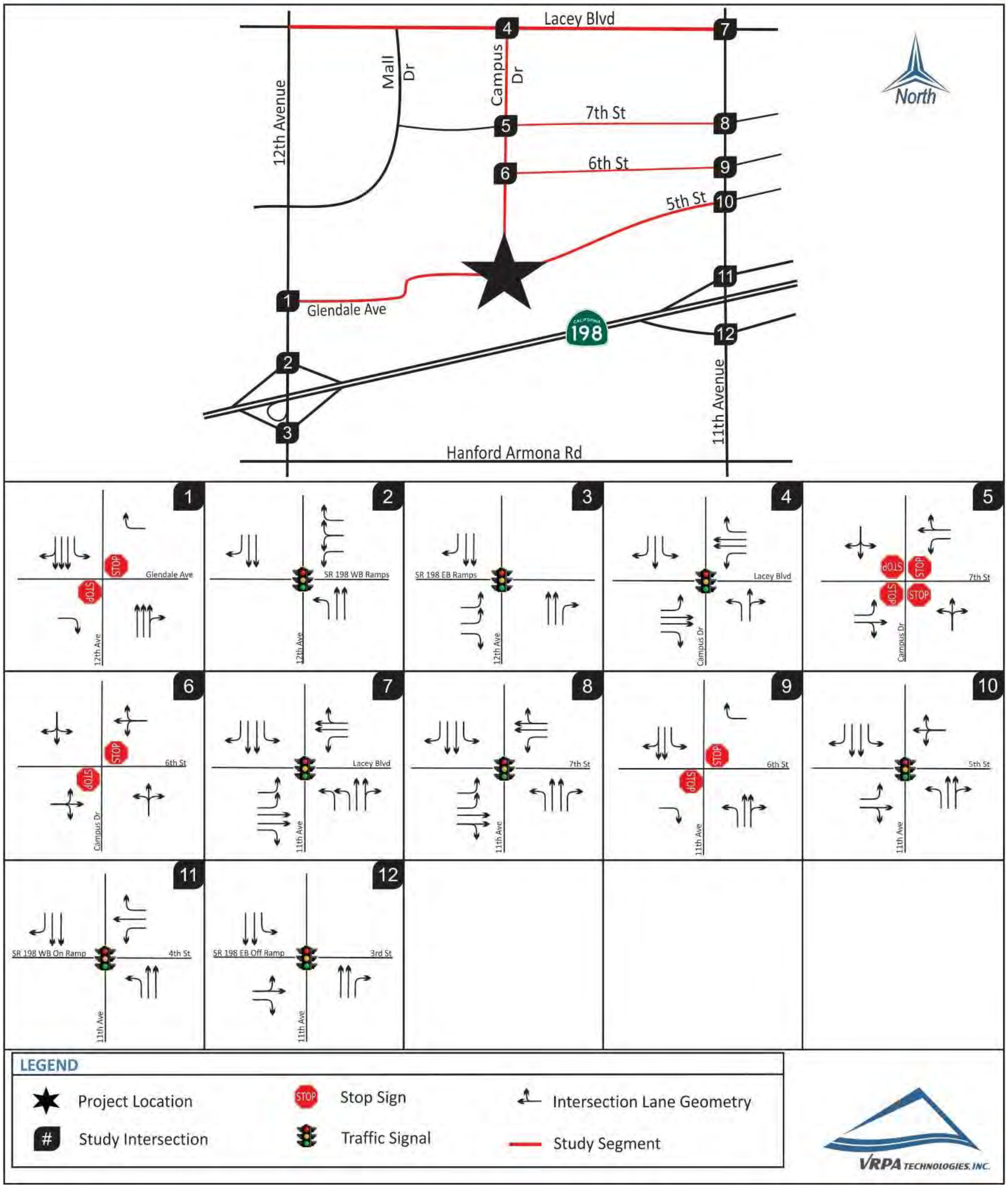
Table 2-2 provides a queue length summary for study intersections for the Existing scenario. Traffic queue lengths at an intersection or along a roadway segment assist in the determination of a roadway's overall performance. Excessive queuing at an intersection increases vehicle delay and reduces capacity. If a dedicated left turn lane doesn't provide adequate storage, vehicles will queue beyond the left turn storage pocket and into other travel lanes, thus increasing vehicle delay and reducing capacity. The queuing analyses is based upon methodology presented in Chapter 400 of Caltrans' Highway Design Manual (HDM), which is included in Appendix D. The queue results shown in Table 2-2 represent the approximate queue lengths for the respective lane movements.

2.4.2 *Roadway Segment Capacity Analysis*

Results of the segment analysis along the existing street and highway system are reflected in Table 2-3. The performance criteria used for evaluating volumes and capacities on the road and highway system for this study were estimated using the Modified Arterial Level of Service Tables included in Table 1-5 and Appendix A. Results of the analysis show that study roadway segments are currently operating at acceptable levels of service.

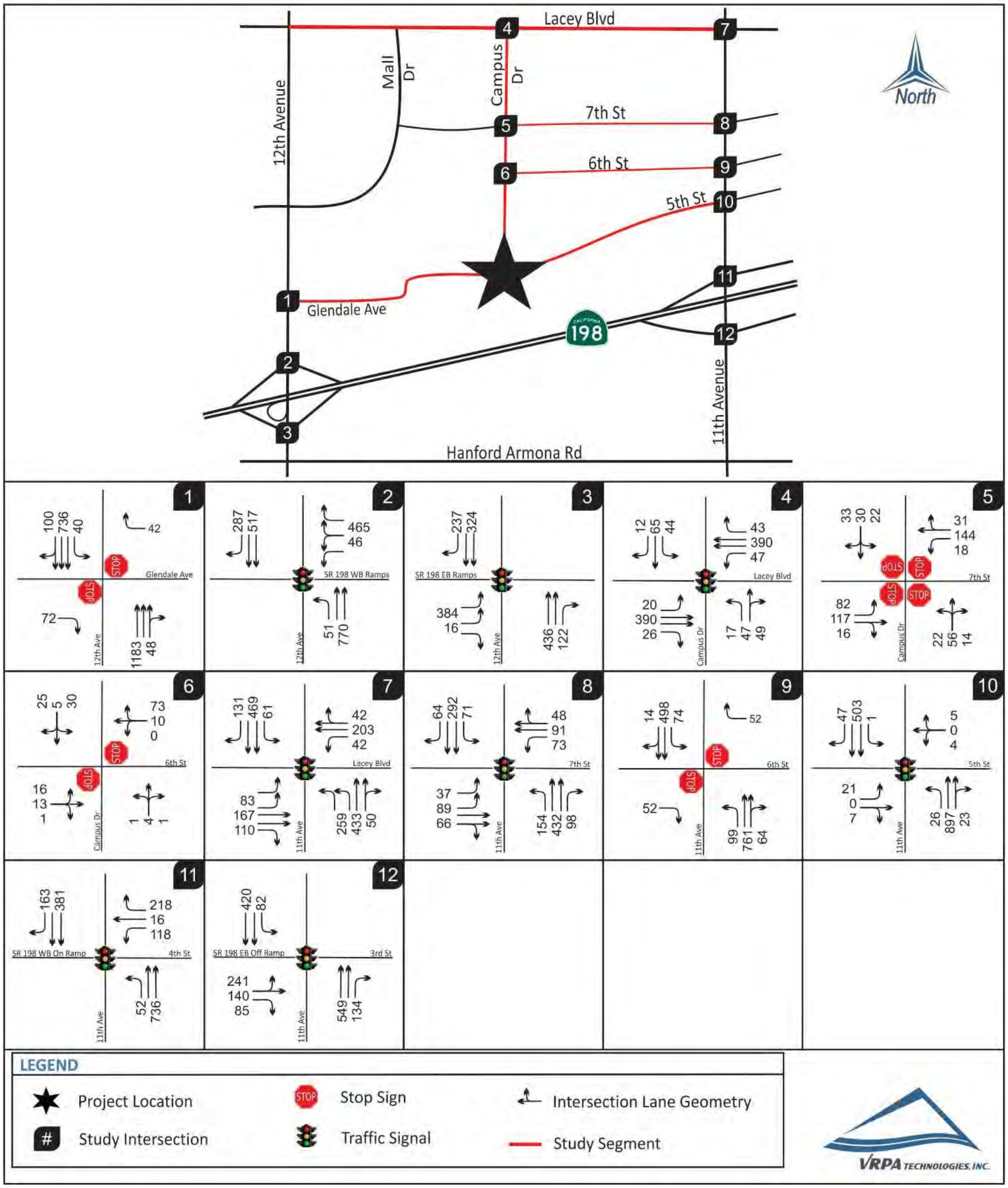
Hanford Place Development
Existing Lane Geometry

Figure 2-1



Hanford Place Development
Existing AM Peak Hour Traffic

Figure 2-2



Hanford Place Development
Existing PM Peak Hour Traffic

Figure 2-3

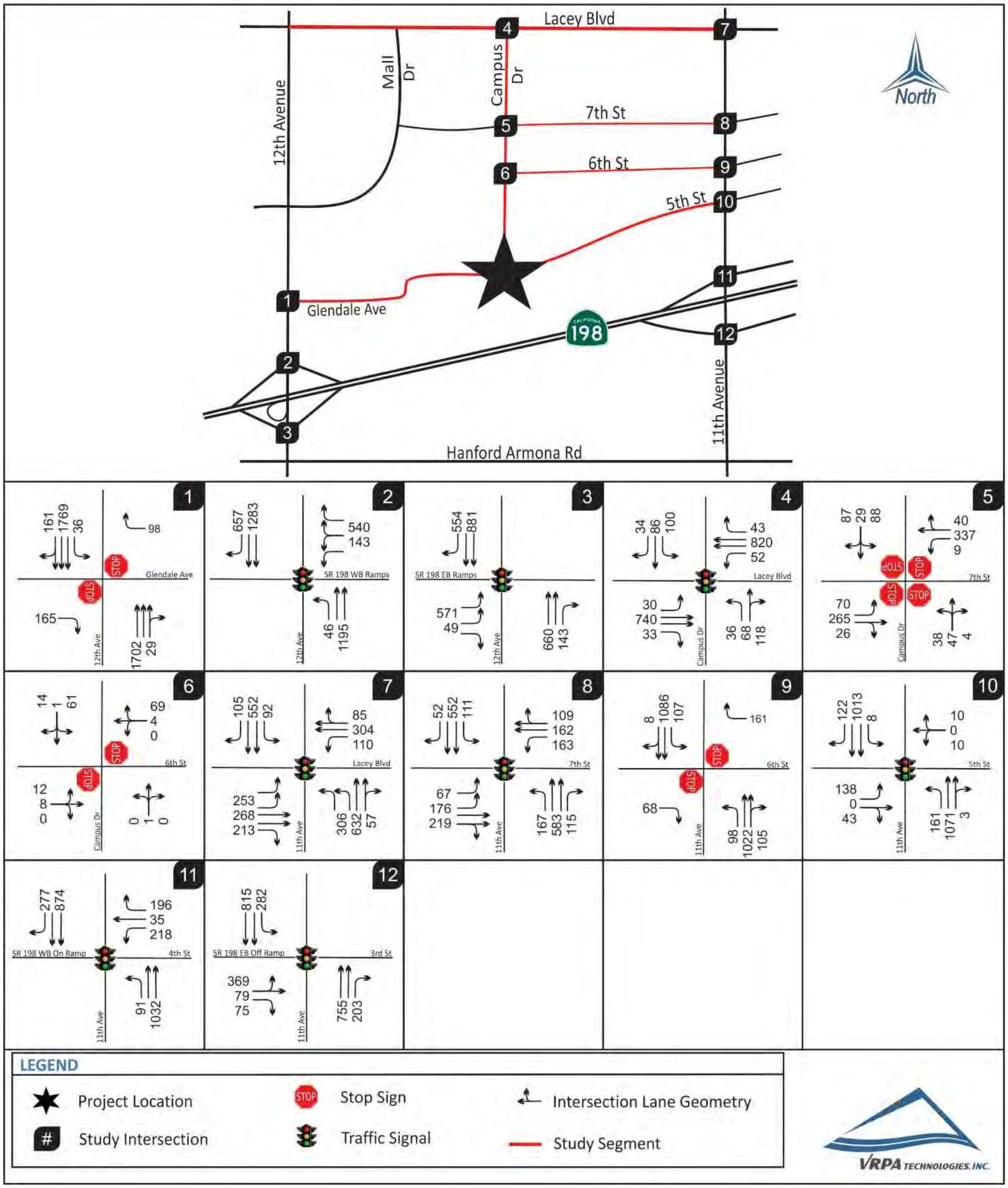


Table 2-1
Existing Intersection Operations

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING	
				DELAY	LOS
1. 12th Avenue / Glendale Avenue	Two-Way Stop Sign	D	AM	22.7	C
			PM	**100.4**	**F +**
2. 12th Avenue / SR 198 WB Ramps	Signalized	-- [1]	AM	13.8	B
			PM	17.8	B
3. 12th Avenue / SR 198 EB Ramps	Signalized	-- [1]	AM	11.9	B
			PM	13.0	B
4. Campus Drive / Lacey Boulevard	Signalized	D	AM	25.0	C
			PM	28.0	C
5. Campus Drive / 7th Street	All-Way Stop Sign	D	AM	9.9	A
			PM	15.6	C
6. Campus Drive / 6th Street	Two-Way Stop Sign	D	AM	10.4	B
			PM	10.6	B
7. 11th Avenue / Lacey Boulevard	Signalized	D	AM	20.4	C
			PM	27.5	C
8. 11th Avenue / 7th Street	Signalized	D	AM	18.9	C
			PM	28.8	C
9. 11th Avenue / 6th Street	Two-Way Stop Sign	D	AM	12.6	B
			PM	17.4	C
10. 11th Avenue / 5th Street	Signalized	D	AM	4.9	A
			PM	12.1	B
11. 11th Avenue / 4th Street-SR 198 WB On Ramp	Signalized	-- [1]	AM	12.0	B
			PM	12.7	B
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	Signalized	-- [1]	AM	18.6	B
			PM	25.1	C

DELAY is measured in seconds
LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized and all-way stop intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

1 - With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation imrovements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance will be used in determining the need for roadway improvements on Caltrans facilities.

+ Meets peak hour signal warrants.

Table 2-2
Existing Queuing Operations

INTERSECTION	EXISTING QUEUE STORAGE LENGTH (ft)		EXISTING CONDITIONS AM Queue	EXISTING CONDITIONS PM Queue
12th Avenue / Glendale Avenue	SB Left	125	33	30
12th Avenue / SR 198 WB Ramps	NB Left	400	43	38
	WB Approach	3 @ 275	426	569
12th Avenue / SR 198 EB Ramps	SB Right	600	198	462
	EB Left	2 @ 875	320	476
	EB Right	850	13	41
Campus Drive / Lacey Boulevard	NB Left	75	14	30
	SB Left	200	37	83
	SB Right	100	10	28
	EB Left	200	17	25
	EB Right	100	22	28
	WB Left	125	39	43
	WB Right	100	36	36
Campus Drive / 7th Street	EB Left	100	68	58
	WB Left	100	15	8
11th Avenue / Lacey Boulevard	NB Left	2 @ 200	216	255
	SB Left	150	51	77
	SB Right	150	109	88
	EB Left	2 @ 125	69	211
	EB Right	100	92	**178**
	WB Left	100	35	92
11th Avenue / 7th Street	NB Left	125	**128**	**139**
	NB Right	100	82	96
	SB Left	100	59	93
	SB Right	100	53	43
	EB Left	2 @ 75	31	56
	WB Left	125	61	**136**
11th Avenue / 6th Street	NB Left	75	**83**	**82**
	SB Left	125	62	89
11th Avenue / 5th Street	NB Left	150	22	134
	SB Left	50	1	7
	SB Right	50	39	**102**
	EB Left	50	18	**115**
11th Avenue / 4th Street-SR 198 WB On Ramp	NB Left	75	43	76
	SB Right	75	**136**	**231**
	WB Left	125	98	**182**
11th Avenue / 3rd Street-SR 198 EB Off Ramp	NB Right	75	**112**	**169**
	SB Left	150	68	**235**
	EB Right	25	**71**	**63**

Queue is measured in feet / **BOLD** denotes exceedance

Table 2-3
Existing Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING	
				VOLUME	LOS
Lacey Boulevard					
12th Avenue to Campus Drive	4 Lanes Divided	D	AM	855	C
			PM	1,693	C
Campus Drive to 11th Avenue	4 Lanes Divided	D	AM	963	C
			PM	1,873	C
7th Street					
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	346	D
			PM	743	D
6th Street					
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	127	C
			PM	142	C
Glendale Avenue					
East of 12th Avenue	2 Lanes Undivided	D	AM	130	C
			PM	163	C
5th Avenue					
West of 11th Avenue	2 Lanes Undivided	D	AM	101	C
			PM	464	D
Campus Drive					
Lacey Bouloevard to Glendale Avenue	2 Lanes Undivided	D	AM	251	C
			PM	393	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

3.0 Traffic Impacts

This chapter provides an assessment of the traffic the Project is expected to generate and the impact of that traffic on the surrounding street system.

3.1 Trip Generation

To assess the impacts that the Project may have on the surrounding roadway network, the first step is to determine Project trip generation. Project trip generation was determined using trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition), the ITE Trip Generation Handbook (3rd Edition), information provided by the Project proponent, and engineering judgement. The considerations described above led to the recommended trip generation for weekday AM (7:00-9:00am) and PM (4:00-6:00pm) peak hours shown in Table 3-1.

Table 3-1
Project Trip Generation

LAND USE	Quantity	DAILY TRIP ENDS (ADT)		WEEKDAY AM PEAK HOUR					WEEKDAY PM PEAK HOUR				
		RATE	VOLUME	RATE	IN:OUT SPLIT	VOLUME			RATE	IN:OUT SPLIT	VOLUME		
						IN	OUT	TOTAL			IN	OUT	TOTAL
Ambulatory Surgery Center[1]	22,525 s.f	6.57	148	2.62	78:22	46	13	59	1.33	29:71	9	21	30
Specialty Clinic (630)	12,445 s.f	38.16	475	3.69	78:22	36	10	46	3.28	29:71	13	31	44
Medical Office Building (720)	24,890 s.f	34.91	869	2.61	78:22	51	14	65	3.46	28:72	24	62	86
Psychiatric Health Facility[1]	12,445 s.f	4.50	56	1.77	55:45	12	10	22	1.77	45:55	10	12	22
Hotel & Conference Center (310)	105 Rooms	7.22	758	0.45	59:41	28	19	47	0.50	51:49	27	26	53
Nursing College (540)	35,000 s.f	20.25	709	2.07	77:23	55	17	72	1.61	50:50	32	33	65
Skilled Nursing Facility (620)	54,611 s.f	6.64	363	0.55	78:22	23	7	30	0.59	41:59	13	19	32
Memory Care (620)	34,480 s.f	6.64	229	0.55	78:22	15	4	19	0.59	41:59	9	12	21
Assisted Living Facility (254)	34,380 s.f	4.19	144	0.38	78:22	10	3	13	0.49	30:70	5	12	17
Multi-Family Apartment (220)	90 Units	7.11	640	0.48	23:77	10	33	43	0.60	63:37	34	20	54
Medical/Commercial (720)	114,200 s.f.	34.45	3,934	2.63	78:22	234	66	300	3.50	28:72	112	288	400
SUBTOTAL TRIP GENERATION			8,325			520	196	716			288	536	824
Internal Vehicle Trips (NCHRP Internal Trip Capture Estimation Tool)[2]			833			52	20	72			29	54	82
TOTAL EXTERNAL TRIP GENERATION			7,493			468	176	644			259	482	742

Source: Generation factors from ITE Trip Generation Manual, 10th Edition.
Trip ends are one-way traffic movements, entering or leaving.
The numbers in parenthesis are ITE land use codes.

1. Information provided by Project Representatives.

2. Internal trip capture rate = 10%.

3.2 Trip Distribution

Project trip distribution percentages for inbound and outbound traffic are shown in Figure 3-1a and 3-1b, respectively. These percentages are based upon knowledge of the study area, engineering judgement, prevailing traffic patterns in the study area, major routes, population centers, other existing development and review and comment by the City of Hanford and Caltrans.

Vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. The proposed project would also construct a roundabout, which would also be dedicated as public right of way and would be constructed to Caltrans or City-approved standards. As part of the project, Glendale Avenue would be realigned at the northwest corner of the Hanford Veterinary Hospital development. The existing knuckle would be removed, and Glendale Avenue would be realigned using speed-specific design curves. Any new portions of Glendale Avenue would be dedicated as public right of way and any portion of existing right of way not used would be abandoned. 5th Street would be extended starting at the existing alignment before realigning to the roundabout. In addition, the proposed project would provide 1,466 parking spaces throughout the project site.

3.3 Project Traffic

Project traffic as shown in Table 3-1 was distributed to the roadway system using the trip distribution percentages shown in Figures 3-1a and 3-1b. A graphical representation of the resulting AM and PM peak hour Project trips used is shown in Figures 3-2 and 3-3.

3.4 Existing Plus Project Traffic Conditions

An Existing Plus Project Scenario was analyzed to include existing traffic plus traffic generated by the Project. The resulting traffic is shown in Figures 3-4 and 3-5.

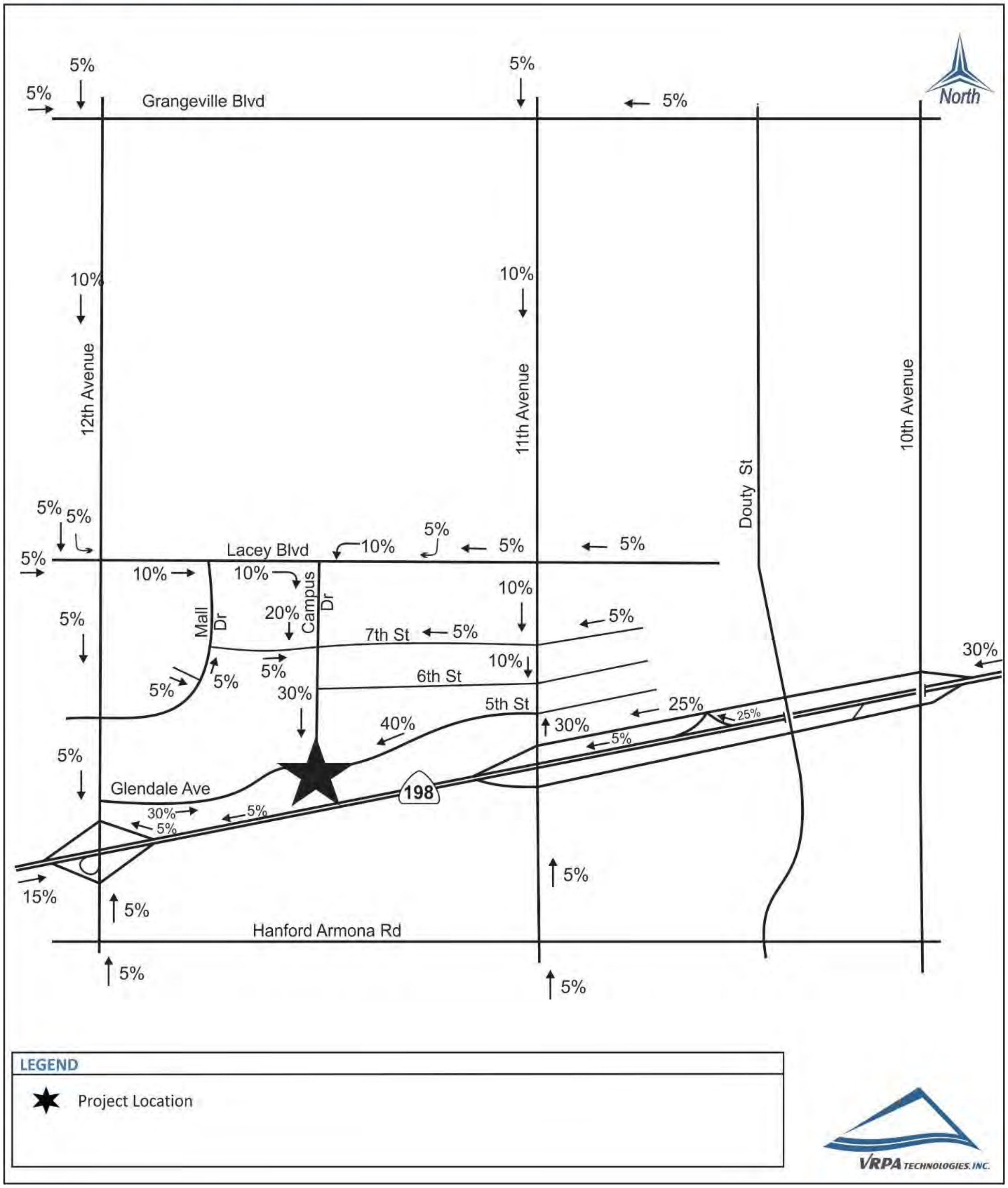
3.5 Near-Term Traffic Conditions

Traffic conditions with the Project in the Year 2024 were estimated by applying a growth rate of 2% per year to the existing traffic volumes. A comparison of the KCAG base year and future year travel model showed that the growth in the study area is approximately 2% per year.

The resulting traffic for the Near-Term scenario is shown in Figures 3-6 and 3-7.

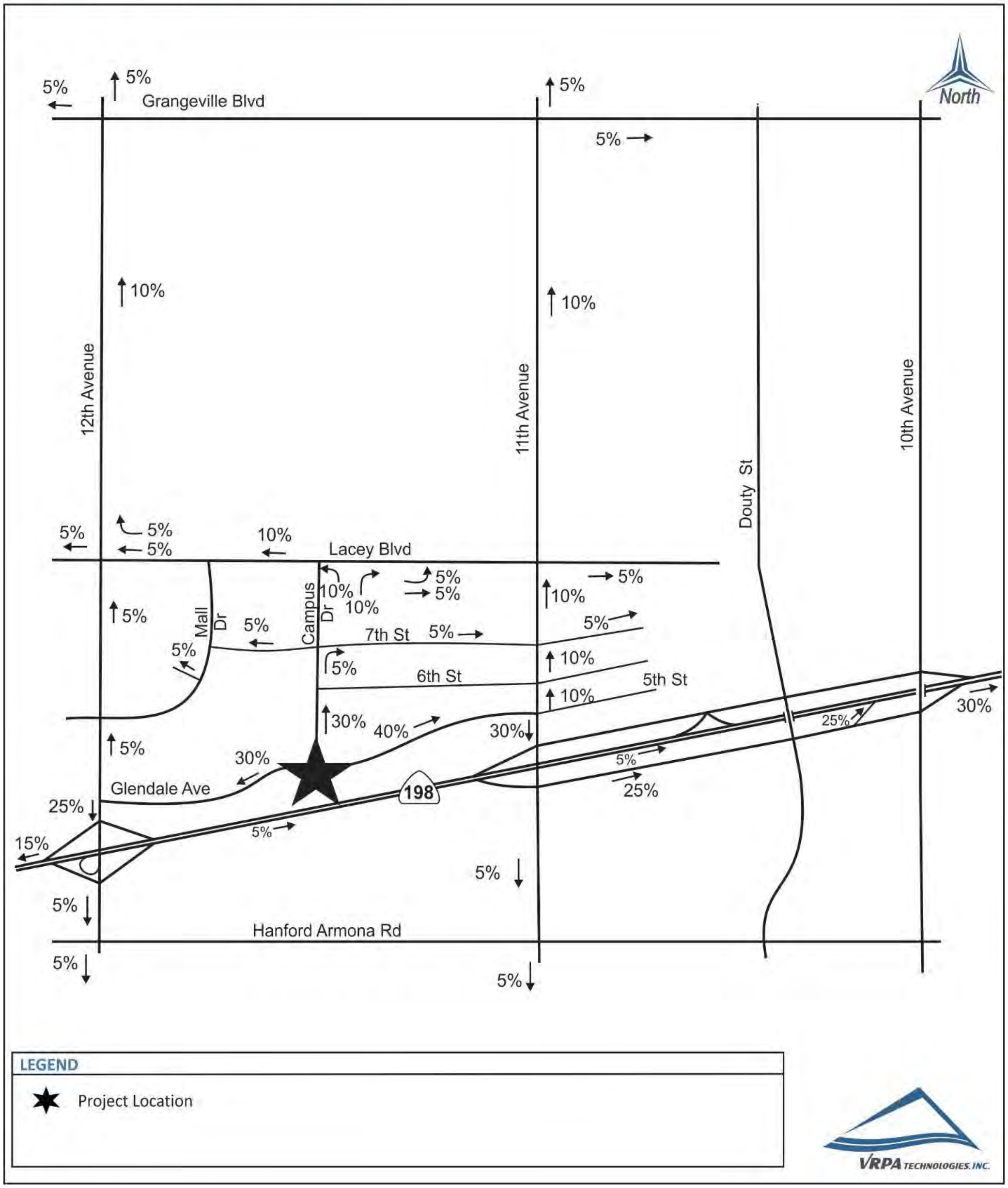
Hanford Place Development
Project Trip Distribution - Inbound

Figure 3-1a



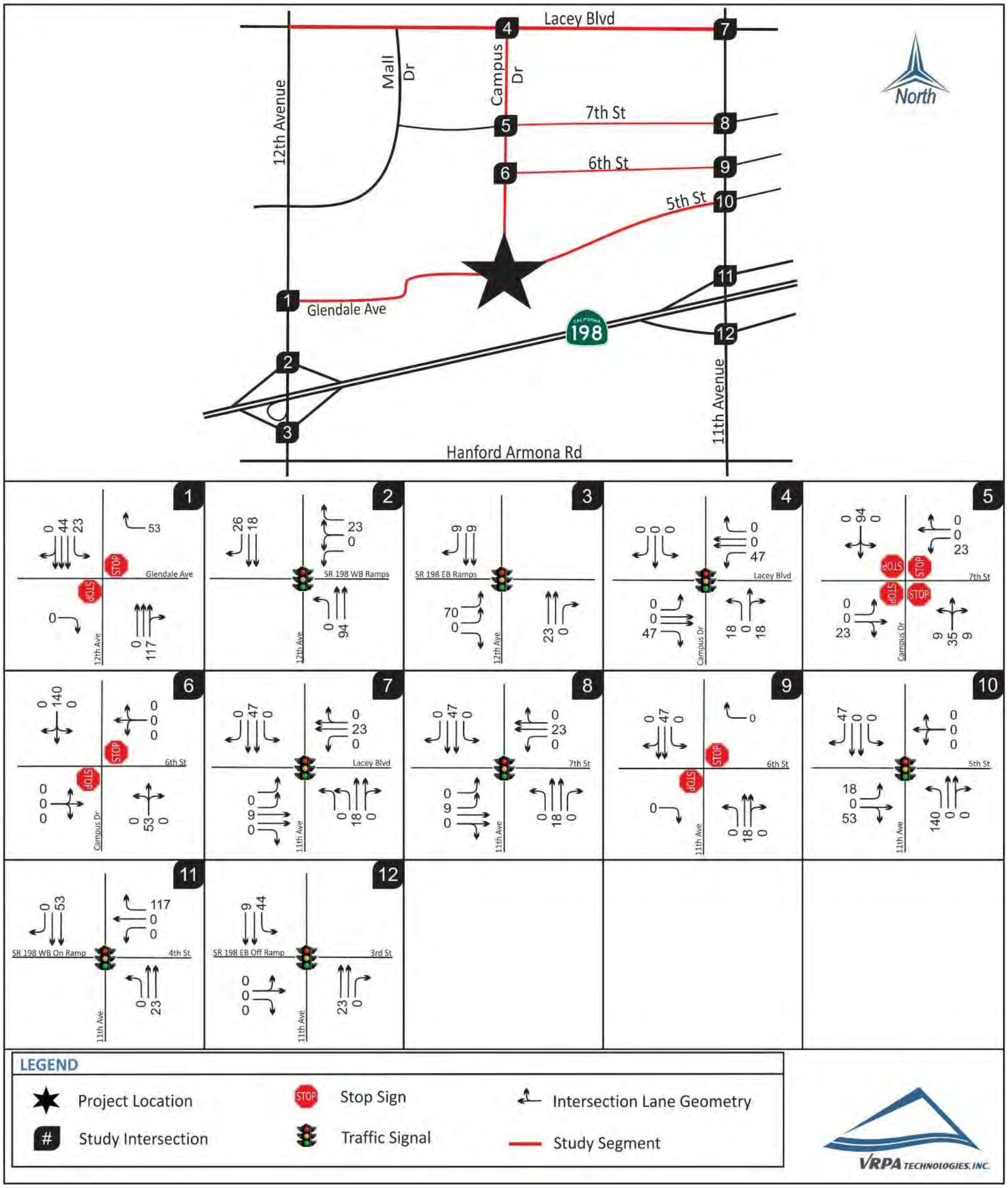
Hanford Place Development
Project Trip Distribution - Outbound

Figure 3-1b



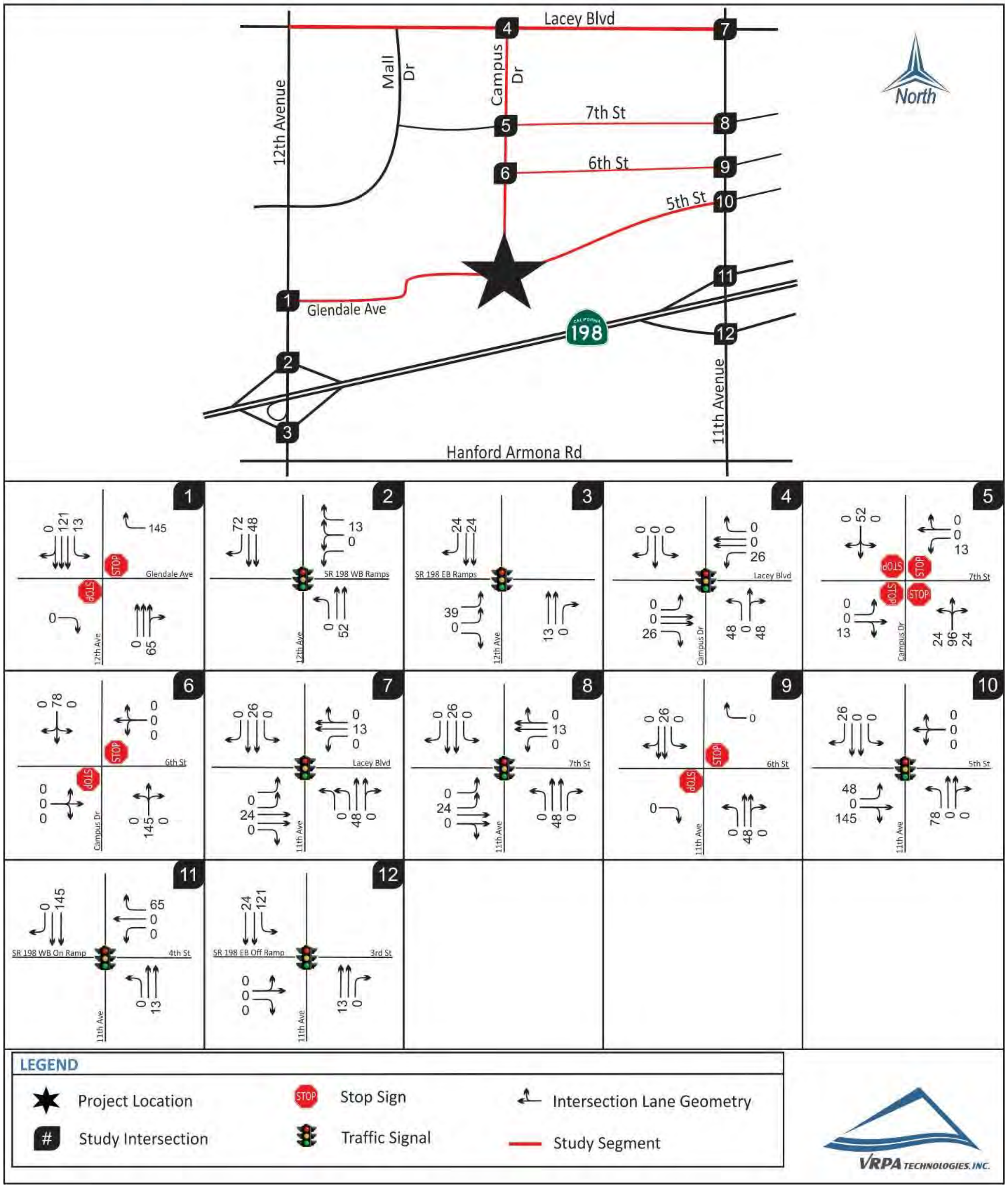
Hanford Place Development
AM Peak Hour Project Traffic

Figure 3-2



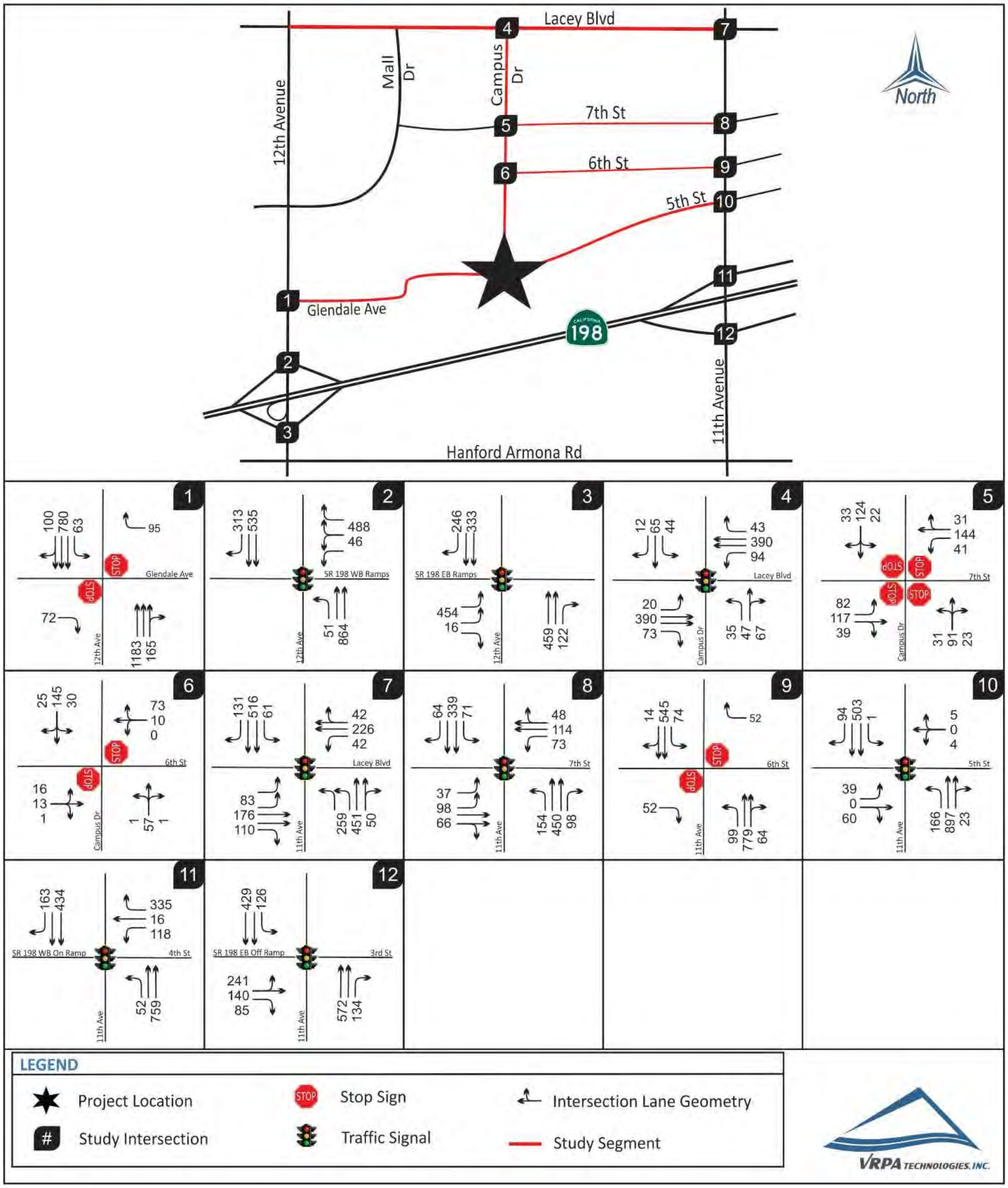
Hanford Place Development
PM Peak Hour Project Traffic

Figure 3-3



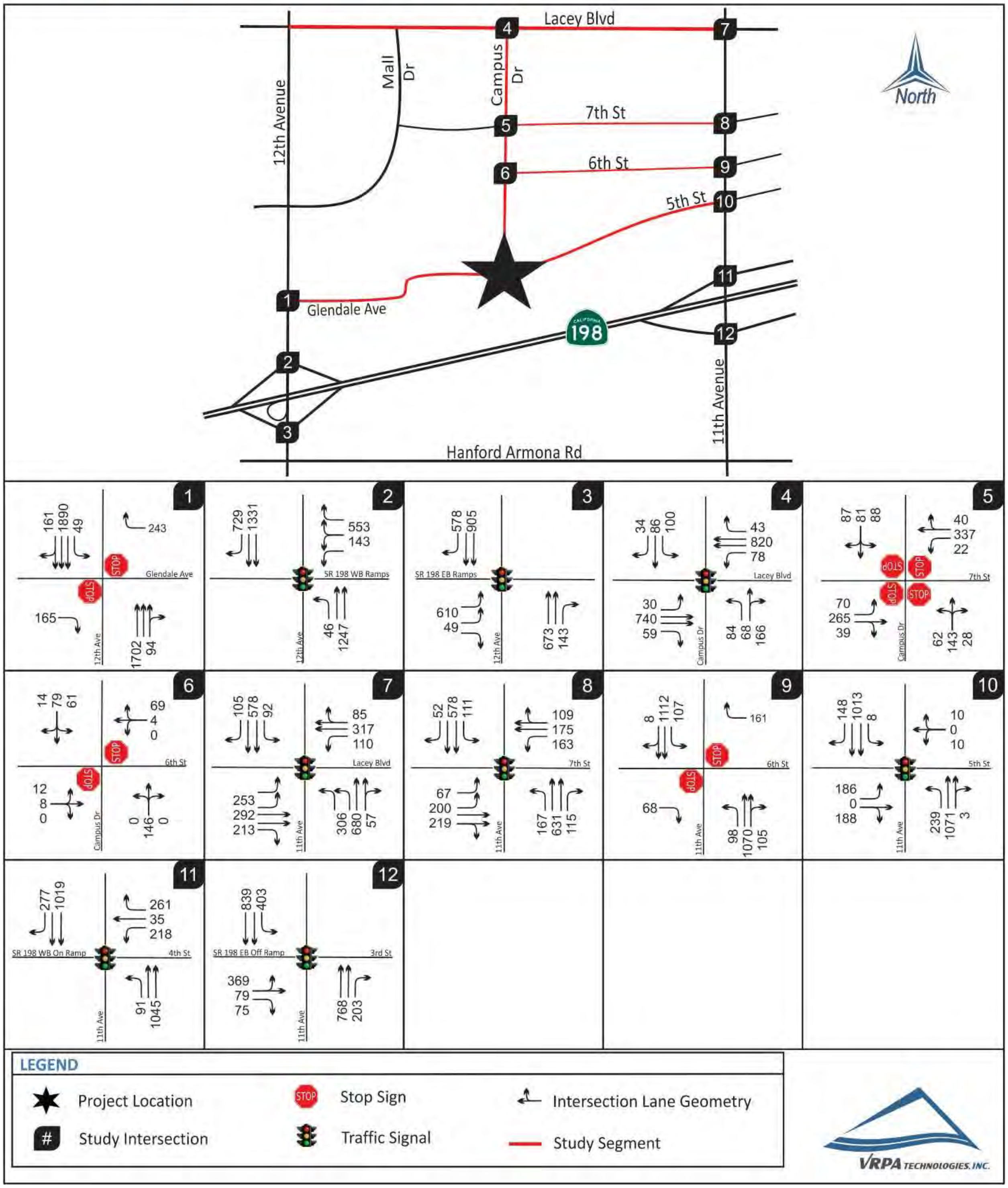
Hanford Place Development
Existing Plus Project AM Peak Hour Traffic

Figure 3-4



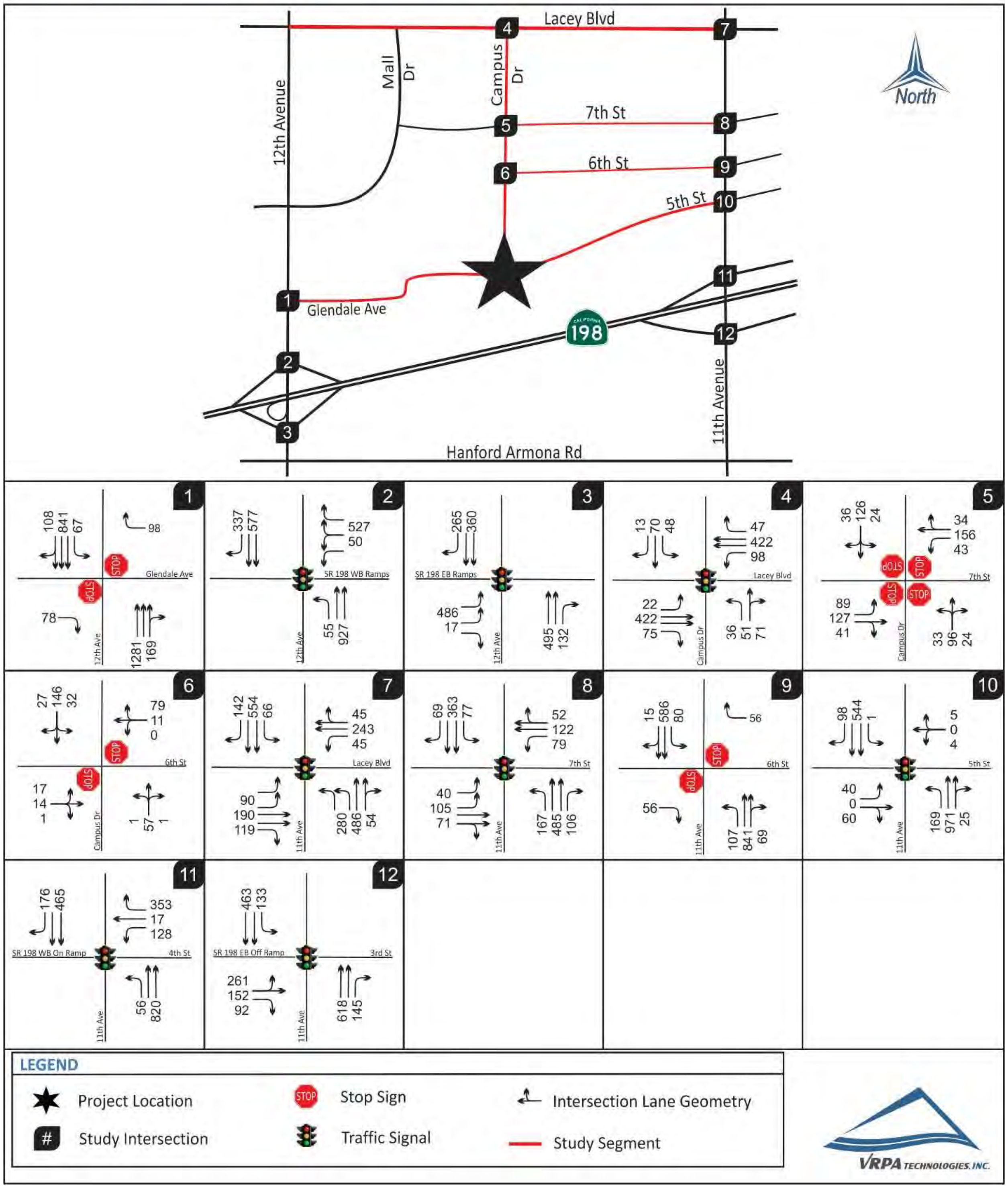
Hanford Place Development
Existing Plus Project PM Peak Hour Traffic

Figure 3-5



Hanford Place Development
Near-Term Plus Project AM Peak Hour Traffic

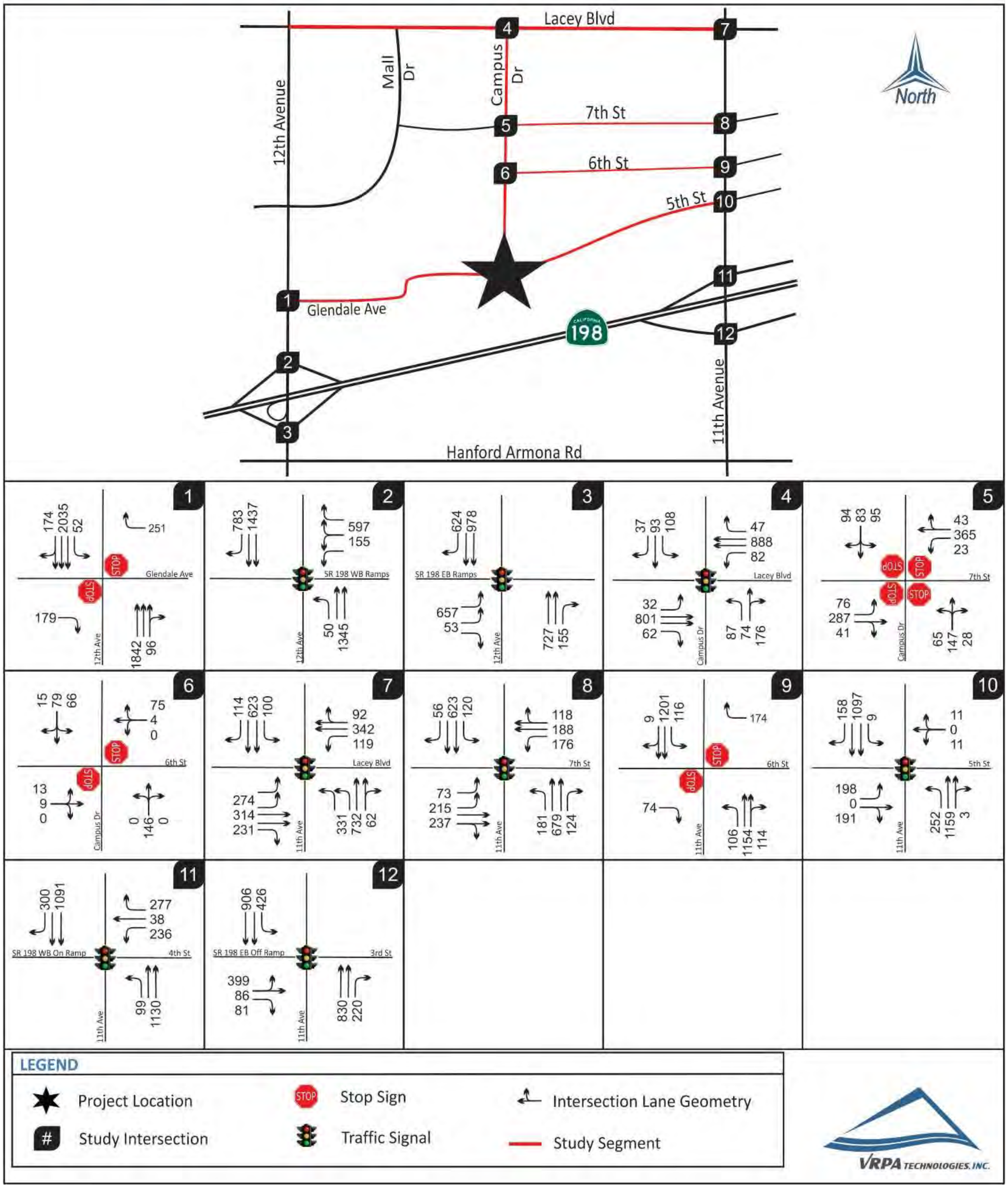
Figure 3-6



Hanford Place Development

Near-Term Plus Project PM Peak Hour Traffic

Figure 3-7



3.6 Cumulative Year 2042 Without Project Traffic Conditions

The impacts of the Project were analyzed considering future traffic conditions in the year 2042. The levels of traffic expected in 2042 relate to the cumulative effect of traffic increases resulting from the implementation of the General Plans of local agencies, including the City of Hanford and Kings County. Traffic conditions without the Project in the Year 2042 were estimated by applying a growth rate of 2% per year to the existing traffic volumes. A comparison of the KCAG base year and future year travel model showed that the growth in the study area is approximately 2% per year. The resulting traffic is shown in Figures 3-8 and 3-9.

3.7 Cumulative Year 2042 Plus Project Traffic Conditions

The addition of Project trips, as shown in Figures 3-2 and 3-3 (Section 3.3), were added to Cumulative Year 2042 Without Project traffic volumes. This leads to the results shown in Figures 3-10 and 3-11.

3.8 Impacts

3.8.1 *Intersection Capacity Analysis*

Table 3-2 provides the intersection level of service analysis for the study intersections considering the study scenarios discussed above. Potential mitigation measures are discussed in Chapter 4 of this report. Results of the analysis show that the Project will contribute to an unacceptable LOS at five (5) of the study intersections when comparing the Cumulative Year 2042 scenarios.

3.8.2 *Queuing Analysis*

Table 3-3 provides a queue length summary for left and right turn lanes at study intersections. The queuing analyses is based upon methodology presented in Chapter 400 of Caltrans' Highway Design Manual (HDM). The queue results shown in Table 3-3 represent the approximate queue lengths for the respective lane movements. Results of the queuing analysis show that several movements exceed the existing queue lane storage lengths.

3.8.3 *Roadway Segment Capacity Analysis*

Table 3-4 shows roadway segments that are expected to fall short of desirable operating conditions for various scenarios. Potential mitigation measures are discussed in Chapter 4 of this report. Results of the analysis also show that the Project will result in a cumulative impact at two (2) of the study roadway segments when comparing the Cumulative Year 2042 scenarios.

3.9 VMT Analysis

Since the City of Hanford has not adopted methodologies or thresholds for VMT analyses related to SB 743, the VMT analysis was conducted using statewide guidance provided by the Governor's Office of Planning and Research (OPR) in the their Technical Advisory on Evaluating Transportation Impacts in CEQA (OPR, December 2018). OPR recommends comparing project VMT/capita and VMT/employee to regional averages to determine the level of significance of project impacts. VMT/capita and VMT/employee values for the project as well as regional averaged were obtained from an online VMT analysis tool provided by the Kings County Association of Governments (KCAG).

For mixed-use projects (such as the proposed Project), OPR recommends analyzing the individual components of the project separately with respect to VMT analysis and taking a reduction for trips that are made within the project site that would have very low VMT values. Since VMT for internal trips is difficult to quantify, no reductions were taken leading to a somewhat conservative approach. OPR also allows for conducting the analysis of mixed-use projects based on the dominant land use if applicable. In the case of the proposed Project, none of the project components (residential, employment, or retail) is considered to be dominant.

The VMT analysis conducted for the residential, employment, and retail components of the project is described below:

- ✓ Residential: The project is located within two traffic analysis zones (TAZ's) of the Kings County Association of Governments (KCAG) model that have little or no existing residential development and therefore no data on which to form a VMT analysis based on these TAZ's. Instead, the VMT analysis was conducted based on the average VMT/capita of the five TAZ's adjacent to the project site. The resulting daily VMT/capita value is 6.562. For residential projects OPR recommends use of a threshold for VMT/capita 15% below either the regional or city average. Anything below either of these values would result in a less than significant impact. The regional average was used since the city average is not currently available from KCAG. Since the regional average daily VMT/capita is 9.562, the project VMT/capita of 6.56 is 31.7% below the regional average. Since this is more than 15% below the regional average, the residential component of the project has a less than significant transportation impact and no mitigation measures are needed.

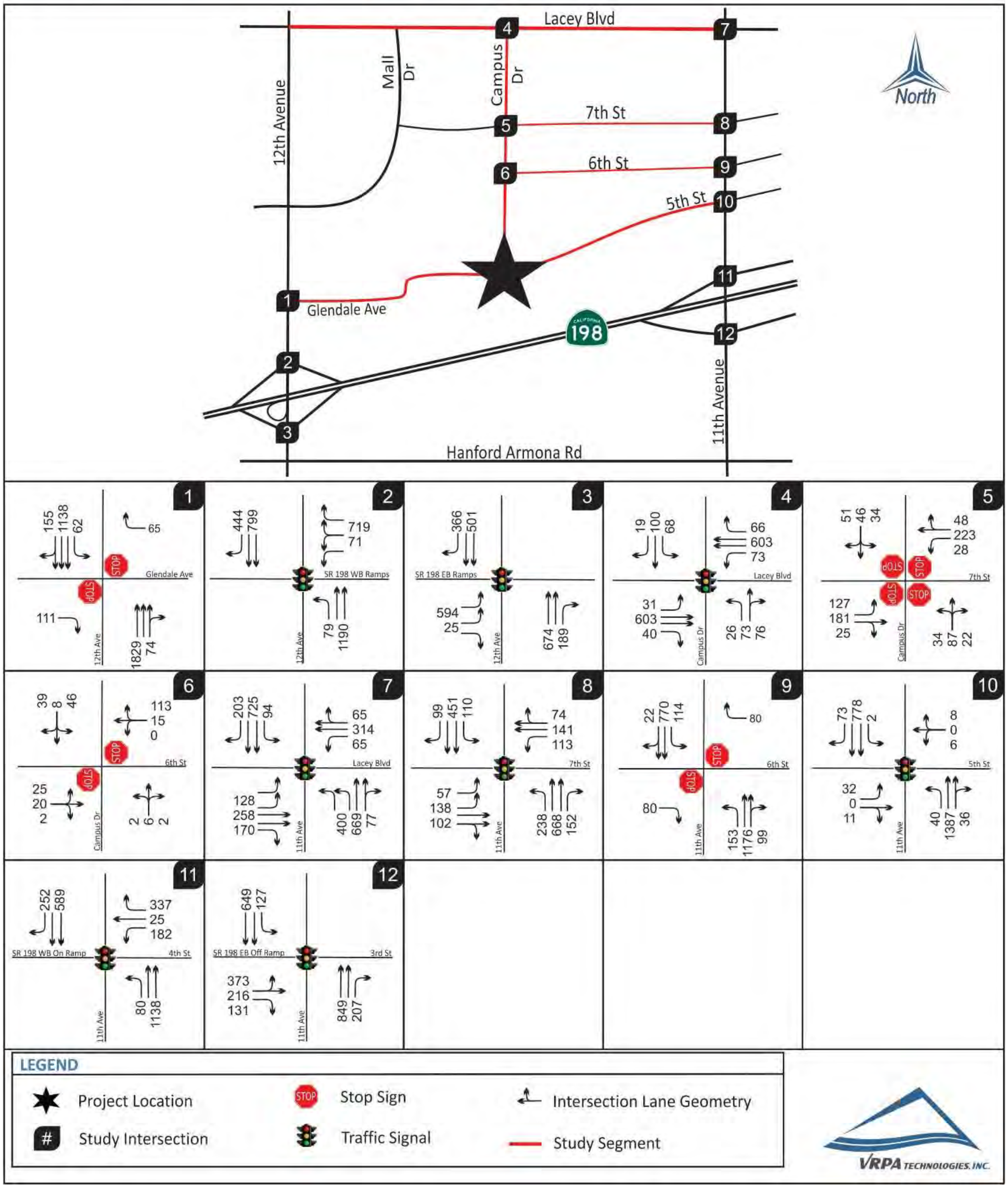
- ✓ Employment: The project is located within two traffic analysis zones (TAZ's) of the Kings County Association of Governments (KCAG) model, each with a separate VMT/employee value. The project VMT/employee was calculated based on the average VMT/employee value for the two TAZ's. It should be noted that a larger portion of the project area falls within the TAZ that has a higher VMT/employee level of the two zones and the analysis is therefore somewhat conservative. The resulting daily VMT/capita value is 12.565. For employment projects OPR recommends use of a threshold for VMT/capita 15% below the regional average. Anything below this value would result in a less than significant impact. The regional average was used since the city average is not currently available from KCAG. Since the regional average daily VMT/employee is 17.7, the project VMT/capita of 12.565 is 29.0% below the regional average. Since this is more than 15% below the regional average, the employment component of the project has a less than significant transportation impact and no mitigation measures are needed.

- ✓ Retail: For local-serving retail projects, such as the retail component of the proposed Project, OPR recommends that the transportation impact of the project be presumed to be less than significant. This is because local-serving retail developments will generally draw trips from the nearby area and will replace trips currently made to more distant retail locations. Therefore, the retail component of the project has a less than significant transportation impact and no mitigation measures are needed.

Copies of the VMT analysis maps used to conduct this analysis are included in Appendix F.

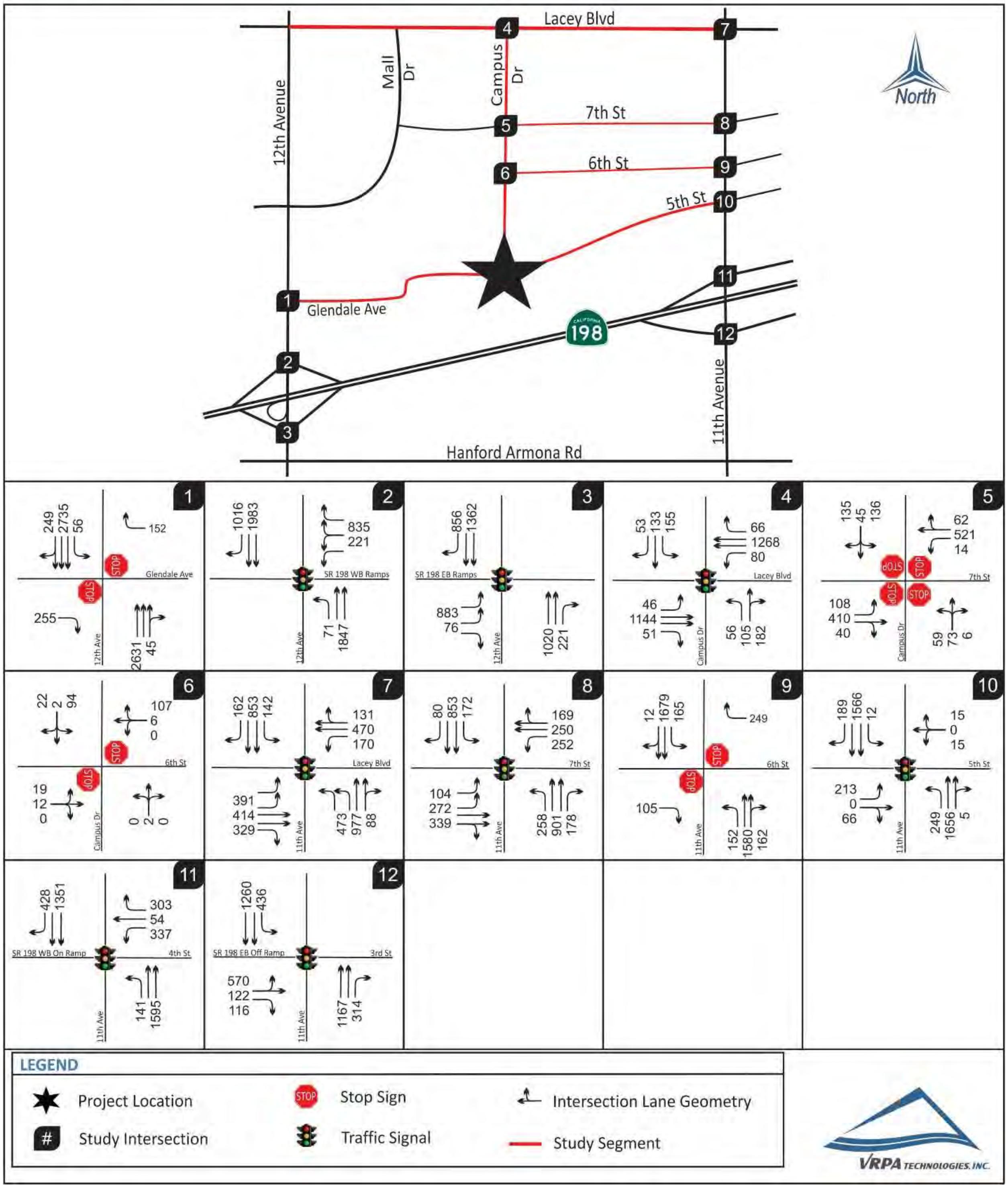
Hanford Place Development
Cumulative Year 2042 Without Project AM Peak Hour Traffic

Figure 3-8



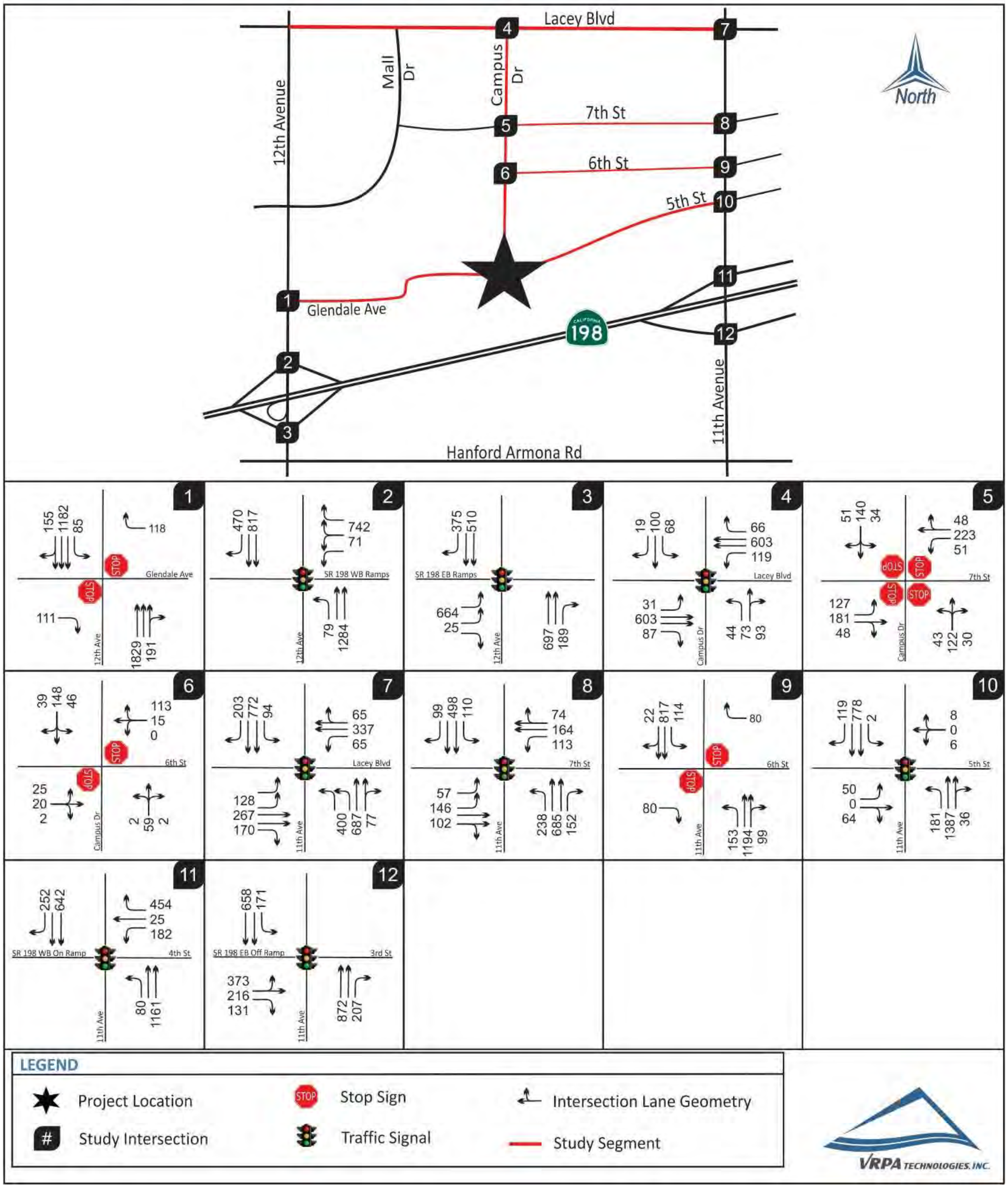
Hanford Place Development
Cumulative Year 2042 Without Project PM Peak Hour Traffic

Figure 3-9



Hanford Place Development
Cumulative Year 2042 Plus Project AM Peak Hour Traffic

Figure 3-10



Hanford Place Development
Cumulative Year 2042 Plus Project PM Peak Hour Traffic

Figure 3-11

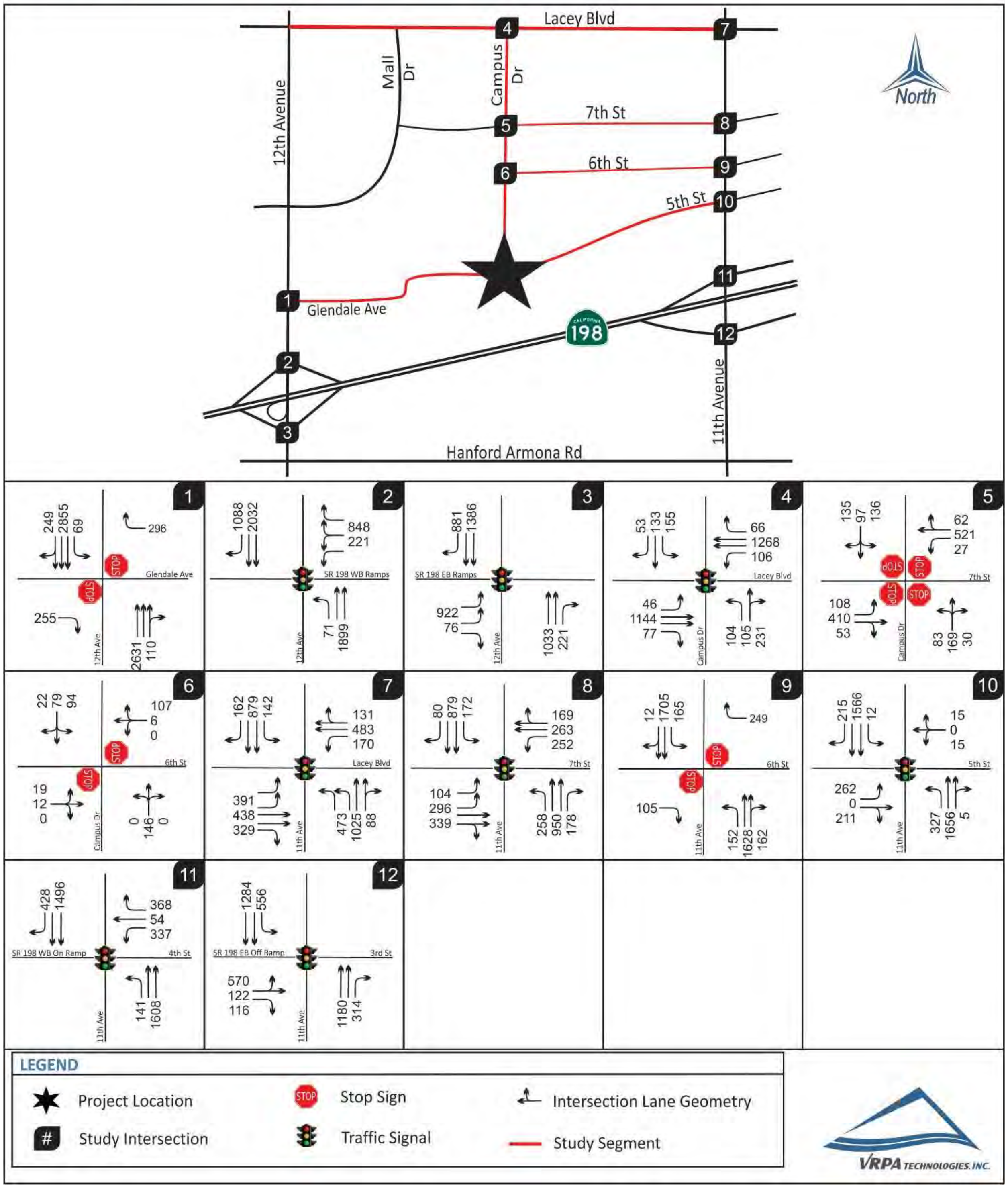


Table 3-2
Intersection Operations

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
1. 12th Avenue / Glendale Avenue	Two-Way Stop Sign	D	AM	30.2	D	**37.2**	**E**	**74.4**	**F**	**154.4**	**F +**
			PM	**184.6**	**F +**	**269.9**	**F +**	**++**	**F**	**++**	**F +**
2. 12th Avenue / SR 198 WB Ramps	Signalized	-- [1]	AM	13.7	B	14.5	B	18.8	B	19.9	B
			PM	19.4	B	23.0	C	64.5	E	75.1	E
3. 12th Avenue / SR 198 EB Ramps	Signalized	-- [1]	AM	12.5	B	12.7	B	13.2	B	13.7	B
			PM	13.6	B	14.3	B	19.0	B	20.1	C
4. Campus Drive / Lacey Boulevard	Signalized	D	AM	25.2	C	25.4	C	25.7	C	25.5	C
			PM	29.2	C	31.4	C	52.2	D	52.9	D
5. Campus Drive / 7th Street	All-Way Stop Sign	D	AM	11.9	B	12.6	B	12.1	B	15.0	B
			PM	23.7	C	31.8	D	**92.9**	**F**	**146.9**	**F**
6. Campus Drive / 6th Street	Two-Way Stop Sign	D	AM	13.3	B	13.6	B	10.7	B	13.1	B
			PM	13.9	B	14.3	B	11.5	B	14.7	B
7. 11th Avenue / Lacey Boulevard	Signalized	D	AM	20.3	C	21.0	C	25.3	C	25.9	C
			PM	28.5	C	31.6	C	49.9	D	52.7	D
8. 11th Avenue / 7th Street	Signalized	D	AM	18.9	B	19.7	B	24.2	C	24.4	C
			PM	29.0	C	31.8	C	**55.6**	**E**	**57.6**	**E**
9. 11th Avenue / 6th Street	Two-Way Stop Sign	D	AM	12.7	B	13.3	B	17.1	C	17.3	C
			PM	18.1	C	20.6	C	**74.3**	**F**	**83.6**	**F**
10. 11th Avenue / 5th Street	Signalized	D	AM	9.6	A	9.7	A	6.5	A	10.7	B
			PM	18.1	B	19.5	B	23.8	C	42.3	D
11. 11th Avenue / 4th Street-SR 198 WB On Ramp	Signalized	-- [1]	AM	15.3	B	15.9	B	16.4	B	20.8	C
			PM	14.6	B	15.6	B	21.0	C	28.4	C
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	Signalized	-- [1]	AM	21.0	C	22.9	C	27.0	C	30.2	C
			PM	30.6	C	35.4	D	76.3	E	97.4	F

DELAY is measured in seconds

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized and all-way stop intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

1 - With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation imrovements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance will be used in determining the need for roadway improvements on Caltrans facilities.

\+ Meets peak hour signal warrants.

++ Delay Exceeds 300 seconds.

Table 3-3
Queuing Operations

INTERSECTION	EXISTING QUEUE STORAGE LENGTH (ft)		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
			AM Queue	PM Queue	AM Queue	PM Queue	AM Queue	PM Queue	AM Queue	PM Queue
12th Avenue / Glendale Avenue	SB Left	125	53	41	56	43	52	47	71	58
12th Avenue / SR 198 WB Ramps	NB Left	400	43	38	46	42	66	59	66	59
	WB Approach	3 @ 275	445	580	481	627	658	**880**	678	**891**
12th Avenue / SR 198 EB Ramps	SB Right	600	205	482	221	520	305	**713**	313	**734**
	EB Left	2 @ 875	378	508	405	548	495	736	553	768
	EB Right	850	13	41	14	44	21	63	21	63
Campus Drive / Lacey Boulevard	NB Left	75	29	70	30	73	22	47	37	**87**
	SB Left	200	37	83	40	90	57	129	57	129
	SB Right	100	10	28	11	31	16	44	16	44
	EB Left	200	17	25	18	27	26	38	26	38
	EB Right	100	61	49	63	52	33	43	73	64
	WB Left	125	78	65	82	68	61	67	99	88
	WB Right	100	36	36	39	39	55	55	55	55
Campus Drive / 7th Street	EB Left	100	68	58	74	63	**106**	90	**106**	90
	WB Left	100	34	18	36	19	23	12	43	23
11th Avenue / Lacey Boulevard	NB Left	2 @ 200	216	255	233	276	333	394	333	394
	SB Left	150	51	77	55	83	78	118	78	118
	SB Right	150	109	88	118	95	**169**	135	**169**	135
	EB Left	2 @ 125	69	211	75	228	107	**326**	107	**326**
	EB Right	100	92	**178**	99	**193**	**142**	**274**	**142**	**274**
	WB Left	100	35	92	38	99	54	**142**	54	**142**
11th Avenue / 7th Street	NB Left	125	**128**	**139**	**139**	**151**	**198**	**215**	**198**	**215**
	NB Right	100	82	96	88	**103**	**127**	**148**	**127**	**148**
	SB Left	100	59	93	64	**100**	92	**143**	92	**143**
	SB Right	100	53	43	58	47	83	67	83	67
	EB Left	2 @ 75	31	56	33	61	48	87	48	87
	WB Left	125	61	**136**	66	**147**	94	**210**	94	**210**
11th Avenue / 6th Street	NB Left	75	**83**	**82**	**89**	**88**	**128**	**127**	**128**	**127**
	SB Left	125	62	89	67	97	95	**138**	95	**138**
11th Avenue / 5th Street	NB Left	150	138	**199**	141	**210**	33	**208**	151	**273**
	SB Left	50	1	7	1	8	2	10	2	10
	SB Right	50	**78**	**123**	**82**	**132**	**61**	**158**	**99**	**179**
	EB Left	50	33	**155**	33	**165**	27	**178**	42	**218**
11th Avenue / 4th Street-SR 198 WB On Ramp	NB Left	75	43	76	47	**83**	67	**118**	67	**118**
	SB Right	75	**136**	**231**	**147**	**250**	**210**	**357**	**210**	**357**
	WB Left	125	98	**182**	107	**197**	**152**	**281**	**152**	**281**
11th Avenue / 3rd Street-SR 198 EB Off Ramp	NB Right	75	**112**	**169**	**121**	**183**	**173**	**262**	**173**	**262**
	SB Left	150	105	**336**	111	**355**	106	**363**	143	**463**
	EB Right	25	**71**	**63**	**77**	**68**	**109**	**97**	**109**	**97**

Queue is measured in feet / **BOLD** denotes exceedance

Table 3-4
Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS
Lacey Boulevard											
12th Avenue to Campus Drive	4 Lanes Divided	D	AM	919	C	990	C	1,322	C	1,386	C
			PM	1,767	C	1,907	C	2,617	D	2,691	D
Campus Drive to 11th Avenue	4 Lanes Divided	D	AM	1,027	C	1,107	C	1,489	C	1,553	C
			PM	1,947	C	2,101	C	2,896	D	**2,970**	**E**
7th Street											
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	378	D	407	D	535	D	567	D
			PM	780	D	841	D	**1,149**	**E**	**1,186**	**E**
6th Street											
Campus Drive to 11th Avenue	2 Lanes Undivided	D	AM	127	C	137	C	196	C	196	C
			PM	142	C	154	C	220	C	220	C
Glendale Avenue											
East of 12th Avenue	2 Lanes Undivided	D	AM	323	C	334	D	201	C	394	D
			PM	385	D	399	D	252	C	474	D
5th Avenue											
West of 11th Avenue	2 Lanes Undivided	D	AM	359	D	367	D	156	C	414	D
			PM	760	D	799	D	717	D	1,014	D
Campus Drive											
Lacey Bouloevard to Glendale Avenue	2 Lanes Undivided	D	AM	380	D	400	D	388	D	517	D
			PM	541	D	574	D	608	D	756	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

4.0 Mitigation

As discussed in Section 3.0 Impacts, the potentially significant impacts resulting from the Project relate to the generation of unacceptable LOS at various intersections and road segments in the long term. Considering the criteria provided in Section 1.3 and the results presented in Section 3.0, the following improvements are recommended to alleviate project-specific impacts.

4.1 Recommended Improvements

4.1.1 *Intersections*

✓ 12th Avenue at Glendale Avenue
No Recommended improvements.

Installation of a traffic signal would alleviate level of service deficiencies at the intersection for all study scenarios. However, providing a traffic signal at this location is not practical given the close spacing of adjacent intersections. In lieu of the traffic signal, dual right turn lanes for the eastbound and westbound approaches to the intersection should be considered to alleviate queuing at the eastbound and westbound approaches.

✓ Campus Drive at 7th Street
Recommended improvements to achieve acceptable levels of service:

- Cumulative Year 2042 Plus Project scenario:
  - Install Traffic Signal

The improvements identified above for the Cumulative Year 2042 Plus Project scenario are sufficient to meet the City of Hanford's acceptable LOS standard of 'D'.

✓ 11th Avenue at 7th Street
No Recommended improvements.

Providing additional turning movement lanes along 11th Avenue and 7th Street is not possible due to design constraints or infeasible/impractical due to the presence of commercial development that currently exists along the north and south side of 7th Street.

✓ 11th Avenue at 6th Street
No Recommended improvements.

This intersection is forecasted to operate at unacceptable LOS 'F' (PM) under Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project conditions; however, this intersection does not meet the peak hour traffic signal warrant because the minor approaches do not carry enough traffic to justify signalization. Therefore, no improvements are recommended for the Project's contribution of traffic at the intersection for the Cumulative Year 2042 Plus Project condition.

✓ 12th Avenue at SR 198 WB Ramps
No Recommended improvements.

Providing additional turning movement lanes at the 12th Avenue and SR 198 WB Ramps intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the north side of the SR 198 WB Ramps. As noted in Section 1.3, Caltrans no longer uses level of service to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

✓ 11th Avenue at 3rd Street-SR 198 EB Off Ramp
No Recommended improvements.

Providing additional turning movement lanes at the 11th Avenue and 3rd Street-SR 198 EB Off Ramp intersection is not possible due to design constraints or infeasible/impractical due to the presence of development that currently exists along the south side of 3rd Street and the SR 198 EB Off Ramp. As noted in Section 1.3, Caltrans no longer uses level of service to determine the need for transportation improvements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes.

4.1.2 *Roadway Segments*

✓ Lacey Boulevard between Campus Drive and 11th Avenue
No Recommended improvements.

Providing additional travel lanes along Lacey Boulevard is not possible due to design constraints or infeasible/impractical due to the presence of retail development that currently exists along the north and south side of Lacey Boulevard. In addition, accommodating additional travel lanes along Lacey Boulevard could result in the elimination of parking along Lacey Boulevard.

✓ 7th Street between Campus Drive and 11th Avenue
Recommended improvements:

- Cumulative Year 2042 Plus Project scenario:
  - Restripe to provide two-way left turn lane with removal of parking as necessary

Providing additional travel lanes along 7th Street is not possible due to right-of-way constraints.

Post-Mitigation Level of Significance

The level of service resulting from the potential improvements identified above is shown in Tables 4-1 and 4-2. Table 4-3 identifies left turn and right turn lane pocket lengths required for the Cumulative Year 2042 scenario. Although the need for extended turn lane pockets would occur at some locations prior to the Cumulative Year 2042 scenario, this scenario provides the maximum length needed and therefore these lengths would also provide for projected traffic volumes under the Existing Plus Project and Near-Term Plus Project scenarios. The left turn and right turn pocket length do not include deceleration lengths.

Table 4-1
Intersection Operations with Mitigation

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS
1. 12th Avenue / Glendale Avenue	Two-Way Stop Sign	D	AM	30.2	D	**37.2**	**E** [2]	**154.4**	**F** [2]
			PM	**184.6**	**F** [2]	**269.9**	**F** [2]	**++**	**F** [2]
2. 12th Avenue / SR 198 WB Ramps	Signalized	-- [1]	AM					19.9	B
			PM					75.1	E [3]
5. Campus Drive / 7th Street	Signalized	D	AM					12.8	B
			PM					20.4	C
8. 11th Avenue / 7th Street	Signalized	D	AM					24.4	C
			PM					**57.6**	**E** [3]
9. 11th Avenue / 6th Street	Two-Way Stop Sign	D	AM					17.3	C
			PM					**83.6**	**F** [4]
12. 11th Avenue / 3rd Street-SR 198 EB Off Ramp	Signalized	-- [1]	AM					30.2	C
			PM					97.4	F [3]

DELAY is measured in seconds

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized and all-way stop intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

1 - With the changes brought about by SB 743, Caltrans no longer uses level of service to determine the need for transportation imrovements. Instead, focus is on providing adequate facilities for pedestrians, bicycles, and transit as well as safety considerations for all transportation modes. Guidance is provided in the Transportation Impact Study Guide dated May 20, 2020 and the Interim Land Development and Intergovernmental Review Safety Review Practitioners Guidance dated July 2020. This guidance will be used in determining the need for roadway improvements on Caltrans facilities.

2 Installation of a traffic signal would alleviate LOS deficiencies at the intersection. A traffic signal is not recommended given the close spacing of adjacent intersections.

3 Improvements to the intersection aren't recommended given the presence of abutting commercial development at the intersection.

4 Intersection does not meet the peak hour traffic signal warrant.

++ Delay Exceeds 300 seconds.

Table 4-2
Segment Operations with Mitigation

STREET SEGMENT	TARGET LOS	PEAK HOUR	CUMULATIVE YEAR 2042 PLUS PROJECT	
			VOLUME	LOS
Lacey Boulevard				
Campus Drive to 11th Avenue	D	AM	1,553	C
		PM	**2,970**	**E ***
7th Street				
Campus Drive to 11th Avenue	D	AM	567	D
		PM	**1,186**	**E ***

* Capacity Increasing Improvements to the roadway segment aren't recommended given the presence of abutting commercial development.

Table 4-3
Left Turn and Right Turn Storage Requirements

INTERSECTION	EXISTING QUEUE STORAGE LENGTH (ft)		CUMULATIVE YEAR 2042 PLUS PROJECT RECOMMENDED STORAGE LENGTH (ft)
12th Avenue / Glendale Avenue	SB Left	125	125
12th Avenue / SR 198 WB Ramps	NB Left	400	400
	WB Approach	3 @ 275	**3 @ 300**
12th Avenue / SR 198 EB Ramps	SB Right	600	600
	EB Left	2 @ 875	2 @ 875
	EB Right	850	850
Campus Drive / Lacey Boulevard	NB Left	75	100
	SB Left	200	200
	SB Right	100	100
	EB Left	200	200
	EB Right	100	100
	WB Left	125	125
	WB Right	100	100
Campus Drive / 7th Street	EB Left	100	100
	WB Left	100	100
11th Avenue / Lacey Boulevard	NB Left	2 @ 200	2 @ 200
	SB Left	150	150
	SB Right	150	**175**
	EB Left	2 @ 125	2 @ 125
	EB Right	100	100
	WB Left	100	100
11th Avenue / 7th Street	NB Left	125	125
	NB Right	100	100
	SB Left	100	100
	SB Right	100	100
	EB Left	2 @ 75	2 @ 75
	WB Left	125	125
11th Avenue / 6th Street	NB Left	75	75
	SB Left	125	125
11th Avenue / 5th Street	NB Left	150	**250**
	SB Left	50	50
	SB Right	50	50
	EB Left	50	**225**
11th Avenue / 4th Street-SR 198 WB On Ramp	NB Left	75	75
	SB Right	75	75
	WB Left	125	125
11th Avenue / 3rd Street-SR 198 EB Off Ramp	NB Right	75	75
	SB Left	150	150
	EB Left	--	**2 @ 250**
	EB Right	25	25

BOLD denotes change in storage length

4.2 Equitable Share Responsibility

This section documents the Project's fair-share responsibility towards the costs of improvements that are identified for the Cumulative Year 2042 scenario. The intent of determining the equitable responsibility for the improvements identified above for the Cumulative Year 2042 scenario, is to provide information for the applicant and the City of Hanford to address traffic mitigation equitability and to calculate the equitable share for mitigating traffic impacts. The formulas used to calculate the equitable share responsibility to City of Hanford facilities is as follows:

Equitable Share = (Project Trips)/(Future Year Plus Project Traffic)

Table 4-4 shows the Project's equitable fair share responsibility on a percentage basis for improvements to City of Hanford facilities as described above. The equitable fair share responsibility shown in Table 4-4 is the result of LOS enhancements related to capacity.

Table 4-4
Cumulative Year 2042 Equitable Share Responsibility

INTERSECTION	PEAK HOUR	PROJECT TRIPS	CUMULATIVE YEAR 2042 PLUS PROJECT	FAIR SHARE PERCENTAGE
Campus Drive / 7th Street	AM	193	1,098	17.6%
	PM	223	1,830	12.2%
ROADWAY SEGMENT				
7th Street between Campus Drive and 11th Avenue	AM	32	567	5.6%
	PM	37	1,186	3.1%

Based on a review of the information provided in this section and the remainder of the traffic impact study, the City of Hanford and the applicant have determined that the payment of the City's impact fees will satisfy the Project's obligations to pay for an equitable share of the improvements.

APPENDIX A

Modified Arterial Level of Service Tables

TABLE 4

Generalized **Peak Hour Two-Way** Volumes for Florida's **Urbanized Areas**[1]

03/14/2018

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Principal (1 signal per half mile)

Lanes	Median	B	C	D	E
2	Undivided	*	360	1,250	1,690
4	Divided	90	2,450	3,250	3,400
6	Divided	150	3,710	4,890	5,130

Minor (1 signal per quarter mile)

Lanes	Median	B	C	D	E
2	Undivided	*	*	380	1,290
4	Divided	*	850	2,530	3,350
6	Divided	*	1,600	3,980	5,050

Non-State Signalized Roadway Adjustments

(Alter corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways - 10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
2	Divided	Yes	No	+5%
2	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	-25%
–	–	–	Yes	+ 5%

One-Way Facility Adjustment

Multiply the corresponding two-directional volumes in this table by 0.6

UNINTERRUPTED FLOW FACILITIES

FREEWAYS

Lanes	B	C	D	E
4	4,560	6,200	7,690	7,870
6	6,650	9,150	11,350	11,820
8	8,760	12,130	15,110	15,760
10	11,960	16,800	19,710	**
12	14,820	19,980	23,640	**

Freeway Adjustments

Auxiliary Lanes Present in Both Directions	Ramp Metering
+ 1,800	+ 5%

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
2	Undivided	1,110	1,690	2,290	3,070
4	Divided	3,350	4,840	6,090	6,840
6	Divided	5,040	7,250	9,130	10,250

Uninterrupted Flow Highway Adjustments

Lanes	Median	Exclusive left lanes	Adjustment factors
2	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

BICYCLE MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/Bicycle Lane Coverage	B	C	D	E
0-49%	*	260	680	1,770
50-84%	190	600	1,770	>1,770
85-100%	830	1,770	>1,770	**

PEDESTRIAN MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	B	C	D	E
0-49%	*	*	260	850
50-84%	*	150	780	1,420
85-100%	340	960	1,560	>1,770

BUS MODE (Scheduled Fixed Route)[3]

(Buses in peak hour in peak direction)

Sidewalk Coverage	B	C	D	E
0-84%	> 5	≥ 4	≥ 3	≥ 2
85-100%	> 4	≥ 3	≥ 2	≥ 1

[1]Values shown are presented as peak hour directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual and the Transit Capacity and Quality of Service Manual.

[2] Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility.

[3] Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.

* Cannot be achieved using table input value defaults.

** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

Source:
Florida Department of Transportation
Systems Planning Office
www.dot.state.fl.us/planning/systems/sm/los/default.shtm

TABLE 4
(continued)

Generalized **Peak Hour Two-Way** Volumes for Florida's **Urbanized Areas**

03/14/2018

INPUT VALUE ASSUMPTIONS	Uninterrupted Flow Facilities			Interrupted Flow Facilities					
	Freeways	Highways		Principal Arterials		Minor Arterials		Bicycle	Pedestrian
ROADWAY CHARACTERISTICS									
Area type (urban, rural)	urban								
Number of through lanes (both dir.)	4-12	2	4-6	2-4	6	2-4	6	4	4
Posted speed (mph)	70	50	50	50	50	40	40	45	45
Free flow speed (mph)	75	55	55	55	55	45	45	50	50
Auxiliary Lanes (n, y)	n								
Median (d, u, twlt)			d						
Terrain (l,r)	l	l	l	l	l	l	l	l	l
% no passing zone		80							
Exclusive left turn lane impact (n, y)		[n]	y	y	y	y	y	y	y
Exclusive right turn lanes (n, y)				n	y	n	y		
Facility length (mi)	3	5	5	2	2	2	2	2	2
Interchange Density (intch/mi)	1								
TRAFFIC CHARACTERISTICS									
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.565	0.565
Peak hour factor (PHF)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Base saturation flow rate (pcphpl)	2,400	1,700	2,100	1,950	1,950	1,950	1,950	1,950	1,950
Heavy vehicle percent	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.0
Speed Adjustment Factor (SAF)	0.950		0.950						
Capacity Adjustment Factor (CAF)	0.939		0.939						
% left turns				12	12	12	12	12	12
% right turns				12	12	12	12	12	12
CONTROL CHARACTERISTICS									
Number of signals				5	5	9	9	4	6
Arrival type (1-6)				3	3	3	3	4	4
Signal type (a, c, p)				c	c	c	c	c	c
Cycle length (C)				150	150	120	120	120	120
Effective green ratio (g/C)				0.44	0.44	0.44	0.44	0.44	0.44
MULTIMODAL CHARACTERISTICS									
Paved shoulder/bicycle lane (n, y)								n, 50%, y	n
Outside lane width								t	t
Pavement condition								t	
On-street parking								n	n
Sidewalk (n, y)									n, 50%, y
Sidewalk/roadway separation (a, t, w)									t
Sidewalk protective barrier (n, y)									n

LEVEL OF SERVICE THRESHOLDS

Level of Service	Freeways	Highways		Arterials	Bicycle	Ped	Bus
	Density pc/mi/ln	Two-Lane	Multilane	Principal & Minor	Score	Score	Buses/hr.
		%ffs	Density pc/mi/ln	%bffs			
B	≤ 18	> 83.3	≤ 18	> 67	≤ 2.75	≤ 2.75	≤ 6
C	≤ 26	> 75.0	≤ 26	> 50	≤ 3.50	≤ 3.50	≤ 4
D	≤ 35	> 66.7	≤ 35	> 40	≤ 4.25	≤ 4.25	< 3
E	≤ 45	≤ 66.7	≤ 45	> 30	≤ 5.00	≤ 5.00	< 2

pc/mi/ln = passenger cars per mile per lane %ffs = percent free flow speed %bffs = percent base free flow speed

APPENDIX B

Traffic Count Data Worksheets

Prepared by National Data & Surveying Services

VOLUME

N 11th Ave Bet. W 6th St & W 7th St

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_008

DAILY TOTALS	NB	SB	EB	WB	Total
	11,082	11,303	0	0	22,385

AM Period	NB		SB		EB	WB	TOTAL	
0:00	31		25				56	
0:15	30		21				51	
0:30	20		22				42	
0:45	12	93	18	86			30	179
1:00	11		14				25	
1:15	13		10				23	
1:30	9		8				17	
1:45	12	45	14	46			26	91
2:00	19		5				24	
2:15	10		7				17	
2:30	9		8				17	
2:45	10	48	10	30			20	78
3:00	15		10				25	
3:15	4		10				14	
3:30	9		17				26	
3:45	12	40	15	52			27	92
4:00	10		12				22	
4:15	19		25				44	
4:30	21		27				48	
4:45	33	83	36	100			69	183
5:00	34		38				72	
5:15	43		61				104	
5:30	33		75				108	
5:45	51	161	75	249			126	410
6:00	45		100				145	
6:15	88		92				180	
6:30	61		79				140	
6:45	73	267	89	360			162	627
7:00	69		96				165	
7:15	103		114				217	
7:30	140		117				257	
7:45	186	498	117	444			303	942
8:00	167		108				275	
8:15	134		111				245	
8:30	143		114				257	
8:45	171	615	120	453			291	1068
9:00	153		139				292	
9:15	134		155				289	
9:30	166		127				293	
9:45	171	624	133	554			304	1178
10:00	147		164				311	
10:15	174		176				350	
10:30	165		156				321	
10:45	201	687	178	674			379	1361
11:00	171		187				358	
11:15	190		201				391	
11:30	169		200				369	
11:45	206	736	179	767			385	1503
TOTALS		3897		3815				**7712**
SPLIT %		50.5%		49.5%				**34.5%**

PM Period	NB		SB		EB	WB	TOTAL	
12:00	217		224				441	
12:15	222		199				421	
12:30	184		222				406	
12:45	171	794	206	851			377	1645
13:00	179		172				351	
13:15	201		192				393	
13:30	195		193				388	
13:45	238	813	204	761			442	1574
14:00	176		184				360	
14:15	208		184				392	
14:30	224		218				442	
14:45	220	828	198	784			418	1612
15:00	242		227				469	
15:15	222		194				416	
15:30	228		236				464	
15:45	223	915	223	880			446	1795
16:00	247		243				490	
16:15	242		210				452	
16:30	239		234				473	
16:45	215	943	225	912			440	1855
17:00	223		256				479	
17:15	207		229				436	
17:30	183		220				403	
17:45	193	806	175	880			368	1686
18:00	174		229				403	
18:15	182		172				354	
18:30	164		183				347	
18:45	155	675	177	761			332	1436
19:00	156		172				328	
19:15	137		156				293	
19:30	131		147				278	
19:45	115	539	140	615			255	1154
20:00	95		126				221	
20:15	89		107				196	
20:30	69		98				167	
20:45	72	325	75	406			147	731
21:00	59		102				161	
21:15	45		82				127	
21:30	55		69				124	
21:45	58	217	63	316			121	533
22:00	44		52				96	
22:15	46		45				91	
22:30	50		57				107	
22:45	37	177	40	194			77	371
23:00	43		26				69	
23:15	38		24				62	
23:30	33		42				75	
23:45	39	153	36	128			75	281
TOTALS		7185		7488				**14673**
SPLIT %		49.0%		51.0%				**65.5%**

DAILY TOTALS	NB	SB	EB	WB	Total
	11,082	11,303	0	0	22,385

	NB	SB	EB	WB	Total
AM Peak Hour	11:45	11:45			**11:45**
AM Pk Volume	829	824			**1653**
Pk Hr Factor	0.934	0.920			**0.937**
7 - 9 Volume	1113	897	0	0	**2010**
7 - 9 Peak Hour	7:45	7:15			**7:30**
7 - 9 Pk Volume	630	456	0	0	**1080**
Pk Hr Factor	0.847	0.974	0.000	0.000	**0.891**

	NB	SB	EB	WB	Total
PM Peak Hour	15:45	16:30			**15:45**
PM Pk Volume	951	944			**1861**
Pk Hr Factor	0.963	0.922			**0.949**
4 - 6 Volume	1749	1792	0	0	**3541**
4 - 6 Peak Hour	16:00	16:30			**16:00**
4 - 6 Pk Volume	943	944	0	0	**1855**
Pk Hr Factor	0.954	0.922	0.000	0.000	**0.946**

Prepared by National Data & Surveying Services

VOLUME

W 6th St Bet. Campus Dr & N 11th Ave

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_007

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	740	1,022	1,762

AM Period	NB	SB	EB		WB		TOTAL	
0:00			0		3		3	
0:15			2		1		3	
0:30			0		0		0	
0:45			2	4	2	6	4	10
1:00			2		0		2	
1:15			0		0		0	
1:30			1		0		1	
1:45			0	3	3	3	3	6
2:00			0		1		1	
2:15			0		1		1	
2:30			1		0		1	
2:45			1	2	3	5	4	7
3:00			1		1		2	
3:15			1		0		1	
3:30			0		1		1	
3:45			1	3	0	2	1	5
4:00			1		4		5	
4:15			0		2		2	
4:30			1		1		2	
4:45			2	4	1	8	3	12
5:00			0		1		1	
5:15			1		2		3	
5:30			2		14		16	
5:45			1	4	9	26	10	30
6:00			3		2		5	
6:15			4		3		7	
6:30			9		8		17	
6:45			9	25	15	28	24	53
7:00			2		5		7	
7:15			5		10		15	
7:30			13		12		25	
7:45			20	40	36	63	56	103
8:00			11		18		29	
8:15			6		16		22	
8:30			5		13		18	
8:45			20	42	17	64	37	106
9:00			9		32		41	
9:15			11		15		26	
9:30			9		7		16	
9:45			8	37	14	68	22	105
10:00			10		20		30	
10:15			11		16		27	
10:30			10		9		19	
10:45			9	40	19	64	28	104
11:00			20		17		37	
11:15			17		18		35	
11:30			8		14		22	
11:45			20	65	19	68	39	133
TOTALS				269		405		**674**
SPLIT %				39.9%		60.1%		**38.3%**

PM Period	NB	SB	EB		WB		TOTAL	
12:00			19		11		30	
12:15			17		28		45	
12:30			22		22		44	
12:45			20	78	26	87	46	165
13:00			13		24		37	
13:15			13		19		32	
13:30			18		23		41	
13:45			16	60	20	86	36	146
14:00			14		24		38	
14:15			15		19		34	
14:30			16		19		35	
14:45			10	55	18	80	28	135
15:00			19		18		37	
15:15			12		23		35	
15:30			13		19		32	
15:45			8	52	23	83	31	135
16:00			15		11		26	
16:15			15		18		33	
16:30			10		15		25	
16:45			12	52	22	66	34	118
17:00			17		20		37	
17:15			16		15		31	
17:30			13		11		24	
17:45			3	49	12	58	15	107
18:00			7		11		18	
18:15			7		18		25	
18:30			13		20		33	
18:45			7	34	13	62	20	96
19:00			9		10		19	
19:15			9		6		15	
19:30			9		9		18	
19:45			12	39	10	35	22	74
20:00			5		5		10	
20:15			2		6		8	
20:30			4		7		11	
20:45			6	17	6	24	12	41
21:00			8		4		12	
21:15			5		3		8	
21:30			2		2		4	
21:45			1	16	4	13	5	29
22:00			2		2		4	
22:15			2		3		5	
22:30			4		3		7	
22:45			3	11	5	13	8	24
23:00			2		2		4	
23:15			2		0		2	
23:30			3		4		7	
23:45			1	8	4	10	5	18
TOTALS				471		617		**1088**
SPLIT %				43.3%		56.7%		**61.7%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	740	1,022	1,762

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour			11:45	7:45	**11:45**	**PM Peak Hour**			12:00	12:15	**12:15**
AM Pk Volume			78	83	**158**	**PM Pk Volume**			78	100	**172**
Pk Hr Factor			0.886	0.576	**0.878**	**Pk Hr Factor**			0.886	0.893	**0.935**
7 - 9 Volume	0	0	82	127	**209**	**4 - 6 Volume**	0	0	101	124	**225**
7 - 9 Peak Hour			7:30	7:45	**7:30**	**4 - 6 Peak Hour**			16:45	16:15	**16:15**
7 - 9 Pk Volume	0	0	50	83	**132**	**4 - 6 Pk Volume**	0	0	58	75	**129**
Pk Hr Factor	0.000	0.000	0.625	0.576	**0.589**	**Pk Hr Factor**	0.000	0.000	0.853	0.852	**0.872**

Prepared by National Data & Surveying Services

VOLUME

W 7th St Bet. Campus Dr & N 11th Ave

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_006

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	3,085	3,870	6,955

AM Period	NB	SB	EB		WB		TOTAL	
0:00			3		2		5	
0:15			2		4		6	
0:30			1		2		3	
0:45			4	10	2	10	6	20
1:00			5		3		8	
1:15			1		5		6	
1:30			2		2		4	
1:45			2	10	1	11	3	21
2:00			5		5		10	
2:15			0		0		0	
2:30			4		6		10	
2:45			5	14	3	14	8	28
3:00			1		2		3	
3:15			1		2		3	
3:30			4		2		6	
3:45			2	8	4	10	6	18
4:00			2		5		7	
4:15			4		1		5	
4:30			3		6		9	
4:45			4	13	8	20	12	33
5:00			3		7		10	
5:15			5		16		21	
5:30			13		8		21	
5:45			3	24	11	42	14	66
6:00			10		10		20	
6:15			8		24		32	
6:30			9		30		39	
6:45			9	36	26	90	35	126
7:00			21		21		42	
7:15			26		24		50	
7:30			23		42		65	
7:45			29	99	56	143	85	242
8:00			28		30		58	
8:15			39		44		83	
8:30			37		27		64	
8:45			43	147	50	151	93	298
9:00			39		57		96	
9:15			56		41		97	
9:30			45		71		116	
9:45			55	195	58	227	113	422
10:00			49		73		122	
10:15			58		66		124	
10:30			50		64		114	
10:45			56	213	69	272	125	485
11:00			45		73		118	
11:15			68		87		155	
11:30			54		71		125	
11:45			65	232	75	306	140	538
TOTALS				1001		1296		**2297**
SPLIT %				43.6%		56.4%		**33.0%**

PM Period	NB	SB	EB		WB		TOTAL	
12:00			58		102		160	
12:15			59		78		137	
12:30			56		92		148	
12:45			73	246	63	335	136	581
13:00			64		92		156	
13:15			79		77		156	
13:30			61		82		143	
13:45			57	261	74	325	131	586
14:00			47		88		135	
14:15			48		88		136	
14:30			78		100		178	
14:45			58	231	89	365	147	596
15:00			64		85		149	
15:15			74		90		164	
15:30			65		82		147	
15:45			59	262	86	343	145	605
16:00			67		81		148	
16:15			68		76		144	
16:30			71		64		135	
16:45			61	267	79	300	140	567
17:00			80		76		156	
17:15			53		84		137	
17:30			60		65		125	
17:45			48	241	58	283	106	524
18:00			60		49		109	
18:15			40		55		95	
18:30			49		61		110	
18:45			44	193	60	225	104	418
19:00			54		51		105	
19:15			41		34		75	
19:30			41		35		76	
19:45			40	176	34	154	74	330
20:00			28		40		68	
20:15			22		29		51	
20:30			19		20		39	
20:45			16	85	21	110	37	195
21:00			10		16		26	
21:15			19		28		47	
21:30			15		16		31	
21:45			9	53	16	76	25	129
22:00			12		6		18	
22:15			11		9		20	
22:30			12		9		21	
22:45			9	44	7	31	16	75
23:00			8		8		16	
23:15			4		6		10	
23:30			8		7		15	
23:45			5	25	6	27	11	52
TOTALS				2084		2574		**4658**
SPLIT %				44.7%		55.3%		**67.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	3,085	3,870	6,955

	NB	SB	EB	WB	Total
AM Peak Hour			11:15	11:45	**11:45**
AM Pk Volume			245	347	**585**
Pk Hr Factor			0.901	0.850	**0.914**
7 - 9 Volume	0	0	246	294	**540**
7 - 9 Peak Hour			8:00	7:30	**8:00**
7 - 9 Pk Volume	0	0	147	172	**298**
Pk Hr Factor	0.000	0.000	0.855	0.768	**0.801**

	NB	SB	EB	WB	Total
PM Peak Hour			16:15	14:00	**14:30**
PM Pk Volume			280	365	**638**
Pk Hr Factor			0.875	0.913	**0.896**
4 - 6 Volume	0	0	508	583	**1091**
4 - 6 Peak Hour			16:15	16:45	**16:15**
4 - 6 Pk Volume	0	0	280	304	**575**
Pk Hr Factor	0.000	0.000	0.875	0.905	**0.921**

Prepared by National Data & Surveying Services

VOLUME

Campus Dr Bet. W Lacey Blvd & W 7th St

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_005

DAILY TOTALS	NB	SB	EB	WB	Total
	1,511	1,394	0	0	2,905

AM Period	NB		SB		EB	WB	TOTAL	
0:00	2		3				5	
0:15	1		2				3	
0:30	3		1				4	
0:45	1	7	0	6			1	13
1:00	0		1				1	
1:15	0		0				0	
1:30	0		0				0	
1:45	3	3	0	1			3	4
2:00	1		0				1	
2:15	0		1				1	
2:30	2		0				2	
2:45	2	5	1	2			3	7
3:00	1		1				2	
3:15	1		0				1	
3:30	1		2				3	
3:45	0	3	3	6			3	9
4:00	1		2				3	
4:15	3		3				6	
4:30	0		2				2	
4:45	2	6	3	10			5	16
5:00	1		3				4	
5:15	1		3				4	
5:30	3		5				8	
5:45	5	10	6	17			11	27
6:00	3		3				6	
6:15	4		11				15	
6:30	4		16				20	
6:45	6	17	14	44			20	61
7:00	9		11				20	
7:15	22		14				36	
7:30	19		13				32	
7:45	45	95	19	57			64	152
8:00	28		22				50	
8:15	15		18				33	
8:30	20		19				39	
8:45	19	82	26	85			45	167
9:00	26		19				45	
9:15	28		20				48	
9:30	20		17				37	
9:45	22	96	32	88			54	184
10:00	30		16				46	
10:15	26		21				47	
10:30	23		16				39	
10:45	24	103	26	79			50	182
11:00	31		22				53	
11:15	36		30				66	
11:30	28		28				56	
11:45	37	132	32	112			69	244
TOTALS	559		507				**1066**	
SPLIT %	52.4%		47.6%				**36.7%**	

PM Period	NB		SB		EB	WB	TOTAL	
12:00	48		40				88	
12:15	30		27				57	
12:30	39		46				85	
12:45	56	173	42	155			98	328
13:00	36		42				78	
13:15	31		32				63	
13:30	28		31				59	
13:45	38	133	21	126			59	259
14:00	30		26				56	
14:15	28		17				45	
14:30	30		35				65	
14:45	31	119	25	103			56	222
15:00	30		34				64	
15:15	25		23				48	
15:30	29		28				57	
15:45	24	108	22	107			46	215
16:00	28		26				54	
16:15	40		38				78	
16:30	33		39				72	
16:45	27	128	32	135			59	263
17:00	45		49				94	
17:15	24		25				49	
17:30	27		24				51	
17:45	19	115	14	112			33	227
18:00	16		10				26	
18:15	11		14				25	
18:30	19		19				38	
18:45	15	61	11	54			26	115
19:00	15		13				28	
19:15	17		8				25	
19:30	13		11				24	
19:45	13	58	12	44			25	102
20:00	11		4				15	
20:15	7		6				13	
20:30	4		7				11	
20:45	1	23	7	24			8	47
21:00	3		3				6	
21:15	4		4				8	
21:30	7		0				7	
21:45	3	17	4	11			7	28
22:00	1		3				4	
22:15	6		1				7	
22:30	2		3				5	
22:45	2	11	2	9			4	20
23:00	1		3				4	
23:15	0		1				1	
23:30	4		0				4	
23:45	1	6	3	7			4	13
TOTALS	952		887				**1839**	
SPLIT %	51.8%		48.2%				**63.3%**	

DAILY TOTALS	NB	SB	EB	WB	Total
	1,511	1,394	0	0	2,905

	NB	SB	EB	WB	Total
AM Peak Hour	11:45	11:45			**11:45**
AM Pk Volume	154	145			**299**
Pk Hr Factor	0.802	0.788			**0.849**
7 - 9 Volume	177	142	0	0	**319**
7 - 9 Peak Hour	7:15	8:00			**7:45**
7 - 9 Pk Volume	114	85	0	0	**186**
Pk Hr Factor	0.633	0.817	0.000	0.000	**0.727**

	NB	SB	EB	WB	Total
PM Peak Hour	12:00	12:30			**12:00**
PM Pk Volume	173	162			**328**
Pk Hr Factor	0.772	0.880			**0.837**
4 - 6 Volume	243	247	0	0	**490**
4 - 6 Peak Hour	16:15	16:15			**16:15**
4 - 6 Pk Volume	145	158	0	0	**303**
Pk Hr Factor	0.806	0.806	0.000	0.000	**0.806**

Prepared by National Data & Surveying Services

VOLUME

W Lacey Blvd Bet. Cousins Dr & Campus Dr

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_004

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	7,648	7,723	15,371

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
0:00			11		5		16		12:00			155		190		345	
0:15			6		8		14		12:15			207		187		394	
0:30			5		7		12		12:30			186		204		390	
0:45			4	26	5	25	9	51	12:45			184	732	156	737	340	1469
1:00			11		7		18		13:00			160		163		323	
1:15			5		5		10		13:15			186		187		373	
1:30			4		4		8		13:30			159		150		309	
1:45			5	25	11	27	16	52	13:45			161	666	168	668	329	1334
2:00			3		5		8		14:00			158		142		300	
2:15			5		3		8		14:15			142		131		273	
2:30			1		1		2		14:30			145		158		303	
2:45			5	14	5	14	10	28	14:45			136	581	148	579	284	1160
3:00			2		4		6		15:00			165		145		310	
3:15			3		6		9		15:15			141		154		295	
3:30			6		2		8		15:30			180		166		346	
3:45			2	13	5	17	7	30	15:45			149	635	160	625	309	1260
4:00			4		3		7		16:00			165		181		346	
4:15			5		6		11		16:15			157		164		321	
4:30			6		7		13		16:30			146		171		317	
4:45			12	27	8	24	20	51	16:45			133	601	180	696	313	1297
5:00			8		8		16		17:00			186		186		372	
5:15			9		8		17		17:15			148		165		313	
5:30			8		18		26		17:30			133		164		297	
5:45			10	35	18	52	28	87	17:45			116	583	141	656	257	1239
6:00			15		24		39		18:00			133		140		273	
6:15			17		21		38		18:15			118		128		246	
6:30			29		26		55		18:30			123		113		236	
6:45			32	93	31	102	63	195	18:45			127	501	87	468	214	969
7:00			32		33		65		19:00			134		103		237	
7:15			51		42		93		19:15			125		111		236	
7:30			59		58		117		19:30			105		95		200	
7:45			85	227	64	197	149	424	19:45			112	476	80	389	192	865
8:00			86		69		155		20:00			71		66		137	
8:15			75		75		150		20:15			75		61		136	
8:30			85		86		171		20:30			50		53		103	
8:45			85	331	86	316	171	647	20:45			60	256	31	211	91	467
9:00			90		88		178		21:00			34		49		83	
9:15			81		105		186		21:15			37		30		67	
9:30			113		112		225		21:30			40		32		72	
9:45			136	420	124	429	260	849	21:45			32	143	24	135	56	278
10:00			127		112		239		22:00			21		24		45	
10:15			115		158		273		22:15			24		27		51	
10:30			135		127		262		22:30			26		14		40	
10:45			144	521	170	567	314	1088	22:45			20	91	19	84	39	175
11:00			150		151		301		23:00			16		11		27	
11:15			153		175		328		23:15			19		11		30	
11:30			133		156		289		23:30			16		8		24	
11:45			153	589	183	665	336	1254	23:45			11	62	10	40	21	102
TOTALS				2321		2435		**4756**	**TOTALS**				5327		5288		**10615**
SPLIT %				48.8%		51.2%		**30.9%**	**SPLIT %**				50.2%		49.8%		**69.1%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	7,648	7,723	15,371

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour			11:45	11:45	**11:45**	**PM Peak Hour**			12:15	12:00	**12:00**
AM Pk Volume			701	764	**1465**	**PM Pk Volume**			737	737	**1469**
Pk Hr Factor			0.847	0.936	**0.930**	**Pk Hr Factor**			0.890	0.903	**0.932**
7 - 9 Volume	0	0	558	513	**1071**	**4 - 6 Volume**	0	0	1184	1352	**2536**
7 - 9 Peak Hour			7:45	8:00	**8:00**	**4 - 6 Peak Hour**			16:15	16:30	**16:15**
7 - 9 Pk Volume	0	0	331	316	**647**	**4 - 6 Pk Volume**	0	0	622	702	**1323**
Pk Hr Factor	0.000	0.000	0.962	0.919	**0.946**	**Pk Hr Factor**	0.000	0.000	0.836	0.944	**0.889**

Prepared by National Data & Surveying Services

VOLUME

Glendale Ave W/O 12th Ave

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,622	1,183	2,805

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
0:00					6		4		10		12:00					24		19		43	
0:15					10		2		12		12:15					26		17		43	
0:30					11		0		11		12:30					31		25		56	
0:45					5	32	2	8	7	40	12:45					22	103	18	79	40	182
1:00					4		1		5		13:00					23		17		40	
1:15					6		0		6		13:15					26		28		54	
1:30					2		2		4		13:30					21		11		32	
1:45					10	22	3	6	13	28	13:45					19	89	12	68	31	157
2:00					2		0		2		14:00					25		20		45	
2:15					2		0		2		14:15					31		18		49	
2:30					4		1		5		14:30					33		24		57	
2:45					3	11	0	1	3	12	14:45					29	118	21	83	50	201
3:00					7		8		15		15:00					33		24		57	
3:15					3		2		5		15:15					37		22		59	
3:30					3		0		3		15:30					28		16		44	
3:45					7	20	2	12	9	32	15:45					34	132	16	78	50	210
4:00					6		1		7		16:00					36		30		66	
4:15					10		3		13		16:15					20		27		47	
4:30					10		2		12		16:30					28		22		50	
4:45					8	34	3	9	11	43	16:45					35	119	37	116	72	235
5:00					10		0		10		17:00					33		36		69	
5:15					18		3		21		17:15					40		27		67	
5:30					11		0		11		17:30					21		20		41	
5:45					14	53	4	7	18	60	17:45					29	123	37	120	66	243
6:00					7		5		12		18:00					34		20		54	
6:15					12		6		18		18:15					17		22		39	
6:30					12		9		21		18:30					29		15		44	
6:45					11	42	10	30	21	72	18:45					25	105	10	67	35	172
7:00					7		17		24		19:00					25		10		35	
7:15					17		17		34		19:15					28		21		49	
7:30					14		16		30		19:30					31		9		40	
7:45					13	51	22	72	35	123	19:45					18	102	12	52	30	154
8:00					11		21		32		20:00					23		13		36	
8:15					10		24		34		20:15					17		8		25	
8:30					9		14		23		20:30					16		9		25	
8:45					10	40	12	71	22	111	20:45					20	76	12	42	32	118
9:00					13		20		33		21:00					15		6		21	
9:15					11		18		29		21:15					23		5		28	
9:30					12		18		30		21:30					19		7		26	
9:45					25	61	11	67	36	128	21:45					12	69	2	20	14	89
10:00					18		22		40		22:00					10		3		13	
10:15					17		13		30		22:15					13		3		16	
10:30					16		13		29		22:30					9		2		11	
10:45					21	72	32	80	53	152	22:45					4	36	5	13	9	49
11:00					20		17		37		23:00					8		4		12	
11:15					23		12		35		23:15					9		5		14	
11:30					18		20		38		23:30					7		3		10	
11:45					21	82	18	67	39	149	23:45					6	30	3	15	9	45
TOTALS						520		430		**950**	**TOTALS**						1102		753		**1855**
SPLIT %						54.7%		45.3%		**33.9%**	**SPLIT %**						59.4%		40.6%		**66.1%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,622	1,183	2,805

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour			11:45	7:30	**11:45**	**PM Peak Hour**			16:30	16:15	**16:30**
AM Pk Volume			102	83	**181**	**PM Pk Volume**			136	122	**258**
Pk Hr Factor			0.823	0.865	**0.808**	**Pk Hr Factor**			0.850	0.824	**0.896**
7 - 9 Volume	0	0	91	143	**234**	**4 - 6 Volume**	0	0	242	236	**478**
7 - 9 Peak Hour			7:15	7:30	**7:15**	**4 - 6 Peak Hour**			16:30	16:15	**16:30**
7 - 9 Pk Volume	0	0	55	83	**131**	**4 - 6 Pk Volume**	0	0	136	122	**258**
Pk Hr Factor	0.000	0.000	0.809	0.865	**0.936**	**Pk Hr Factor**	0.000	0.000	0.850	0.824	**0.896**

Prepared by National Data & Surveying Services

VOLUME

12th Ave Bet. Mall Dr & Glendale Ave

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_002

DAILY TOTALS	NB	SB	EB	WB	Total
	16,391	17,139	0	0	33,530

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
0:00	33		39				72		12:00	271		313				584	
0:15	26		26				52		12:15	283		267				550	
0:30	13		21				34		12:30	296		280				576	
0:45	17	89	22	108			39	197	12:45	314	1164	268	1128			582	2292
1:00	17		39				56		13:00	264		293				557	
1:15	14		27				41		13:15	260		295				555	
1:30	17		17				34		13:30	261		287				548	
1:45	25	73	23	106			48	179	13:45	314	1099	292	1167			606	2266
2:00	17		16				33		14:00	241		338				579	
2:15	11		17				28		14:15	290		307				597	
2:30	4		15				19		14:30	295		304				599	
2:45	17	49	12	60			29	109	14:45	298	1124	312	1261			610	2385
3:00	17		20				37		15:00	281		349				630	
3:15	10		6				16		15:15	307		317				624	
3:30	23		13				36		15:30	314		319				633	
3:45	43	93	17	56			60	149	15:45	337	1239	322	1307			659	2546
4:00	22		30				52		16:00	333		350				683	
4:15	29		35				64		16:15	310		345				655	
4:30	40		38				78		16:30	336		338				674	
4:45	44	135	50	153			94	288	16:45	348	1327	345	1378			693	2705
5:00	54		83				137		17:00	355		431				786	
5:15	48		79				127		17:15	339		399				738	
5:30	63		92				155		17:30	344		343				687	
5:45	102	267	91	345			193	612	17:45	303	1341	350	1523			653	2864
6:00	90		112				202		18:00	293		322				615	
6:15	91		89				180		18:15	310		327				637	
6:30	112		117				229		18:30	295		311				606	
6:45	171	464	128	446			299	910	18:45	286	1184	307	1267			593	2451
7:00	138		137				275		19:00	248		310				558	
7:15	202		152				354		19:15	203		287				490	
7:30	223		195				418		19:30	214		302				516	
7:45	303	866	157	641			460	1507	19:45	198	863	251	1150			449	2013
8:00	216		165				381		20:00	160		236				396	
8:15	199		158				357		20:15	145		206				351	
8:30	195		125				320		20:30	143		221				364	
8:45	220	830	130	578			350	1408	20:45	142	590	164	827			306	1417
9:00	176		167				343		21:00	89		156				245	
9:15	187		176				363		21:15	88		142				230	
9:30	203		173				376		21:30	87		142				229	
9:45	233	799	168	684			401	1483	21:45	87	351	103	543			190	894
10:00	215		163				378		22:00	61		115				176	
10:15	242		201				443		22:15	57		88				145	
10:30	245		191				436		22:30	70		89				159	
10:45	264	966	246	801			510	1767	22:45	51	239	79	371			130	610
11:00	273		225				498		23:00	39		60				99	
11:15	267		242				509		23:15	43		55				98	
11:30	296		270				566		23:30	32		53				85	
11:45	263	1099	296	1033			559	2132	23:45	26	140	38	206			64	346
TOTALS		5730		5011				**10741**	**TOTALS**		10661		12128				**22789**
SPLIT %		53.3%		46.7%				**32.0%**	**SPLIT %**		46.8%		53.2%				**68.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	16,391	17,139	0	0	33,530

	NB	SB	EB	WB	TOTAL		NB	SB	EB	WB	TOTAL
AM Peak Hour	11:30	11:45			**11:45**	**PM Peak Hour**	16:45	17:00			**16:45**
AM Pk Volume	1113	1156			**2269**	**PM Pk Volume**	1386	1523			**2904**
Pk Hr Factor	0.940	0.923			**0.971**	**Pk Hr Factor**	0.976	0.883			**0.924**
7 - 9 Volume	1696	1219	0	0	**2915**	**4 - 6 Volume**	2668	2901	0	0	**5569**
7 - 9 Peak Hour	7:15	7:30			**7:30**	**4 - 6 Peak Hour**	16:45	17:00			**16:45**
7 - 9 Pk Volume	944	675	0	0	**1616**	**4 - 6 Pk Volume**	1386	1523	0	0	**2904**
Pk Hr Factor	0.779	0.865	0.000	0.000	**0.878**	**Pk Hr Factor**	0.976	0.883	0.000	0.000	**0.924**

Prepared by National Data & Surveying Services

VOLUME

Grangeville Blvd W/O 12th Ave

Day: Thursday
Date: 10/1/2020

City: Hanford
Project #: CA20_90150_001

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,956	5,086	10,042

AM Period	NB	SB	EB		WB		TOTAL	
00:00			4		9		13	
00:15			12		12		24	
00:30			5		4		9	
00:45			4	25	7	32	11	57
01:00			7		4		11	
01:15			8		4		12	
01:30			6		2		8	
01:45			3	24	2	12	5	36
02:00			6		4		10	
02:15			3		2		5	
02:30			3		3		6	
02:45			11	23	3	12	14	35
03:00			3		5		8	
03:15			3		5		8	
03:30			6		4		10	
03:45			12	24	10	24	22	48
04:00			5		9		14	
04:15			4		11		15	
04:30			8		8		16	
04:45			8	25	27	55	35	80
05:00			10		28		38	
05:15			21		38		59	
05:30			23		34		57	
05:45			26	80	33	133	59	213
06:00			25		58		83	
06:15			24		54		78	
06:30			36		62		98	
06:45			37	122	64	238	101	360
07:00			46		60		106	
07:15			66		57		123	
07:30			73		72		145	
07:45			111	296	103	292	214	588
08:00			68		86		154	
08:15			65		71		136	
08:30			70		60		130	
08:45			66	269	64	281	130	550
09:00			60		53		113	
09:15			63		65		128	
09:30			57		52		109	
09:45			66	246	82	252	148	498
10:00			73		58		131	
10:15			68		77		145	
10:30			76		64		140	
10:45			80	297	78	277	158	574
11:00			72		80		152	
11:15			87		87		174	
11:30			64		65		129	
11:45			77	300	93	325	170	625
TOTALS				1731		1933		**3664**
SPLIT %				47.2%		52.8%		**36.5%**

PM Period	NB	SB	EB		WB		TOTAL	
12:00			85		83		168	
12:15			54		63		117	
12:30			66		83		149	
12:45			110	315	84	313	194	628
13:00			86		81		167	
13:15			80		81		161	
13:30			72		75		147	
13:45			70	308	74	311	144	619
14:00			84		81		165	
14:15			72		85		157	
14:30			103		95		198	
14:45			107	366	78	339	185	705
15:00			94		88		182	
15:15			121		81		202	
15:30			113		83		196	
15:45			120	448	86	338	206	786
16:00			89		114		203	
16:15			113		79		192	
16:30			115		105		220	
16:45			127	444	98	396	225	840
17:00			104		119		223	
17:15			104		92		196	
17:30			106		93		199	
17:45			69	383	100	404	169	787
18:00			73		109		182	
18:15			76		76		152	
18:30			67		77		144	
18:45			66	282	78	340	144	622
19:00			67		77		144	
19:15			79		79		158	
19:30			62		52		114	
19:45			57	265	54	262	111	527
20:00			36		54		90	
20:15			50		43		93	
20:30			40		42		82	
20:45			31	157	32	171	63	328
21:00			34		43		77	
21:15			23		48		71	
21:30			27		30		57	
21:45			29	113	26	147	55	260
22:00			19		26		45	
22:15			14		14		28	
22:30			16		15		31	
22:45			19	68	14	69	33	137
23:00			17		22		39	
23:15			15		12		27	
23:30			23		18		41	
23:45			21	76	11	63	32	139
TOTALS				3225		3153		**6378**
SPLIT %				50.6%		49.4%		**63.5%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,956	5,086	10,042

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour			07:15	07:30	**07:30**	**PM Peak Hour**			16:15	16:30	**16:30**
AM Pk Volume			318	332	**649**	**PM Pk Volume**			459	414	**864**
Pk Hr Factor			0.716	0.806	**0.758**	**Pk Hr Factor**			0.904	0.870	**0.960**
7 - 9 Volume	0	0	565	573	**1138**	**4 - 6 Volume**	0	0	827	800	**1627**
7 - 9 Peak Hour			07:15	07:30	**07:30**	**4 - 6 Peak Hour**			16:15	16:30	**16:30**
7 - 9 Pk Volume	0	0	318	332	**649**	**4 - 6 Pk Volume**	0	0	459	414	**864**
Pk Hr Factor	0.000	0.000	0.716	0.806	**0.758**	**Pk Hr Factor**	0.000	0.000	0.904	0.870	**0.960**

National Data & Surveying Services

Intersection Turning Movement Count

Location: 11th Ave & 7th St
City: Hanford
Control: Signalized

Project ID: Historical
Date: 7/23/2019

Total

NS/EW Streets:	11th Ave				11th Ave				7th St				7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	1	0	1	2	1	0	2	1.5	0.5	0	1	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	17	51	3	0	13	71	4	0	6	10	10	0	18	7	6	0	216
7:15 AM	18	67	11	5	8	79	7	0	5	19	20	0	10	14	5	0	268
7:30 AM	28	76	22	1	11	83	8	0	9	20	10	0	14	26	9	0	317
7:45 AM	42	134	27	6	20	87	21	0	8	20	15	0	7	25	8	0	420
8:00 AM	34	94	29	2	15	65	15	0	10	17	9	0	22	18	16	0	346
8:15 AM	27	108	23	1	14	62	14	1	6	21	15	0	18	20	14	0	344
8:30 AM	35	88	17	4	20	72	13	0	12	29	26	0	25	26	9	0	376
8:45 AM	25	114	27	1	19	80	16	0	12	26	23	0	23	25	14	0	405
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	226	732	159	20	120	599	98	1	68	162	128	0	137	161	81	0	2692
APPROACH %'s :	19.88%	64.38%	13.98%	1.76%	14.67%	73.23%	11.98%	0.12%	18.99%	45.25%	35.75%	0.00%	36.15%	42.48%	21.37%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	138	424	96	13	69	286	63	1	36	87	65	0	72	89	47	0	1486
PEAK HR FACTOR :	0.821	0.791	0.828	0.542	0.863	0.822	0.750	0.250	0.750	0.750	0.625	0.000	0.720	0.856	0.734	0.000	0.885
	0.803				0.818				0.701				0.867				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	1	2	1	0	1	2	1	0	2	1.5	0.5	0	1	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	22	161	28	4	26	140	15	1	21	36	45	0	39	46	22	0	606
4:15 PM	38	142	35	10	19	119	18	4	18	40	34	0	37	38	29	0	581
4:30 PM	32	142	33	6	27	120	8	1	21	52	61	0	43	38	30	0	614
4:45 PM	33	132	26	7	31	126	12	1	16	43	48	0	37	38	21	0	571
5:00 PM	35	156	19	3	23	176	13	3	11	38	72	0	43	45	27	0	664
5:15 PM	38	127	29	10	20	152	17	0	18	45	41	0	27	30	23	0	577
5:30 PM	30	123	24	5	20	133	4	0	15	39	38	0	36	34	18	0	519
5:45 PM	23	128	29	7	12	119	11	2	12	30	32	0	34	32	18	0	489
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	251	1111	223	52	178	1085	98	12	132	323	371	0	296	301	188	0	4621
APPROACH %'s :	15.33%	67.87%	13.62%	3.18%	12.96%	79.02%	7.14%	0.87%	15.98%	39.10%	44.92%	0.00%	37.71%	38.34%	23.95%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	138	572	113	26	100	541	51	9	66	173	215	0	160	159	107	0	2430
PEAK HR FACTOR :	0.908	0.917	0.807	0.650	0.806	0.768	0.708	0.563	0.786	0.832	0.747	0.000	0.930	0.883	0.892	0.000	0.915
	0.943				0.815				0.847				0.926				

National Data & Surveying Services

Intersection Turning Movement Count

Location: S 11th Ave & W 6th St
City: Hanford
Control: 2-Way Stop(EB/WB)

Project ID: 20-090149-010
Date: 10/1/2020

Total

NS/EW Streets:	S 11th Ave				S 11th Ave				W 6th St				W 6th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	1	2	1	0	0	0	1	0	0	0	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	10	64	3	1	6	89	0	0	0	0	4	0	0	0	8	0	185
7:15 AM	9	91	5	0	9	103	2	0	0	0	5	0	0	0	11	0	235
7:30 AM	13	127	11	0	13	104	1	2	0	0	14	0	0	0	12	0	297
7:45 AM	26	182	15	0	9	99	6	0	0	0	10	0	0	0	9	0	356
8:00 AM	22	147	11	1	20	90	0	0	0	0	12	0	0	0	14	0	317
8:15 AM	14	129	12	0	11	90	4	2	0	0	4	0	0	0	5	0	271
8:30 AM	15	126	12	0	15	99	2	0	0	0	6	0	0	0	20	0	295
8:45 AM	16	154	16	0	20	91	6	0	0	0	18	0	0	0	13	0	334
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	125	1020	85	2	103	765	21	4	0	0	73	0	0	0	92	0	2290
APPROACH %'s :	10.15%	82.79%	6.90%	0.16%	11.53%	85.67%	2.35%	0.45%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	75	585	49	1	53	383	11	4	0	0	40	0	0	0	40	0	1241
PEAK HR FACTOR :	0.721	0.804	0.817	0.250	0.663	0.921	0.458	0.500	0.000	0.000	0.714	0.000	0.000	0.000	0.714	0.000	0.871
	0.796				0.940				0.714				0.714				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	1	2	0	0	1	2	1	0	0	0	1	0	0	0	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	11	214	11	0	20	215	1	1	0	0	18	0	0	0	35	0	526
4:15 PM	19	216	18	1	17	188	2	1	0	0	14	0	0	0	23	0	499
4:30 PM	13	209	20	0	21	218	1	2	0	0	10	0	0	0	32	0	526
4:45 PM	24	181	18	0	12	202	1	4	0	0	12	0	0	0	34	0	488
5:00 PM	18	180	25	0	25	227	2	0	0	0	16	0	0	0	35	0	528
5:15 PM	11	177	10	0	17	209	2	3	0	0	14	0	0	0	27	0	470
5:30 PM	12	167	12	0	20	193	5	1	0	0	14	0	0	0	17	0	441
5:45 PM	9	167	15	1	16	162	2	1	0	0	4	0	0	0	23	0	400
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	117	1511	129	2	148	1614	16	13	0	0	102	0	0	0	226	0	3878
APPROACH %'s :	6.65%	85.90%	7.33%	0.11%	8.26%	90.12%	0.89%	0.73%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	74	786	81	1	75	835	6	7	0	0	52	0	0	0	124	0	2041
PEAK HR FACTOR :	0.771	0.910	0.810	0.250	0.750	0.920	0.750	0.438	0.000	0.000	0.813	0.000	0.000	0.000	0.886	0.000	0.966
	0.927				0.908				0.813				0.886				

National Data & Surveying Services

Intersection Turning Movement Count

Location: S 11th Ave & W 5th St
City: Hanford
Control: Signalized

Project ID: 20-090149-009
Date: 10/1/2020

Total

NS/EW Streets:	S 11th Ave				S 11th Ave				W 5th St				W 5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	1	2	1	0	1	0	1	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	5	74	0	0	0	84	8	0	3	0	1	0	0	0	0	0	175
7:15 AM	5	105	3	0	2	97	11	0	2	0	1	0	0	0	0	0	226
7:30 AM	4	146	5	0	1	113	2	0	3	0	3	0	1	0	0	0	278
7:45 AM	3	220	6	0	0	103	8	0	3	0	0	0	1	0	0	0	344
8:00 AM	9	179	4	0	0	95	8	0	4	0	1	0	1	0	2	0	303
8:15 AM	4	145	3	0	0	76	18	0	6	0	1	0	0	0	2	0	255
8:30 AM	7	143	0	0	1	96	5	0	7	0	1	0	2	0	1	0	263
8:45 AM	11	179	2	0	2	102	8	0	8	0	2	0	1	1	1	0	317
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	48	1191	23	0	6	766	68	0	36	0	10	0	6	1	6	0	2161
APPROACH %'s :	3.80%	94.37%	1.82%	0.00%	0.71%	91.19%	8.10%	0.00%	78.26%	0.00%	21.74%	0.00%	46.15%	7.69%	46.15%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	20	690	18	0	1	387	36	0	16	0	5	0	3	0	4	0	1180
PEAK HR FACTOR :	0.556	0.784	0.750	0.000	0.250	0.856	0.500	0.000	0.667	0.000	0.417	0.000	0.750	0.000	0.500	0.000	0.858
	0.795				0.914				0.750				0.583				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	1	2	1	0	1	0	1	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	25	204	2	0	1	208	28	1	31	0	6	0	1	0	2	0	509
4:15 PM	28	210	1	1	1	166	26	3	36	0	10	0	2	0	3	0	487
4:30 PM	26	214	0	0	0	210	19	2	28	0	8	0	6	0	0	0	513
4:45 PM	35	205	0	1	0	186	24	0	13	0	7	0	0	0	1	0	472
5:00 PM	31	195	1	2	0	217	25	0	29	0	8	0	0	0	4	0	512
5:15 PM	19	178	0	0	1	208	20	0	18	0	9	0	3	0	0	0	456
5:30 PM	29	168	0	1	0	189	19	1	24	0	14	0	3	0	1	0	449
5:45 PM	26	172	0	0	0	153	12	0	16	0	7	0	1	0	1	0	388
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	219	1546	4	5	3	1537	173	7	195	0	69	0	16	0	12	0	3786
APPROACH %'s :	12.34%	87.15%	0.23%	0.28%	0.17%	89.36%	10.06%	0.41%	73.86%	0.00%	26.14%	0.00%	57.14%	0.00%	42.86%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	120	824	2	4	1	779	94	5	106	0	33	0	8	0	8	0	1984
PEAK HR FACTOR :	0.857	0.963	0.500	0.500	0.250	0.897	0.904	0.417	0.736	0.000	0.825	0.000	0.333	0.000	0.500	0.000	0.967
	0.985				0.908				0.755				0.667				

National Data & Surveying Services

Intersection Turning Movement Count

Location: S 11th Ave & SR 198 WB On Ramp/W 4th St
City: Hanford
Control: Signalized

Project ID: 20-090149-008
Date: 10/1/2020

Total

NS/EW Streets:	S 11th Ave				S 11th Ave				SR 198 WB On Ramp/W 4th St				SR 198 WB On Ramp/W 4th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	0	2	1	0	0	0	0	0	1	1	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	13	68	0	0	0	56	34	0	0	0	0	0	13	5	14	0	203
7:15 AM	5	82	0	1	0	64	33	0	0	0	0	0	30	1	27	0	243
7:30 AM	13	109	0	0	0	83	43	0	0	0	0	0	18	1	51	0	318
7:45 AM	10	173	0	0	0	77	21	0	0	0	0	0	39	1	55	0	376
8:00 AM	7	151	0	1	0	76	33	0	0	0	0	0	23	2	38	0	331
8:15 AM	9	133	0	0	0	57	28	0	0	0	0	0	11	8	24	0	270
8:30 AM	6	125	0	0	0	80	22	0	0	0	0	0	18	9	23	0	283
8:45 AM	4	161	0	0	0	84	26	0	0	0	0	0	28	3	32	0	338
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	67	1002	0	2	0	577	240	0	0	0	0	0	180	30	264	0	2362
APPROACH %'s :	6.26%	93.56%	0.00%	0.19%	0.00%	70.62%	29.38%	0.00%					37.97%	6.33%	55.70%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	39	566	0	1	0	293	125	0	0	0	0	0	91	12	168	0	1295
PEAK HR FACTOR :	0.750	0.818	0.000	0.250	0.000	0.883	0.727	0.000	0.000	0.000	0.000	0.000	0.583	0.375	0.764	0.000	0.861
	0.828				0.829								0.713				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	1	2	0	0	0	2	1	0	0	0	0	0	1	1	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	10	198	0	0	0	163	58	0	0	0	0	0	45	8	36	0	518
4:15 PM	14	195	0	0	0	154	37	0	0	0	0	0	53	8	43	0	504
4:30 PM	17	203	0	0	0	171	63	0	0	0	0	0	40	5	33	0	532
4:45 PM	15	202	0	0	0	156	55	0	0	0	0	0	34	9	38	0	509
5:00 PM	23	194	0	1	0	191	58	0	0	0	0	0	41	5	37	0	550
5:15 PM	10	171	0	0	0	187	50	0	0	0	0	0	44	11	28	0	501
5:30 PM	15	163	0	0	0	156	38	0	0	0	0	0	43	8	33	0	456
5:45 PM	12	169	0	0	0	127	40	0	0	0	0	0	44	5	33	0	430
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	116	1495	0	1	0	1305	399	0	0	0	0	0	344	59	281	0	4000
APPROACH %'s :	7.20%	92.74%	0.00%	0.06%	0.00%	76.58%	23.42%	0.00%					50.29%	8.63%	41.08%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	69	794	0	1	0	672	213	0	0	0	0	0	168	27	151	0	2095
PEAK HR FACTOR :	0.750	0.978	0.000	0.250	0.000	0.880	0.845	0.000	0.000	0.000	0.000	0.000	0.792	0.750	0.878	0.000	0.952
	0.982				0.889								0.832				

National Data & Surveying Services

Intersection Turning Movement Count

Location: S 11th Ave & SR 198 EB Off Ramp/W 3rd St
City: Hanford
Control: Signalized

Project ID: 20-090149-007
Date: 10/1/2020

Total

NS/EW Streets:	S 11th Ave				S 11th Ave				SR 198 EB Off Ramp/W 3rd St				SR 198 EB Off Ramp/W 3rd St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	2	1	0	1	2	0	0	0	1	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	59	24	0	14	51	0	0	23	14	3	0	0	0	0	0	188
7:15 AM	0	59	23	0	12	86	0	0	25	21	6	0	0	0	0	0	232
7:30 AM	0	85	28	0	15	83	0	1	37	26	14	0	0	0	0	0	289
7:45 AM	0	131	32	0	19	100	0	0	57	38	22	0	0	0	0	0	399
8:00 AM	0	104	23	0	12	83	0	0	50	22	16	0	0	0	0	0	310
8:15 AM	0	102	20	0	16	57	0	0	41	22	13	0	0	0	0	0	271
8:30 AM	0	84	27	0	22	76	0	0	46	18	11	0	0	0	0	0	284
8:45 AM	0	109	30	0	26	84	0	0	60	22	11	0	0	0	0	0	342
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	733	207	0	136	620	0	1	339	183	96	0	0	0	0	0	2315
APPROACH %'s :	0.00%	77.98%	22.02%	0.00%	17.97%	81.90%	0.00%	0.13%	54.85%	29.61%	15.53%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	0	422	103	0	62	323	0	1	185	108	65	0	0	0	0	0	1269
PEAK HR FACTOR :	0.000	0.805	0.805	0.000	0.816	0.808	0.000	0.250	0.811	0.711	0.739	0.000	0.000	0.000	0.000	0.000	0.795
	0.805				0.811				0.765								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	2	1	0	1	2	0	0	0	1	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	146	45	0	42	163	0	0	59	8	18	0	0	0	0	0	481
4:15 PM	0	133	38	0	47	163	0	0	79	23	19	0	0	0	0	0	502
4:30 PM	0	152	35	0	57	153	0	1	65	17	16	0	0	0	0	0	496
4:45 PM	0	148	42	0	47	141	0	0	68	12	13	0	0	0	0	0	471
5:00 PM	0	148	41	0	65	170	0	0	72	9	10	0	0	0	0	0	515
5:15 PM	0	118	37	0	46	184	0	0	61	16	16	0	0	0	0	0	478
5:30 PM	0	126	33	0	39	160	0	1	53	8	9	0	0	0	0	0	429
5:45 PM	0	131	25	0	24	144	0	0	53	8	10	0	0	0	0	0	395
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1102	296	0	367	1278	0	2	510	101	111	0	0	0	0	0	3767
APPROACH %'s :	0.00%	78.83%	21.17%	0.00%	22.28%	77.60%	0.00%	0.12%	70.64%	13.99%	15.37%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	581	156	0	216	627	0	1	284	61	58	0	0	0	0	0	1984
PEAK HR FACTOR :	0.000	0.956	0.929	0.000	0.831	0.922	0.000	0.250	0.899	0.663	0.763	0.000	0.000	0.000	0.000	0.000	0.963
	0.970				0.898				0.833								

National Data & Surveying Services

Intersection Turning Movement Count

Location: 12th Ave & SR 198 EB Off/On Ramps
City: Hanford
Control: Signalized

Project ID: 20-090149-006
Date: 10/1/2020

Total

NS/EW Streets:	12th Ave				12th Ave				SR 198 EB Off/On Ramps				SR 198 EB Off/On Ramps				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	2	1	0	0	2	1	0	2	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	54	23	0	0	39	34	0	28	0	3	0	0	0	0	0	181
7:15 AM	0	84	16	0	0	57	51	0	62	0	2	0	0	0	0	0	272
7:30 AM	0	81	26	0	0	75	61	0	54	0	5	0	0	0	0	0	302
7:45 AM	0	100	27	0	0	53	35	0	106	0	2	0	0	0	0	0	323
8:00 AM	0	88	17	0	0	53	44	0	56	0	0	0	0	0	0	0	258
8:15 AM	0	66	24	0	0	68	42	0	79	0	5	0	0	0	0	0	284
8:30 AM	0	77	9	0	0	47	39	0	59	0	4	0	0	0	0	0	235
8:45 AM	0	81	22	0	0	60	37	0	63	0	1	0	0	0	0	0	264
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	631	164	0	0	452	343	0	507	0	22	0	0	0	0	0	2119
APPROACH %'s :	0.00%	79.37%	20.63%	0.00%	0.00%	56.86%	43.14%	0.00%	95.84%	0.00%	4.16%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	0	335	94	0	0	249	182	0	295	0	12	0	0	0	0	0	1167
PEAK HR FACTOR :	0.000	0.838	0.870	0.000	0.000	0.830	0.746	0.000	0.696	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.903
	0.844				0.792				0.711								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	2	1	0	0	2	1	0	2	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	119	29	0	0	156	101	0	130	0	7	0	0	0	0	0	542
4:15 PM	0	121	28	0	0	147	87	0	123	0	10	0	0	0	0	0	516
4:30 PM	0	114	34	0	0	145	107	0	109	0	7	0	0	0	0	0	516
4:45 PM	0	130	30	0	0	152	76	0	115	0	14	0	0	0	0	0	517
5:00 PM	0	133	23	0	0	184	138	0	104	0	10	0	0	0	0	0	592
5:15 PM	0	131	23	0	0	197	105	0	111	0	7	0	0	0	0	0	574
5:30 PM	0	128	26	0	0	168	81	0	100	0	10	0	0	0	0	0	513
5:45 PM	0	119	21	0	0	155	79	0	87	0	3	0	0	0	0	0	464
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	995	214	0	0	1304	774	0	879	0	68	0	0	0	0	0	4234
APPROACH %'s :	0.00%	82.30%	17.70%	0.00%	0.00%	62.75%	37.25%	0.00%	92.82%	0.00%	7.18%	0.00%					
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	508	110	0	0	678	426	0	439	0	38	0	0	0	0	0	2199
PEAK HR FACTOR :	0.000	0.955	0.809	0.000	0.000	0.860	0.772	0.000	0.954	0.000	0.679	0.000	0.000	0.000	0.000	0.000	0.929
	0.966				0.857				0.924								

National Data & Surveying Services

Intersection Turning Movement Count

Location: 12th Ave & SR 198 WB On/Off Ramps
City: Hanford
Control: Signalized

Project ID: 20-090149-005
Date: 10/1/2020

Total

NS/EW Streets:	12th Ave				12th Ave				SR 198 WB On/Off Ramps				SR 198 WB On/Off Ramps				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	0	3	1	0	0	0	0	0	1.5	0	1.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	8	76	0	0	0	65	58	0	0	0	0	0	7	0	60	0	274
7:15 AM	12	134	0	0	0	101	48	0	0	0	0	0	8	0	72	0	375
7:30 AM	12	123	0	0	0	123	59	0	0	0	0	0	12	0	100	0	429
7:45 AM	6	197	0	0	0	78	55	0	0	0	0	0	10	0	109	0	455
8:00 AM	9	138	0	0	0	96	59	0	0	0	0	0	5	0	77	0	384
8:15 AM	6	139	0	0	0	95	46	0	0	0	0	0	12	0	49	0	347
8:30 AM	3	131	0	0	0	85	42	0	0	0	0	0	11	0	65	0	337
8:45 AM	7	139	0	0	0	78	36	0	0	0	0	0	8	0	77	0	345
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	63	1077	0	0	0	721	403	0	0	0	0	0	73	0	609	0	2946
APPROACH %'s :	5.53%	94.47%	0.00%	0.00%	0.00%	64.15%	35.85%	0.00%					10.70%	0.00%	89.30%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	39	592	0	0	0	398	221	0	0	0	0	0	35	0	358	0	1643
PEAK HR FACTOR :	0.813	0.751	0.000	0.000	0.000	0.809	0.936	0.000	0.000	0.000	0.000	0.000	0.729	0.000	0.821	0.000	0.903
	0.777				0.850								0.826				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	1	2	0	0	0	3	1	0	0	0	0	0	1.5	0	1.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	5	244	0	0	0	232	126	0	0	0	0	0	29	0	88	0	724
4:15 PM	5	232	0	0	0	202	113	0	0	0	0	0	30	0	80	0	662
4:30 PM	6	222	0	0	0	223	124	0	0	0	0	0	31	0	94	0	700
4:45 PM	9	238	0	0	0	196	118	0	0	0	0	0	29	0	98	0	688
5:00 PM	10	227	0	0	0	309	130	0	0	0	0	0	18	1	110	0	805
5:15 PM	9	231	0	0	0	249	134	0	0	0	0	0	46	0	97	0	766
5:30 PM	7	223	0	0	0	233	123	0	0	0	0	0	17	0	110	0	713
5:45 PM	11	192	0	0	0	209	132	0	0	0	0	0	27	0	100	0	671
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	62	1809	0	0	0	1853	1000	0	0	0	0	0	227	1	777	0	5729
APPROACH %'s :	3.31%	96.69%	0.00%	0.00%	0.00%	64.95%	35.05%	0.00%					22.59%	0.10%	77.31%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	35	919	0	0	0	987	505	0	0	0	0	0	110	1	415	0	2972
PEAK HR FACTOR :	0.875	0.965	0.000	0.000	0.000	0.799	0.942	0.000	0.000	0.000	0.000	0.000	0.598	0.250	0.943	0.000	0.923
	0.966				0.850								0.920				

National Data & Surveying Services

Intersection Turning Movement Count

Location: 12th Ave & Glendale Ave
City: Hanford
Control: 2-Way Stop (EB/WB)

Project ID: 20-090149-004
Date: 10/1/2020

Total

NS/EW Streets:	12th Ave				12th Ave				Glendale Ave				Glendale Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	3	0	0	1	3	0	0	0	0	1	0	0	0	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	130	7	0	2	116	18	0	0	0	7	0	0	0	10	0	290
7:15 AM	0	200	6	0	4	133	12	1	0	0	16	0	0	0	4	0	376
7:30 AM	0	211	9	0	4	171	22	1	0	0	15	0	0	0	9	0	442
7:45 AM	0	296	12	0	14	126	16	0	0	0	12	0	0	0	11	0	487
8:00 AM	0	203	10	0	6	136	27	1	0	0	12	0	0	0	8	0	403
8:15 AM	0	182	8	0	6	136	17	0	0	0	10	0	0	0	12	0	371
8:30 AM	0	189	8	0	1	111	12	0	0	0	9	0	0	0	10	0	340
8:45 AM	0	203	13	0	6	106	16	0	0	0	9	0	0	0	12	0	365
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1614	73	0	43	1035	140	3	0	0	90	0	0	0	76	0	3074
APPROACH %'s :	0.00%	95.67%	4.33%	0.00%	3.52%	84.77%	11.47%	0.25%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	910	37	0	28	566	77	3	0	0	55	0	0	0	32	0	1708
PEAK HR FACTOR :	0.000	0.769	0.771	0.000	0.500	0.827	0.713	0.750	0.000	0.000	0.859	0.000	0.000	0.000	0.727	0.000	0.877
	0.769				0.851				0.859				0.727				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	3	0	0	1	3	0	0	0	0	1	0	0	0	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	322	8	0	5	319	28	1	0	0	33	0	0	0	10	0	726
4:15 PM	0	302	12	0	9	302	30	2	0	0	24	0	0	0	15	0	696
4:30 PM	0	309	7	0	5	311	26	2	0	0	28	0	0	0	19	0	707
4:45 PM	0	328	8	0	8	295	36	3	0	0	32	0	0	0	22	0	732
5:00 PM	0	327	5	0	4	393	40	2	0	0	36	0	0	0	20	0	827
5:15 PM	0	328	5	0	3	357	25	0	0	0	35	0	0	0	14	0	767
5:30 PM	0	326	4	0	5	316	23	3	0	0	24	0	0	0	19	0	720
5:45 PM	0	288	7	0	6	315	34	0	0	0	28	0	0	0	11	0	689
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	2530	56	0	45	2608	242	13	0	0	240	0	0	0	130	0	5864
APPROACH %'s :	0.00%	97.83%	2.17%	0.00%	1.55%	89.68%	8.32%	0.45%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	1309	22	0	20	1361	124	8	0	0	127	0	0	0	75	0	3046
PEAK HR FACTOR :	0.000	0.998	0.688	0.000	0.625	0.866	0.775	0.667	0.000	0.000	0.882	0.000	0.000	0.000	0.852	0.000	0.921
	0.990				0.862				0.882				0.852				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Campus Dr & W 6th St
City: Hanford
Control: 2-Way Stop (EB/WB)

Project ID: 20-090149-003
Date: 10/1/2020

Total

NS/EW Streets:	Campus Dr				Campus Dr				W 6th St				W 6th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	2	0	2	0	0	0	0	0	0	1	4	0	9
7:15 AM	0	0	1	0	6	0	0	0	1	1	1	0	0	1	6	0	17
7:30 AM	0	0	1	0	5	0	8	0	6	6	0	0	0	1	8	0	35
7:45 AM	0	2	0	0	5	1	8	0	3	3	0	0	0	5	22	0	49
8:00 AM	0	0	0	0	9	1	2	0	2	0	0	0	0	0	18	0	32
8:15 AM	1	1	0	0	4	2	1	0	1	1	1	0	0	2	8	0	22
8:30 AM	1	0	0	0	8	0	1	0	2	0	1	0	0	3	5	0	21
8:45 AM	1	0	0	0	14	1	2	0	1	0	1	0	0	2	14	0	36
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	3	3	2	0	53	5	24	0	16	11	4	0	0	15	85	0	221
APPROACH %'s :	37.50%	37.50%	25.00%	0.00%	64.63%	6.10%	29.27%	0.00%	51.61%	35.48%	12.90%	0.00%	0.00%	15.00%	85.00%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	1	3	1	0	23	4	19	0	12	10	1	0	0	8	56	0	138
PEAK HR FACTOR :	0.250	0.375	0.250	0.000	0.639	0.500	0.594	0.000	0.500	0.417	0.250	0.000	0.000	0.400	0.636	0.000	0.704
	0.625				0.821				0.479				0.593				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	19	0	1	0	3	2	0	0	0	0	11	0	36
4:15 PM	0	0	0	0	10	0	3	0	1	2	0	0	0	1	10	0	27
4:30 PM	0	1	0	0	9	1	1	0	2	1	0	0	0	1	10	0	26
4:45 PM	0	0	0	0	9	0	6	0	3	1	0	0	0	1	22	0	42
5:00 PM	0	0	0	0	9	0	1	0	2	2	0	0	0	2	17	0	33
5:15 PM	0	0	0	0	10	0	2	0	2	1	0	0	0	1	9	0	25
5:30 PM	0	0	0	0	10	0	1	0	2	3	0	0	0	0	12	0	28
5:45 PM	0	0	0	0	3	0	2	0	1	0	0	0	0	2	4	0	12
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	79	1	17	0	16	12	0	0	0	8	95	0	229
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	81.44%	1.03%	17.53%	0.00%	57.14%	42.86%	0.00%	0.00%	0.00%	7.77%	92.23%	0.00%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	0	1	0	0	47	1	11	0	9	6	0	0	0	3	53	0	131
PEAK HR FACTOR :	0.000	0.250	0.000	0.000	0.618	0.250	0.458	0.000	0.750	0.750	0.000	0.000	0.000	0.750	0.602	0.000	0.780
	0.250				0.738				0.750				0.609				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Campus Dr & W 7th St
City: Hanford
Control: 4-Way Stop

Project ID: 20-090149-002
Date: 10/1/2020

Total

NS/EW Streets:	Campus Dr				Campus Dr				W 7th St				W 7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	2	2	0	0	1	2	5	0	6	16	2	0	1	18	2	0	57
7:15 AM	1	5	1	0	3	2	4	0	7	17	1	0	1	23	5	0	70
7:30 AM	2	8	4	0	3	8	10	0	13	14	3	0	4	32	2	0	103
7:45 AM	8	16	2	0	4	3	5	0	26	23	6	0	6	32	12	0	143
8:00 AM	5	14	2	0	1	7	5	0	17	24	2	0	1	19	5	0	102
8:15 AM	2	5	3	0	9	5	5	0	7	29	1	0	3	28	5	0	102
8:30 AM	3	4	0	0	6	4	10	0	8	31	7	0	0	26	4	0	103
8:45 AM	4	7	4	0	8	8	7	0	7	31	5	0	3	36	4	0	124
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	27	61	16	0	35	39	51	0	91	185	27	0	19	214	39	0	804
APPROACH %'s :	25.96%	58.65%	15.38%	0.00%	28.00%	31.20%	40.80%	0.00%	30.03%	61.06%	8.91%	0.00%	6.99%	78.68%	14.34%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	17	43	11	0	17	23	25	0	63	90	12	0	14	111	24	0	450
PEAK HR FACTOR :	0.531	0.672	0.688	0.000	0.472	0.719	0.625	0.000	0.606	0.776	0.500	0.000	0.583	0.867	0.500	0.000	0.787
	0.683				0.774				0.750				0.745				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	5	8	0	0	13	9	10	0	19	53	8	0	3	62	10	0	200
4:15 PM	4	8	0	0	11	5	14	0	14	53	9	0	0	71	9	0	198
4:30 PM	7	6	0	0	23	5	16	0	15	49	5	0	1	58	3	0	188
4:45 PM	10	13	1	0	9	5	11	0	14	53	3	0	6	73	7	0	205
5:00 PM	8	9	2	0	25	7	26	0	11	49	3	0	0	57	12	0	209
5:15 PM	4	6	2	0	13	6	9	0	11	34	3	0	3	66	6	0	163
5:30 PM	4	10	1	0	7	6	9	0	12	47	5	0	2	56	5	0	164
5:45 PM	2	3	0	0	7	2	7	0	9	40	2	0	0	46	6	0	124
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	44	63	6	0	108	45	102	0	105	378	38	0	15	489	58	0	1451
APPROACH %'s :	38.94%	55.75%	5.31%	0.00%	42.35%	17.65%	40.00%	0.00%	20.15%	72.55%	7.29%	0.00%	2.67%	87.01%	10.32%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	29	36	3	0	68	22	67	0	54	204	20	0	7	259	31	0	800
PEAK HR FACTOR :	0.725	0.692	0.375	0.000	0.680	0.786	0.644	0.000	0.900	0.962	0.556	0.000	0.292	0.887	0.646	0.000	0.957
	0.708				0.677				0.914				0.863				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Campus Dr & W Lacey Blvd
City: Hanford
Control: Signalized

Project ID: 20-090149-001
Date: 10/1/2020

Total

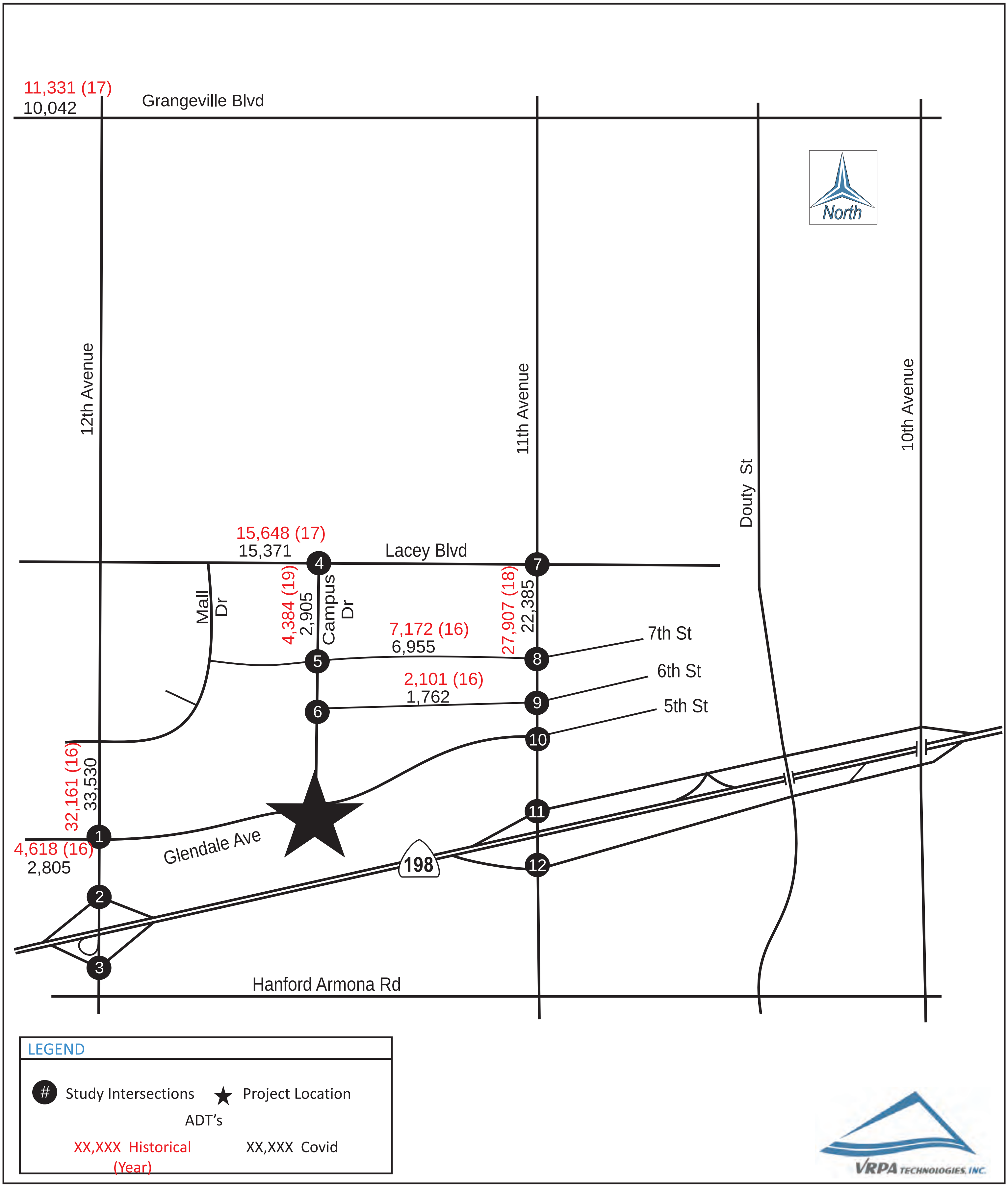
NS/EW Streets:	Campus Dr				Campus Dr				W Lacey Blvd				W Lacey Blvd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	0	0	1	1	1	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	2	2	4	0	1	9	0	0	1	31	0	0	5	27	3	0	85
7:15 AM	3	4	8	0	3	4	2	0	2	44	3	1	4	43	8	0	129
7:30 AM	7	12	7	0	5	9	3	0	4	52	4	1	17	44	14	1	180
7:45 AM	9	19	11	0	3	11	1	0	2	68	9	0	15	60	24	0	232
8:00 AM	7	14	11	0	5	15	3	0	3	71	12	3	6	60	7	0	217
8:15 AM	1	6	4	0	10	11	2	0	2	70	2	1	11	75	8	0	203
8:30 AM	2	8	13	0	9	13	3	0	2	79	1	1	7	75	10	0	223
8:45 AM	3	8	10	0	10	11	1	0	3	80	5	0	12	90	8	0	241
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	34	73	68	0	46	83	15	0	19	495	36	7	77	474	82	1	1510
APPROACH %'s :	19.43%	41.71%	38.86%	0.00%	31.94%	57.64%	10.42%	0.00%	3.41%	88.87%	6.46%	1.26%	12.15%	74.76%	12.93%	0.16%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	13	36	38	0	34	50	9	0	10	300	20	5	36	300	33	0	884
PEAK HR FACTOR :	0.464	0.643	0.731	0.000	0.850	0.833	0.750	0.000	0.833	0.938	0.417	0.417	0.750	0.833	0.825	0.000	0.917
	0.680				0.930				0.941				0.839				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	1	1	0	0	1	1	1	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	4	14	19	0	20	13	8	0	11	149	4	1	9	173	9	0	434
4:15 PM	5	12	27	0	16	11	4	0	4	146	6	2	10	156	6	0	405
4:30 PM	4	11	21	0	24	25	11	0	4	136	2	0	7	144	8	0	397
4:45 PM	5	12	17	0	14	14	4	0	9	121	4	1	7	167	5	0	380
5:00 PM	14	17	26	0	23	16	7	0	3	166	13	0	16	164	14	0	479
5:15 PM	4	6	17	0	9	13	4	0	5	141	5	1	6	158	10	0	379
5:30 PM	3	13	15	0	5	9	9	0	5	126	3	0	6	152	8	0	354
5:45 PM	2	6	13	0	6	4	2	0	6	107	2	0	5	140	4	0	297
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	41	91	155	0	117	105	49	0	47	1092	39	5	66	1254	64	0	3125
APPROACH %'s :	14.29%	31.71%	54.01%	0.00%	43.17%	38.75%	18.08%	0.00%	3.97%	92.31%	3.30%	0.42%	4.77%	90.61%	4.62%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	28	52	91	0	77	66	26	0	20	569	25	3	40	631	33	0	1661
PEAK HR FACTOR :	0.500	0.765	0.843	0.000	0.802	0.660	0.591	0.000	0.556	0.857	0.481	0.375	0.625	0.945	0.589	0.000	0.867
	0.750				0.704				0.848				0.907				

Hanford Place Development Traffic Impact Study

Average Daily Traffic Historical vs Covid

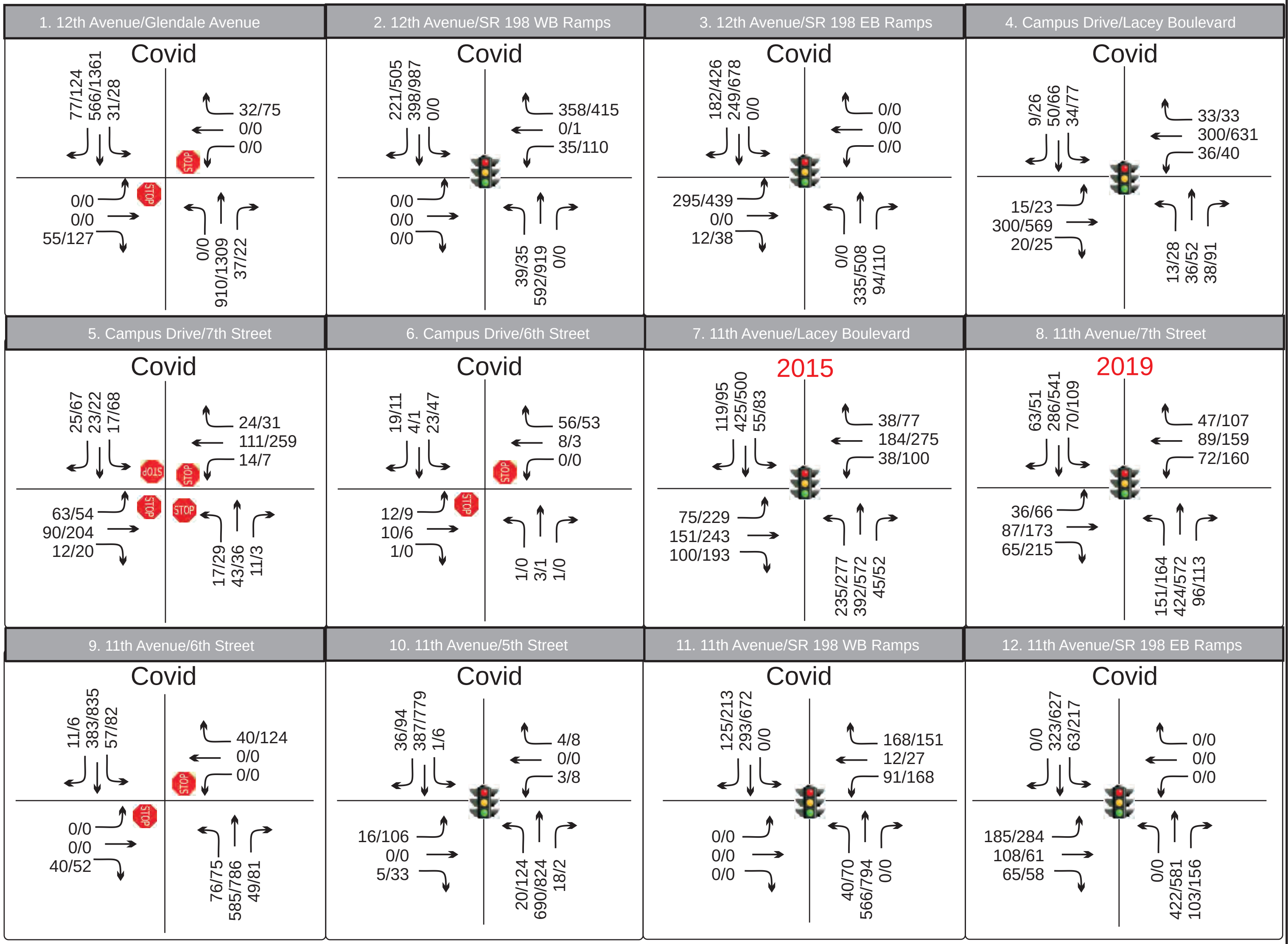
Figure 7



Hanford Place Development Traffic Impact Study

Historical vs Covid

Figure 7



LEGEND

Study Intersections

← AM/PM Peakhour

VRPA TECHNOLOGIES, INC.

APPENDIX C

SYNCHRO 10 (HCM 6th Edition) Worksheets

EXISTING WORKSHEETS

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	72	0	0	42	0	1183	48	40	736	100
Future Vol, veh/h	0	0	72	0	0	42	0	1183	48	40	736	100
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	82	0	0	48	0	1344	55	45	836	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	475	-	-	700	-	0	0	1399	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	456	0	0	326	0	-	-	248	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	456	-	-	326	-	-	-	248	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	17.9	0	1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	456	326	248	-	-
HCM Lane V/C Ratio	-	-	0.179	0.146	0.183	-	-
HCM Control Delay (s)	-	-	14.6	17.9	22.7	-	-
HCM Lane LOS	-	-	B	C	C	-	-
HCM 95th %tile Q(veh)	-	-	0.6	0.5	0.7	-	-

Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	13	1	0	10	73	1	4	1	30	5	25
Future Vol, veh/h	16	13	1	0	10	73	1	4	1	30	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	23	19	1	0	14	104	1	6	1	43	7	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	179	120	25	130	138	7	43	0	0	7	0	0
Stage 1	111	111	-	9	9	-	-	-	-	-	-	-
Stage 2	68	9	-	121	129	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	781	768	1048	840	751	1072	1559	-	-	1607	-	-
Stage 1	892	802	-	1010	886	-	-	-	-	-	-	-
Stage 2	940	886	-	881	787	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	679	746	1048	805	729	1072	1559	-	-	1607	-	-
Mov Cap-2 Maneuver	679	746	-	805	729	-	-	-	-	-	-	-
Stage 1	891	780	-	1009	885	-	-	-	-	-	-	-
Stage 2	834	885	-	835	765	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	9	1.2	3.7
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	715	1014	1607	-	-
HCM Lane V/C Ratio	0.001	-	-	0.06	0.117	0.027	-	-
HCM Control Delay (s)	7.3	0	-	10.4	9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0.1	-	-

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	0	0	52	0	0	52	99	761	64	74	498	14
Future Vol, veh/h	0	0	52	0	0	52	99	761	64	74	498	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	60	0	0	60	114	875	74	85	572	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	294	-	-	475	588	0	0	949	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	699	0	0	533	976	-	-	713	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	699	-	-	533	976	-	-	713	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	12.6	1	1.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	976	-	-	699	533	713	-	-
HCM Lane V/C Ratio	0.117	-	-	0.086	0.112	0.119	-	-
HCM Control Delay (s)	9.2	-	-	10.6	12.6	10.7	-	-
HCM Lane LOS	A	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	0.4	0.4	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	46	465	51	770	0	0	517	287	0	0
Future Volume (veh/h)	46	465	51	770	0	0	517	287	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	51	517	57	856	0	0	574	319		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	370	658	82	2366	0	0	1992	889		
Arrive On Green	0.21	0.21	0.05	0.67	0.00	0.00	0.57	0.57		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	51	517	57	856	0	0	574	319		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	1.8	11.7	2.4	7.9	0.0	0.0	6.4	8.3		
Cycle Q Clear(g_c), s	1.8	11.7	2.4	7.9	0.0	0.0	6.4	8.3		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	370	658	82	2366	0	0	1992	889		
V/C Ratio(X)	0.14	0.79	0.70	0.36	0.00	0.00	0.29	0.36		
Avail Cap(c_a), veh/h	716	1275	247	2366	0	0	1992	889		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	24.2	28.2	35.4	5.4	0.0	0.0	8.5	8.9		
Incr Delay (d2), s/veh	0.2	2.1	10.2	0.4	0.0	0.0	0.4	1.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	4.2	1.2	2.1	0.0	0.0	2.1	2.6		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	24.4	30.3	45.6	5.8	0.0	0.0	8.9	10.1		
LnGrp LOS	C	C	D	A	A	A	A	B		
Approach Vol, veh/h	568			913			893			
Approach Delay, s/veh	29.7			8.3			9.3			
Approach LOS	C			A			A			

Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		55.0			8.0	47.0		20.2		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		50.5			10.5	35.5		30.5		
Max Q Clear Time (g_c+I1), s		9.9			4.4	10.3		13.7		
Green Ext Time (p_c), s		6.7			0.0	5.0		2.0		

Intersection Summary			
HCM 6th Ctrl Delay			13.8
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰		↱					↑↑	↱		↑↑	↱
Traffic Volume (veh/h)	384	0	16	0	0	0	0	436	122	0	324	237
Future Volume (veh/h)	384	0	16	0	0	0	0	436	122	0	324	237
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	427	0	18				0	484	0	0	360	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	588	0	270				0	2439		0	2439	
Arrive On Green	0.17	0.00	0.17				0.00	0.69	0.00	0.00	0.69	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	427	0	18				0	484	0	0	360	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	7.8	0.0	0.6				0.0	3.2	0.0	0.0	2.3	0.0
Cycle Q Clear(g_c), s	7.8	0.0	0.6				0.0	3.2	0.0	0.0	2.3	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	588	0	270				0	2439		0	2439	
V/C Ratio(X)	0.73	0.00	0.07				0.00	0.20		0.00	0.15	
Avail Cap(c_a), veh/h	1850	0	849				0	2439		0	2439	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	25.8	0.0	22.8				0.0	3.6	0.0	0.0	3.5	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.1				0.0	0.2	0.0	0.0	0.1	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
%ile BackOfQ(50%),veh/ln	3.0	0.0	0.2				0.0	0.7	0.0	0.0	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.5	0.0	22.9				0.0	3.8	0.0	0.0	3.6	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		445						484	A		360	A
Approach Delay, s/veh		27.3						3.8			3.6	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		50.0		15.8		50.0
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		45.5		35.5		45.5
Max Q Clear Time (g_c+I1), s		5.2		9.8		4.3
Green Ext Time (p_c), s		3.3		1.5		2.4

Intersection Summary	
HCM 6th Ctrl Delay	11.9
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
4: Campus Drive & Lacey Boulevard

10/31/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	390	26	47	390	43	17	47	49	44	65	12
Future Volume (veh/h)	20	390	26	47	390	43	17	47	49	44	65	12
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	424	28	51	424	47	18	51	53	48	71	13
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	44	625	279	81	698	311	38	386	401	78	902	765
Arrive On Green	0.03	0.18	0.18	0.05	0.20	0.20	0.02	0.46	0.46	0.04	0.49	0.49
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	833	866	1767	1856	1572
Grp Volume(v), veh/h	22	424	28	51	424	47	18	0	104	48	71	13
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1700	1767	1856	1572
Q Serve(g_s), s	0.8	7.5	1.0	1.9	7.3	1.7	0.7	0.0	2.3	1.8	1.4	0.3
Cycle Q Clear(g_c), s	0.8	7.5	1.0	1.9	7.3	1.7	0.7	0.0	2.3	1.8	1.4	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.51	1.00		1.00
Lane Grp Cap(c), veh/h	44	625	279	81	698	311	38	0	788	78	902	765
V/C Ratio(X)	0.50	0.68	0.10	0.63	0.61	0.15	0.48	0.00	0.13	0.62	0.08	0.02
Avail Cap(c_a), veh/h	198	1240	553	251	1345	600	172	0	788	251	902	765
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	25.7	23.0	31.3	24.4	22.2	32.3	0.0	10.2	31.4	9.2	8.9
Incr Delay (d2), s/veh	8.3	1.3	0.2	7.8	0.9	0.2	9.2	0.0	0.3	7.6	0.2	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	0.4	3.0	0.4	0.9	2.9	0.6	0.4	0.0	0.9	0.9	0.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.5	27.0	23.2	39.2	25.3	22.4	41.5	0.0	10.6	39.0	9.3	8.9
LnGrp LOS	D	C	C	D	C	C	D	A	B	D	A	A
Approach Vol, veh/h		474			522			122			132	
Approach Delay, s/veh		27.4			26.4			15.2			20.1	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.4	35.5	7.6	16.3	5.9	37.0	6.2	17.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	29.5	9.5	23.5	6.5	32.5	7.5	25.5
Max Q Clear Time (g_c+I1), s	3.8	4.3	3.9	9.5	2.7	3.4	2.8	9.3
Green Ext Time (p_c), s	0.0	0.5	0.0	2.3	0.0	0.4	0.0	2.5

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	167	110	42	203	42	259	433	50	61	469	131
Future Volume (veh/h)	83	167	110	42	203	42	259	433	50	61	469	131
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	92	186	122	47	226	47	288	481	56	68	521	146
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	214	445	198	113	372	76	402	1523	177	96	1466	654
Arrive On Green	0.06	0.13	0.13	0.06	0.13	0.13	0.12	0.48	0.48	0.05	0.42	0.42
Sat Flow, veh/h	3428	3526	1572	1767	2916	595	3428	3183	369	1767	3526	1572
Grp Volume(v), veh/h	92	186	122	47	135	138	288	266	271	68	521	146
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1748	1714	1763	1789	1767	1763	1572
Q Serve(g_s), s	1.7	3.2	4.8	1.7	4.7	4.9	5.3	6.0	6.1	2.5	6.6	2.5
Cycle Q Clear(g_c), s	1.7	3.2	4.8	1.7	4.7	4.9	5.3	6.0	6.1	2.5	6.6	2.5
Prop In Lane	1.00		1.00	1.00		0.34	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	214	445	198	113	225	223	402	843	856	96	1466	654
V/C Ratio(X)	0.43	0.42	0.62	0.42	0.60	0.62	0.72	0.31	0.32	0.71	0.36	0.22
Avail Cap(c_a), veh/h	290	1455	649	182	760	754	607	843	856	248	1466	654
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	29.3	26.2	26.9	29.2	26.8	26.8	27.6	10.4	10.4	30.2	13.0	5.3
Incr Delay (d2), s/veh	1.4	0.6	3.1	2.4	2.6	2.8	2.4	1.0	1.0	9.1	0.7	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.3	1.8	0.7	2.0	2.1	2.2	2.2	2.2	1.2	2.4	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.7	26.8	30.0	31.7	29.3	29.6	30.0	11.4	11.4	39.3	13.7	6.0
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	B	A
Approach Vol, veh/h		400			320			825			735	
Approach Delay, s/veh		28.7			29.8			17.9			14.5	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.0	35.6	8.6	12.7	12.1	31.5	8.5	12.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	9.1	29.4	6.7	26.8	11.5	27.0	5.5	28.0				
Max Q Clear Time (g_c+I1), s	4.5	8.1	3.7	6.8	7.3	8.6	3.7	6.9				
Green Ext Time (p_c), s	0.0	3.1	0.0	1.4	0.4	3.7	0.0	1.4				
Intersection Summary												
HCM 6th Ctrl Delay			20.4									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	89	66	73	91	48	154	432	98	71	292	64
Future Volume (veh/h)	37	89	66	73	91	48	154	432	98	71	292	64
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	42	101	75	83	103	55	175	491	111	81	332	73
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	143	198	135	109	270	135	221	1715	765	108	1489	664
Arrive On Green	0.04	0.10	0.10	0.06	0.12	0.12	0.12	0.49	0.49	0.06	0.42	0.42
Sat Flow, veh/h	3428	2002	1370	1767	2273	1140	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	42	88	88	83	78	80	175	491	111	81	332	73
Grp Sat Flow(s),veh/h/ln	1714	1763	1609	1767	1763	1650	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	0.7	2.9	3.2	2.8	2.5	2.7	5.9	5.1	1.4	2.8	3.7	1.7
Cycle Q Clear(g_c), s	0.7	2.9	3.2	2.8	2.5	2.7	5.9	5.1	1.4	2.8	3.7	1.7
Prop In Lane	1.00		0.85	1.00		0.69	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	143	174	159	109	209	196	221	1715	765	108	1489	664
V/C Ratio(X)	0.29	0.51	0.55	0.76	0.37	0.41	0.79	0.29	0.15	0.75	0.22	0.11
Avail Cap(c_a), veh/h	278	744	680	215	816	764	359	1715	765	281	1489	664
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	28.6	26.3	26.5	28.4	25.0	25.1	26.2	9.4	3.1	28.5	11.3	10.8
Incr Delay (d2), s/veh	1.1	2.3	3.0	10.5	1.1	1.4	6.3	0.4	0.4	10.1	0.3	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	1.2	1.3	1.5	1.1	1.1	2.7	1.7	0.8	1.4	1.3	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.8	28.6	29.5	38.9	26.1	26.5	32.5	9.9	3.5	38.5	11.7	11.1
LnGrp LOS	C	C	C	D	C	C	C	A	A	D	B	B
Approach Vol, veh/h		218			241			777			486	
Approach Delay, s/veh		29.2			30.6			14.0			16.1	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	34.4	8.3	10.6	12.2	30.5	7.1	11.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.8	28.7	7.5	26.0	12.5	26.0	5.0	28.5
Max Q Clear Time (g_c+I1), s	4.8	7.1	4.8	5.2	7.9	5.7	2.7	4.7
Green Ext Time (p_c), s	0.1	3.5	0.0	0.9	0.2	2.2	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	0	7	4	0	5	26	897	23	1	503	47
Future Volume (veh/h)	21	0	7	4	0	5	26	897	23	1	503	47
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	24	0	8	5	0	6	30	1043	27	1	585	55
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	179	0	66	110	2	33	58	2588	67	3	2489	1110
Arrive On Green	0.04	0.00	0.04	0.04	0.00	0.04	0.03	0.74	0.74	0.00	0.71	0.71
Sat Flow, veh/h	1399	0	1572	598	50	777	1767	3511	91	1767	3526	1572
Grp Volume(v), veh/h	24	0	8	11	0	0	30	524	546	1	585	55
Grp Sat Flow(s),veh/h/ln	1399	0	1572	1424	0	0	1767	1763	1839	1767	1763	1572
Q Serve(g_s), s	0.3	0.0	0.3	0.2	0.0	0.0	1.0	6.8	6.8	0.0	3.6	0.7
Cycle Q Clear(g_c), s	0.9	0.0	0.3	0.6	0.0	0.0	1.0	6.8	6.8	0.0	3.6	0.7
Prop In Lane	1.00		1.00	0.45		0.55	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	179	0	66	145	0	0	58	1300	1356	3	2489	1110
V/C Ratio(X)	0.13	0.00	0.12	0.08	0.00	0.00	0.52	0.40	0.40	0.35	0.24	0.05
Avail Cap(c_a), veh/h	722	0	676	722	0	0	186	1300	1356	158	2489	1110
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	0.0	28.4	28.5	0.0	0.0	29.3	3.0	3.0	30.7	3.2	2.8
Incr Delay (d2), s/veh	0.3	0.0	0.8	0.2	0.0	0.0	7.1	0.9	0.9	60.2	0.2	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.1	0.2	0.0	0.0	0.5	1.5	1.6	0.1	0.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.0	0.0	29.2	28.7	0.0	0.0	36.4	4.0	3.9	90.9	3.4	2.8
LnGrp LOS	C	A	C	C	A	A	D	A	A	F	A	A
Approach Vol, veh/h		32			11			1100			641	
Approach Delay, s/veh		29.0			28.7			4.8			3.5	
Approach LOS		C			C			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	49.9		7.1	6.5	48.0		7.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	44.5		26.5	6.5	43.5		26.5				
Max Q Clear Time (g_c+I1), s	2.0	8.8		2.9	3.0	5.6		2.6				
Green Ext Time (p_c), s	0.0	8.7		0.1	0.0	4.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			4.9									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	118	16	218	52	736	0	0	381	163
Future Volume (veh/h)	0	0	0	118	16	218	52	736	0	0	381	163
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				137	19	253	60	856	0	0	443	190
Peak Hour Factor				0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				357	374	317	89	2341	0	0	1927	859
Arrive On Green				0.20	0.20	0.20	0.05	0.66	0.00	0.00	0.55	0.55
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				137	19	253	60	856	0	0	443	190
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				4.5	0.6	10.3	2.2	7.2	0.0	0.0	4.4	4.2
Cycle Q Clear(g_c), s				4.5	0.6	10.3	2.2	7.2	0.0	0.0	4.4	4.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				357	374	317	89	2341	0	0	1927	859
V/C Ratio(X)				0.38	0.05	0.80	0.68	0.37	0.00	0.00	0.23	0.22
Avail Cap(c_a), veh/h				962	1010	856	330	2341	0	0	1927	859
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				23.1	21.6	25.4	31.3	5.0	0.0	0.0	7.9	7.8
Incr Delay (d2), s/veh				0.7	0.1	4.6	8.7	0.4	0.0	0.0	0.3	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				1.7	0.2	3.8	1.1	2.1	0.0	0.0	1.4	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				23.8	21.6	30.0	40.0	5.4	0.0	0.0	8.2	8.4
LnGrp LOS				C	C	C	D	A	A	A	A	A
Approach Vol, veh/h					409			916			633	
Approach Delay, s/veh					27.6			7.7			8.2	
Approach LOS					C			A			A	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		49.0			7.9	41.1		18.0				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		44.5			12.5	27.5		36.5				
Max Q Clear Time (g_c+I1), s		9.2			4.2	6.4		12.3				
Green Ext Time (p_c), s		7.2			0.1	3.4		1.3				
Intersection Summary												
HCM 6th Ctrl Delay			12.0									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	140	85	0	0	0	0	549	134	82	420	0
Future Volume (veh/h)	241	140	85	0	0	0	0	549	134	82	420	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	301	175	106				0	686	168	102	525	0
Peak Hour Factor	0.80	0.80	0.80				0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	354	206	489				0	1541	687	132	2012	0
Arrive On Green	0.31	0.31	0.31				0.00	0.44	0.44	0.07	0.57	0.00
Sat Flow, veh/h	1137	661	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	476	0	106				0	686	168	102	525	0
Grp Sat Flow(s),veh/h/ln	1799	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	18.9	0.0	3.8				0.0	10.4	5.1	4.3	5.7	0.0
Cycle Q Clear(g_c), s	18.9	0.0	3.8				0.0	10.4	5.1	4.3	5.7	0.0
Prop In Lane	0.63		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	560	0	489				0	1541	687	132	2012	0
V/C Ratio(X)	0.85	0.00	0.22				0.00	0.45	0.24	0.78	0.26	0.00
Avail Cap(c_a), veh/h	885	0	774				0	1541	687	276	2012	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.6	0.0	19.4				0.0	15.0	13.5	34.6	8.3	0.0
Incr Delay (d2), s/veh	4.7	0.0	0.2				0.0	0.9	0.8	9.3	0.3	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
%ile BackOfQ(50%),veh/ln	7.9	0.0	1.3				0.0	3.8	1.8	2.1	2.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	0.0	19.6				0.0	15.9	14.4	44.0	8.6	0.0
LnGrp LOS	C	A	B				A	B	B	D	A	A
Approach Vol, veh/h		582						854			627	
Approach Delay, s/veh		27.5						15.6			14.3	
Approach LOS		C						B			B	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	10.2	37.8		28.2		48.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	11.9	27.1		37.5		43.5						
Max Q Clear Time (g_c+I1), s	6.3	12.4		20.9		7.7						
Green Ext Time (p_c), s	0.1	4.4		2.8		4.0						

Intersection Summary			
HCM 6th Ctrl Delay			18.6
HCM 6th LOS			B

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	117	16	18	144	31	22	56	14	22	30	33
Future Vol, veh/h	82	117	16	18	144	31	22	56	14	22	30	33
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	104	148	20	23	182	39	28	71	18	28	38	42
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	9.8	10.5	9.5	9.3
HCM LOS	A	B	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	100%	0%	100%	0%	26%
Vol Thru, %	61%	0%	88%	0%	82%	35%
Vol Right, %	15%	0%	12%	0%	18%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	92	82	133	18	175	85
LT Vol	22	82	0	18	0	22
Through Vol	56	0	117	0	144	30
RT Vol	14	0	16	0	31	33
Lane Flow Rate	116	104	168	23	222	108
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.172	0.17	0.248	0.038	0.326	0.156
Departure Headway (Hd)	5.329	5.888	5.298	5.931	5.302	5.21
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	666	604	672	599	671	681
Service Time	3.419	3.673	3.083	3.718	3.088	3.301
HCM Lane V/C Ratio	0.174	0.172	0.25	0.038	0.331	0.159
HCM Control Delay	9.5	9.9	9.8	9	10.7	9.3
HCM Lane LOS	A	A	A	A	B	A
HCM 95th-tile Q	0.6	0.6	1	0.1	1.4	0.6

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	165	0	0	98	0	1702	29	36	1769	161
Future Vol, veh/h	0	0	165	0	0	98	0	1702	29	36	1769	161
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	179	0	0	107	0	1850	32	39	1923	175

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1049	-	-	941	-	0	0	1882	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	191	0	0	226	0	-	-	142	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	191	-	-	226	-	-	-	142	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	100.4	34.4	0	0.7
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	191	226	142	-	-
HCM Lane V/C Ratio	-	-	0.939	0.471	0.276	-	-
HCM Control Delay (s)	-	-	100.4	34.4	39.7	-	-
HCM Lane LOS	-	-	F	D	E	-	-
HCM 95th %tile Q(veh)	-	-	7.5	2.3	1.1	-	-

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	0	0	4	69	0	1	0	61	1	14
Future Vol, veh/h	12	8	0	0	4	69	0	1	0	61	1	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	15	10	0	0	5	88	0	1	0	78	1	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	214	167	10	172	176	1	19	0	0	1	0	0
Stage 1	166	166	-	1	1	-	-	-	-	-	-	-
Stage 2	48	1	-	171	175	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	741	724	1068	789	716	1081	1591	-	-	1615	-	-
Stage 1	834	759	-	1019	893	-	-	-	-	-	-	-
Stage 2	963	893	-	829	752	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	651	689	1068	751	681	1081	1591	-	-	1615	-	-
Mov Cap-2 Maneuver	651	689	-	751	681	-	-	-	-	-	-	-
Stage 1	834	722	-	1019	893	-	-	-	-	-	-	-
Stage 2	879	893	-	777	715	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	8.8	0	5.9
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1591	-	-	666	1047	1615	-	-
HCM Lane V/C Ratio	-	-	-	0.039	0.089	0.048	-	-
HCM Control Delay (s)	0	-	-	10.6	8.8	7.3	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.2	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	68	0	0	161	98	1022	105	107	1086	8
Future Vol, veh/h	0	0	68	0	0	161	98	1022	105	107	1086	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	70	0	0	166	101	1054	108	110	1120	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	564	-	-	581	1128	0	0	1162	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	466	0	0	454	609	-	-	591	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	466	-	-	454	609	-	-	591	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	17.4	1	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	609	-	-	466	454	591	-	-
HCM Lane V/C Ratio	0.166	-	-	0.15	0.366	0.187	-	-
HCM Control Delay (s)	12.1	-	-	14.1	17.4	12.5	-	-
HCM Lane LOS	B	-	-	B	C	B	-	-
HCM 95th %tile Q(veh)	0.6	-	-	0.5	1.7	0.7	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	143	540	46	1195	0	0	1283	657	0	0
Future Volume (veh/h)	143	540	46	1195	0	0	1283	657	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	155	587	50	1299	0	0	1395	714		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	391	696	72	2373	0	0	2044	912		
Arrive On Green	0.22	0.22	0.04	0.67	0.00	0.00	0.58	0.58		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	155	587	50	1299	0	0	1395	714		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	6.4	15.3	2.4	16.3	0.0	0.0	23.5	29.8		
Cycle Q Clear(g_c), s	6.4	15.3	2.4	16.3	0.0	0.0	23.5	29.8		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	391	696	72	2373	0	0	2044	912		
V/C Ratio(X)	0.40	0.84	0.70	0.55	0.00	0.00	0.68	0.78		
Avail Cap(c_a), veh/h	486	865	114	2373	0	0	2044	912		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	28.4	31.8	40.4	7.2	0.0	0.0	12.5	13.8		
Incr Delay (d2), s/veh	0.7	6.3	11.4	0.9	0.0	0.0	1.9	6.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.6	6.0	1.2	4.8	0.0	0.0	8.2	10.3		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	29.0	38.1	51.9	8.1	0.0	0.0	14.3	20.5		
LnGrp LOS	C	D	D	A	A	A	B	C		
Approach Vol, veh/h	742			1349			2109			
Approach Delay, s/veh	36.2			9.8			16.4			
Approach LOS	D			A			B			

Timer - Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		62.0			8.0	54.0		23.4
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5
Max Green Setting (Gmax), s		57.5			5.5	47.5		23.5
Max Q Clear Time (g_c+I1), s		18.3			4.4	31.8		17.3
Green Ext Time (p_c), s		12.1			0.0	10.9		1.6

Intersection Summary	
HCM 6th Ctrl Delay	17.8
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	571	0	49	0	0	0	0	660	143	0	881	554
Future Volume (veh/h)	571	0	49	0	0	0	0	660	143	0	881	554
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	614	0	53				0	710	0	0	947	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	767	0	352				0	2323		0	2323	
Arrive On Green	0.22	0.00	0.22				0.00	0.66	0.00	0.00	0.66	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	614	0	53				0	710	0	0	947	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	13.0	0.0	2.1				0.0	6.6	0.0	0.0	9.6	0.0
Cycle Q Clear(g_c), s	13.0	0.0	2.1				0.0	6.6	0.0	0.0	9.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	767	0	352				0	2323		0	2323	
V/C Ratio(X)	0.80	0.00	0.15				0.00	0.31		0.00	0.41	
Avail Cap(c_a), veh/h	1364	0	626				0	2323		0	2323	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	28.1	0.0	23.9				0.0	5.6	0.0	0.0	6.1	0.0
Incr Delay (d2), s/veh	2.0	0.0	0.2				0.0	0.3	0.0	0.0	0.5	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
%ile BackOfQ(50%),veh/ln	5.0	0.0	0.7				0.0	1.8	0.0	0.0	2.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	0.0	24.1				0.0	5.9	0.0	0.0	6.6	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		667						710	A		947	A
Approach Delay, s/veh		29.6						5.9			6.6	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		55.0		21.6		55.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		50.5		30.5		50.5						
Max Q Clear Time (g_c+I1), s		8.6		15.0		11.6						
Green Ext Time (p_c), s		5.2		2.2		7.6						

Intersection Summary			
HCM 6th Ctrl Delay			13.0
HCM 6th LOS			B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	740	33	52	820	43	36	68	118	100	86	34
Future Volume (veh/h)	30	740	33	52	820	43	36	68	118	100	86	34
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	34	851	38	60	943	49	41	78	136	115	99	39
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	59	1103	492	82	1149	513	66	200	349	147	696	590
Arrive On Green	0.03	0.31	0.31	0.05	0.33	0.33	0.04	0.33	0.33	0.08	0.38	0.38
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	607	1058	1767	1856	1572
Grp Volume(v), veh/h	34	851	38	60	943	49	41	0	214	115	99	39
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1665	1767	1856	1572
Q Serve(g_s), s	1.5	17.3	1.3	2.6	19.4	1.7	1.8	0.0	7.8	5.0	2.8	1.3
Cycle Q Clear(g_c), s	1.5	17.3	1.3	2.6	19.4	1.7	1.8	0.0	7.8	5.0	2.8	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.64	1.00		1.00
Lane Grp Cap(c), veh/h	59	1103	492	82	1149	513	66	0	549	147	696	590
V/C Ratio(X)	0.58	0.77	0.08	0.73	0.82	0.10	0.62	0.00	0.39	0.78	0.14	0.07
Avail Cap(c_a), veh/h	123	1318	588	146	1363	608	143	0	549	235	696	590
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.6	24.6	19.1	37.1	24.5	18.5	37.4	0.0	20.3	35.5	16.3	15.8
Incr Delay (d2), s/veh	8.7	2.4	0.1	11.8	3.6	0.1	9.0	0.0	2.1	8.9	0.4	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	0.8	7.1	0.5	1.4	8.1	0.6	0.9	0.0	3.2	2.5	1.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.3	26.9	19.2	49.0	28.0	18.6	46.4	0.0	22.4	44.4	16.7	16.0
LnGrp LOS	D	C	B	D	C	B	D	A	C	D	B	B
Approach Vol, veh/h		923			1052			255			253	
Approach Delay, s/veh		27.3			28.8			26.3			29.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	30.5	8.2	29.2	7.5	34.1	7.1	30.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	25.5	6.5	29.5	6.4	29.6	5.5	30.5
Max Q Clear Time (g_c+I1), s	7.0	9.8	4.6	19.3	3.8	4.8	3.5	21.4
Green Ext Time (p_c), s	0.1	1.1	0.0	4.2	0.0	0.6	0.0	4.3

Intersection Summary	
HCM 6th Ctrl Delay	28.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	253	268	213	110	304	85	306	632	57	92	552	105
Future Volume (veh/h)	253	268	213	110	304	85	306	632	57	92	552	105
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	278	295	234	121	334	93	336	695	63	101	607	115
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	362	679	303	154	476	131	421	1325	120	129	1254	560
Arrive On Green	0.11	0.19	0.19	0.09	0.17	0.17	0.12	0.41	0.41	0.07	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	1767	2733	750	3428	3269	296	1767	3526	1572
Grp Volume(v), veh/h	278	295	234	121	214	213	336	375	383	101	607	115
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1721	1714	1763	1802	1767	1763	1572
Q Serve(g_s), s	5.9	5.5	7.3	5.0	8.5	8.7	7.1	11.9	12.0	4.2	10.0	3.8
Cycle Q Clear(g_c), s	5.9	5.5	7.3	5.0	8.5	8.7	7.1	11.9	12.0	4.2	10.0	3.8
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	362	679	303	154	307	299	421	715	731	129	1254	560
V/C Ratio(X)	0.77	0.43	0.77	0.79	0.70	0.71	0.80	0.52	0.52	0.78	0.48	0.21
Avail Cap(c_a), veh/h	368	1264	564	221	663	647	437	715	731	202	1254	560
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	32.4	26.5	13.9	33.3	28.9	29.0	31.8	16.7	16.7	33.9	18.7	16.7
Incr Delay (d2), s/veh	9.3	0.4	4.2	11.3	2.8	3.1	9.7	2.7	2.7	9.8	1.3	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	2.2	3.9	2.5	3.6	3.7	3.4	4.9	5.0	2.1	4.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.7	26.9	18.1	44.6	31.8	32.1	41.5	19.5	19.4	43.7	20.0	17.5
LnGrp LOS	D	C	B	D	C	C	D	B	B	D	C	B
Approach Vol, veh/h		807			548			1094			823	
Approach Delay, s/veh		29.5			34.7			26.2			22.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	34.7	11.0	18.9	13.6	31.0	12.4	17.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	27.5	9.3	26.7	9.5	26.5	8.0	28.0
Max Q Clear Time (g_c+I1), s	6.2	14.0	7.0	9.3	9.1	12.0	7.9	10.7
Green Ext Time (p_c), s	0.0	3.9	0.1	2.4	0.1	3.8	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	27.5
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	176	219	163	162	109	167	583	115	111	552	52
Future Volume (veh/h)	67	176	219	163	162	109	167	583	115	111	552	52
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	74	193	241	179	178	120	184	641	126	122	607	57
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	175	348	311	216	554	354	221	1277	569	154	1143	510
Arrive On Green	0.05	0.20	0.20	0.12	0.27	0.27	0.13	0.36	0.36	0.09	0.32	0.32
Sat Flow, veh/h	3428	1763	1572	1767	2063	1318	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	74	193	241	179	151	147	184	641	126	122	607	57
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1618	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	1.6	7.7	11.3	7.7	5.3	5.7	7.9	11.1	2.7	5.3	11.0	2.0
Cycle Q Clear(g_c), s	1.6	7.7	11.3	7.7	5.3	5.7	7.9	11.1	2.7	5.3	11.0	2.0
Prop In Lane	1.00		1.00	1.00		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	348	311	216	474	435	221	1277	569	154	1143	510
V/C Ratio(X)	0.42	0.55	0.78	0.83	0.32	0.34	0.83	0.50	0.22	0.79	0.53	0.11
Avail Cap(c_a), veh/h	233	587	524	231	698	641	238	1277	569	213	1143	510
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	35.9	28.2	29.7	33.5	22.8	23.0	33.3	19.4	6.8	34.9	21.5	18.5
Incr Delay (d2), s/veh	1.6	1.4	4.2	20.5	0.4	0.5	20.4	1.4	0.9	12.8	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	0.7	3.2	4.4	4.5	2.2	2.2	4.5	4.4	1.6	2.7	4.5	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.5	29.6	33.8	54.0	23.2	23.4	53.7	20.8	7.7	47.7	23.3	18.9
LnGrp LOS	D	C	C	D	C	C	D	C	A	D	C	B
Approach Vol, veh/h		508			477			951			786	
Approach Delay, s/veh		32.8			34.8			25.4			26.8	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	32.8	14.0	19.9	14.3	29.8	8.5	25.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.4	26.4	10.2	26.0	10.5	25.3	5.3	30.9
Max Q Clear Time (g_c+I1), s	7.3	13.1	9.7	13.3	9.9	13.0	3.6	7.7
Green Ext Time (p_c), s	0.1	3.9	0.0	2.1	0.0	3.3	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	28.8
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	0	43	10	0	10	161	1071	3	8	1013	122
Future Volume (veh/h)	138	0	43	10	0	10	161	1071	3	8	1013	122
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	142	0	44	10	0	10	166	1104	3	8	1044	126
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	290	0	205	153	24	98	209	2391	6	18	1956	872
Arrive On Green	0.13	0.00	0.13	0.13	0.00	0.13	0.12	0.66	0.66	0.01	0.55	0.55
Sat Flow, veh/h	1394	0	1572	572	182	753	1767	3607	10	1767	3526	1572
Grp Volume(v), veh/h	142	0	44	20	0	0	166	540	567	8	1044	126
Grp Sat Flow(s),veh/h/ln	1394	0	1572	1507	0	0	1767	1763	1854	1767	1763	1572
Q Serve(g_s), s	5.9	0.0	1.7	0.0	0.0	0.0	6.3	10.2	10.2	0.3	12.9	2.7
Cycle Q Clear(g_c), s	6.6	0.0	1.7	0.7	0.0	0.0	6.3	10.2	10.2	0.3	12.9	2.7
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	205	275	0	0	209	1168	1229	18	1956	872
V/C Ratio(X)	0.49	0.00	0.21	0.07	0.00	0.00	0.79	0.46	0.46	0.44	0.53	0.14
Avail Cap(c_a), veh/h	637	0	596	636	0	0	373	1168	1229	129	1956	872
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	0.0	26.7	26.3	0.0	0.0	29.4	5.6	5.6	33.8	9.7	7.4
Incr Delay (d2), s/veh	1.3	0.0	0.5	0.1	0.0	0.0	6.6	1.3	1.3	15.7	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	2.3	0.0	0.7	0.3	0.0	0.0	2.9	3.2	3.3	0.2	4.4	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.0	0.0	27.2	26.4	0.0	0.0	36.1	6.9	6.9	49.5	10.7	7.7
LnGrp LOS	C	A	C	C	A	A	D	A	A	D	B	A
Approach Vol, veh/h		186			20			1273			1178	
Approach Delay, s/veh		29.4			26.4			10.7			10.7	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.2	50.0		13.4	12.6	42.6		13.4				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	45.5		26.0	14.5	36.0		26.0				
Max Q Clear Time (g_c+I1), s	2.3	12.2		8.6	8.3	14.9		2.7				
Green Ext Time (p_c), s	0.0	9.0		0.6	0.2	8.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.1									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	218	35	196	91	1032	0	0	874	277
Future Volume (veh/h)	0	0	0	218	35	196	91	1032	0	0	874	277
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				229	37	206	96	1086	0	0	920	292
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				305	320	271	124	2476	0	0	2008	896
Arrive On Green				0.17	0.17	0.17	0.07	0.70	0.00	0.00	0.57	0.57
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				229	37	206	96	1086	0	0	920	292
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				8.9	1.2	9.0	3.8	9.5	0.0	0.0	10.9	7.1
Cycle Q Clear(g_c), s				8.9	1.2	9.0	3.8	9.5	0.0	0.0	10.9	7.1
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				305	320	271	124	2476	0	0	2008	896
V/C Ratio(X)				0.75	0.12	0.76	0.77	0.44	0.00	0.00	0.46	0.33
Avail Cap(c_a), veh/h				750	787	667	261	2476	0	0	2008	896
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				28.3	25.1	28.3	32.9	4.6	0.0	0.0	9.0	8.2
Incr Delay (d2), s/veh				3.7	0.2	4.4	9.8	0.6	0.0	0.0	0.8	1.0
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				3.7	0.5	3.4	1.9	2.6	0.0	0.0	3.6	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				32.0	25.3	32.7	42.7	5.2	0.0	0.0	9.8	9.1
LnGrp LOS				C	C	C	D	A	A	A	A	A
Approach Vol, veh/h					472			1182			1212	
Approach Delay, s/veh					31.8			8.2			9.6	
Approach LOS					C			A			A	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		55.0			9.5	45.5		16.9				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		50.5			10.6	35.4		30.5				
Max Q Clear Time (g_c+I1), s		11.5			5.8	12.9		11.0				
Green Ext Time (p_c), s		10.2			0.1	7.9		1.4				
Intersection Summary												
HCM 6th Ctrl Delay			12.7									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	369	79	75	0	0	0	0	755	203	282	815	0
Future Volume (veh/h)	369	79	75	0	0	0	0	755	203	282	815	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	384	82	78				0	786	211	294	849	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	432	92	463				0	1253	559	336	2111	0
Arrive On Green	0.29	0.29	0.29				0.00	0.36	0.36	0.19	0.60	0.00
Sat Flow, veh/h	1469	314	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	466	0	78				0	786	211	294	849	0
Grp Sat Flow(s),veh/h/ln	1782	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	21.1	0.0	3.1				0.0	15.6	8.4	13.6	10.7	0.0
Cycle Q Clear(g_c), s	21.1	0.0	3.1				0.0	15.6	8.4	13.6	10.7	0.0
Prop In Lane	0.82		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	525	0	463				0	1253	559	336	2111	0
V/C Ratio(X)	0.89	0.00	0.17				0.00	0.63	0.38	0.88	0.40	0.00
Avail Cap(c_a), veh/h	644	0	569				0	1253	559	430	2111	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.4	0.0	22.1				0.0	22.5	20.2	33.2	8.9	0.0
Incr Delay (d2), s/veh	12.3	0.0	0.2				0.0	2.4	1.9	15.1	0.6	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
%ile BackOfQ(50%),veh/ln	10.0	0.0	1.1				0.0	6.4	3.2	7.1	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	0.0	22.3				0.0	24.9	22.2	48.3	9.5	0.0
LnGrp LOS	D	A	C				A	C	C	D	A	A
Approach Vol, veh/h		544						997			1143	
Approach Delay, s/veh		38.1						24.3			19.5	
Approach LOS		D						C			B	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	20.5	34.5		29.3		55.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	20.5	25.5		30.5		50.5						
Max Q Clear Time (g_c+I1), s	15.6	17.6		23.1		12.7						
Green Ext Time (p_c), s	0.4	3.5		1.8		7.2						

Intersection Summary			
HCM 6th Ctrl Delay			25.1
HCM 6th LOS			C

Intersection	
Intersection Delay, s/veh	15.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	265	26	9	337	40	38	47	4	88	29	87
Future Vol, veh/h	70	265	26	9	337	40	38	47	4	88	29	87
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	73	276	27	9	351	42	40	49	4	92	30	91
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.2	19.4	11.2	12.7
HCM LOS	B	C	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	43%	100%	0%	100%	0%	43%
Vol Thru, %	53%	0%	91%	0%	89%	14%
Vol Right, %	4%	0%	9%	0%	11%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	89	70	291	9	377	204
LT Vol	38	70	0	9	0	88
Through Vol	47	0	265	0	337	29
RT Vol	4	0	26	0	40	87
Lane Flow Rate	93	73	303	9	393	212
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.175	0.134	0.511	0.017	0.656	0.362
Departure Headway (Hd)	6.785	6.638	6.065	6.601	6.018	6.134
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	532	537	591	540	597	582
Service Time	4.785	4.413	3.84	4.373	3.789	4.222
HCM Lane V/C Ratio	0.175	0.136	0.513	0.017	0.658	0.364
HCM Control Delay	11.2	10.4	15.1	9.5	19.6	12.7
HCM Lane LOS	B	B	C	A	C	B
HCM 95th-tile Q	0.6	0.5	2.9	0.1	4.8	1.6

EXISTING PLUS PROJECT
WORKSHEETS

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	72	0	0	95	0	1183	165	63	780	100
Future Vol, veh/h	0	0	72	0	0	95	0	1183	165	63	780	100
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	82	0	0	108	0	1344	188	72	886	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	500	-	-	766	-	0	0	1532	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	440	0	0	295	0	-	-	213	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	440	-	-	295	-	-	-	213	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	24.1	0	2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	440	295	213	-	-
HCM Lane V/C Ratio	-	-	0.186	0.366	0.336	-	-
HCM Control Delay (s)	-	-	15	24.1	30.2	-	-
HCM Lane LOS	-	-	C	C	D	-	-
HCM 95th %tile Q(veh)	-	-	0.7	1.6	1.4	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	13	1	0	10	73	1	57	1	30	145	25
Future Vol, veh/h	16	13	1	0	10	73	1	57	1	30	145	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	23	19	1	0	14	104	1	81	1	43	207	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	454	395	225	405	413	82	243	0	0	82	0	0
Stage 1	311	311	-	84	84	-	-	-	-	-	-	-
Stage 2	143	84	-	321	329	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	515	540	812	554	528	975	1317	-	-	1509	-	-
Stage 1	697	656	-	922	823	-	-	-	-	-	-	-
Stage 2	857	823	-	689	645	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	438	522	812	524	510	975	1317	-	-	1509	-	-
Mov Cap-2 Maneuver	438	522	-	524	510	-	-	-	-	-	-	-
Stage 1	696	634	-	921	822	-	-	-	-	-	-	-
Stage 2	751	822	-	646	624	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.3	9.7	0.1	1.1
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1317	-	-	479	878	1509	-	-
HCM Lane V/C Ratio	0.001	-	-	0.089	0.135	0.028	-	-
HCM Control Delay (s)	7.7	0	-	13.3	9.7	7.5	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0.1	-	-

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	0	0	52	0	0	52	99	779	64	74	545	14
Future Vol, veh/h	0	0	52	0	0	52	99	779	64	74	545	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	60	0	0	60	114	895	74	85	626	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	321	-	-	485	642	0	0	969	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	672	0	0	525	932	-	-	701	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	672	-	-	525	932	-	-	701	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	12.7	1	1.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	932	-	-	672	525	701	-	-
HCM Lane V/C Ratio	0.122	-	-	0.089	0.114	0.121	-	-
HCM Control Delay (s)	9.4	-	-	10.9	12.7	10.8	-	-
HCM Lane LOS	A	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	0.4	0.4	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	46	488	51	864	0	0	535	313	0	0
Future Volume (veh/h)	46	488	51	864	0	0	535	313	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	51	542	57	960	0	0	594	348		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	388	690	83	2321	0	0	1941	866		
Arrive On Green	0.22	0.22	0.05	0.66	0.00	0.00	0.55	0.55		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	51	542	57	960	0	0	594	348		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	1.7	12.0	2.3	9.4	0.0	0.0	6.7	9.4		
Cycle Q Clear(g_c), s	1.7	12.0	2.3	9.4	0.0	0.0	6.7	9.4		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	388	690	83	2321	0	0	1941	866		
V/C Ratio(X)	0.13	0.79	0.69	0.41	0.00	0.00	0.31	0.40		
Avail Cap(c_a), veh/h	780	1387	228	2321	0	0	1941	866		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	23.1	27.1	34.6	5.9	0.0	0.0	9.0	9.6		
Incr Delay (d2), s/veh	0.2	2.0	9.8	0.5	0.0	0.0	0.4	1.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	4.3	1.2	2.6	0.0	0.0	2.2	3.0		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	23.3	29.1	44.4	6.5	0.0	0.0	9.4	10.9		
LnGrp LOS	C	C	D	A	A	A	A	B		
Approach Vol, veh/h	593			1017			942			
Approach Delay, s/veh	28.6			8.6			9.9			
Approach LOS	C			A			A			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		53.0			7.9	45.1		20.7		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		48.5			9.5	34.5		32.5		
Max Q Clear Time (g_c+I1), s		11.4			4.3	11.4		14.0		
Green Ext Time (p_c), s		7.7			0.0	5.2		2.2		
Intersection Summary										
HCM 6th Ctrl Delay			13.7							
HCM 6th LOS			B							

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰		↱					↑↑	↱		↑↑	↱
Traffic Volume (veh/h)	454	0	16	0	0	0	0	459	122	0	333	246
Future Volume (veh/h)	454	0	16	0	0	0	0	459	122	0	333	246
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	504	0	18				0	510	0	0	370	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	675	0	310				0	2346		0	2346	
Arrive On Green	0.20	0.00	0.20				0.00	0.67	0.00	0.00	0.67	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	504	0	18				0	510	0	0	370	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	9.0	0.0	0.6				0.0	3.7	0.0	0.0	2.6	0.0
Cycle Q Clear(g_c), s	9.0	0.0	0.6				0.0	3.7	0.0	0.0	2.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	675	0	310				0	2346		0	2346	
V/C Ratio(X)	0.75	0.00	0.06				0.00	0.22		0.00	0.16	
Avail Cap(c_a), veh/h	1966	0	902				0	2346		0	2346	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	24.7	0.0	21.3				0.0	4.3	0.0	0.0	4.1	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.1				0.0	0.2	0.0	0.0	0.1	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
%ile BackOfQ(50%),veh/ln	3.4	0.0	0.2				0.0	0.9	0.0	0.0	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.4	0.0	21.4				0.0	4.5	0.0	0.0	4.2	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		522						510	A		370	A
Approach Delay, s/veh		26.2						4.5			4.2	
Approach LOS		C						A			A	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	48.0	17.4	48.0
Change Period (Y+Rc), s	4.5	4.5	4.5
Max Green Setting (Gmax), s	43.5	37.5	43.5
Max Q Clear Time (g_c+I1), s	5.7	11.0	4.6
Green Ext Time (p_c), s	3.5	1.8	2.4

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	390	73	94	390	43	35	47	67	44	65	12
Future Volume (veh/h)	20	390	73	94	390	43	35	47	67	44	65	12
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	424	79	102	424	47	38	51	73	48	71	13
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	44	615	274	133	791	353	67	299	428	93	832	705
Arrive On Green	0.02	0.17	0.17	0.08	0.22	0.22	0.04	0.43	0.43	0.05	0.45	0.45
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	690	988	1767	1856	1572
Grp Volume(v), veh/h	22	424	79	102	424	47	38	0	124	48	71	13
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1678	1767	1856	1572
Q Serve(g_s), s	0.8	7.7	3.0	3.9	7.2	1.2	1.4	0.0	3.1	1.8	1.5	0.3
Cycle Q Clear(g_c), s	0.8	7.7	3.0	3.9	7.2	1.2	1.4	0.0	3.1	1.8	1.5	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.59	1.00		1.00
Lane Grp Cap(c), veh/h	44	615	274	133	791	353	67	0	727	93	832	705
V/C Ratio(X)	0.50	0.69	0.29	0.77	0.54	0.13	0.57	0.00	0.17	0.52	0.09	0.02
Avail Cap(c_a), veh/h	169	1062	474	351	1425	636	195	0	727	221	832	705
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.7	26.4	24.4	30.9	23.3	12.2	32.2	0.0	11.8	31.4	10.8	10.4
Incr Delay (d2), s/veh	8.4	1.4	0.6	9.0	0.6	0.2	7.5	0.0	0.5	4.4	0.2	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	0.4	3.1	1.1	1.9	2.8	0.6	0.7	0.0	1.1	0.9	0.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.2	27.7	25.0	39.9	23.8	12.4	39.7	0.0	12.3	35.8	11.0	10.5
LnGrp LOS	D	C	C	D	C	B	D	A	B	D	B	B
Approach Vol, veh/h		525			573			162			132	
Approach Delay, s/veh		27.9			25.7			18.7			20.0	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	34.0	9.6	16.4	7.1	35.0	6.2	19.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	29.5	13.5	20.5	7.5	30.5	6.5	27.5
Max Q Clear Time (g_c+I1), s	3.8	5.1	5.9	9.7	3.4	3.5	2.8	9.2
Green Ext Time (p_c), s	0.0	0.7	0.1	2.2	0.0	0.4	0.0	2.7

Intersection Summary	
HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	176	110	42	226	42	259	451	50	61	516	131
Future Volume (veh/h)	83	176	110	42	226	42	259	451	50	61	516	131
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	92	196	122	47	251	47	288	501	56	68	573	146
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	212	541	242	77	403	74	400	1516	169	96	1451	647
Arrive On Green	0.06	0.15	0.15	0.04	0.14	0.14	0.12	0.47	0.47	0.05	0.41	0.41
Sat Flow, veh/h	3428	3526	1572	1767	2972	548	3428	3198	356	1767	3526	1572
Grp Volume(v), veh/h	92	196	122	47	147	151	288	275	282	68	573	146
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1757	1714	1763	1791	1767	1763	1572
Q Serve(g_s), s	1.7	3.3	3.3	1.7	5.2	5.3	5.3	6.4	6.4	2.5	7.5	4.0
Cycle Q Clear(g_c), s	1.7	3.3	3.3	1.7	5.2	5.3	5.3	6.4	6.4	2.5	7.5	4.0
Prop In Lane	1.00		1.00	1.00		0.31	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	212	541	242	77	239	238	400	836	849	96	1451	647
V/C Ratio(X)	0.43	0.36	0.51	0.61	0.62	0.63	0.72	0.33	0.33	0.71	0.39	0.23
Avail Cap(c_a), veh/h	287	1440	642	180	752	750	601	836	849	245	1451	647
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	29.7	24.9	12.5	30.8	26.8	26.8	27.9	10.8	10.8	30.5	13.6	12.5
Incr Delay (d2), s/veh	1.4	0.4	1.6	7.4	2.6	2.8	2.4	1.1	1.0	9.3	0.8	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.3	1.7	0.9	2.2	2.3	2.2	2.4	2.4	1.2	2.8	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.1	25.3	14.1	38.2	29.3	29.6	30.4	11.8	11.8	39.8	14.4	13.3
LnGrp LOS	C	C	B	D	C	C	C	B	B	D	B	B
Approach Vol, veh/h		410			345			845			787	
Approach Delay, s/veh		23.3			30.7			18.1			16.4	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	35.6	7.4	14.6	12.2	31.5	8.6	13.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.1	29.4	6.7	26.8	11.5	27.0	5.5	28.0
Max Q Clear Time (g_c+I1), s	4.5	8.4	3.7	5.3	7.3	9.5	3.7	7.3
Green Ext Time (p_c), s	0.0	3.2	0.0	1.5	0.4	4.0	0.0	1.6

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	98	66	73	114	48	154	450	98	71	339	64
Future Volume (veh/h)	37	98	66	73	114	48	154	450	98	71	339	64
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	42	111	75	83	130	55	175	511	111	81	385	73
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	142	212	133	109	299	121	221	1709	762	107	1483	661
Arrive On Green	0.04	0.10	0.10	0.06	0.12	0.12	0.12	0.48	0.48	0.06	0.42	0.42
Sat Flow, veh/h	3428	2078	1305	1767	2450	990	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	42	93	93	83	92	93	175	511	111	81	385	73
Grp Sat Flow(s),veh/h/ln	1714	1763	1621	1767	1763	1677	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	0.7	3.1	3.4	2.9	3.0	3.2	5.9	5.4	1.4	2.8	4.4	1.7
Cycle Q Clear(g_c), s	0.7	3.1	3.4	2.9	3.0	3.2	5.9	5.4	1.4	2.8	4.4	1.7
Prop In Lane	1.00		0.81	1.00		0.59	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	142	180	165	109	215	204	221	1709	762	107	1483	661
V/C Ratio(X)	0.29	0.52	0.56	0.76	0.43	0.46	0.79	0.30	0.15	0.75	0.26	0.11
Avail Cap(c_a), veh/h	277	741	681	214	813	773	357	1709	762	280	1483	661
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	28.8	26.3	26.4	28.6	25.1	25.2	26.3	9.6	3.2	28.6	11.7	10.9
Incr Delay (d2), s/veh	1.1	2.3	3.0	10.6	1.3	1.6	6.3	0.4	0.4	10.2	0.4	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	1.3	1.4	1.5	1.3	1.3	2.7	1.8	0.8	1.4	1.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.9	28.6	29.4	39.2	26.5	26.8	32.6	10.1	3.6	38.8	12.1	11.2
LnGrp LOS	C	C	C	D	C	C	C	B	A	D	B	B
Approach Vol, veh/h		228			268			797			539	
Approach Delay, s/veh		29.2			30.5			14.1			16.0	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	34.5	8.3	10.8	12.2	30.5	7.1	12.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.8	28.7	7.5	26.0	12.5	26.0	5.0	28.5
Max Q Clear Time (g_c+I1), s	4.8	7.4	4.9	5.4	7.9	6.4	2.7	5.2
Green Ext Time (p_c), s	0.1	3.7	0.0	0.9	0.2	2.6	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	0	60	4	0	5	166	897	23	1	503	94
Future Volume (veh/h)	39	0	60	4	0	5	166	897	23	1	503	94
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	45	0	70	5	0	6	193	1043	27	1	585	109
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	233	0	115	103	22	50	246	2493	65	3	2018	900
Arrive On Green	0.07	0.00	0.07	0.07	0.00	0.07	0.14	0.71	0.71	0.00	0.57	0.57
Sat Flow, veh/h	1399	0	1572	269	302	686	1767	3511	91	1767	3526	1572
Grp Volume(v), veh/h	45	0	70	11	0	0	193	524	546	1	585	109
Grp Sat Flow(s),veh/h/ln	1399	0	1572	1257	0	0	1767	1763	1839	1767	1763	1572
Q Serve(g_s), s	0.0	0.0	2.7	0.0	0.0	0.0	6.6	7.7	7.7	0.0	5.3	2.0
Cycle Q Clear(g_c), s	1.5	0.0	2.7	2.7	0.0	0.0	6.6	7.7	7.7	0.0	5.3	2.0
Prop In Lane	1.00		1.00	0.45		0.55	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	233	0	115	175	0	0	246	1252	1306	3	2018	900
V/C Ratio(X)	0.19	0.00	0.61	0.06	0.00	0.00	0.79	0.42	0.42	0.35	0.29	0.12
Avail Cap(c_a), veh/h	722	0	665	681	0	0	606	1252	1306	155	2018	900
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	28.2	27.1	0.0	0.0	26.1	3.7	3.7	31.3	6.9	6.2
Incr Delay (d2), s/veh	0.4	0.0	5.1	0.1	0.0	0.0	5.5	1.0	1.0	62.4	0.4	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	0.6	0.0	1.1	0.2	0.0	0.0	3.0	2.0	2.0	0.1	1.7	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.0	0.0	33.3	27.2	0.0	0.0	31.5	4.8	4.7	93.6	7.2	6.4
LnGrp LOS	C	A	C	C	A	A	C	A	A	F	A	A
Approach Vol, veh/h		115			11			1263			695	
Approach Delay, s/veh		31.2			27.2			8.8			7.2	
Approach LOS		C			C			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	49.0		9.1	13.2	40.4		9.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	44.5		26.5	21.5	28.5		26.5				
Max Q Clear Time (g_c+I1), s	2.0	9.7		4.7	8.6	7.3		4.7				
Green Ext Time (p_c), s	0.0	8.7		0.5	0.4	4.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			9.6									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	118	16	335	52	759	0	0	434	163
Future Volume (veh/h)	0	0	0	118	16	335	52	759	0	0	434	163
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				137	19	390	60	883	0	0	505	190
Peak Hour Factor				0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				507	533	451	86	2074	0	0	1684	751
Arrive On Green				0.29	0.29	0.29	0.05	0.59	0.00	0.00	0.48	0.48
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				137	19	390	60	883	0	0	505	190
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				4.3	0.5	17.0	2.4	9.9	0.0	0.0	6.3	5.2
Cycle Q Clear(g_c), s				4.3	0.5	17.0	2.4	9.9	0.0	0.0	6.3	5.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				507	533	451	86	2074	0	0	1684	751
V/C Ratio(X)				0.27	0.04	0.86	0.70	0.43	0.00	0.00	0.30	0.25
Avail Cap(c_a), veh/h				942	989	838	257	2074	0	0	1684	751
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				19.9	18.5	24.4	33.9	8.2	0.0	0.0	11.5	11.2
Incr Delay (d2), s/veh				0.3	0.0	5.1	9.9	0.6	0.0	0.0	0.5	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				1.6	0.2	6.2	1.2	3.3	0.0	0.0	2.3	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				20.2	18.6	29.5	43.8	8.8	0.0	0.0	12.0	12.0
LnGrp LOS				C	B	C	D	A	A	A	B	B
Approach Vol, veh/h					546			943			695	
Approach Delay, s/veh					26.8			11.0			12.0	
Approach LOS					C			B			B	

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		47.0			8.0	39.0		25.2				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		42.5			10.5	27.5		38.5				
Max Q Clear Time (g_c+I1), s		11.9			4.4	8.3		19.0				
Green Ext Time (p_c), s		7.3			0.0	3.8		1.7				

Intersection Summary			
HCM 6th Ctrl Delay			15.3
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	140	85	0	0	0	0	572	134	126	429	0
Future Volume (veh/h)	241	140	85	0	0	0	0	572	134	126	429	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	301	175	106				0	715	168	158	536	0
Peak Hour Factor	0.80	0.80	0.80				0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	348	202	481				0	1459	651	196	2049	0
Arrive On Green	0.31	0.31	0.31				0.00	0.41	0.41	0.11	0.58	0.00
Sat Flow, veh/h	1137	661	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	476	0	106				0	715	168	158	536	0
Grp Sat Flow(s),veh/h/ln	1799	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	20.0	0.0	4.0				0.0	11.9	5.6	7.0	6.0	0.0
Cycle Q Clear(g_c), s	20.0	0.0	4.0				0.0	11.9	5.6	7.0	6.0	0.0
Prop In Lane	0.63		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	551	0	481				0	1459	651	196	2049	0
V/C Ratio(X)	0.86	0.00	0.22				0.00	0.49	0.26	0.80	0.26	0.00
Avail Cap(c_a), veh/h	776	0	678				0	1459	651	320	2049	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.2	0.0	20.6				0.0	17.2	15.4	34.7	8.3	0.0
Incr Delay (d2), s/veh	7.3	0.0	0.2				0.0	1.2	1.0	7.5	0.3	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
%ile BackOfQ(50%),veh/ln	8.8	0.0	1.4				0.0	4.6	2.0	3.3	2.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.5	0.0	20.9				0.0	18.4	16.3	42.2	8.6	0.0
LnGrp LOS	C	A	C				A	B	B	D	A	A
Approach Vol, veh/h		582						883			694	
Approach Delay, s/veh		31.2						18.0			16.2	
Approach LOS		C						B			B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	13.4	37.6		29.0		51.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	14.5	27.5		34.5		46.5						
Max Q Clear Time (g_c+I1), s	9.0	13.9		22.0		8.0						
Green Ext Time (p_c), s	0.2	4.4		2.5		4.1						
Intersection Summary												
HCM 6th Ctrl Delay			21.0									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	117	39	41	144	31	31	91	23	22	124	33
Future Vol, veh/h	82	117	39	41	144	31	31	91	23	22	124	33
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	104	148	49	52	182	39	39	115	29	28	157	42
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	11.6	12.2	11.6	12.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	21%	100%	0%	100%	0%	12%
Vol Thru, %	63%	0%	75%	0%	82%	69%
Vol Right, %	16%	0%	25%	0%	18%	18%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	145	82	156	41	175	179
LT Vol	31	82	0	41	0	22
Through Vol	91	0	117	0	144	124
RT Vol	23	0	39	0	31	33
Lane Flow Rate	184	104	197	52	222	227
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.304	0.194	0.332	0.098	0.378	0.367
Departure Headway (Hd)	5.954	6.735	6.048	6.774	6.139	5.832
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	600	531	592	527	583	614
Service Time	4.025	4.499	3.811	4.539	3.904	3.9
HCM Lane V/C Ratio	0.307	0.196	0.333	0.099	0.381	0.37
HCM Control Delay	11.6	11.1	11.8	10.3	12.6	12.3
HCM Lane LOS	B	B	B	B	B	B
HCM 95th-tile Q	1.3	0.7	1.4	0.3	1.8	1.7

Intersection	
Int Delay, s/veh	16.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	165	0	0	243	0	1702	94	49	1890	161
Future Vol, veh/h	0	0	165	0	0	243	0	1702	94	49	1890	161
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	179	0	0	264	0	1850	102	53	2054	175

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1115	-	-	976	-	0	0	1952	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	~ 172	0	0	~ 214	0	-	-	131	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	~ 172	-	-	~ 214	-	-	-	131	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	135.1	184.6	0	1.2
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	172	214	131	-	-
HCM Lane V/C Ratio	-	-	1.043	1.234	0.407	-	-
HCM Control Delay (s)	-	-	135.1	184.6	50.1	-	-
HCM Lane LOS	-	-	F	F	F	-	-
HCM 95th %tile Q(veh)	-	-	8.7	13.6	1.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	0	0	4	69	0	146	0	61	79	14
Future Vol, veh/h	12	8	0	0	4	69	0	146	0	61	79	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	15	10	0	0	5	88	0	187	0	78	101	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	500	453	110	458	462	187	119	0	0	187	0	0
Stage 1	266	266	-	187	187	-	-	-	-	-	-	-
Stage 2	234	187	-	271	275	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	480	501	941	511	495	852	1463	-	-	1381	-	-
Stage 1	737	687	-	812	743	-	-	-	-	-	-	-
Stage 2	767	743	-	733	681	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	407	470	941	479	465	852	1463	-	-	1381	-	-
Mov Cap-2 Maneuver	407	470	-	479	465	-	-	-	-	-	-	-
Stage 1	737	645	-	812	743	-	-	-	-	-	-	-
Stage 2	683	743	-	677	639	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.9	10	0	3.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1463	-	-	430	815	1381	-	-
HCM Lane V/C Ratio	-	-	-	0.06	0.115	0.057	-	-
HCM Control Delay (s)	0	-	-	13.9	10	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0.2	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	68	0	0	161	98	1070	105	107	1112	8
Future Vol, veh/h	0	0	68	0	0	161	98	1070	105	107	1112	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	70	0	0	166	101	1103	108	110	1146	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	577	-	-	606	1154	0	0	1211	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	457	0	0	438	595	-	-	566	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	457	-	-	438	595	-	-	566	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	18.1	0.9	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	595	-	-	457	438	566	-	-
HCM Lane V/C Ratio	0.17	-	-	0.153	0.379	0.195	-	-
HCM Control Delay (s)	12.3	-	-	14.3	18.1	12.9	-	-
HCM Lane LOS	B	-	-	B	C	B	-	-
HCM 95th %tile Q(veh)	0.6	-	-	0.5	1.7	0.7	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	143	553	46	1247	0	0	1331	729	0	0
Future Volume (veh/h)	143	553	46	1247	0	0	1331	729	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	155	601	50	1355	0	0	1447	792		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	393	699	71	2376	0	0	2051	915		
Arrive On Green	0.22	0.22	0.04	0.67	0.00	0.00	0.58	0.58		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	155	601	50	1355	0	0	1447	792		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	6.5	15.9	2.4	17.7	0.0	0.0	25.3	36.8		
Cycle Q Clear(g_c), s	6.5	15.9	2.4	17.7	0.0	0.0	25.3	36.8		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	393	699	71	2376	0	0	2051	915		
V/C Ratio(X)	0.39	0.86	0.70	0.57	0.00	0.00	0.71	0.87		
Avail Cap(c_a), veh/h	458	815	112	2376	0	0	2051	915		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	28.8	32.4	41.1	7.5	0.0	0.0	12.9	15.3		
Incr Delay (d2), s/veh	0.6	8.2	11.8	1.0	0.0	0.0	2.1	10.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.6	6.4	1.3	5.3	0.0	0.0	8.9	13.5		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	29.4	40.6	52.9	8.5	0.0	0.0	14.9	26.1		
LnGrp LOS	C	D	D	A	A	A	B	C		
Approach Vol, veh/h	756			1405			2239			
Approach Delay, s/veh	38.3			10.1			18.9			
Approach LOS	D			B			B			

Timer - Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		63.0			8.0	55.0		23.8
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5
Max Green Setting (Gmax), s		58.5			5.5	48.5		22.5
Max Q Clear Time (g_c+I1), s		19.7			4.4	38.8		17.9
Green Ext Time (p_c), s		12.9			0.0	7.7		1.4

Intersection Summary	
HCM 6th Ctrl Delay	19.4
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰		↱					↑↑	↱		↑↑	↱
Traffic Volume (veh/h)	610	0	49	0	0	0	0	673	143	0	905	578
Future Volume (veh/h)	610	0	49	0	0	0	0	673	143	0	905	578
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	656	0	53				0	724	0	0	973	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	808	0	371				0	2287		0	2287	
Arrive On Green	0.24	0.00	0.24				0.00	0.65	0.00	0.00	0.65	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	656	0	53				0	724	0	0	973	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	14.1	0.0	2.1				0.0	7.1	0.0	0.0	10.4	0.0
Cycle Q Clear(g_c), s	14.1	0.0	2.1				0.0	7.1	0.0	0.0	10.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	808	0	371				0	2287		0	2287	
V/C Ratio(X)	0.81	0.00	0.14				0.00	0.32		0.00	0.43	
Avail Cap(c_a), veh/h	1343	0	616				0	2287		0	2287	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	28.1	0.0	23.5				0.0	6.0	0.0	0.0	6.6	0.0
Incr Delay (d2), s/veh	2.0	0.0	0.2				0.0	0.4	0.0	0.0	0.6	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
%ile BackOfQ(50%),veh/ln	5.5	0.0	0.7				0.0	2.0	0.0	0.0	3.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	0.0	23.7				0.0	6.4	0.0	0.0	7.2	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		709						724	A		973	A
Approach Delay, s/veh		29.7						6.4			7.2	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		55.0		22.9		55.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		50.5		30.5		50.5						
Max Q Clear Time (g_c+I1), s		9.1		16.1		12.4						
Green Ext Time (p_c), s		5.4		2.3		7.9						

Intersection Summary			
HCM 6th Ctrl Delay			13.6
HCM 6th LOS			B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	740	59	78	820	43	84	68	166	100	86	34
Future Volume (veh/h)	30	740	59	78	820	43	84	68	166	100	86	34
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	34	851	68	90	943	49	97	78	191	115	99	39
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	59	1045	466	116	1158	517	125	155	380	147	627	531
Arrive On Green	0.03	0.30	0.30	0.07	0.33	0.33	0.07	0.33	0.33	0.08	0.34	0.34
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	477	1168	1767	1856	1572
Grp Volume(v), veh/h	34	851	68	90	943	49	97	0	269	115	99	39
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1645	1767	1856	1572
Q Serve(g_s), s	1.5	17.5	2.5	3.9	19.2	1.7	4.2	0.0	10.3	5.0	2.9	1.3
Cycle Q Clear(g_c), s	1.5	17.5	2.5	3.9	19.2	1.7	4.2	0.0	10.3	5.0	2.9	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.71	1.00		1.00
Lane Grp Cap(c), veh/h	59	1045	466	116	1158	517	125	0	535	147	627	531
V/C Ratio(X)	0.58	0.81	0.15	0.78	0.81	0.09	0.78	0.00	0.50	0.78	0.16	0.07
Avail Cap(c_a), veh/h	113	1237	552	192	1395	622	237	0	535	237	627	531
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.3	25.6	20.3	36.1	24.1	18.2	35.8	0.0	21.3	35.2	18.1	17.6
Incr Delay (d2), s/veh	8.6	3.7	0.1	10.7	3.2	0.1	9.9	0.0	3.3	8.9	0.5	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	0.8	7.4	0.9	2.0	7.9	0.6	2.1	0.0	4.3	2.5	1.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.9	29.3	20.4	46.7	27.3	18.3	45.7	0.0	24.7	44.1	18.7	17.9
LnGrp LOS	D	C	C	D	C	B	D	A	C	D	B	B
Approach Vol, veh/h		953			1082			366			253	
Approach Delay, s/veh		29.2			28.5			30.2			30.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	30.0	9.6	27.7	10.0	31.0	7.1	30.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	25.5	8.5	27.5	10.5	25.5	5.0	31.0
Max Q Clear Time (g_c+I1), s	7.0	12.3	5.9	19.5	6.2	4.9	3.5	21.2
Green Ext Time (p_c), s	0.1	1.3	0.0	3.6	0.1	0.6	0.0	4.5

Intersection Summary	
HCM 6th Ctrl Delay	29.2
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	253	292	213	110	317	85	306	680	57	92	578	105
Future Volume (veh/h)	253	292	213	110	317	85	306	680	57	92	578	105
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	278	321	234	121	348	93	336	747	63	101	635	115
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	361	701	313	154	498	131	420	1322	111	129	1243	554
Arrive On Green	0.11	0.20	0.20	0.09	0.18	0.18	0.12	0.40	0.40	0.07	0.35	0.35
Sat Flow, veh/h	3428	3526	1572	1767	2760	728	3428	3291	277	1767	3526	1572
Grp Volume(v), veh/h	278	321	234	121	221	220	336	400	410	101	635	115
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1725	1714	1763	1806	1767	1763	1572
Q Serve(g_s), s	5.9	6.0	10.5	5.0	8.8	9.0	7.2	13.2	13.2	4.2	10.7	2.5
Cycle Q Clear(g_c), s	5.9	6.0	10.5	5.0	8.8	9.0	7.2	13.2	13.2	4.2	10.7	2.5
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	361	701	313	154	318	311	420	708	725	129	1243	554
V/C Ratio(X)	0.77	0.46	0.75	0.79	0.69	0.71	0.80	0.56	0.57	0.78	0.51	0.21
Avail Cap(c_a), veh/h	365	1252	558	219	656	642	433	708	725	200	1243	554
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	32.7	26.6	28.4	33.6	28.9	29.0	32.1	17.4	17.4	34.2	19.2	7.2
Incr Delay (d2), s/veh	9.6	0.5	3.6	11.6	2.7	3.0	10.0	3.2	3.2	10.1	1.5	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	2.5	4.1	2.6	3.8	3.8	3.4	5.5	5.6	2.1	4.3	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	27.0	31.9	45.3	31.6	31.9	42.1	20.7	20.6	44.3	20.7	8.1
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	A
Approach Vol, veh/h		833			562			1146			851	
Approach Delay, s/veh		33.5			34.7			26.9			21.8	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	34.7	11.0	19.4	13.7	31.0	12.4	18.1				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.5	27.5	9.3	26.7	9.5	26.5	8.0	28.0				
Max Q Clear Time (g_c+I1), s	6.2	15.2	7.0	12.5	9.2	12.7	7.9	11.0				
Green Ext Time (p_c), s	0.0	4.0	0.1	2.4	0.0	3.9	0.0	2.3				
Intersection Summary												
HCM 6th Ctrl Delay			28.5									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	200	219	163	175	109	167	631	115	111	578	52
Future Volume (veh/h)	67	200	219	163	175	109	167	631	115	111	578	52
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	74	220	241	179	192	120	184	693	126	122	635	57
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	175	351	313	216	574	342	221	1274	568	154	1140	509
Arrive On Green	0.05	0.20	0.20	0.12	0.27	0.27	0.13	0.36	0.36	0.09	0.32	0.32
Sat Flow, veh/h	3428	1763	1572	1767	2125	1266	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	74	220	241	179	158	154	184	693	126	122	635	57
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1628	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	1.6	8.9	11.3	7.7	5.6	6.0	8.0	12.2	2.7	5.3	11.6	2.0
Cycle Q Clear(g_c), s	1.6	8.9	11.3	7.7	5.6	6.0	8.0	12.2	2.7	5.3	11.6	2.0
Prop In Lane	1.00		1.00	1.00		0.78	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	351	313	216	476	440	221	1274	568	154	1140	509
V/C Ratio(X)	0.42	0.63	0.77	0.83	0.33	0.35	0.83	0.54	0.22	0.79	0.56	0.11
Avail Cap(c_a), veh/h	232	586	523	230	696	643	237	1274	568	212	1140	509
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	36.0	28.7	29.6	33.5	22.9	23.0	33.4	19.9	6.9	35.0	21.8	18.6
Incr Delay (d2), s/veh	1.6	1.8	4.0	20.7	0.4	0.5	20.5	1.7	0.9	12.9	2.0	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	0.7	3.8	4.4	4.5	2.3	2.3	4.5	4.9	1.6	2.7	4.8	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.6	30.5	33.6	54.2	23.3	23.5	53.9	21.5	7.8	47.9	23.8	19.0
LnGrp LOS	D	C	C	D	C	C	D	C	A	D	C	B
Approach Vol, veh/h		535			491			1003			814	
Approach Delay, s/veh		32.9			34.6			25.7			27.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	32.8	14.1	20.1	14.3	29.8	8.5	25.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.4	26.4	10.2	26.0	10.5	25.3	5.3	30.9
Max Q Clear Time (g_c+I1), s	7.3	14.2	9.7	13.3	10.0	13.6	3.6	8.0
Green Ext Time (p_c), s	0.1	4.0	0.0	2.2	0.0	3.4	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	29.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	186	0	188	10	0	10	239	1071	3	8	1013	148
Future Volume (veh/h)	186	0	188	10	0	10	239	1071	3	8	1013	148
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	192	0	194	10	0	10	246	1104	3	8	1044	153
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	344	0	311	130	23	80	292	2204	6	18	1607	717
Arrive On Green	0.20	0.00	0.20	0.20	0.00	0.20	0.17	0.61	0.61	0.01	0.46	0.46
Sat Flow, veh/h	1394	0	1572	289	115	404	1767	3607	10	1767	3526	1572
Grp Volume(v), veh/h	192	0	194	20	0	0	246	540	567	8	1044	153
Grp Sat Flow(s),veh/h/ln	1394	0	1572	807	0	0	1767	1763	1854	1767	1763	1572
Q Serve(g_s), s	2.8	0.0	8.4	0.1	0.0	0.0	10.1	12.8	12.8	0.3	17.0	4.4
Cycle Q Clear(g_c), s	11.3	0.0	8.4	8.5	0.0	0.0	10.1	12.8	12.8	0.3	17.0	4.4
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	344	0	311	232	0	0	292	1077	1133	18	1607	717
V/C Ratio(X)	0.56	0.00	0.62	0.09	0.00	0.00	0.84	0.50	0.50	0.44	0.65	0.21
Avail Cap(c_a), veh/h	556	0	549	436	0	0	415	1077	1133	119	1607	717
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	0.0	27.4	24.5	0.0	0.0	30.1	8.1	8.1	36.6	15.7	12.2
Incr Delay (d2), s/veh	1.4	0.0	2.1	0.2	0.0	0.0	10.3	1.7	1.6	16.0	2.0	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	3.2	0.3	0.0	0.0	4.9	4.5	4.7	0.2	6.7	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	0.0	29.4	24.7	0.0	0.0	40.5	9.8	9.7	52.7	17.7	12.9
LnGrp LOS	C	A	C	C	A	A	D	A	A	D	B	B
Approach Vol, veh/h		386			20			1353			1205	
Approach Delay, s/veh		29.8			24.7			15.3			17.3	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	50.0		19.2	16.8	38.4		19.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	45.5		26.0	17.5	33.0		26.0				
Max Q Clear Time (g_c+I1), s	2.3	14.8		13.3	12.1	19.0		10.5				
Green Ext Time (p_c), s	0.0	8.8		1.5	0.3	6.8		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		18.1
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	218	35	261	91	1045	0	0	1019	277
Future Volume (veh/h)	0	0	0	218	35	261	91	1045	0	0	1019	277
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				229	37	275	96	1100	0	0	1073	292
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				377	396	336	123	2357	0	0	1902	849
Arrive On Green				0.21	0.21	0.21	0.07	0.67	0.00	0.00	0.54	0.54
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				229	37	275	96	1100	0	0	1073	292
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				8.9	1.2	12.7	4.1	11.5	0.0	0.0	15.4	8.0
Cycle Q Clear(g_c), s				8.9	1.2	12.7	4.1	11.5	0.0	0.0	15.4	8.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				377	396	336	123	2357	0	0	1902	849
V/C Ratio(X)				0.61	0.09	0.82	0.78	0.47	0.00	0.00	0.56	0.34
Avail Cap(c_a), veh/h				695	730	618	220	2357	0	0	1902	849
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				27.1	24.1	28.6	34.9	6.1	0.0	0.0	11.6	9.9
Incr Delay (d2), s/veh				1.6	0.1	4.9	10.0	0.7	0.0	0.0	1.2	1.1
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	0.5	4.8	2.0	3.5	0.0	0.0	5.5	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				28.7	24.2	33.5	44.9	6.8	0.0	0.0	12.8	11.0
LnGrp LOS				C	C	C	D	A	A	A	B	B
Approach Vol, veh/h					541			1196			1365	
Approach Delay, s/veh					30.8			9.8			12.5	
Approach LOS					C			A			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		55.5			9.8	45.7		20.8				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		51.0			9.5	37.0		30.0				
Max Q Clear Time (g_c+I1), s		13.5			6.1	17.4		14.7				
Green Ext Time (p_c), s		10.3			0.1	8.7		1.6				
Intersection Summary												
HCM 6th Ctrl Delay			14.6									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	369	79	75	0	0	0	0	768	203	403	839	0
Future Volume (veh/h)	369	79	75	0	0	0	0	768	203	403	839	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	384	82	78				0	800	211	420	874	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	421	90	451				0	1062	474	456	2153	0
Arrive On Green	0.29	0.29	0.29				0.00	0.30	0.30	0.26	0.61	0.00
Sat Flow, veh/h	1469	314	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	466	0	78				0	800	211	420	874	0
Grp Sat Flow(s),veh/h/ln	1782	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	22.1	0.0	3.3				0.0	18.0	9.5	20.3	11.2	0.0
Cycle Q Clear(g_c), s	22.1	0.0	3.3				0.0	18.0	9.5	20.3	11.2	0.0
Prop In Lane	0.82		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	511	0	451				0	1062	474	456	2153	0
V/C Ratio(X)	0.91	0.00	0.17				0.00	0.75	0.45	0.92	0.41	0.00
Avail Cap(c_a), veh/h	559	0	494				0	1062	474	494	2153	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.2	0.0	23.5				0.0	27.7	24.7	31.6	8.8	0.0
Incr Delay (d2), s/veh	18.5	0.0	0.2				0.0	5.0	3.0	21.8	0.6	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
%ile BackOfQ(50%),veh/ln	11.3	0.0	1.2				0.0	7.8	3.7	11.1	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.7	0.0	23.6				0.0	32.6	27.7	53.4	9.4	0.0
LnGrp LOS	D	A	C				A	C	C	D	A	A
Approach Vol, veh/h		544						1011			1294	
Approach Delay, s/veh		45.1						31.6			23.7	
Approach LOS		D						C			C	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	27.1	30.9		29.6		58.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	24.5	24.5		27.5		53.5						
Max Q Clear Time (g_c+I1), s	22.3	20.0		24.1		13.2						
Green Ext Time (p_c), s	0.3	2.3		1.0		7.6						

Intersection Summary			
HCM 6th Ctrl Delay			30.6
HCM 6th LOS			C

Intersection	
Intersection Delay, s/veh	23.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	265	39	22	337	40	62	143	28	88	81	87
Future Vol, veh/h	70	265	39	22	337	40	62	143	28	88	81	87
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	73	276	41	23	351	42	65	149	29	92	84	91
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	21.2	32.3	18.3	19
HCM LOS	C	D	C	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	27%	100%	0%	100%	0%	34%
Vol Thru, %	61%	0%	87%	0%	89%	32%
Vol Right, %	12%	0%	13%	0%	11%	34%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	233	70	304	22	377	256
LT Vol	62	70	0	22	0	88
Through Vol	143	0	265	0	337	81
RT Vol	28	0	39	0	40	87
Lane Flow Rate	243	73	317	23	393	267
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.51	0.163	0.654	0.05	0.8	0.546
Departure Headway (Hd)	7.563	8.039	7.43	7.929	7.338	7.371
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	476	446	485	451	495	488
Service Time	5.622	5.792	5.183	5.68	5.088	5.427
HCM Lane V/C Ratio	0.511	0.164	0.654	0.051	0.794	0.547
HCM Control Delay	18.3	12.4	23.2	11.1	33.5	19
HCM Lane LOS	C	B	C	B	D	C
HCM 95th-tile Q	2.8	0.6	4.6	0.2	7.4	3.2

NEAR-TERM
WORKSHEETS

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	78	0	0	98	0	1281	169	67	841	108
Future Vol, veh/h	0	0	78	0	0	98	0	1281	169	67	841	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	89	0	0	111	0	1456	192	76	956	123

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	540	-	-	824	-	0	0	1648	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	414	0	0	270	0	-	-	186	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	414	-	-	270	-	-	-	186	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16	27.4	0	2.4
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	414	270	186	-	-
HCM Lane V/C Ratio	-	-	0.214	0.412	0.409	-	-
HCM Control Delay (s)	-	-	16	27.4	37.2	-	-
HCM Lane LOS	-	-	C	D	E	-	-
HCM 95th %tile Q(veh)	-	-	0.8	1.9	1.8	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	14	1	0	11	79	1	57	1	32	146	27
Future Vol, veh/h	17	14	1	0	11	79	1	57	1	32	146	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	24	20	1	0	16	113	1	81	1	46	209	39

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	469	405	229	415	424	82	248	0	0	82	0	0
Stage 1	321	321	-	84	84	-	-	-	-	-	-	-
Stage 2	148	84	-	331	340	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	503	533	808	546	520	975	1312	-	-	1509	-	-
Stage 1	689	650	-	922	823	-	-	-	-	-	-	-
Stage 2	852	823	-	680	637	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	422	513	808	514	501	975	1312	-	-	1509	-	-
Mov Cap-2 Maneuver	422	513	-	514	501	-	-	-	-	-	-	-
Stage 1	688	627	-	921	822	-	-	-	-	-	-	-
Stage 2	738	822	-	633	614	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.6	9.8	0.1	1.2
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1312	-	-	465	874	1509	-	-
HCM Lane V/C Ratio	0.001	-	-	0.098	0.147	0.03	-	-
HCM Control Delay (s)	7.7	0	-	13.6	9.8	7.5	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0.1	-	-

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	0	0	56	0	0	56	107	841	69	80	586	15
Future Vol, veh/h	0	0	56	0	0	56	107	841	69	80	586	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	64	0	0	64	123	967	79	92	674	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	346	-	-	523	691	0	0	1046	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	647	0	0	496	893	-	-	655	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	647	-	-	496	893	-	-	655	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	13.3	1	1.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	893	-	-	647	496	655	-	-
HCM Lane V/C Ratio	0.138	-	-	0.099	0.13	0.14	-	-
HCM Control Delay (s)	9.7	-	-	11.2	13.3	11.4	-	-
HCM Lane LOS	A	-	-	B	B	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	0.3	0.4	0.5	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	50	527	55	927	0	0	577	337	0	0
Future Volume (veh/h)	50	527	55	927	0	0	577	337	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	56	586	61	1030	0	0	641	374		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	413	735	85	2279	0	0	1898	847		
Arrive On Green	0.23	0.23	0.05	0.65	0.00	0.00	0.54	0.54		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	56	586	61	1030	0	0	641	374		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	1.9	13.2	2.6	11.0	0.0	0.0	7.7	10.8		
Cycle Q Clear(g_c), s	1.9	13.2	2.6	11.0	0.0	0.0	7.7	10.8		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	413	735	85	2279	0	0	1898	847		
V/C Ratio(X)	0.14	0.80	0.72	0.45	0.00	0.00	0.34	0.44		
Avail Cap(c_a), veh/h	765	1362	224	2279	0	0	1898	847		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	22.8	27.1	35.2	6.6	0.0	0.0	9.8	10.5		
Incr Delay (d2), s/veh	0.1	2.0	10.9	0.6	0.0	0.0	0.5	1.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	4.7	1.3	3.1	0.0	0.0	2.6	3.5		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	22.9	29.1	46.1	7.3	0.0	0.0	10.3	12.2		
LnGrp LOS	C	C	D	A	A	A	B	B		
Approach Vol, veh/h	642			1091			1015			
Approach Delay, s/veh	28.6			9.4			11.0			
Approach LOS	C			A			B			

Timer - Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		53.0			8.1	44.9		22.0
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5
Max Green Setting (Gmax), s		48.5			9.5	34.5		32.5
Max Q Clear Time (g_c+I1), s		13.0			4.6	12.8		15.2
Green Ext Time (p_c), s		8.4			0.0	5.6		2.4

Intersection Summary			
HCM 6th Ctrl Delay			14.5
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰		↱					↑↑	↱		↑↑	↱
Traffic Volume (veh/h)	486	0	17	0	0	0	0	495	132	0	360	265
Future Volume (veh/h)	486	0	17	0	0	0	0	495	132	0	360	265
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	540	0	19				0	550	0	0	400	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	713	0	327				0	2314		0	2314	
Arrive On Green	0.21	0.00	0.21				0.00	0.66	0.00	0.00	0.66	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	540	0	19				0	550	0	0	400	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	9.8	0.0	0.6				0.0	4.2	0.0	0.0	2.9	0.0
Cycle Q Clear(g_c), s	9.8	0.0	0.6				0.0	4.2	0.0	0.0	2.9	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	713	0	327				0	2314		0	2314	
V/C Ratio(X)	0.76	0.00	0.06				0.00	0.24		0.00	0.17	
Avail Cap(c_a), veh/h	1939	0	890				0	2314		0	2314	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	24.7	0.0	21.0				0.0	4.6	0.0	0.0	4.4	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.1				0.0	0.2	0.0	0.0	0.2	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
%ile BackOfQ(50%),veh/ln	3.7	0.0	0.2				0.0	1.0	0.0	0.0	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.4	0.0	21.1				0.0	4.9	0.0	0.0	4.6	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		559						550	A		400	A
Approach Delay, s/veh		26.2						4.9			4.6	
Approach LOS		C						A			A	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		48.0		18.3		48.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		43.5		37.5		43.5						
Max Q Clear Time (g_c+I1), s		6.2		11.8		4.9						
Green Ext Time (p_c), s		3.8		2.0		2.7						
Intersection Summary												
HCM 6th Ctrl Delay			12.7									
HCM 6th LOS			B									

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	422	75	98	422	47	36	51	71	48	70	13
Future Volume (veh/h)	22	422	75	98	422	47	36	51	71	48	70	13
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	24	459	82	107	459	51	39	55	77	52	76	14
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	47	648	289	139	831	371	67	298	417	93	816	692
Arrive On Green	0.03	0.18	0.18	0.08	0.24	0.24	0.04	0.43	0.43	0.05	0.44	0.44
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	700	980	1767	1856	1572
Grp Volume(v), veh/h	24	459	82	107	459	51	39	0	132	52	76	14
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1679	1767	1856	1572
Q Serve(g_s), s	0.9	8.5	3.1	4.1	7.9	1.4	1.5	0.0	3.4	2.0	1.7	0.3
Cycle Q Clear(g_c), s	0.9	8.5	3.1	4.1	7.9	1.4	1.5	0.0	3.4	2.0	1.7	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.58	1.00		1.00
Lane Grp Cap(c), veh/h	47	648	289	139	831	371	67	0	714	93	816	692
V/C Ratio(X)	0.51	0.71	0.28	0.77	0.55	0.14	0.58	0.00	0.18	0.56	0.09	0.02
Avail Cap(c_a), veh/h	166	1042	465	344	1398	624	191	0	714	217	816	692
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.3	26.5	24.4	31.3	23.3	12.1	32.8	0.0	12.4	32.1	11.3	11.0
Incr Delay (d2), s/veh	8.2	1.4	0.5	8.7	0.6	0.2	7.7	0.0	0.6	5.2	0.2	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	3.5	1.1	2.0	3.1	0.6	0.8	0.0	1.3	1.0	0.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	28.0	24.9	40.0	23.9	12.3	40.5	0.0	13.0	37.3	11.6	11.0
LnGrp LOS	D	C	C	D	C	B	D	A	B	D	B	B
Approach Vol, veh/h		565			617			171			142	
Approach Delay, s/veh		28.1			25.7			19.3			20.9	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	34.0	9.9	17.3	7.1	35.0	6.4	20.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	29.5	13.5	20.5	7.5	30.5	6.5	27.5
Max Q Clear Time (g_c+I1), s	4.0	5.4	6.1	10.5	3.5	3.7	2.9	9.9
Green Ext Time (p_c), s	0.0	0.7	0.1	2.3	0.0	0.4	0.0	2.9

Intersection Summary	
HCM 6th Ctrl Delay	25.4
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	190	119	45	243	45	280	486	54	66	554	142
Future Volume (veh/h)	90	190	119	45	243	45	280	486	54	66	554	142
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	100	211	132	50	270	50	311	540	60	73	616	158
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	216	564	251	80	423	77	421	1506	167	98	1422	634
Arrive On Green	0.06	0.16	0.16	0.05	0.14	0.14	0.12	0.47	0.47	0.06	0.40	0.40
Sat Flow, veh/h	3428	3526	1572	1767	2977	544	3428	3200	355	1767	3526	1572
Grp Volume(v), veh/h	100	211	132	50	158	162	311	297	303	73	616	158
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1758	1714	1763	1792	1767	1763	1572
Q Serve(g_s), s	1.9	3.6	3.6	1.9	5.7	5.8	5.9	7.2	7.2	2.7	8.5	4.5
Cycle Q Clear(g_c), s	1.9	3.6	3.6	1.9	5.7	5.8	5.9	7.2	7.2	2.7	8.5	4.5
Prop In Lane	1.00		1.00	1.00		0.31	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	216	564	251	80	250	250	421	830	843	98	1422	634
V/C Ratio(X)	0.46	0.37	0.53	0.63	0.63	0.65	0.74	0.36	0.36	0.74	0.43	0.25
Avail Cap(c_a), veh/h	282	1411	629	177	737	735	589	830	843	240	1422	634
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	30.3	25.1	12.4	31.4	27.1	27.1	28.3	11.3	11.3	31.1	14.4	13.2
Incr Delay (d2), s/veh	1.5	0.4	1.7	7.8	2.6	2.8	3.1	1.2	1.2	10.6	1.0	0.9
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	0.8	1.4	1.9	0.9	2.4	2.5	2.4	2.7	2.7	1.4	3.2	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.8	25.5	14.1	39.2	29.7	30.0	31.4	12.5	12.5	41.7	15.4	14.2
LnGrp LOS	C	C	B	D	C	C	C	B	B	D	B	B
Approach Vol, veh/h		443			370			911			847	
Approach Delay, s/veh		23.6			31.1			18.9			17.4	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	36.0	7.5	15.2	12.7	31.5	8.7	14.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.1	29.4	6.7	26.8	11.5	27.0	5.5	28.0
Max Q Clear Time (g_c+I1), s	4.7	9.2	3.9	5.6	7.9	10.5	3.9	7.8
Green Ext Time (p_c), s	0.0	3.5	0.0	1.6	0.4	4.2	0.0	1.7

Intersection Summary			
HCM 6th Ctrl Delay			21.0
HCM 6th LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	105	71	79	122	52	167	485	106	77	363	69
Future Volume (veh/h)	40	105	71	79	122	52	167	485	106	77	363	69
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	45	119	81	90	139	59	190	551	120	88	412	78
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	148	220	139	116	314	128	236	1692	755	114	1447	645
Arrive On Green	0.04	0.11	0.11	0.07	0.13	0.13	0.13	0.48	0.48	0.06	0.41	0.41
Sat Flow, veh/h	3428	2070	1312	1767	2447	993	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	45	100	100	90	98	100	190	551	120	88	412	78
Grp Sat Flow(s),veh/h/ln	1714	1763	1619	1767	1763	1677	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	0.8	3.4	3.7	3.2	3.3	3.5	6.6	6.1	1.6	3.1	4.9	1.9
Cycle Q Clear(g_c), s	0.8	3.4	3.7	3.2	3.3	3.5	6.6	6.1	1.6	3.1	4.9	1.9
Prop In Lane	1.00		0.81	1.00		0.59	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	148	187	172	116	226	215	236	1692	755	114	1447	645
V/C Ratio(X)	0.30	0.53	0.58	0.78	0.43	0.46	0.80	0.33	0.16	0.77	0.28	0.12
Avail Cap(c_a), veh/h	271	723	665	209	793	754	349	1692	755	273	1447	645
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	29.4	26.8	27.0	29.2	25.5	25.6	26.6	10.2	3.4	29.2	12.5	11.6
Incr Delay (d2), s/veh	1.1	2.4	3.1	10.7	1.3	1.5	8.2	0.5	0.5	10.7	0.5	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	1.5	1.5	1.7	1.4	1.4	3.1	2.1	0.9	1.6	1.8	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	29.2	30.1	39.8	26.8	27.1	34.8	10.7	3.8	39.8	13.0	12.0
LnGrp LOS	C	C	C	D	C	C	C	B	A	D	B	B
Approach Vol, veh/h		245			288			861			578	
Approach Delay, s/veh		29.8			31.0			15.0			16.9	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.6	34.9	8.6	11.2	13.0	30.5	7.2	12.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.8	28.7	7.5	26.0	12.5	26.0	5.0	28.5
Max Q Clear Time (g_c+I1), s	5.1	8.1	5.2	5.7	8.6	6.9	2.8	5.5
Green Ext Time (p_c), s	0.1	3.9	0.0	1.0	0.2	2.7	0.0	1.1

Intersection Summary			
HCM 6th Ctrl Delay			19.7
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	60	4	0	5	169	971	25	1	544	98
Future Volume (veh/h)	40	0	60	4	0	5	169	971	25	1	544	98
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	47	0	70	5	0	6	197	1129	29	1	633	114
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	234	0	116	103	22	51	250	2493	64	3	2008	896
Arrive On Green	0.07	0.00	0.07	0.07	0.00	0.07	0.14	0.71	0.71	0.00	0.57	0.57
Sat Flow, veh/h	1399	0	1572	272	301	687	1767	3512	90	1767	3526	1572
Grp Volume(v), veh/h	47	0	70	11	0	0	197	567	591	1	633	114
Grp Sat Flow(s),veh/h/ln	1399	0	1572	1260	0	0	1767	1763	1839	1767	1763	1572
Q Serve(g_s), s	0.0	0.0	2.7	0.0	0.0	0.0	6.8	8.6	8.6	0.0	5.9	2.1
Cycle Q Clear(g_c), s	1.6	0.0	2.7	2.7	0.0	0.0	6.8	8.6	8.6	0.0	5.9	2.1
Prop In Lane	1.00		1.00	0.45		0.55	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	234	0	116	176	0	0	250	1251	1305	3	2008	896
V/C Ratio(X)	0.20	0.00	0.61	0.06	0.00	0.00	0.79	0.45	0.45	0.35	0.32	0.13
Avail Cap(c_a), veh/h	722	0	665	681	0	0	606	1251	1305	155	2008	896
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	28.2	27.1	0.0	0.0	26.0	3.9	3.9	31.3	7.1	6.3
Incr Delay (d2), s/veh	0.4	0.0	5.0	0.1	0.0	0.0	5.4	1.2	1.1	62.4	0.4	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	0.7	0.0	1.1	0.2	0.0	0.0	3.1	2.2	2.3	0.1	1.9	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.1	0.0	33.2	27.2	0.0	0.0	31.4	5.1	5.0	93.7	7.5	6.6
LnGrp LOS	C	A	C	C	A	A	C	A	A	F	A	A
Approach Vol, veh/h		117			11			1355			748	
Approach Delay, s/veh		31.1			27.2			8.9			7.5	
Approach LOS		C			C			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	49.0		9.1	13.4	40.2		9.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	44.5		26.5	21.5	28.5		26.5				
Max Q Clear Time (g_c+I1), s	2.0	10.6		4.7	8.8	7.9		4.7				
Green Ext Time (p_c), s	0.0	9.7		0.5	0.4	4.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	128	17	353	56	820	0	0	465	176
Future Volume (veh/h)	0	0	0	128	17	353	56	820	0	0	465	176
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				149	20	410	65	953	0	0	541	205
Peak Hour Factor				0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				529	556	471	88	2038	0	0	1646	734
Arrive On Green				0.30	0.30	0.30	0.05	0.58	0.00	0.00	0.47	0.47
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				149	20	410	65	953	0	0	541	205
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				4.7	0.6	18.2	2.7	11.5	0.0	0.0	7.1	5.9
Cycle Q Clear(g_c), s				4.7	0.6	18.2	2.7	11.5	0.0	0.0	7.1	5.9
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				529	556	471	88	2038	0	0	1646	734
V/C Ratio(X)				0.28	0.04	0.87	0.74	0.47	0.00	0.00	0.33	0.28
Avail Cap(c_a), veh/h				926	972	824	252	2038	0	0	1646	734
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				19.7	18.2	24.4	34.4	9.0	0.0	0.0	12.3	12.0
Incr Delay (d2), s/veh				0.3	0.0	5.1	11.2	0.8	0.0	0.0	0.5	0.9
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				1.8	0.2	6.6	1.4	4.0	0.0	0.0	2.6	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				20.0	18.3	29.5	45.7	9.7	0.0	0.0	12.9	13.0
LnGrp LOS				B	B	C	D	A	A	A	B	B
Approach Vol, veh/h					579			1018			746	
Approach Delay, s/veh					26.7			12.0			12.9	
Approach LOS					C			B			B	

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		47.0			8.2	38.8		26.5				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		42.5			10.5	27.5		38.5				
Max Q Clear Time (g_c+I1), s		13.5			4.7	9.1		20.2				
Green Ext Time (p_c), s		7.9			0.0	4.0		1.8				

Intersection Summary			
HCM 6th Ctrl Delay			15.9
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	152	92	0	0	0	0	618	145	133	463	0
Future Volume (veh/h)	261	152	92	0	0	0	0	618	145	133	463	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	326	190	115				0	772	181	166	579	0
Peak Hour Factor	0.80	0.80	0.80				0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	370	216	512				0	1391	621	204	1991	0
Arrive On Green	0.33	0.33	0.33				0.00	0.39	0.39	0.12	0.56	0.00
Sat Flow, veh/h	1136	662	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	516	0	115				0	772	181	166	579	0
Grp Sat Flow(s),veh/h/ln	1799	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	22.3	0.0	4.4				0.0	14.0	6.5	7.5	7.0	0.0
Cycle Q Clear(g_c), s	22.3	0.0	4.4				0.0	14.0	6.5	7.5	7.0	0.0
Prop In Lane	0.63		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	586	0	512				0	1391	621	204	1991	0
V/C Ratio(X)	0.88	0.00	0.22				0.00	0.55	0.29	0.81	0.29	0.00
Avail Cap(c_a), veh/h	754	0	659				0	1391	621	311	1991	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.2	0.0	20.2				0.0	19.3	17.0	35.5	9.3	0.0
Incr Delay (d2), s/veh	9.7	0.0	0.2				0.0	1.6	1.2	9.3	0.4	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
%ile BackOfQ(50%),veh/ln	10.1	0.0	1.5				0.0	5.5	2.4	3.7	2.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	0.0	20.4				0.0	20.9	18.2	44.8	9.7	0.0
LnGrp LOS	D	A	C				A	C	B	D	A	A
Approach Vol, veh/h		631						953			745	
Approach Delay, s/veh		33.1						20.4			17.5	
Approach LOS		C						C			B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	14.0	37.0		31.3		51.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	14.5	27.5		34.5		46.5						
Max Q Clear Time (g_c+I1), s	9.5	16.0		24.3		9.0						
Green Ext Time (p_c), s	0.2	4.3		2.5		4.5						
Intersection Summary												
HCM 6th Ctrl Delay			22.9									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	127	41	43	156	34	33	96	24	24	126	36
Future Vol, veh/h	89	127	41	43	156	34	33	96	24	24	126	36
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	113	161	52	54	197	43	42	122	30	30	159	46
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	12.2	13	12.3	13
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	22%	100%	0%	100%	0%	13%
Vol Thru, %	63%	0%	76%	0%	82%	68%
Vol Right, %	16%	0%	24%	0%	18%	19%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	153	89	168	43	190	186
LT Vol	33	89	0	43	0	24
Through Vol	96	0	127	0	156	126
RT Vol	24	0	41	0	34	36
Lane Flow Rate	194	113	213	54	241	235
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.33	0.215	0.366	0.105	0.42	0.393
Departure Headway (Hd)	6.137	6.877	6.193	6.92	6.283	6.006
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	581	519	576	515	570	593
Service Time	4.228	4.657	3.973	4.701	4.063	4.092
HCM Lane V/C Ratio	0.334	0.218	0.37	0.105	0.423	0.396
HCM Control Delay	12.3	11.6	12.5	10.5	13.6	13
HCM Lane LOS	B	B	B	B	B	B
HCM 95th-tile Q	1.4	0.8	1.7	0.3	2.1	1.9

Intersection												
Int Delay, s/veh	24.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	179	0	0	251	0	1842	96	52	2035	174
Future Vol, veh/h	0	0	179	0	0	251	0	1842	96	52	2035	174
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	195	0	0	273	0	2002	104	57	2212	189

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1201	-	-	1053	-	0	0	2106	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	~ 151	0	0	~ 190	0	-	-	109	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	~ 151	-	-	~ 190	-	-	-	109	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	228.1	269.9	0	1.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	151	190	109	-	-
HCM Lane V/C Ratio	-	-	1.289	1.436	0.519	-	-
HCM Control Delay (s)	-	-	228.1	269.9	69.1	-	-
HCM Lane LOS	-	-	F	F	F	-	-
HCM 95th %tile Q(veh)	-	-	11.7	16.5	2.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	9	0	0	4	75	0	146	0	66	79	15
Future Vol, veh/h	13	9	0	0	4	75	0	146	0	66	79	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	17	12	0	0	5	96	0	187	0	85	101	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	519	468	111	474	477	187	120	0	0	187	0	0
Stage 1	281	281	-	187	187	-	-	-	-	-	-	-
Stage 2	238	187	-	287	290	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	466	491	940	499	486	852	1462	-	-	1381	-	-
Stage 1	724	677	-	812	743	-	-	-	-	-	-	-
Stage 2	763	743	-	718	670	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	389	459	940	465	454	852	1462	-	-	1381	-	-
Mov Cap-2 Maneuver	389	459	-	465	454	-	-	-	-	-	-	-
Stage 1	724	632	-	812	743	-	-	-	-	-	-	-
Stage 2	672	743	-	658	626	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	10	0	3.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1462	-	-	415	816	1381	-	-
HCM Lane V/C Ratio	-	-	-	0.068	0.124	0.061	-	-
HCM Control Delay (s)	0	-	-	14.3	10	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0.2	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	74	0	0	174	106	1154	114	116	1201	9
Future Vol, veh/h	0	0	74	0	0	174	106	1154	114	116	1201	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	76	0	0	179	109	1190	118	120	1238	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	624	-	-	654	1247	0	0	1308	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	426	0	0	407	549	-	-	520	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	426	-	-	407	549	-	-	520	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.3	20.6	1	1.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	549	-	-	426	407	520	-	-
HCM Lane V/C Ratio	0.199	-	-	0.179	0.441	0.23	-	-
HCM Control Delay (s)	13.2	-	-	15.3	20.6	14	-	-
HCM Lane LOS	B	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0.7	-	-	0.6	2.2	0.9	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	155	597	50	1345	0	0	1437	783	0	0
Future Volume (veh/h)	155	597	50	1345	0	0	1437	783	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	168	649	54	1462	0	0	1562	851		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	413	735	74	2341	0	0	2014	898		
Arrive On Green	0.23	0.23	0.04	0.66	0.00	0.00	0.57	0.57		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	168	649	54	1462	0	0	1562	851		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	7.1	17.6	2.7	21.0	0.0	0.0	30.0	44.5		
Cycle Q Clear(g_c), s	7.1	17.6	2.7	21.0	0.0	0.0	30.0	44.5		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	413	735	74	2341	0	0	2014	898		
V/C Ratio(X)	0.41	0.88	0.73	0.62	0.00	0.00	0.78	0.95		
Avail Cap(c_a), veh/h	451	803	110	2341	0	0	2014	898		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	28.6	32.6	41.7	8.5	0.0	0.0	14.5	17.6		
Incr Delay (d2), s/veh	0.6	10.7	13.2	1.3	0.0	0.0	3.0	19.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.9	7.3	1.4	6.5	0.0	0.0	10.9	18.2		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	29.2	43.3	54.9	9.8	0.0	0.0	17.5	37.3		
LnGrp LOS	C	D	D	A	A	A	B	D		
Approach Vol, veh/h	817			1516			2413			
Approach Delay, s/veh	40.4			11.4			24.5			
Approach LOS	D			B			C			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		63.0			8.2	54.8		25.1		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		58.5			5.5	48.5		22.5		
Max Q Clear Time (g_c+I1), s		23.0			4.7	46.5		19.6		
Green Ext Time (p_c), s		14.1			0.0	1.8		1.0		
Intersection Summary										
HCM 6th Ctrl Delay			23.0							
HCM 6th LOS			C							

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	657	0	53	0	0	0	0	727	155	0	978	624
Future Volume (veh/h)	657	0	53	0	0	0	0	727	155	0	978	624
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	706	0	57				0	782	0	0	1052	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	857	0	393				0	2245		0	2245	
Arrive On Green	0.25	0.00	0.25				0.00	0.64	0.00	0.00	0.64	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	706	0	57				0	782	0	0	1052	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	15.4	0.0	2.2				0.0	8.2	0.0	0.0	12.3	0.0
Cycle Q Clear(g_c), s	15.4	0.0	2.2				0.0	8.2	0.0	0.0	12.3	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	857	0	393				0	2245		0	2245	
V/C Ratio(X)	0.82	0.00	0.15				0.00	0.35		0.00	0.47	
Avail Cap(c_a), veh/h	1318	0	605				0	2245		0	2245	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	28.1	0.0	23.2				0.0	6.7	0.0	0.0	7.5	0.0
Incr Delay (d2), s/veh	2.6	0.0	0.2				0.0	0.4	0.0	0.0	0.7	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
%ile BackOfQ(50%),veh/ln	6.1	0.0	0.8				0.0	2.5	0.0	0.0	3.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.7	0.0	23.3				0.0	7.2	0.0	0.0	8.2	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		763						782	A		1052	A
Approach Delay, s/veh		30.1						7.2			8.2	
Approach LOS		C						A			A	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		55.0		24.3		55.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		50.5		30.5		50.5						
Max Q Clear Time (g_c+I1), s		10.2		17.4		14.3						
Green Ext Time (p_c), s		5.9		2.4		8.7						
Intersection Summary												
HCM 6th Ctrl Delay			14.3									
HCM 6th LOS			B									

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	801	62	82	888	47	87	74	176	108	93	37
Future Volume (veh/h)	32	801	62	82	888	47	87	74	176	108	93	37
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	37	921	71	94	1021	54	100	85	202	124	107	43
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	62	1086	484	120	1203	537	128	153	364	157	612	519
Arrive On Green	0.03	0.31	0.31	0.07	0.34	0.34	0.07	0.31	0.31	0.09	0.33	0.33
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	488	1159	1767	1856	1572
Grp Volume(v), veh/h	37	921	71	94	1021	54	100	0	287	124	107	43
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1647	1767	1856	1572
Q Serve(g_s), s	1.7	19.9	2.7	4.3	21.8	1.9	4.5	0.0	11.8	5.6	3.3	1.5
Cycle Q Clear(g_c), s	1.7	19.9	2.7	4.3	21.8	1.9	4.5	0.0	11.8	5.6	3.3	1.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.70	1.00		1.00
Lane Grp Cap(c), veh/h	62	1086	484	120	1203	537	128	0	517	157	612	519
V/C Ratio(X)	0.60	0.85	0.15	0.78	0.85	0.10	0.78	0.00	0.56	0.79	0.17	0.08
Avail Cap(c_a), veh/h	109	1193	532	185	1345	600	228	0	517	228	612	519
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.7	26.3	20.4	37.3	24.8	18.3	37.0	0.0	23.2	36.3	19.4	18.8
Incr Delay (d2), s/veh	9.1	5.5	0.1	11.0	4.9	0.1	9.7	0.0	4.3	11.1	0.6	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	0.9	8.6	0.9	2.1	9.3	0.7	2.3	0.0	5.0	2.8	1.5	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.7	31.9	20.5	48.2	29.7	18.3	46.8	0.0	27.4	47.4	20.0	19.1
LnGrp LOS	D	C	C	D	C	B	D	A	C	D	B	B
Approach Vol, veh/h		1029			1169			387			274	
Approach Delay, s/veh		31.6			30.7			32.4			32.3	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.7	30.0	10.0	29.5	10.4	31.3	7.3	32.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	25.5	8.5	27.5	10.5	25.5	5.0	31.0				
Max Q Clear Time (g_c+I1), s	7.6	13.8	6.3	21.9	6.5	5.3	3.7	23.8				
Green Ext Time (p_c), s	0.1	1.4	0.0	3.0	0.1	0.6	0.0	3.9				
Intersection Summary												
HCM 6th Ctrl Delay			31.4									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	274	314	231	119	342	92	331	732	62	100	623	114
Future Volume (veh/h)	274	314	231	119	342	92	331	732	62	100	623	114
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	301	345	254	131	376	101	364	804	68	110	685	125
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	354	742	331	165	552	147	420	1267	107	140	1205	537
Arrive On Green	0.10	0.21	0.21	0.09	0.20	0.20	0.12	0.39	0.39	0.08	0.34	0.34
Sat Flow, veh/h	3428	3526	1572	1767	2755	731	3428	3290	278	1767	3526	1572
Grp Volume(v), veh/h	301	345	254	131	239	238	364	431	441	110	685	125
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1724	1714	1763	1805	1767	1763	1572
Q Serve(g_s), s	6.7	6.6	11.8	5.6	9.7	9.9	8.1	15.4	15.4	4.7	12.3	2.9
Cycle Q Clear(g_c), s	6.7	6.6	11.8	5.6	9.7	9.9	8.1	15.4	15.4	4.7	12.3	2.9
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	354	742	331	165	353	345	420	679	695	140	1205	537
V/C Ratio(X)	0.85	0.47	0.77	0.80	0.68	0.69	0.87	0.63	0.63	0.79	0.57	0.23
Avail Cap(c_a), veh/h	354	1214	542	212	637	623	420	679	695	194	1205	537
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	34.2	26.8	28.8	34.4	28.7	28.8	33.4	19.4	19.4	35.0	20.8	8.1
Incr Delay (d2), s/veh	17.6	0.5	3.7	14.8	2.3	2.5	17.1	4.5	4.4	13.3	1.9	1.0
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	3.5	2.7	4.5	3.0	4.1	4.1	4.2	6.6	6.8	2.5	5.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.8	27.2	32.6	49.2	30.9	31.2	50.5	23.9	23.8	48.4	22.8	9.1
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	A
Approach Vol, veh/h		900			608			1236			920	
Approach Delay, s/veh		37.0			35.0			31.7			24.0	
Approach LOS		D			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.6	34.4	11.7	20.8	14.0	31.0	12.5	20.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.5	27.5	9.3	26.7	9.5	26.5	8.0	28.0				
Max Q Clear Time (g_c+I1), s	6.7	17.4	7.6	13.8	10.1	14.3	8.7	11.9				
Green Ext Time (p_c), s	0.0	3.8	0.0	2.5	0.0	4.0	0.0	2.5				
Intersection Summary												
HCM 6th Ctrl Delay			31.6									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	215	237	176	188	118	181	679	124	120	623	56
Future Volume (veh/h)	73	215	237	176	188	118	181	679	124	120	623	56
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	80	236	260	193	207	130	199	746	136	132	685	62
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	177	369	330	223	601	361	229	1230	548	165	1102	491
Arrive On Green	0.05	0.21	0.21	0.13	0.28	0.28	0.13	0.35	0.35	0.09	0.31	0.31
Sat Flow, veh/h	3428	1763	1572	1767	2118	1272	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	80	236	260	193	171	166	199	746	136	132	685	62
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1627	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	1.8	9.9	12.7	8.7	6.2	6.6	8.9	14.2	3.2	5.9	13.4	2.3
Cycle Q Clear(g_c), s	1.8	9.9	12.7	8.7	6.2	6.6	8.9	14.2	3.2	5.9	13.4	2.3
Prop In Lane	1.00		1.00	1.00		0.78	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	177	369	330	223	501	462	229	1230	548	165	1102	491
V/C Ratio(X)	0.45	0.64	0.79	0.87	0.34	0.36	0.87	0.61	0.25	0.80	0.62	0.13
Avail Cap(c_a), veh/h	224	566	505	223	673	621	229	1230	548	205	1102	491
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	37.3	29.2	30.3	34.7	23.0	23.1	34.6	21.8	7.6	36.0	23.8	19.9
Incr Delay (d2), s/veh	1.8	1.8	4.7	28.3	0.4	0.5	27.9	2.2	1.1	16.3	2.6	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	0.8	4.2	5.0	5.4	2.6	2.6	5.5	5.8	1.9	3.2	5.7	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.1	31.0	35.0	63.0	23.4	23.6	62.5	24.0	8.7	52.3	26.4	20.5
LnGrp LOS	D	C	C	E	C	C	E	C	A	D	C	C
Approach Vol, veh/h		576			530			1081			879	
Approach Delay, s/veh		33.9			37.9			29.2			29.9	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.1	32.7	14.7	21.5	15.0	29.8	8.7	27.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.4	26.4	10.2	26.0	10.5	25.3	5.3	30.9
Max Q Clear Time (g_c+I1), s	7.9	16.2	10.7	14.7	10.9	15.4	3.8	8.6
Green Ext Time (p_c), s	0.0	3.9	0.0	2.3	0.0	3.3	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	31.8
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	198	0	191	11	0	11	252	1159	3	9	1097	158
Future Volume (veh/h)	198	0	191	11	0	11	252	1159	3	9	1097	158
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	204	0	197	11	0	11	260	1195	3	9	1131	163
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	354	0	324	134	22	85	305	2177	5	20	1558	695
Arrive On Green	0.21	0.00	0.21	0.21	0.00	0.21	0.17	0.60	0.60	0.01	0.44	0.44
Sat Flow, veh/h	1392	0	1572	302	109	411	1767	3608	9	1767	3526	1572
Grp Volume(v), veh/h	204	0	197	22	0	0	260	584	614	9	1131	163
Grp Sat Flow(s),veh/h/ln	1392	0	1572	822	0	0	1767	1763	1854	1767	1763	1572
Q Serve(g_s), s	3.4	0.0	8.6	0.1	0.0	0.0	10.8	14.8	14.8	0.4	19.9	4.9
Cycle Q Clear(g_c), s	12.1	0.0	8.6	8.7	0.0	0.0	10.8	14.8	14.8	0.4	19.9	4.9
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	354	0	324	241	0	0	305	1064	1118	20	1558	695
V/C Ratio(X)	0.58	0.00	0.61	0.09	0.00	0.00	0.85	0.55	0.55	0.45	0.73	0.23
Avail Cap(c_a), veh/h	547	0	542	428	0	0	410	1064	1118	117	1558	695
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	0.0	27.2	24.4	0.0	0.0	30.3	8.9	8.9	37.0	17.3	13.1
Incr Delay (d2), s/veh	1.5	0.0	1.8	0.2	0.0	0.0	12.2	2.0	1.9	14.7	3.0	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	0.0	3.3	0.3	0.0	0.0	5.4	5.4	5.6	0.2	8.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.3	0.0	29.0	24.5	0.0	0.0	42.4	10.9	10.8	51.8	20.3	13.9
LnGrp LOS	C	A	C	C	A	A	D	B	B	D	C	B
Approach Vol, veh/h		401			22			1458			1303	
Approach Delay, s/veh		29.6			24.5			16.5			19.7	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	50.0		20.1	17.5	37.8		20.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	45.5		26.0	17.5	33.0		26.0				
Max Q Clear Time (g_c+I1), s	2.4	16.8		14.1	12.8	21.9		10.7				
Green Ext Time (p_c), s	0.0	9.7		1.5	0.3	6.3		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			19.5
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	236	38	277	99	1130	0	0	1091	300
Future Volume (veh/h)	0	0	0	236	38	277	99	1130	0	0	1091	300
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				248	40	292	104	1189	0	0	1148	316
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				397	416	353	133	2324	0	0	1853	827
Arrive On Green				0.22	0.22	0.22	0.08	0.66	0.00	0.00	0.53	0.53
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				248	40	292	104	1189	0	0	1148	316
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				9.8	1.3	13.7	4.5	13.4	0.0	0.0	17.7	9.2
Cycle Q Clear(g_c), s				9.8	1.3	13.7	4.5	13.4	0.0	0.0	17.7	9.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				397	416	353	133	2324	0	0	1853	827
V/C Ratio(X)				0.63	0.10	0.83	0.78	0.51	0.00	0.00	0.62	0.38
Avail Cap(c_a), veh/h				685	720	610	217	2324	0	0	1853	827
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				27.1	23.8	28.6	35.1	6.8	0.0	0.0	12.9	10.9
Incr Delay (d2), s/veh				1.6	0.1	5.0	9.5	0.8	0.0	0.0	1.6	1.3
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				4.0	0.5	5.2	2.2	4.2	0.0	0.0	6.4	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				28.7	23.9	33.5	44.6	7.6	0.0	0.0	14.5	12.2
LnGrp LOS				C	C	C	D	A	A	A	B	B
Approach Vol, veh/h					580			1293			1464	
Approach Delay, s/veh					30.8			10.6			14.0	
Approach LOS					C			B			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		55.5			10.3	45.2		21.9				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		51.0			9.5	37.0		30.0				
Max Q Clear Time (g_c+I1), s		15.4			6.5	19.7		15.7				
Green Ext Time (p_c), s		11.4			0.1	8.8		1.7				
Intersection Summary												
HCM 6th Ctrl Delay			15.6									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	399	86	81	0	0	0	0	830	220	426	906	0
Future Volume (veh/h)	399	86	81	0	0	0	0	830	220	426	906	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	416	90	84				0	865	229	444	944	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	443	96	475				0	982	438	475	2106	0
Arrive On Green	0.30	0.30	0.30				0.00	0.28	0.28	0.27	0.60	0.00
Sat Flow, veh/h	1465	317	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	506	0	84				0	865	229	444	944	0
Grp Sat Flow(s),veh/h/ln	1782	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	24.8	0.0	3.5				0.0	21.0	11.0	22.0	13.2	0.0
Cycle Q Clear(g_c), s	24.8	0.0	3.5				0.0	21.0	11.0	22.0	13.2	0.0
Prop In Lane	0.82		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	538	0	475				0	982	438	475	2106	0
V/C Ratio(X)	0.94	0.00	0.18				0.00	0.88	0.52	0.93	0.45	0.00
Avail Cap(c_a), veh/h	547	0	483				0	982	438	484	2106	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.5	0.0	23.0				0.0	30.9	27.3	32.0	9.9	0.0
Incr Delay (d2), s/veh	24.3	0.0	0.2				0.0	11.2	4.4	25.4	0.7	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
%ile BackOfQ(50%),veh/ln	13.4	0.0	1.2				0.0	9.9	4.4	12.4	4.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.8	0.0	23.2				0.0	42.1	31.7	57.3	10.6	0.0
LnGrp LOS	D	A	C				A	D	C	E	B	A
Approach Vol, veh/h		590						1094			1388	
Approach Delay, s/veh		50.3						39.9			25.6	
Approach LOS		D						D			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	28.6	29.4		31.5		58.0
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	24.5	24.5		27.5		53.5
Max Q Clear Time (g_c+I1), s	24.0	23.0		26.8		15.2
Green Ext Time (p_c), s	0.1	0.9		0.3		8.3

Intersection Summary			
HCM 6th Ctrl Delay			35.4
HCM 6th LOS			D

Intersection	
Intersection Delay, s/veh	31.8
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	76	287	41	23	365	43	65	147	28	95	83	94
Future Vol, veh/h	76	287	41	23	365	43	65	147	28	95	83	94
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	79	299	43	24	380	45	68	153	29	99	86	98
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	27	48	21.1	22.8
HCM LOS	D	E	C	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	27%	100%	0%	100%	0%	35%
Vol Thru, %	61%	0%	88%	0%	89%	31%
Vol Right, %	12%	0%	12%	0%	11%	35%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	240	76	328	23	408	272
LT Vol	65	76	0	23	0	95
Through Vol	147	0	287	0	365	83
RT Vol	28	0	41	0	43	94
Lane Flow Rate	250	79	342	24	425	283
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.561	0.186	0.743	0.055	0.909	0.616
Departure Headway (Hd)	8.077	8.441	7.832	8.292	7.699	7.829
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	445	424	461	431	468	459
Service Time	6.171	6.224	5.615	6.068	5.474	5.918
HCM Lane V/C Ratio	0.562	0.186	0.742	0.056	0.908	0.617
HCM Control Delay	21.1	13.2	30.2	11.6	50	22.8
HCM Lane LOS	C	B	D	B	E	C
HCM 95th-tile Q	3.4	0.7	6.1	0.2	10.2	4.1

CUMULATIVE YEAR 2042
WORKSHEETS

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	111	0	0	65	0	1829	74	62	1138	155
Future Vol, veh/h	0	0	111	0	0	65	0	1829	74	62	1138	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	121	0	0	71	0	1988	80	67	1237	168

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	703	-	-	1034	-	0	0	2068	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	324	0	0	195	0	-	-	114	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	324	-	-	195	-	-	-	114	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.6	33.6	0	3.4
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	324	195	114	-	-
HCM Lane V/C Ratio	-	-	0.372	0.362	0.591	-	-
HCM Control Delay (s)	-	-	22.6	33.6	74.4	-	-
HCM Lane LOS	-	-	C	D	F	-	-
HCM 95th %tile Q(veh)	-	-	1.7	1.6	2.9	-	-

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	20	2	0	15	113	2	6	2	46	8	39
Future Vol, veh/h	25	20	2	0	15	113	2	6	2	46	8	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	27	22	2	0	16	123	2	7	2	50	9	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	212	143	30	154	163	8	51	0	0	9	0	0
Stage 1	130	130	-	12	12	-	-	-	-	-	-	-
Stage 2	82	13	-	142	151	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	743	746	1042	811	728	1071	1549	-	-	1604	-	-
Stage 1	871	787	-	1006	884	-	-	-	-	-	-	-
Stage 2	924	883	-	859	770	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	630	721	1042	771	704	1071	1549	-	-	1604	-	-
Mov Cap-2 Maneuver	630	721	-	771	704	-	-	-	-	-	-	-
Stage 1	870	762	-	1005	883	-	-	-	-	-	-	-
Stage 2	802	882	-	806	745	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	9.1	1.5	3.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1549	-	-	678	1009	1604	-	-
HCM Lane V/C Ratio	0.001	-	-	0.075	0.138	0.031	-	-
HCM Control Delay (s)	7.3	0	-	10.7	9.1	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	80	0	0	80	153	1176	99	114	770	22
Future Vol, veh/h	0	0	80	0	0	80	153	1176	99	114	770	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	87	0	0	87	166	1278	108	124	837	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	431	-	-	693	861	0	0	1386	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	570	0	0	384	770	-	-	485	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	570	-	-	384	770	-	-	485	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	17.1	1.2	1.9
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	770	-	-	570	384	485	-	-
HCM Lane V/C Ratio	0.216	-	-	0.153	0.226	0.255	-	-
HCM Control Delay (s)	11	-	-	12.4	17.1	15	-	-
HCM Lane LOS	B	-	-	B	C	B	-	-
HCM 95th %tile Q(veh)	0.8	-	-	0.5	0.9	1	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	71	719	79	1190	0	0	799	444	0	0
Future Volume (veh/h)	71	719	79	1190	0	0	799	444	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	77	782	86	1293	0	0	868	483		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	525	935	111	2076	0	0	1654	738		
Arrive On Green	0.30	0.30	0.06	0.59	0.00	0.00	0.47	0.47		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	77	782	86	1293	0	0	868	483		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	2.5	18.4	3.8	18.8	0.0	0.0	13.7	18.6		
Cycle Q Clear(g_c), s	2.5	18.4	3.8	18.8	0.0	0.0	13.7	18.6		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	525	935	111	2076	0	0	1654	738		
V/C Ratio(X)	0.15	0.84	0.78	0.62	0.00	0.00	0.52	0.65		
Avail Cap(c_a), veh/h	772	1374	213	2076	0	0	1654	738		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	20.4	26.0	36.5	10.5	0.0	0.0	14.8	16.1		
Incr Delay (d2), s/veh	0.1	3.1	11.0	1.4	0.0	0.0	1.2	4.5		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.0	6.6	1.9	6.2	0.0	0.0	5.1	6.7		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	20.5	29.0	47.4	12.0	0.0	0.0	16.0	20.6		
LnGrp LOS	C	C	D	B	A	A	B	C		
Approach Vol, veh/h	859			1379			1351			
Approach Delay, s/veh	28.3			14.2			17.6			
Approach LOS	C			B			B			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		51.0			9.5	41.5		28.0		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		46.5			9.5	32.5		34.5		
Max Q Clear Time (g_c+I1), s		20.8			5.8	20.6		20.4		
Green Ext Time (p_c), s		10.4			0.0	5.9		3.1		
Intersection Summary										
HCM 6th Ctrl Delay			18.8							
HCM 6th LOS			B							

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰		↱					↑↑	↱		↑↑	↱
Traffic Volume (veh/h)	594	0	25	0	0	0	0	674	189	0	501	366
Future Volume (veh/h)	594	0	25	0	0	0	0	674	189	0	501	366
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	646	0	27				0	733	0	0	545	0
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	0	3				0	3	3	0	3	3
Cap, veh/h	820	0	376				0	2231		0	2231	
Arrive On Green	0.24	0.00	0.24				0.00	0.63	0.00	0.00	0.63	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	646	0	27				0	733	0	0	545	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	12.4	0.0	0.9				0.0	6.8	0.0	0.0	4.7	0.0
Cycle Q Clear(g_c), s	12.4	0.0	0.9				0.0	6.8	0.0	0.0	4.7	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	820	0	376				0	2231		0	2231	
V/C Ratio(X)	0.79	0.00	0.07				0.00	0.33		0.00	0.24	
Avail Cap(c_a), veh/h	1780	0	816				0	2231		0	2231	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	25.1	0.0	20.7				0.0	6.0	0.0	0.0	5.6	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.1				0.0	0.4	0.0	0.0	0.3	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
%ile BackOfQ(50%),veh/ln	4.7	0.0	0.3				0.0	1.9	0.0	0.0	1.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.8	0.0	20.8				0.0	6.4	0.0	0.0	5.9	0.0
LnGrp LOS	C	A	C				A	A		A	A	
Approach Vol, veh/h		673						733	A		545	A
Approach Delay, s/veh		26.6						6.4			5.9	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		49.0		21.3		49.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		44.5		36.5		44.5						
Max Q Clear Time (g_c+I1), s		8.8		14.4		6.7						
Green Ext Time (p_c), s		5.4		2.4		3.8						

Intersection Summary			
HCM 6th Ctrl Delay			13.2
HCM 6th LOS			B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	603	40	73	603	66	26	73	76	68	100	19
Future Volume (veh/h)	31	603	40	73	603	66	26	73	76	68	100	19
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	34	655	43	79	655	72	28	79	83	74	109	21
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	60	863	385	102	946	422	52	308	323	144	785	665
Arrive On Green	0.03	0.24	0.24	0.06	0.27	0.27	0.03	0.37	0.37	0.08	0.42	0.42
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	828	870	1767	1856	1572
Grp Volume(v), veh/h	34	655	43	79	655	72	28	0	162	74	109	21
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1699	1767	1856	1572
Q Serve(g_s), s	1.4	12.7	1.6	3.2	12.3	1.9	1.1	0.0	4.9	3.0	2.6	0.6
Cycle Q Clear(g_c), s	1.4	12.7	1.6	3.2	12.3	1.9	1.1	0.0	4.9	3.0	2.6	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.51	1.00		1.00
Lane Grp Cap(c), veh/h	60	863	385	102	946	422	52	0	631	144	785	665
V/C Ratio(X)	0.57	0.76	0.11	0.78	0.69	0.17	0.53	0.00	0.26	0.51	0.14	0.03
Avail Cap(c_a), veh/h	156	1223	546	233	1377	614	137	0	631	228	785	665
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.0	25.7	21.6	34.2	24.2	10.7	35.2	0.0	16.1	32.4	13.0	12.4
Incr Delay (d2), s/veh	8.1	1.8	0.1	11.8	0.9	0.2	8.2	0.0	1.0	2.8	0.4	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	5.2	0.6	1.7	4.9	0.9	0.6	0.0	1.9	1.3	1.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.0	27.5	21.7	46.0	25.1	10.9	43.4	0.0	17.0	35.2	13.4	12.5
LnGrp LOS	D	C	C	D	C	B	D	A	B	D	B	B
Approach Vol, veh/h		732			806			190			204	
Approach Delay, s/veh		27.9			25.9			20.9			21.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.5	31.8	8.7	22.5	6.7	35.6	7.0	24.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	27.3	9.7	25.5	5.7	31.1	6.5	28.7
Max Q Clear Time (g_c+I1), s	5.0	6.9	5.2	14.7	3.1	4.6	3.4	14.3
Green Ext Time (p_c), s	0.0	0.9	0.1	3.3	0.0	0.6	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	25.7
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	258	170	65	314	65	400	669	77	94	725	203
Future Volume (veh/h)	128	258	170	65	314	65	400	669	77	94	725	203
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	139	280	185	71	341	71	435	727	84	102	788	221
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	221	639	285	93	492	101	529	1416	164	131	1285	573
Arrive On Green	0.06	0.18	0.18	0.05	0.17	0.17	0.15	0.44	0.44	0.07	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	1767	2911	599	3428	3184	368	1767	3526	1572
Grp Volume(v), veh/h	139	280	185	71	205	207	435	402	409	102	788	221
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1748	1714	1763	1789	1767	1763	1572
Q Serve(g_s), s	2.9	5.1	5.2	2.9	7.9	8.1	8.9	11.9	12.0	4.1	13.3	7.6
Cycle Q Clear(g_c), s	2.9	5.1	5.2	2.9	7.9	8.1	8.9	11.9	12.0	4.1	13.3	7.6
Prop In Lane	1.00		1.00	1.00		0.34	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	221	639	285	93	298	296	529	784	796	131	1285	573
V/C Ratio(X)	0.63	0.44	0.65	0.77	0.69	0.70	0.82	0.51	0.51	0.78	0.61	0.39
Avail Cap(c_a), veh/h	236	1290	575	156	679	673	589	784	796	207	1285	573
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	33.2	26.5	12.0	34.0	28.4	28.5	29.8	14.5	14.5	33.1	18.9	17.1
Incr Delay (d2), s/veh	4.7	0.5	2.5	12.4	2.8	3.0	8.4	2.4	2.4	9.6	2.2	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	2.1	2.9	1.5	3.4	3.5	4.1	4.7	4.8	2.0	5.3	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	26.9	14.5	46.4	31.2	31.5	38.2	16.9	16.9	42.7	21.1	19.0
LnGrp LOS	D	C	B	D	C	C	D	B	B	D	C	B
Approach Vol, veh/h		604			483			1246			1111	
Approach Delay, s/veh		25.7			33.6			24.3			22.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	36.8	8.3	17.7	15.7	31.0	9.2	16.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	30.5	6.4	26.6	12.5	26.5	5.0	28.0
Max Q Clear Time (g_c+I1), s	6.1	14.0	4.9	7.2	10.9	15.3	4.9	10.1
Green Ext Time (p_c), s	0.0	4.6	0.0	2.2	0.3	4.6	0.0	2.2

Intersection Summary		
HCM 6th Ctrl Delay		25.3
HCM 6th LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	138	102	113	141	74	238	668	152	110	451	99
Future Volume (veh/h)	57	138	102	113	141	74	238	668	152	110	451	99
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	62	150	111	123	153	80	259	726	165	120	490	108
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	171	247	171	155	370	184	303	1571	701	153	1272	567
Arrive On Green	0.05	0.12	0.12	0.09	0.16	0.16	0.17	0.45	0.45	0.09	0.36	0.36
Sat Flow, veh/h	3428	1990	1380	1767	2280	1134	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	62	132	129	123	116	117	259	726	165	120	490	108
Grp Sat Flow(s),veh/h/ln	1714	1763	1607	1767	1763	1651	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	1.2	5.0	5.4	4.8	4.2	4.5	10.0	10.1	2.8	4.7	7.3	3.3
Cycle Q Clear(g_c), s	1.2	5.0	5.4	4.8	4.2	4.5	10.0	10.1	2.8	4.7	7.3	3.3
Prop In Lane	1.00		0.86	1.00		0.69	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	171	219	199	155	286	268	303	1571	701	153	1272	567
V/C Ratio(X)	0.36	0.60	0.65	0.79	0.41	0.44	0.85	0.46	0.24	0.78	0.39	0.19
Avail Cap(c_a), veh/h	243	651	594	176	701	657	341	1571	701	233	1272	567
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	32.4	29.2	29.4	31.5	26.5	26.6	28.3	13.6	4.5	31.5	16.7	15.4
Incr Delay (d2), s/veh	1.3	2.6	3.5	19.3	0.9	1.1	17.2	1.0	0.8	9.2	0.9	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	0.5	2.2	2.2	2.8	1.8	1.8	5.4	3.8	1.6	2.3	2.8	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.6	31.8	32.9	50.7	27.4	27.7	45.5	14.6	5.3	40.7	17.6	16.2
LnGrp LOS	C	C	C	D	C	C	D	B	A	D	B	B
Approach Vol, veh/h		323			356			1150			718	
Approach Delay, s/veh		32.6			35.6			20.2			21.2	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	35.9	10.7	13.2	16.6	29.9	8.0	15.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.3	29.7	7.0	26.0	13.6	25.4	5.0	28.0
Max Q Clear Time (g_c+I1), s	6.7	12.1	6.8	7.4	12.0	9.3	3.2	6.5
Green Ext Time (p_c), s	0.1	5.1	0.0	1.3	0.1	3.2	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	0	11	6	0	8	40	1387	36	2	778	73
Future Volume (veh/h)	32	0	11	6	0	8	40	1387	36	2	778	73
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	35	0	12	7	0	9	43	1508	39	2	846	79
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	191	0	83	110	8	45	74	2566	66	5	2438	1087
Arrive On Green	0.05	0.00	0.05	0.05	0.00	0.05	0.04	0.73	0.73	0.00	0.69	0.69
Sat Flow, veh/h	1395	0	1572	523	145	859	1767	3511	91	1767	3526	1572
Grp Volume(v), veh/h	35	0	12	16	0	0	43	756	791	2	846	79
Grp Sat Flow(s),veh/h/ln	1395	0	1572	1526	0	0	1767	1763	1839	1767	1763	1572
Q Serve(g_s), s	0.8	0.0	0.5	0.0	0.0	0.0	1.5	12.8	12.8	0.1	6.2	1.0
Cycle Q Clear(g_c), s	1.4	0.0	0.5	0.6	0.0	0.0	1.5	12.8	12.8	0.1	6.2	1.0
Prop In Lane	1.00		1.00	0.44		0.56	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	191	0	83	163	0	0	74	1288	1344	5	2438	1087
V/C Ratio(X)	0.18	0.00	0.14	0.10	0.00	0.00	0.58	0.59	0.59	0.41	0.35	0.07
Avail Cap(c_a), veh/h	693	0	649	698	0	0	187	1288	1344	143	2438	1087
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.0	0.0	28.6	28.6	0.0	0.0	29.7	4.0	4.0	31.5	4.0	3.2
Incr Delay (d2), s/veh	0.5	0.0	0.8	0.3	0.0	0.0	7.0	2.0	1.9	48.3	0.4	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.2	0.2	0.0	0.0	0.8	3.2	3.3	0.1	1.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.4	0.0	29.3	28.9	0.0	0.0	36.7	6.0	5.9	79.7	4.3	3.3
LnGrp LOS	C	A	C	C	A	A	D	A	A	E	A	A
Approach Vol, veh/h		47			16			1590			927	
Approach Delay, s/veh		29.4			28.9			6.8			4.4	
Approach LOS		C			C			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	50.7		7.8	7.1	48.2		7.8				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.1	45.3		26.1	6.7	43.7		26.1				
Max Q Clear Time (g_c+I1), s	2.1	14.8		3.4	3.5	8.2		2.6				
Green Ext Time (p_c), s	0.0	14.6		0.1	0.0	7.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			6.5									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑	↱	↰	↑↑			↑↑	↱
Traffic Volume (veh/h)	0	0	0	182	25	337	80	1138	0	0	589	252
Future Volume (veh/h)	0	0	0	182	25	337	80	1138	0	0	589	252
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				198	27	366	87	1237	0	0	640	274
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	3	3	3	0	0	3	3
Cap, veh/h				475	499	422	113	2175	0	0	1748	780
Arrive On Green				0.27	0.27	0.27	0.06	0.62	0.00	0.00	0.50	0.50
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				198	27	366	87	1237	0	0	640	274
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				7.3	0.8	17.4	3.8	16.3	0.0	0.0	8.8	8.4
Cycle Q Clear(g_c), s				7.3	0.8	17.4	3.8	16.3	0.0	0.0	8.8	8.4
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				475	499	422	113	2175	0	0	1748	780
V/C Ratio(X)				0.42	0.05	0.87	0.77	0.57	0.00	0.00	0.37	0.35
Avail Cap(c_a), veh/h				730	767	650	258	2175	0	0	1748	780
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				23.7	21.3	27.4	36.2	8.9	0.0	0.0	12.2	12.1
Incr Delay (d2), s/veh				0.6	0.0	7.7	10.7	1.1	0.0	0.0	0.6	1.2
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				2.8	0.3	6.8	1.9	5.6	0.0	0.0	3.2	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				24.3	21.4	35.1	46.9	10.0	0.0	0.0	12.8	13.3
LnGrp LOS				C	C	D	D	A	A	A	B	B
Approach Vol, veh/h					591			1324			914	
Approach Delay, s/veh					30.9			12.4			13.0	
Approach LOS					C			B			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		53.0			9.5	43.5		25.6				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		48.5			11.5	32.5		32.5				
Max Q Clear Time (g_c+I1), s		18.3			5.8	10.8		19.4				
Green Ext Time (p_c), s		11.4			0.1	5.3		1.7				
Intersection Summary												
HCM 6th Ctrl Delay			16.4									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	373	216	131	0	0	0	0	849	207	127	649	0
Future Volume (veh/h)	373	216	131	0	0	0	0	849	207	127	649	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	405	235	142				0	923	225	138	705	0
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	3				0	3	3	3	3	0
Cap, veh/h	445	258	615				0	1247	556	171	1775	0
Arrive On Green	0.39	0.39	0.39				0.00	0.35	0.35	0.10	0.50	0.00
Sat Flow, veh/h	1138	660	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	640	0	142				0	923	225	138	705	0
Grp Sat Flow(s),veh/h/ln	1799	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	28.7	0.0	5.2				0.0	19.5	9.2	6.5	10.6	0.0
Cycle Q Clear(g_c), s	28.7	0.0	5.2				0.0	19.5	9.2	6.5	10.6	0.0
Prop In Lane	0.63		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	703	0	615				0	1247	556	171	1775	0
V/C Ratio(X)	0.91	0.00	0.23				0.00	0.74	0.40	0.81	0.40	0.00
Avail Cap(c_a), veh/h	804	0	703				0	1247	556	212	1775	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.5	0.0	17.4				0.0	24.1	20.8	37.7	13.1	0.0
Incr Delay (d2), s/veh	13.3	0.0	0.2				0.0	4.0	2.2	16.8	0.7	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
%ile BackOfQ(50%),veh/ln	13.3	0.0	1.7				0.0	8.1	3.5	3.6	4.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.8	0.0	17.6				0.0	28.1	22.9	54.5	13.8	0.0
LnGrp LOS	D	A	B				A	C	C	D	B	A
Approach Vol, veh/h		782						1148			843	
Approach Delay, s/veh		34.1						27.1			20.5	
Approach LOS		C						C			C	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	12.7	34.7	37.8	47.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.2	28.2	38.1	42.9
Max Q Clear Time (g_c+I1), s	8.5	21.5	30.7	12.6
Green Ext Time (p_c), s	0.1	3.6	2.7	5.5

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	127	181	25	28	223	48	34	87	22	34	46	51
Future Vol, veh/h	127	181	25	28	223	48	34	87	22	34	46	51
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
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	138	197	27	30	242	52	37	95	24	37	50	55
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	11.7	13.5	11.2	10.8
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	100%	0%	100%	0%	26%
Vol Thru, %	61%	0%	88%	0%	82%	35%
Vol Right, %	15%	0%	12%	0%	18%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	143	127	206	28	271	131
LT Vol	34	127	0	28	0	34
Through Vol	87	0	181	0	223	46
RT Vol	22	0	25	0	48	51
Lane Flow Rate	155	138	224	30	295	142
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.26	0.247	0.363	0.055	0.479	0.234
Departure Headway (Hd)	6.014	6.43	5.837	6.489	5.856	5.913
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	595	558	616	551	616	605
Service Time	4.074	4.178	3.584	4.237	3.604	3.976
HCM Lane V/C Ratio	0.261	0.247	0.364	0.054	0.479	0.235
HCM Control Delay	11.2	11.3	11.9	9.6	13.9	10.8
HCM Lane LOS	B	B	B	A	B	B
HCM 95th-tile Q	1	1	1.7	0.2	2.6	0.9

Intersection	
Int Delay, s/veh	66.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	255	0	0	152	0	2631	45	56	2735	249
Future Vol, veh/h	0	0	255	0	0	152	0	2631	45	56	2735	249
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	277	0	0	165	0	2860	49	61	2973	271

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1622	-	-	1455	-	0	0	2909	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	~ 78	0	0	~ 101	0	-	-	~ 42	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	~ 78	-	-	~ 101	-	-	-	~ 42	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1261.2	$ 399.8	0	8.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	78	101	~ 42	-	-
HCM Lane V/C Ratio	-	-	3.554	1.636	1.449	-	-
HCM Control Delay (s)	-	$	1261.2$	399.8$	448.9	-	-
HCM Lane LOS	-	-	F	F	F	-	-
HCM 95th %tile Q(veh)	-	-	28.5	12.8	6.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	19	12	0	0	6	107	0	2	0	94	2	22
Future Vol, veh/h	19	12	0	0	6	107	0	2	0	94	2	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	21	13	0	0	7	116	0	2	0	102	2	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	282	220	14	227	232	2	26	0	0	2	0	0
Stage 1	218	218	-	2	2	-	-	-	-	-	-	-
Stage 2	64	2	-	225	230	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	668	677	1063	726	666	1079	1582	-	-	1614	-	-
Stage 1	782	721	-	1018	892	-	-	-	-	-	-	-
Stage 2	944	892	-	775	712	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	562	634	1063	680	623	1079	1582	-	-	1614	-	-
Mov Cap-2 Maneuver	562	634	-	680	623	-	-	-	-	-	-	-
Stage 1	782	675	-	1018	892	-	-	-	-	-	-	-
Stage 2	836	892	-	711	666	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.5	8.9	0	5.9
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1582	-	-	588	1039	1614	-	-
HCM Lane V/C Ratio	-	-	-	0.057	0.118	0.063	-	-
HCM Control Delay (s)	0	-	-	11.5	8.9	7.4	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0.2	-	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	105	0	0	249	152	1580	162	165	1679	12
Future Vol, veh/h	0	0	105	0	0	249	152	1580	162	165	1679	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	108	0	0	257	157	1629	167	170	1731	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	872	-	-	898	1743	0	0	1796	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	292	0	0	280	352	-	-	336	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	292	-	-	280	352	-	-	336	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.4	74.3	1.9	2.3
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	352	-	-	292	280	336	-	-
HCM Lane V/C Ratio	0.445	-	-	0.371	0.917	0.506	-	-
HCM Control Delay (s)	23.2	-	-	24.4	74.3	26.2	-	-
HCM Lane LOS	C	-	-	C	F	D	-	-
HCM 95th %tile Q(veh)	2.2	-	-	1.6	8.5	2.7	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	221	835	71	1847	0	0	1983	1016	0	0
Future Volume (veh/h)	221	835	71	1847	0	0	1983	1016	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	240	908	77	2008	0	0	2155	1104		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	434	773	81	2394	0	0	2101	937		
Arrive On Green	0.25	0.25	0.05	0.68	0.00	0.00	0.60	0.60		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	240	908	77	2008	0	0	2155	1104		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	14.2	29.5	5.2	50.9	0.0	0.0	71.5	71.5		
Cycle Q Clear(g_c), s	14.2	29.5	5.2	50.9	0.0	0.0	71.5	71.5		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	434	773	81	2394	0	0	2101	937		
V/C Ratio(X)	0.55	1.17	0.95	0.84	0.00	0.00	1.03	1.18		
Avail Cap(c_a), veh/h	434	773	81	2394	0	0	2101	937		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	39.5	45.3	57.1	14.3	0.0	0.0	24.2	24.2		
Incr Delay (d2), s/veh	1.5	91.9	83.2	3.7	0.0	0.0	26.5	91.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	6.2	20.9	4.2	18.4	0.0	0.0	34.1	47.3		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	41.0	137.1	140.3	18.1	0.0	0.0	50.8	115.6		
LnGrp LOS	D	F	F	B	A	A	F	F		
Approach Vol, veh/h	1148			2085			3259			
Approach Delay, s/veh	117.0			22.6			72.8			
Approach LOS	F			C			E			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		86.0			10.0	76.0		34.0		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		81.5			5.5	71.5		29.5		
Max Q Clear Time (g_c+I1), s		52.9			7.2	73.5		31.5		
Green Ext Time (p_c), s		19.4			0.0	0.0		0.0		
Intersection Summary										
HCM 6th Ctrl Delay			64.5							
HCM 6th LOS			E							

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	883	0	76	0	0	0	0	1020	221	0	1362	856
Future Volume (veh/h)	883	0	76	0	0	0	0	1020	221	0	1362	856
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	949	0	82				0	1097	0	0	1465	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	1089	0	499				0	2029		0	2029	
Arrive On Green	0.32	0.00	0.32				0.00	0.58	0.00	0.00	0.58	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	949	0	82				0	1097	0	0	1465	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	22.0	0.0	3.2				0.0	16.2	0.0	0.0	25.4	0.0
Cycle Q Clear(g_c), s	22.0	0.0	3.2				0.0	16.2	0.0	0.0	25.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	1089	0	499				0	2029		0	2029	
V/C Ratio(X)	0.87	0.00	0.16				0.00	0.54		0.00	0.72	
Avail Cap(c_a), veh/h	1322	0	607				0	2029		0	2029	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.1	0.0	20.7				0.0	11.0	0.0	0.0	13.0	0.0
Incr Delay (d2), s/veh	5.7	0.0	0.2				0.0	1.0	0.0	0.0	2.3	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
%ile BackOfQ(50%),veh/ln	9.0	0.0	1.1				0.0	5.5	0.0	0.0	8.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.8	0.0	20.9				0.0	12.1	0.0	0.0	15.2	0.0
LnGrp LOS	C	A	C				A	B		A	B	
Approach Vol, veh/h		1031						1097	A		1465	A
Approach Delay, s/veh		31.9						12.1			15.2	
Approach LOS		C						B			B	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		53.0		31.3		53.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		48.5		32.5		48.5						
Max Q Clear Time (g_c+I1), s		18.2		24.0		27.4						
Green Ext Time (p_c), s		8.8		2.8		11.0						
Intersection Summary												
HCM 6th Ctrl Delay			19.0									
HCM 6th LOS			B									

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	1144	51	80	1268	66	56	105	182	155	133	53
Future Volume (veh/h)	46	1144	51	80	1268	66	56	105	182	155	133	53
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	50	1243	55	87	1378	72	61	114	198	168	145	58
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	70	1277	570	102	1341	598	78	172	298	173	623	528
Arrive On Green	0.04	0.36	0.36	0.06	0.38	0.38	0.04	0.28	0.28	0.10	0.34	0.34
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	608	1057	1767	1856	1572
Grp Volume(v), veh/h	50	1243	55	87	1378	72	61	0	312	168	145	58
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1665	1767	1856	1572
Q Serve(g_s), s	2.5	31.3	2.1	4.4	34.2	1.8	3.1	0.0	14.9	8.5	5.1	2.3
Cycle Q Clear(g_c), s	2.5	31.3	2.1	4.4	34.2	1.8	3.1	0.0	14.9	8.5	5.1	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.63	1.00		1.00
Lane Grp Cap(c), veh/h	70	1277	570	102	1341	598	78	0	470	173	623	528
V/C Ratio(X)	0.71	0.97	0.10	0.85	1.03	0.12	0.78	0.00	0.66	0.97	0.23	0.11
Avail Cap(c_a), veh/h	98	1277	570	102	1341	598	173	0	470	173	623	528
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	28.3	19.0	42.0	27.9	8.4	42.6	0.0	28.5	40.5	21.5	20.6
Incr Delay (d2), s/veh	13.4	19.1	0.1	46.1	31.9	0.1	15.1	0.0	7.2	60.1	0.9	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	1.3	15.7	0.7	3.2	19.3	0.9	1.7	0.0	6.7	6.5	2.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.1	47.3	19.0	88.1	59.8	8.5	57.6	0.0	35.7	100.6	22.4	21.0
LnGrp LOS	E	D	B	F	F	A	E	A	D	F	C	C
Approach Vol, veh/h		1348			1537			373			371	
Approach Delay, s/veh		46.5			59.0			39.3			57.6	
Approach LOS		D			E			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.3	29.9	9.7	37.1	8.5	34.7	8.1	38.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.8	25.4	5.2	32.6	8.8	25.4	5.0	32.8				
Max Q Clear Time (g_c+I1), s	10.5	16.9	6.4	33.3	5.1	7.1	4.5	36.2				
Green Ext Time (p_c), s	0.0	1.2	0.0	0.0	0.0	0.9	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			52.2									
HCM 6th LOS			D									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	391	414	329	170	470	131	473	977	88	142	853	162
Future Volume (veh/h)	391	414	329	170	470	131	473	977	88	142	853	162
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	425	450	358	185	511	142	514	1062	96	154	927	176
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	466	838	374	218	614	170	569	1159	105	183	1029	459
Arrive On Green	0.14	0.24	0.24	0.12	0.22	0.22	0.17	0.35	0.35	0.10	0.29	0.29
Sat Flow, veh/h	3428	3526	1572	1767	2728	754	3428	3270	295	1767	3526	1572
Grp Volume(v), veh/h	425	450	358	185	329	324	514	572	586	154	927	176
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1720	1714	1763	1802	1767	1763	1572
Q Serve(g_s), s	12.1	11.1	14.8	10.2	17.7	17.9	14.6	30.8	30.9	8.5	25.1	8.9
Cycle Q Clear(g_c), s	12.1	11.1	14.8	10.2	17.7	17.9	14.6	30.8	30.9	8.5	25.1	8.9
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	466	838	374	218	396	387	569	625	639	183	1029	459
V/C Ratio(X)	0.91	0.54	0.96	0.85	0.83	0.84	0.90	0.92	0.92	0.84	0.90	0.38
Avail Cap(c_a), veh/h	466	948	423	263	497	485	569	625	639	183	1029	459
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	42.3	33.1	16.4	42.7	36.7	36.8	40.6	30.7	30.7	43.7	33.8	28.0
Incr Delay (d2), s/veh	22.2	0.5	31.4	19.5	9.3	10.1	17.7	20.4	20.2	27.9	12.4	2.4
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	6.5	4.7	8.3	5.5	8.4	8.4	7.4	16.0	16.4	5.1	12.1	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.5	33.6	47.8	62.1	46.0	46.8	58.3	51.1	50.9	71.6	46.2	30.5
LnGrp LOS	E	C	D	E	D	D	E	D	D	E	D	C
Approach Vol, veh/h		1233			838			1672			1257	
Approach Delay, s/veh		48.4			49.9			53.2			47.1	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	39.7	16.7	28.1	21.0	33.5	18.0	26.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.3	35.2	14.8	26.7	16.5	29.0	13.5	28.0
Max Q Clear Time (g_c+I1), s	10.5	32.9	12.2	16.8	16.6	27.1	14.1	19.9
Green Ext Time (p_c), s	0.0	1.5	0.1	3.0	0.0	1.2	0.0	2.5

Intersection Summary	
HCM 6th Ctrl Delay	49.9
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	272	339	252	250	169	258	901	178	172	853	80
Future Volume (veh/h)	104	272	339	252	250	169	258	901	178	172	853	80
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	113	296	368	274	272	184	280	979	193	187	927	87
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	169	417	372	281	706	463	284	1147	512	204	987	440
Arrive On Green	0.05	0.24	0.24	0.16	0.35	0.35	0.16	0.33	0.33	0.12	0.28	0.28
Sat Flow, veh/h	3428	1763	1572	1767	2041	1337	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	113	296	368	274	234	222	280	979	193	187	927	87
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1615	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	3.6	17.0	25.7	17.0	11.0	11.5	17.4	28.5	6.7	11.5	28.3	4.6
Cycle Q Clear(g_c), s	3.6	17.0	25.7	17.0	11.0	11.5	17.4	28.5	6.7	11.5	28.3	4.6
Prop In Lane	1.00		1.00	1.00		0.83	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	169	417	372	281	610	559	284	1147	512	204	987	440
V/C Ratio(X)	0.67	0.71	0.99	0.97	0.38	0.40	0.98	0.85	0.38	0.92	0.94	0.20
Avail Cap(c_a), veh/h	234	417	372	281	610	559	284	1147	512	204	987	440
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	51.4	38.5	41.9	46.0	27.1	27.3	46.0	34.6	11.8	48.1	38.7	30.2
Incr Delay (d2), s/veh	4.5	5.6	43.9	46.5	0.4	0.5	49.0	8.1	2.1	40.5	17.3	1.0
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	1.6	7.8	14.2	11.1	4.7	4.5	11.4	13.2	2.6	7.3	14.2	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	44.1	85.8	92.5	27.5	27.7	95.0	42.8	13.9	88.6	55.9	31.2
LnGrp LOS	E	D	F	F	C	C	F	D	B	F	E	C
Approach Vol, veh/h		777			730			1452			1201	
Approach Delay, s/veh		65.6			52.0			49.0			59.2	
Approach LOS		E			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.2	40.3	22.0	30.5	22.2	35.3	9.9	42.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.7	35.8	17.5	26.0	17.7	30.8	7.5	36.0
Max Q Clear Time (g_c+I1), s	13.5	30.5	19.0	27.7	19.4	30.3	5.6	13.5
Green Ext Time (p_c), s	0.0	3.1	0.0	0.0	0.0	0.4	0.1	3.0

Intersection Summary	
HCM 6th Ctrl Delay	55.6
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	213	0	66	15	0	15	249	1656	5	12	1566	189
Future Volume (veh/h)	213	0	66	15	0	15	249	1656	5	12	1566	189
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	220	0	68	15	0	15	257	1707	5	12	1614	195
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	337	0	274	159	19	117	291	2380	7	25	1798	802
Arrive On Green	0.17	0.00	0.17	0.17	0.00	0.17	0.16	0.66	0.66	0.01	0.51	0.51
Sat Flow, veh/h	1387	0	1572	565	109	673	1767	3606	11	1767	3526	1572
Grp Volume(v), veh/h	220	0	68	30	0	0	257	834	878	12	1614	195
Grp Sat Flow(s),veh/h/ln	1387	0	1572	1347	0	0	1767	1763	1854	1767	1763	1572
Q Serve(g_s), s	9.5	0.0	3.3	0.0	0.0	0.0	12.7	27.3	27.3	0.6	37.0	6.2
Cycle Q Clear(g_c), s	12.8	0.0	3.3	3.4	0.0	0.0	12.7	27.3	27.3	0.6	37.0	6.2
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	337	0	274	295	0	0	291	1164	1224	25	1798	802
V/C Ratio(X)	0.65	0.00	0.25	0.10	0.00	0.00	0.88	0.72	0.72	0.47	0.90	0.24
Avail Cap(c_a), veh/h	498	0	457	463	0	0	295	1164	1224	99	1798	802
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	0.0	31.8	31.0	0.0	0.0	36.5	9.8	9.8	43.7	19.8	12.2
Incr Delay (d2), s/veh	2.1	0.0	0.5	0.1	0.0	0.0	25.4	3.8	3.6	12.9	7.5	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	4.7	0.0	1.3	0.6	0.0	0.0	7.4	10.0	10.5	0.4	15.7	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.6	0.0	32.3	31.2	0.0	0.0	61.9	13.6	13.4	56.6	27.3	13.0
LnGrp LOS	D	A	C	C	A	A	E	B	B	E	C	B
Approach Vol, veh/h		288			30			1969			1821	
Approach Delay, s/veh		36.3			31.2			19.8			26.0	
Approach LOS		D			C			B			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	63.5		20.1	19.2	50.1		20.1
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	55.5		26.0	14.9	45.6		26.0
Max Q Clear Time (g_c+I1), s	2.6	29.3		14.8	14.7	39.0		5.4
Green Ext Time (p_c), s	0.0	15.5		0.8	0.0	5.4		0.1

Intersection Summary	
HCM 6th Ctrl Delay	23.8
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	337	54	303	141	1595	0	0	1351	428
Future Volume (veh/h)	0	0	0	337	54	303	141	1595	0	0	1351	428
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				355	57	319	148	1679	0	0	1422	451
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				431	453	384	182	2265	0	0	1702	759
Arrive On Green				0.24	0.24	0.24	0.10	0.64	0.00	0.00	0.48	0.48
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				355	57	319	148	1679	0	0	1422	451
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				15.1	1.9	15.3	6.5	25.8	0.0	0.0	27.7	16.5
Cycle Q Clear(g_c), s				15.1	1.9	15.3	6.5	25.8	0.0	0.0	27.7	16.5
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				431	453	384	182	2265	0	0	1702	759
V/C Ratio(X)				0.82	0.13	0.83	0.81	0.74	0.00	0.00	0.84	0.59
Avail Cap(c_a), veh/h				668	701	594	191	2265	0	0	1702	759
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				28.4	23.4	28.5	34.8	9.7	0.0	0.0	17.8	14.9
Incr Delay (d2), s/veh				4.9	0.1	5.9	21.9	2.2	0.0	0.0	5.0	3.4
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				6.4	0.8	5.9	3.8	8.7	0.0	0.0	11.1	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				33.2	23.5	34.3	56.7	11.9	0.0	0.0	22.8	18.3
LnGrp LOS				C	C	C	E	B	A	A	C	B
Approach Vol, veh/h					731			1827			1873	
Approach Delay, s/veh					33.0			15.5			21.7	
Approach LOS					C			B			C	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		55.5			12.7	42.8		23.9				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		51.0			8.6	37.9		30.0				
Max Q Clear Time (g_c+I1), s		27.8			8.5	29.7		17.3				
Green Ext Time (p_c), s		14.6			0.0	6.2		2.1				
Intersection Summary												
HCM 6th Ctrl Delay			21.0									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	570	122	116	0	0	0	0	1167	314	436	1260	0
Future Volume (veh/h)	570	122	116	0	0	0	0	1167	314	436	1260	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	594	127	121				0	1216	327	454	1312	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	514	110	550				0	1106	493	378	2003	0
Arrive On Green	0.35	0.35	0.35				0.00	0.31	0.31	0.21	0.57	0.00
Sat Flow, veh/h	1468	314	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	721	0	121				0	1216	327	454	1312	0
Grp Sat Flow(s),veh/h/ln	1782	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	38.5	0.0	6.0				0.0	34.5	19.8	23.5	28.2	0.0
Cycle Q Clear(g_c), s	38.5	0.0	6.0				0.0	34.5	19.8	23.5	28.2	0.0
Prop In Lane	0.82		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	624	0	550				0	1106	493	378	2003	0
V/C Ratio(X)	1.16	0.00	0.22				0.00	1.10	0.66	1.20	0.65	0.00
Avail Cap(c_a), veh/h	624	0	550				0	1106	493	378	2003	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.8	0.0	25.2				0.0	37.8	32.7	43.3	16.3	0.0
Incr Delay (d2), s/veh	87.3	0.0	0.2				0.0	58.6	6.9	113.8	1.7	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
%ile BackOfQ(50%),veh/ln	30.8	0.0	2.2				0.0	23.2	8.2	22.1	11.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	123.1	0.0	25.4				0.0	96.4	39.6	157.1	18.0	0.0
LnGrp LOS	F	A	C				A	F	D	F	B	A
Approach Vol, veh/h		842						1543			1766	
Approach Delay, s/veh		109.1						84.3			53.8	
Approach LOS		F						F			D	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	28.0	39.0		43.0		67.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	23.5	34.5		38.5		62.5						
Max Q Clear Time (g_c+I1), s	25.5	36.5		40.5		30.2						
Green Ext Time (p_c), s	0.0	0.0		0.0		12.7						

Intersection Summary			
HCM 6th Ctrl Delay			76.3
HCM 6th LOS			E

Intersection	
Intersection Delay, s/veh	92.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	108	410	40	14	521	62	59	73	6	136	45	135
Future Vol, veh/h	108	410	40	14	521	62	59	73	6	136	45	135
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	113	427	42	15	543	65	61	76	6	142	47	141
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	58.9	175.5	18.1	29.5
HCM LOS	F	F	C	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	43%	100%	0%	100%	0%	43%
Vol Thru, %	53%	0%	91%	0%	89%	14%
Vol Right, %	4%	0%	9%	0%	11%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	108	450	14	583	316
LT Vol	59	108	0	14	0	136
Through Vol	73	0	410	0	521	45
RT Vol	6	0	40	0	62	135
Lane Flow Rate	144	112	469	15	607	329
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.354	0.256	0.991	0.034	1.314	0.708
Departure Headway (Hd)	9.816	8.804	8.219	8.387	7.792	8.475
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	369	411	445	426	468	431
Service Time	7.816	6.504	5.919	6.148	5.553	6.475
HCM Lane V/C Ratio	0.39	0.273	1.054	0.035	1.297	0.763
HCM Control Delay	18.1	14.5	69.5	11.4	179.4	29.5
HCM Lane LOS	C	B	F	B	F	D
HCM 95th-tile Q	1.6	1	12.5	0.1	26.5	5.4

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	111	0	0	118	0	1829	191	85	1182	155
Future Vol, veh/h	0	0	111	0	0	118	0	1829	191	85	1182	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	121	0	0	128	0	1988	208	92	1285	168

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	727	-	-	1098	-	0	0	2196	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	313	0	0	177	0	-	-	98	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	313	-	-	177	-	-	-	98	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	23.5	65.7	0	9.2
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	313	177	98	-	-
HCM Lane V/C Ratio	-	-	0.385	0.725	0.943	-	-
HCM Control Delay (s)	-	-	23.5	65.7	154.4	-	-
HCM Lane LOS	-	-	C	F	F	-	-
HCM 95th %tile Q(veh)	-	-	1.8	4.5	5.5	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	20	2	0	15	113	2	59	2	46	148	39
Future Vol, veh/h	25	20	2	0	15	113	2	59	2	46	148	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	27	22	2	0	16	123	2	64	2	50	161	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	421	352	182	363	372	65	203	0	0	66	0	0
Stage 1	282	282	-	69	69	-	-	-	-	-	-	-
Stage 2	139	70	-	294	303	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	541	571	858	591	557	996	1363	-	-	1529	-	-
Stage 1	723	676	-	939	835	-	-	-	-	-	-	-
Stage 2	862	835	-	712	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	450	549	858	555	535	996	1363	-	-	1529	-	-
Mov Cap-2 Maneuver	450	549	-	555	535	-	-	-	-	-	-	-
Stage 1	722	651	-	937	833	-	-	-	-	-	-	-
Stage 2	739	833	-	661	638	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.1	9.7	0.2	1.5
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1363	-	-	498	905	1529	-	-
HCM Lane V/C Ratio	0.002	-	-	0.103	0.154	0.033	-	-
HCM Control Delay (s)	7.6	0	-	13.1	9.7	7.4	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	80	0	0	80	153	1194	99	114	817	22
Future Vol, veh/h	0	0	80	0	0	80	153	1194	99	114	817	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	87	0	0	87	166	1298	108	124	888	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	456	-	-	703	912	0	0	1406	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	549	0	0	378	737	-	-	476	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	549	-	-	378	737	-	-	476	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.8	17.3	1.2	1.8
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	737	-	-	549	378	476	-	-
HCM Lane V/C Ratio	0.226	-	-	0.158	0.23	0.26	-	-
HCM Control Delay (s)	11.3	-	-	12.8	17.3	15.2	-	-
HCM Lane LOS	B	-	-	B	C	C	-	-
HCM 95th %tile Q(veh)	0.9	-	-	0.6	0.9	1	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	71	742	79	1284	0	0	817	470	0	0
Future Volume (veh/h)	71	742	79	1284	0	0	817	470	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	77	807	86	1396	0	0	888	511		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	535	951	111	2067	0	0	1651	736		
Arrive On Green	0.30	0.30	0.06	0.59	0.00	0.00	0.47	0.47		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	77	807	86	1396	0	0	888	511		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	2.6	19.5	3.9	22.0	0.0	0.0	14.5	20.7		
Cycle Q Clear(g_c), s	2.6	19.5	3.9	22.0	0.0	0.0	14.5	20.7		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	535	951	111	2067	0	0	1651	736		
V/C Ratio(X)	0.14	0.85	0.78	0.68	0.00	0.00	0.54	0.69		
Avail Cap(c_a), veh/h	731	1301	185	2067	0	0	1651	736		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	20.6	26.5	37.4	11.5	0.0	0.0	15.3	17.0		
Incr Delay (d2), s/veh	0.1	4.0	11.1	1.8	0.0	0.0	1.3	5.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.0	7.1	1.9	7.4	0.0	0.0	5.4	7.6		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	20.7	30.5	48.5	13.3	0.0	0.0	16.6	22.3		
LnGrp LOS	C	C	D	B	A	A	B	C		
Approach Vol, veh/h	884			1482			1399			
Approach Delay, s/veh	29.7			15.3			18.7			
Approach LOS	C			B			B			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		52.0			9.6	42.4		29.0		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		47.5			8.5	34.5		33.5		
Max Q Clear Time (g_c+I1), s		24.0			5.9	22.7		21.5		
Green Ext Time (p_c), s		11.0			0.0	6.0		3.0		

Intersection Summary		
HCM 6th Ctrl Delay		19.9
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	664	0	25	0	0	0	0	697	189	0	510	375
Future Volume (veh/h)	664	0	25	0	0	0	0	697	189	0	510	375
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	722	0	27				0	758	0	0	554	0
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	0	3				0	3	3	0	3	3
Cap, veh/h	905	0	415				0	2142		0	2142	
Arrive On Green	0.26	0.00	0.26				0.00	0.61	0.00	0.00	0.61	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	722	0	27				0	758	0	0	554	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	13.7	0.0	0.9				0.0	7.5	0.0	0.0	5.1	0.0
Cycle Q Clear(g_c), s	13.7	0.0	0.9				0.0	7.5	0.0	0.0	5.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	905	0	415				0	2142		0	2142	
V/C Ratio(X)	0.80	0.00	0.07				0.00	0.35		0.00	0.26	
Avail Cap(c_a), veh/h	1886	0	865				0	2142		0	2142	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	24.0	0.0	19.3				0.0	6.9	0.0	0.0	6.4	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.1				0.0	0.5	0.0	0.0	0.3	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
%ile BackOfQ(50%),veh/ln	5.1	0.0	0.3				0.0	2.2	0.0	0.0	1.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.7	0.0	19.3				0.0	7.3	0.0	0.0	6.7	0.0
LnGrp LOS	C	A	B				A	A		A	A	
Approach Vol, veh/h		749						758	A		554	A
Approach Delay, s/veh		25.4						7.3			6.7	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		47.0		23.0		47.0
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		42.5		38.5		42.5
Max Q Clear Time (g_c+I1), s		9.5		15.7		7.1
Green Ext Time (p_c), s		5.5		2.7		3.8

Intersection Summary			
HCM 6th Ctrl Delay			13.7
HCM 6th LOS			B

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	603	87	119	603	66	44	73	93	68	100	19
Future Volume (veh/h)	31	603	87	119	603	66	44	73	93	68	100	19
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	34	655	95	129	655	72	48	79	101	74	109	21
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	60	860	383	165	1069	477	75	252	322	138	697	590
Arrive On Green	0.03	0.24	0.24	0.09	0.30	0.30	0.04	0.34	0.34	0.08	0.38	0.38
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	740	946	1767	1856	1572
Grp Volume(v), veh/h	34	655	95	129	655	72	48	0	180	74	109	21
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1685	1767	1856	1572
Q Serve(g_s), s	1.4	12.7	3.6	5.2	11.7	1.8	2.0	0.0	5.8	3.0	2.9	0.6
Cycle Q Clear(g_c), s	1.4	12.7	3.6	5.2	11.7	1.8	2.0	0.0	5.8	3.0	2.9	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.56	1.00		1.00
Lane Grp Cap(c), veh/h	60	860	383	165	1069	477	75	0	573	138	697	590
V/C Ratio(X)	0.57	0.76	0.25	0.78	0.61	0.15	0.64	0.00	0.31	0.54	0.16	0.04
Avail Cap(c_a), veh/h	144	1170	522	317	1516	676	163	0	573	226	697	590
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.0	25.8	22.4	32.6	21.9	9.5	34.6	0.0	17.9	32.6	15.2	14.5
Incr Delay (d2), s/veh	8.1	2.0	0.3	7.9	0.6	0.1	8.7	0.0	1.4	3.2	0.5	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	5.2	1.3	2.5	4.6	0.8	1.0	0.0	2.4	1.4	1.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.0	27.8	22.7	40.4	22.5	9.6	43.3	0.0	19.3	35.9	15.7	14.6
LnGrp LOS	D	C	C	D	C	A	D	A	B	D	B	B
Approach Vol, veh/h		784			856			228			204	
Approach Delay, s/veh		27.9			24.1			24.4			22.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	29.5	11.4	22.4	7.6	32.1	7.0	26.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.4	25.0	13.2	24.4	6.8	27.6	6.0	31.6
Max Q Clear Time (g_c+I1), s	5.0	7.8	7.2	14.7	4.0	4.9	3.4	13.7
Green Ext Time (p_c), s	0.0	0.9	0.1	3.2	0.0	0.6	0.0	4.3

Intersection Summary	
HCM 6th Ctrl Delay	25.5
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	267	170	65	337	65	400	687	77	94	772	203
Future Volume (veh/h)	128	267	170	65	337	65	400	687	77	94	772	203
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	139	290	185	71	366	71	435	747	84	102	839	221
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	220	665	296	92	521	100	527	1407	158	131	1271	567
Arrive On Green	0.06	0.19	0.19	0.05	0.18	0.18	0.15	0.44	0.44	0.07	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	1767	2950	567	3428	3195	359	1767	3526	1572
Grp Volume(v), veh/h	139	290	185	71	217	220	435	412	419	102	839	221
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1754	1714	1763	1791	1767	1763	1572
Q Serve(g_s), s	2.9	5.3	5.2	2.9	8.5	8.7	9.0	12.5	12.6	4.2	14.7	7.7
Cycle Q Clear(g_c), s	2.9	5.3	5.2	2.9	8.5	8.7	9.0	12.5	12.6	4.2	14.7	7.7
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	220	665	296	92	311	310	527	776	789	131	1271	567
V/C Ratio(X)	0.63	0.44	0.62	0.77	0.70	0.71	0.82	0.53	0.53	0.78	0.66	0.39
Avail Cap(c_a), veh/h	233	1276	569	154	672	668	583	776	789	204	1271	567
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	33.5	26.4	11.9	34.4	28.4	28.5	30.1	15.0	15.0	33.4	19.7	17.5
Incr Delay (d2), s/veh	5.0	0.5	2.2	12.7	2.8	3.0	8.7	2.6	2.6	9.6	2.7	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	2.2	2.9	1.5	3.6	3.7	4.2	5.0	5.1	2.1	5.9	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	26.8	14.1	47.1	31.2	31.5	38.8	17.6	17.6	43.0	22.4	19.5
LnGrp LOS	D	C	B	D	C	C	D	B	B	D	C	B
Approach Vol, veh/h		614			508			1266			1162	
Approach Delay, s/veh		25.6			33.6			24.9			23.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	36.9	8.3	18.4	15.8	31.0	9.2	17.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	30.5	6.4	26.6	12.5	26.5	5.0	28.0
Max Q Clear Time (g_c+I1), s	6.2	14.6	4.9	7.3	11.0	16.7	4.9	10.7
Green Ext Time (p_c), s	0.0	4.7	0.0	2.3	0.3	4.5	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	25.9
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	146	102	113	164	74	238	685	152	110	498	99
Future Volume (veh/h)	57	146	102	113	164	74	238	685	152	110	498	99
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	62	159	111	123	178	80	259	745	165	120	541	108
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	171	258	170	155	396	171	303	1565	698	153	1267	565
Arrive On Green	0.05	0.13	0.13	0.09	0.16	0.16	0.17	0.44	0.44	0.09	0.36	0.36
Sat Flow, veh/h	3428	2038	1339	1767	2397	1035	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	62	136	134	123	129	129	259	745	165	120	541	108
Grp Sat Flow(s),veh/h/ln	1714	1763	1614	1767	1763	1669	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	1.2	5.2	5.6	4.8	4.7	4.9	10.1	10.5	2.8	4.7	8.2	3.3
Cycle Q Clear(g_c), s	1.2	5.2	5.6	4.8	4.7	4.9	10.1	10.5	2.8	4.7	8.2	3.3
Prop In Lane	1.00		0.83	1.00		0.62	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	171	224	205	155	291	275	303	1565	698	153	1267	565
V/C Ratio(X)	0.36	0.61	0.65	0.79	0.44	0.47	0.86	0.48	0.24	0.78	0.43	0.19
Avail Cap(c_a), veh/h	242	648	594	175	698	661	340	1565	698	232	1267	565
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	32.5	29.2	29.4	31.6	26.6	26.7	28.4	13.9	4.6	31.6	17.1	15.6
Incr Delay (d2), s/veh	1.3	2.7	3.5	19.4	1.1	1.2	17.4	1.0	0.8	9.4	1.1	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.2	2.2	2.9	2.0	2.0	5.5	3.9	1.6	2.3	3.2	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.8	31.9	32.9	51.0	27.6	27.9	45.9	14.9	5.4	41.0	18.2	16.3
LnGrp LOS	C	C	C	D	C	C	D	B	A	D	B	B
Approach Vol, veh/h		332			381			1169			769	
Approach Delay, s/veh		32.6			35.3			20.4			21.5	
Approach LOS		C			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.6	35.9	10.7	13.5	16.6	29.9	8.0	16.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	9.3	29.7	7.0	26.0	13.6	25.4	5.0	28.0				
Max Q Clear Time (g_c+I1), s	6.7	12.5	6.8	7.6	12.1	10.2	3.2	6.9				
Green Ext Time (p_c), s	0.1	5.2	0.0	1.4	0.1	3.4	0.0	1.5				
Intersection Summary												
HCM 6th Ctrl Delay			24.4									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary
10: 11th Avenue & 5th Street

11/02/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	0	64	6	0	8	181	1387	36	2	778	119
Future Volume (veh/h)	50	0	64	6	0	8	181	1387	36	2	778	119
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	54	0	70	7	0	9	197	1508	39	2	846	129
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	233	0	118	101	21	53	378	2497	64	5	1763	787
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.21	0.71	0.71	0.00	0.50	0.50
Sat Flow, veh/h	1395	0	1572	270	277	704	1767	3511	91	1767	3526	1572
Grp Volume(v), veh/h	54	0	70	16	0	0	197	756	791	2	846	129
Grp Sat Flow(s),veh/h/ln	1395	0	1572	1252	0	0	1767	1763	1839	1767	1763	1572
Q Serve(g_s), s	0.0	0.0	2.8	0.0	0.0	0.0	6.3	13.9	13.9	0.1	10.1	2.9
Cycle Q Clear(g_c), s	1.9	0.0	2.8	2.8	0.0	0.0	6.3	13.9	13.9	0.1	10.1	2.9
Prop In Lane	1.00		1.00	0.44		0.56	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	233	0	118	175	0	0	378	1254	1308	5	1763	787
V/C Ratio(X)	0.23	0.00	0.59	0.09	0.00	0.00	0.52	0.60	0.60	0.41	0.48	0.16
Avail Cap(c_a), veh/h	696	0	639	656	0	0	511	1254	1308	138	1763	787
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	0.0	28.6	27.6	0.0	0.0	22.3	4.7	4.7	31.8	10.5	8.7
Incr Delay (d2), s/veh	0.5	0.0	4.7	0.2	0.0	0.0	1.1	2.2	2.1	48.3	0.9	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	0.8	0.0	1.1	0.2	0.0	0.0	2.6	3.7	3.9	0.1	3.6	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.7	0.0	33.3	27.9	0.0	0.0	23.4	6.8	6.8	80.1	11.5	9.2
LnGrp LOS	C	A	C	C	A	A	C	A	A	F	B	A
Approach Vol, veh/h		124			16			1744			977	
Approach Delay, s/veh		31.3			27.9			8.7			11.3	
Approach LOS		C			C			A			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	50.0		9.3	18.2	36.5		9.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	45.5		26.0	18.5	32.0		26.0				
Max Q Clear Time (g_c+I1), s	2.1	15.9		4.8	8.3	12.1		4.8				
Green Ext Time (p_c), s	0.0	14.4		0.5	0.4	6.5		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			10.7									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	182	25	454	80	1161	0	0	642	252
Future Volume (veh/h)	0	0	0	182	25	454	80	1161	0	0	642	252
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				198	27	493	87	1262	0	0	698	274
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	3	3	3	0	0	3	3
Cap, veh/h				615	646	547	112	1904	0	0	1484	662
Arrive On Green				0.35	0.35	0.35	0.06	0.54	0.00	0.00	0.42	0.42
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				198	27	493	87	1262	0	0	698	274
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				6.6	0.8	24.0	3.9	20.6	0.0	0.0	11.5	9.8
Cycle Q Clear(g_c), s				6.6	0.8	24.0	3.9	20.6	0.0	0.0	11.5	9.8
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				615	646	547	112	1904	0	0	1484	662
V/C Ratio(X)				0.32	0.04	0.90	0.78	0.66	0.00	0.00	0.47	0.41
Avail Cap(c_a), veh/h				823	864	732	224	1904	0	0	1484	662
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				19.3	17.4	24.9	37.1	13.3	0.0	0.0	16.8	16.4
Incr Delay (d2), s/veh				0.3	0.0	11.6	10.8	1.8	0.0	0.0	1.1	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
%ile BackOfQ(50%),veh/ln				2.5	0.3	9.7	2.0	7.8	0.0	0.0	4.5	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				19.6	17.4	36.5	47.9	15.1	0.0	0.0	17.9	18.3
LnGrp LOS				B	B	D	D	B	A	A	B	B
Approach Vol, veh/h					718			1349			972	
Approach Delay, s/veh					31.1			17.2			18.0	
Approach LOS					C			B			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		48.0			9.6	38.4		32.5				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		43.5			10.2	28.8		37.5				
Max Q Clear Time (g_c+I1), s		22.6			5.9	13.5		26.0				
Green Ext Time (p_c), s		9.8			0.1	5.0		2.1				
Intersection Summary												
HCM 6th Ctrl Delay			20.8									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary
12: 11th Avenue & SR 198 EB Off Ramp/3rd Street

11/02/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	373	216	131	0	0	0	0	872	207	171	658	0
Future Volume (veh/h)	373	216	131	0	0	0	0	872	207	171	658	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	405	235	142				0	948	225	186	715	0
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	3				0	3	3	3	3	0
Cap, veh/h	438	254	606				0	1180	526	221	1803	0
Arrive On Green	0.39	0.39	0.39				0.00	0.33	0.33	0.12	0.51	0.00
Sat Flow, veh/h	1138	660	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	640	0	142				0	948	225	186	715	0
Grp Sat Flow(s),veh/h/ln	1799	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	29.6	0.0	5.3				0.0	21.3	9.7	9.0	10.8	0.0
Cycle Q Clear(g_c), s	29.6	0.0	5.3				0.0	21.3	9.7	9.0	10.8	0.0
Prop In Lane	0.63		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	693	0	606				0	1180	526	221	1803	0
V/C Ratio(X)	0.92	0.00	0.23				0.00	0.80	0.43	0.84	0.40	0.00
Avail Cap(c_a), veh/h	754	0	660				0	1180	526	234	1803	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.5	0.0	18.1				0.0	26.3	22.5	37.2	13.0	0.0
Incr Delay (d2), s/veh	16.3	0.0	0.2				0.0	5.8	2.5	22.6	0.7	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
%ile BackOfQ(50%),veh/ln	14.3	0.0	1.8				0.0	9.2	3.7	5.2	4.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.8	0.0	18.3				0.0	32.2	25.0	59.8	13.7	0.0
LnGrp LOS	D	A	B				A	C	C	E	B	A
Approach Vol, veh/h		782						1173			901	
Approach Delay, s/veh		37.5						30.8			23.2	
Approach LOS		D						C			C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	15.4	33.6		38.0		49.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	11.5	28.5		36.5		44.5						
Max Q Clear Time (g_c+I1), s	11.0	23.3		31.6		12.8						
Green Ext Time (p_c), s	0.0	3.0		2.0		5.6						
Intersection Summary												
HCM 6th Ctrl Delay			30.2									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	15
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	127	181	48	51	223	48	43	122	30	34	140	51
Future Vol, veh/h	127	181	48	51	223	48	43	122	30	34	140	51
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
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	138	197	52	55	242	52	47	133	33	37	152	55
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.3	16.4	14.1	14.9
HCM LOS	B	C	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	22%	100%	0%	100%	0%	15%
Vol Thru, %	63%	0%	79%	0%	82%	62%
Vol Right, %	15%	0%	21%	0%	18%	23%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	127	229	51	271	225
LT Vol	43	127	0	51	0	34
Through Vol	122	0	181	0	223	140
RT Vol	30	0	48	0	48	51
Lane Flow Rate	212	138	249	55	295	245
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.396	0.28	0.46	0.113	0.55	0.447
Departure Headway (Hd)	6.721	7.311	6.648	7.357	6.718	6.576
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	534	491	540	487	536	548
Service Time	4.773	5.06	4.397	5.106	4.466	4.625
HCM Lane V/C Ratio	0.397	0.281	0.461	0.113	0.55	0.447
HCM Control Delay	14.1	12.9	15	11	17.4	14.9
HCM Lane LOS	B	B	B	B	C	B
HCM 95th-tile Q	1.9	1.1	2.4	0.4	3.3	2.3

Intersection	
Int Delay, s/veh	117.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	255	0	0	296	0	2631	110	69	2855	249
Future Vol, veh/h	0	0	255	0	0	296	0	2631	110	69	2855	249
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	-	125	-	-
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	0	0	277	0	0	322	0	2860	120	75	3103	271

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1687	-	-	1490	-	0	0	2980	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.16	-	-	7.16	-	-	-	5.36	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.93	-	-	3.93	-	-	-	3.13	-	-
Pot Cap-1 Maneuver	0	0	~ 70	0	0	~ 96	0	-	-	~ 38	-	-
Stage 1	0	0	-	0	0	-	0	-	-	-	-	-
Stage 2	0	0	-	0	0	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	~ 70	-	-	~ 96	-	-	-	~ 38	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1453.8	$ 1151.6	0	14.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	70	96	~ 38	-	-
HCM Lane V/C Ratio	-	-	3.96	3.351	1.974	-	-
HCM Control Delay (s)	-		$ 1453.8	$ 1151.6	$ 682.3	-	-
HCM Lane LOS	-	-	F	F	F	-	-
HCM 95th %tile Q(veh)	-	-	29.4	32	8.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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	19	12	0	0	6	107	0	146	0	94	79	22
Future Vol, veh/h	19	12	0	0	6	107	0	146	0	94	79	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	21	13	0	0	7	116	0	159	0	102	86	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	523	461	98	468	473	159	110	0	0	159	0	0
Stage 1	302	302	-	159	159	-	-	-	-	-	-	-
Stage 2	221	159	-	309	314	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
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	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	463	496	955	504	488	884	1474	-	-	1414	-	-
Stage 1	705	662	-	841	764	-	-	-	-	-	-	-
Stage 2	779	764	-	699	654	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	374	458	955	464	450	884	1474	-	-	1414	-	-
Mov Cap-2 Maneuver	374	458	-	464	450	-	-	-	-	-	-	-
Stage 1	705	611	-	841	764	-	-	-	-	-	-	-
Stage 2	671	764	-	631	604	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.7	10	0	3.7
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1474	-	-	403	841	1414	-	-
HCM Lane V/C Ratio	-	-	-	0.084	0.146	0.072	-	-
HCM Control Delay (s)	0	-	-	14.7	10	7.7	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.5	0.2	-	-

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	105	0	0	249	152	1628	162	165	1705	12
Future Vol, veh/h	0	0	105	0	0	249	152	1628	162	165	1705	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	75	-	-	125	-	-
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	0	0	108	0	0	257	157	1678	167	170	1758	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	885	-	-	923	1770	0	0	1845	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.96	-	-	6.96	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.33	-	-	3.33	2.23	-	-	2.23	-	-
Pot Cap-1 Maneuver	0	0	286	0	0	270	344	-	-	321	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	286	-	-	270	344	-	-	321	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.1	83.6	1.9	2.5
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	344	-	-	286	270	321	-	-
HCM Lane V/C Ratio	0.456	-	-	0.378	0.951	0.53	-	-
HCM Control Delay (s)	23.9	-	-	25.1	83.6	28.2	-	-
HCM Lane LOS	C	-	-	D	F	D	-	-
HCM 95th %tile Q(veh)	2.3	-	-	1.7	9	2.9	-	-

Movement	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Traffic Volume (veh/h)	221	848	71	1899	0	0	2032	1088	0	0
Future Volume (veh/h)	221	848	71	1899	0	0	2032	1088	0	0
Initial Q (Qb), veh	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		
Work Zone On Approach	No			No			No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	0	0	1856	1856		
Adj Flow Rate, veh/h	240	922	77	2064	0	0	2209	1183		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	3	3	3	3	0	0	3	3		
Cap, veh/h	434	773	81	2394	0	0	2101	937		
Arrive On Green	0.25	0.25	0.05	0.68	0.00	0.00	0.60	0.60		
Sat Flow, veh/h	1767	3145	1767	3618	0	0	3618	1572		
Grp Volume(v), veh/h	240	922	77	2064	0	0	2209	1183		
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1763	0	0	1763	1572		
Q Serve(g_s), s	14.2	29.5	5.2	54.4	0.0	0.0	71.5	71.5		
Cycle Q Clear(g_c), s	14.2	29.5	5.2	54.4	0.0	0.0	71.5	71.5		
Prop In Lane	1.00	1.00	1.00		0.00	0.00		1.00		
Lane Grp Cap(c), veh/h	434	773	81	2394	0	0	2101	937		
V/C Ratio(X)	0.55	1.19	0.95	0.86	0.00	0.00	1.05	1.26		
Avail Cap(c_a), veh/h	434	773	81	2394	0	0	2101	937		
HCM Platoon Ratio	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	0.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	39.5	45.3	57.1	14.9	0.0	0.0	24.2	24.2		
Incr Delay (d2), s/veh	1.5	99.2	83.2	4.4	0.0	0.0	34.9	126.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	6.2	21.7	4.2	19.8	0.0	0.0	36.5	56.5		
Unsig. Movement Delay, s/veh										
LnGrp Delay(d),s/veh	41.0	144.5	140.3	19.3	0.0	0.0	59.1	151.0		
LnGrp LOS	D	F	F	B	A	A	F	F		
Approach Vol, veh/h	1162			2141			3392			
Approach Delay, s/veh	123.1			23.6			91.2			
Approach LOS	F			C			F			
Timer - Assigned Phs		2			5	6		8		
Phs Duration (G+Y+Rc), s		86.0			10.0	76.0		34.0		
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5		
Max Green Setting (Gmax), s		81.5			5.5	71.5		29.5		
Max Q Clear Time (g_c+I1), s		56.4			7.2	73.5		31.5		
Green Ext Time (p_c), s		18.2			0.0	0.0		0.0		
Intersection Summary										
HCM 6th Ctrl Delay			75.1							
HCM 6th LOS			E							

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	922	0	76	0	0	0	0	1033	221	0	1386	881
Future Volume (veh/h)	922	0	76	0	0	0	0	1033	221	0	1386	881
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	0	1856				0	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	991	0	82				0	1111	0	0	1490	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	0	3				0	3	3	0	3	3
Cap, veh/h	1122	0	515				0	2001		0	2001	
Arrive On Green	0.33	0.00	0.33				0.00	0.57	0.00	0.00	0.57	0.00
Sat Flow, veh/h	3428	0	1572				0	3618	1572	0	3618	1572
Grp Volume(v), veh/h	991	0	82				0	1111	0	0	1490	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1572	0	1763	1572
Q Serve(g_s), s	23.4	0.0	3.2				0.0	17.0	0.0	0.0	27.1	0.0
Cycle Q Clear(g_c), s	23.4	0.0	3.2				0.0	17.0	0.0	0.0	27.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	1122	0	515				0	2001		0	2001	
V/C Ratio(X)	0.88	0.00	0.16				0.00	0.56		0.00	0.74	
Avail Cap(c_a), veh/h	1304	0	598				0	2001		0	2001	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	0.0	20.4				0.0	11.7	0.0	0.0	13.8	0.0
Incr Delay (d2), s/veh	6.7	0.0	0.1				0.0	1.1	0.0	0.0	2.6	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
%ile BackOfQ(50%),veh/ln	9.7	0.0	1.1				0.0	5.9	0.0	0.0	9.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.9	0.0	20.5				0.0	12.8	0.0	0.0	16.4	0.0
LnGrp LOS	C	A	C				A	B		A	B	
Approach Vol, veh/h		1073						1111	A		1490	A
Approach Delay, s/veh		32.9						12.8			16.4	
Approach LOS		C						B			B	

Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		53.0		32.5		53.0						
Change Period (Y+Rc), s		4.5		4.5		4.5						
Max Green Setting (Gmax), s		48.5		32.5		48.5						
Max Q Clear Time (g_c+I1), s		19.0		25.4		29.1						
Green Ext Time (p_c), s		8.9		2.6		10.7						

Intersection Summary		
HCM 6th Ctrl Delay		20.1
HCM 6th LOS		C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	1144	77	106	1268	66	104	105	231	155	133	53
Future Volume (veh/h)	46	1144	77	106	1268	66	104	105	231	155	133	53
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	50	1243	84	115	1378	72	113	114	251	168	145	58
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	69	1257	561	129	1375	613	134	144	316	171	555	470
Arrive On Green	0.04	0.36	0.36	0.07	0.39	0.39	0.08	0.28	0.28	0.10	0.30	0.30
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	516	1135	1767	1856	1572
Grp Volume(v), veh/h	50	1243	84	115	1378	72	113	0	365	168	145	58
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	0	1651	1767	1856	1572
Q Serve(g_s), s	2.6	32.2	3.3	5.9	35.9	1.8	5.8	0.0	18.8	8.7	5.5	2.5
Cycle Q Clear(g_c), s	2.6	32.2	3.3	5.9	35.9	1.8	5.8	0.0	18.8	8.7	5.5	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.69	1.00		1.00
Lane Grp Cap(c), veh/h	69	1257	561	129	1375	613	134	0	459	171	555	470
V/C Ratio(X)	0.72	0.99	0.15	0.89	1.00	0.12	0.84	0.00	0.79	0.98	0.26	0.12
Avail Cap(c_a), veh/h	96	1257	561	129	1375	613	134	0	459	171	555	470
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	29.4	20.1	42.3	28.1	8.3	41.9	0.0	30.8	41.5	24.5	23.5
Incr Delay (d2), s/veh	15.0	22.7	0.1	48.6	24.7	0.1	35.4	0.0	13.2	63.5	1.1	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	1.4	16.7	1.2	4.3	18.8	0.9	3.8	0.0	9.0	6.8	2.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.7	52.1	20.2	90.9	52.8	8.4	77.4	0.0	44.0	105.0	25.7	24.0
LnGrp LOS	E	D	C	F	F	A	E	A	D	F	C	C
Approach Vol, veh/h		1377			1565			478			371	
Approach Delay, s/veh		50.4			53.5			51.9			61.3	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	30.1	11.2	37.3	11.5	32.0	8.1	40.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.9	25.6	6.7	32.8	7.0	27.5	5.0	34.5
Max Q Clear Time (g_c+I1), s	10.7	20.8	7.9	34.2	7.8	7.5	4.6	37.9
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	0.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	52.9
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑	↱	↰	↑↱		↰↰	↑↱		↰	↑↑	↱
Traffic Volume (veh/h)	391	438	329	170	483	131	473	1025	88	142	879	162
Future Volume (veh/h)	391	438	329	170	483	131	473	1025	88	142	879	162
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	425	476	358	185	525	142	514	1114	96	154	955	176
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	464	847	378	217	626	169	567	1159	100	182	1025	457
Arrive On Green	0.14	0.24	0.24	0.12	0.23	0.23	0.17	0.35	0.35	0.10	0.29	0.29
Sat Flow, veh/h	3428	3526	1572	1767	2746	739	3428	3285	283	1767	3526	1572
Grp Volume(v), veh/h	425	476	358	185	336	331	514	597	613	154	955	176
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1722	1714	1763	1805	1767	1763	1572
Q Serve(g_s), s	12.2	11.8	14.8	10.2	18.1	18.3	14.7	33.1	33.2	8.5	26.3	8.9
Cycle Q Clear(g_c), s	12.2	11.8	14.8	10.2	18.1	18.3	14.7	33.1	33.2	8.5	26.3	8.9
Prop In Lane	1.00		1.00	1.00		0.43	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	464	847	378	217	402	393	567	622	637	182	1025	457
V/C Ratio(X)	0.92	0.56	0.95	0.85	0.84	0.84	0.91	0.96	0.96	0.84	0.93	0.38
Avail Cap(c_a), veh/h	464	944	421	262	495	484	567	622	637	182	1025	457
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	42.6	33.3	16.4	42.8	36.7	36.8	40.9	31.6	31.6	43.9	34.4	28.3
Incr Delay (d2), s/veh	22.9	0.6	29.3	19.7	10.0	10.7	18.3	27.6	27.4	28.6	15.8	2.4
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	6.5	5.0	8.1	5.6	8.7	8.7	7.5	18.2	18.6	5.1	13.1	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.4	33.9	45.7	62.5	46.7	47.5	59.1	59.1	59.1	72.6	50.2	30.7
LnGrp LOS	E	C	D	E	D	D	E	E	E	E	D	C
Approach Vol, veh/h		1259			852			1724			1285	
Approach Delay, s/veh		47.9			50.5			59.1			50.2	
Approach LOS		D			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	39.7	16.8	28.5	21.0	33.5	18.0	27.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.3	35.2	14.8	26.7	16.5	29.0	13.5	28.0
Max Q Clear Time (g_c+I1), s	10.5	35.2	12.2	16.8	16.7	28.3	14.2	20.3
Green Ext Time (p_c), s	0.0	0.0	0.1	3.2	0.0	0.5	0.0	2.4

Intersection Summary			
HCM 6th Ctrl Delay			52.7
HCM 6th LOS			D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	296	339	252	263	169	258	950	178	172	879	80
Future Volume (veh/h)	104	296	339	252	263	169	258	950	178	172	879	80
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	113	322	368	274	286	184	280	1033	193	187	955	87
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	169	417	372	281	721	450	284	1147	512	204	987	440
Arrive On Green	0.05	0.24	0.24	0.16	0.35	0.35	0.16	0.33	0.33	0.12	0.28	0.28
Sat Flow, veh/h	3428	1763	1572	1767	2082	1302	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	113	322	368	274	241	229	280	1033	193	187	955	87
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1767	1763	1621	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	3.6	18.8	25.7	17.0	11.4	11.8	17.4	30.8	6.7	11.5	29.4	4.6
Cycle Q Clear(g_c), s	3.6	18.8	25.7	17.0	11.4	11.8	17.4	30.8	6.7	11.5	29.4	4.6
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	169	417	372	281	610	561	284	1147	512	204	987	440
V/C Ratio(X)	0.67	0.77	0.99	0.97	0.39	0.41	0.98	0.90	0.38	0.92	0.97	0.20
Avail Cap(c_a), veh/h	234	417	372	281	610	561	284	1147	512	204	987	440
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	51.4	39.2	41.9	46.0	27.2	27.4	46.0	35.4	11.8	48.1	39.1	30.2
Incr Delay (d2), s/veh	4.5	8.7	43.9	46.5	0.4	0.5	49.0	11.3	2.1	40.5	21.8	1.0
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	1.6	9.0	14.2	11.1	4.9	4.7	11.4	14.6	2.6	7.3	15.3	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	48.0	85.8	92.5	27.7	27.9	95.0	46.7	13.9	88.6	60.9	31.2
LnGrp LOS	E	D	F	F	C	C	F	D	B	F	E	C
Approach Vol, veh/h		803			744			1506			1229	
Approach Delay, s/veh		66.4			51.6			51.5			63.0	
Approach LOS		E			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.2	40.3	22.0	30.5	22.2	35.3	9.9	42.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.7	35.8	17.5	26.0	17.7	30.8	7.5	36.0
Max Q Clear Time (g_c+I1), s	13.5	32.8	19.0	27.7	19.4	31.4	5.6	13.8
Green Ext Time (p_c), s	0.0	2.0	0.0	0.0	0.0	0.0	0.1	3.1

Intersection Summary			
HCM 6th Ctrl Delay			57.6
HCM 6th LOS			E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	0	211	15	0	15	327	1656	5	12	1566	215
Future Volume (veh/h)	262	0	211	15	0	15	327	1656	5	12	1566	215
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	270	0	218	15	0	15	337	1707	5	12	1614	222
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	345	0	372	125	15	91	339	2261	7	25	1583	706
Arrive On Green	0.24	0.00	0.24	0.24	0.00	0.24	0.19	0.63	0.63	0.01	0.45	0.45
Sat Flow, veh/h	1387	0	1572	319	65	385	1767	3606	11	1767	3526	1572
Grp Volume(v), veh/h	270	0	218	30	0	0	337	834	878	12	1614	222
Grp Sat Flow(s),veh/h/ln	1387	0	1572	770	0	0	1767	1763	1854	1767	1763	1572
Q Serve(g_s), s	11.3	0.0	13.5	0.3	0.0	0.0	20.9	36.9	36.9	0.7	49.4	10.0
Cycle Q Clear(g_c), s	25.1	0.0	13.5	13.8	0.0	0.0	20.9	36.9	36.9	0.7	49.4	10.0
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	345	0	372	231	0	0	339	1105	1162	25	1583	706
V/C Ratio(X)	0.78	0.00	0.59	0.13	0.00	0.00	0.99	0.75	0.76	0.49	1.02	0.31
Avail Cap(c_a), veh/h	345	0	372	231	0	0	339	1105	1162	80	1583	706
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	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	0.0	37.2	33.3	0.0	0.0	44.4	14.5	14.5	53.8	30.3	19.4
Incr Delay (d2), s/veh	11.2	0.0	2.4	0.3	0.0	0.0	47.2	4.8	4.6	14.1	27.6	1.2
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	8.3	0.0	5.4	0.6	0.0	0.0	13.5	15.0	15.7	0.4	26.1	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	0.0	39.6	33.5	0.0	0.0	91.6	19.3	19.1	67.9	57.9	20.6
LnGrp LOS	D	A	D	C	A	A	F	B	B	E	F	C
Approach Vol, veh/h		488			30			2049			1848	
Approach Delay, s/veh		47.5			33.5			31.1			53.5	
Approach LOS		D			C			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	73.5		30.5	25.6	53.9		30.5				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	65.5		26.0	21.1	49.4		26.0				
Max Q Clear Time (g_c+I1), s	2.7	38.9		27.1	22.9	51.4		15.8				
Green Ext Time (p_c), s	0.0	15.6		0.0	0.0	0.0		0.1				

Intersection Summary			
HCM 6th Ctrl Delay			42.3
HCM 6th LOS			D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	337	54	368	141	1608	0	0	1496	428
Future Volume (veh/h)	0	0	0	337	54	368	141	1608	0	0	1496	428
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	1856	1856	1856	0	0	1856	1856
Adj Flow Rate, veh/h				355	57	387	148	1693	0	0	1575	451
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				3	3	3	3	3	0	0	3	3
Cap, veh/h				498	523	443	165	2153	0	0	1634	729
Arrive On Green				0.28	0.28	0.28	0.09	0.61	0.00	0.00	0.46	0.46
Sat Flow, veh/h				1767	1856	1572	1767	3618	0	0	3618	1572
Grp Volume(v), veh/h				355	57	387	148	1693	0	0	1575	451
Grp Sat Flow(s),veh/h/ln				1767	1856	1572	1767	1763	0	0	1763	1572
Q Serve(g_s), s				15.1	1.9	19.6	6.9	30.0	0.0	0.0	36.2	18.0
Cycle Q Clear(g_c), s				15.1	1.9	19.6	6.9	30.0	0.0	0.0	36.2	18.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				498	523	443	165	2153	0	0	1634	729
V/C Ratio(X)				0.71	0.11	0.87	0.90	0.79	0.00	0.00	0.96	0.62
Avail Cap(c_a), veh/h				635	666	565	165	2153	0	0	1634	729
HCM Platoon Ratio				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	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				27.0	22.2	28.6	37.5	12.2	0.0	0.0	21.7	16.9
Incr Delay (d2), s/veh				2.7	0.1	11.8	41.8	3.0	0.0	0.0	15.2	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				6.2	0.8	8.2	4.8	10.9	0.0	0.0	16.8	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				29.7	22.3	40.4	79.3	15.2	0.0	0.0	37.0	20.8
LnGrp LOS				C	C	D	E	B	A	A	D	C
Approach Vol, veh/h					799			1841			2026	
Approach Delay, s/veh					34.3			20.3			33.4	
Approach LOS					C			C			C	

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		55.5			12.3	43.2		28.0				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		51.0			7.8	38.7		30.0				
Max Q Clear Time (g_c+I1), s		32.0			8.9	38.2		21.6				
Green Ext Time (p_c), s		12.8			0.0	0.5		1.9				

Intersection Summary			
HCM 6th Ctrl Delay			28.4
HCM 6th LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	570	122	116	0	0	0	0	1180	314	556	1284	0
Future Volume (veh/h)	570	122	116	0	0	0	0	1180	314	556	1284	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	594	127	121				0	1229	327	579	1338	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	496	106	531				0	1043	465	449	2071	0
Arrive On Green	0.34	0.34	0.34				0.00	0.30	0.30	0.25	0.59	0.00
Sat Flow, veh/h	1468	314	1572				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	721	0	121				0	1229	327	579	1338	0
Grp Sat Flow(s),veh/h/ln	1782	0	1572				0	1763	1572	1767	1763	0
Q Serve(g_s), s	40.5	0.0	6.6				0.0	35.5	22.2	30.5	30.3	0.0
Cycle Q Clear(g_c), s	40.5	0.0	6.6				0.0	35.5	22.2	30.5	30.3	0.0
Prop In Lane	0.82		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	601	0	531				0	1043	465	449	2071	0
V/C Ratio(X)	1.20	0.00	0.23				0.00	1.18	0.70	1.29	0.65	0.00
Avail Cap(c_a), veh/h	601	0	531				0	1043	465	449	2071	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.8	0.0	28.5				0.0	42.3	37.6	44.7	16.5	0.0
Incr Delay (d2), s/veh	104.8	0.0	0.2				0.0	90.4	8.6	146.0	1.6	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
%ile BackOfQ(50%),veh/ln	34.3	0.0	2.5				0.0	28.0	9.4	31.4	12.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	144.6	0.0	28.7				0.0	132.6	46.2	190.8	18.0	0.0
LnGrp LOS	F	A	C				A	F	D	F	B	A
Approach Vol, veh/h		842						1556			1917	
Approach Delay, s/veh		127.9						114.5			70.2	
Approach LOS		F						F			E	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	35.0	40.0		45.0		75.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	30.5	35.5		40.5		70.5						
Max Q Clear Time (g_c+I1), s	32.5	37.5		42.5		32.3						
Green Ext Time (p_c), s	0.0	0.0		0.0		13.8						

Intersection Summary			
HCM 6th Ctrl Delay			97.4
HCM 6th LOS			F

Intersection	
Intersection Delay, s/veh	146.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	108	410	53	27	521	62	83	169	30	136	97	135
Future Vol, veh/h	108	410	53	27	521	62	83	169	30	136	97	135
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	113	427	55	28	543	65	86	176	31	142	101	141
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	123.6	263.1	44	69.1
HCM LOS	F	F	E	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	29%	100%	0%	100%	0%	37%
Vol Thru, %	60%	0%	89%	0%	89%	26%
Vol Right, %	11%	0%	11%	0%	11%	37%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	282	108	463	27	583	368
LT Vol	83	108	0	27	0	136
Through Vol	169	0	410	0	521	97
RT Vol	30	0	53	0	62	135
Lane Flow Rate	294	112	482	28	607	383
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.77	0.3	1.209	0.075	1.527	0.943
Departure Headway (Hd)	11.38	10.86	10.246	10.213	9.609	10.6
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	320	333	357	353	383	345
Service Time	9.38	8.56	7.946	7.913	7.309	8.6
HCM Lane V/C Ratio	0.919	0.336	1.35	0.079	1.585	1.11
HCM Control Delay	44	18.1	148.2	13.7	274.6	69.1
HCM Lane LOS	E	C	F	B	F	F
HCM 95th-tile Q	6	1.2	18	0.2	31.5	9.8

TRANSPORTATION IMPROVEMENT WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	181	48	51	223	48	43	122	30	34	140	51
Future Volume (veh/h)	127	181	48	51	223	48	43	122	30	34	140	51
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	138	197	52	55	242	52	47	133	33	37	152	55
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	192	429	113	106	377	81	189	276	61	161	268	88
Arrive On Green	0.11	0.30	0.30	0.06	0.25	0.25	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1767	1415	373	1767	1480	318	245	1207	266	157	1172	387
Grp Volume(v), veh/h	138	0	249	55	0	294	213	0	0	244	0	0
Grp Sat Flow(s),veh/h/ln	1767	0	1788	1767	0	1798	1718	0	0	1716	0	0
Q Serve(g_s), s	2.5	0.0	3.7	1.0	0.0	4.8	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.5	0.0	3.7	1.0	0.0	4.8	3.4	0.0	0.0	4.1	0.0	0.0
Prop In Lane	1.00		0.21	1.00		0.18	0.22		0.15	0.15		0.23
Lane Grp Cap(c), veh/h	192	0	543	106	0	458	525	0	0	518	0	0
V/C Ratio(X)	0.72	0.00	0.46	0.52	0.00	0.64	0.41	0.00	0.00	0.47	0.00	0.00
Avail Cap(c_a), veh/h	935	0	1973	508	0	1549	1636	0	0	1665	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.3	0.0	9.3	15.1	0.0	11.0	11.2	0.0	0.0	11.4	0.0	0.0
Incr Delay (d2), s/veh	5.0	0.0	0.6	3.9	0.0	1.5	0.5	0.0	0.0	0.7	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	1.0	0.0	1.0	0.4	0.0	1.5	1.1	0.0	0.0	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.2	0.0	9.9	19.0	0.0	12.5	11.7	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	A	A	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		387			349			213			244	
Approach Delay, s/veh		13.2			13.5			11.7			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		12.1	6.5	14.5		12.1	8.1	12.9				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		30.5	9.5	36.5		30.5	17.5	28.5				
Max Q Clear Time (g_c+I1), s		5.4	3.0	5.7		6.1	4.5	6.8				
Green Ext Time (p_c), s		1.3	0.0	1.5		1.5	0.3	1.6				

Intersection Summary			
HCM 6th Ctrl Delay			12.8
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	410	53	27	521	62	83	169	30	136	97	135
Future Volume (veh/h)	108	410	53	27	521	62	83	169	30	136	97	135
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	112	427	55	28	543	65	86	176	31	142	101	141
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	144	712	92	55	637	76	178	325	51	226	144	169
Arrive On Green	0.08	0.44	0.44	0.03	0.39	0.39	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1767	1611	207	1767	1626	195	332	1052	164	475	466	546
Grp Volume(v), veh/h	112	0	482	28	0	608	293	0	0	384	0	0
Grp Sat Flow(s),veh/h/ln	1767	0	1818	1767	0	1821	1548	0	0	1488	0	0
Q Serve(g_s), s	3.8	0.0	12.4	1.0	0.0	18.9	0.0	0.0	0.0	5.2	0.0	0.0
Cycle Q Clear(g_c), s	3.8	0.0	12.4	1.0	0.0	18.9	9.5	0.0	0.0	14.7	0.0	0.0
Prop In Lane	1.00		0.11	1.00		0.11	0.29		0.11	0.37		0.37
Lane Grp Cap(c), veh/h	144	0	804	55	0	713	553	0	0	539	0	0
V/C Ratio(X)	0.78	0.00	0.60	0.51	0.00	0.85	0.53	0.00	0.00	0.71	0.00	0.00
Avail Cap(c_a), veh/h	243	0	1093	166	0	1015	911	0	0	875	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.9	0.0	13.1	29.5	0.0	17.2	17.8	0.0	0.0	19.7	0.0	0.0
Incr Delay (d2), s/veh	8.7	0.0	0.7	7.3	0.0	5.0	0.8	0.0	0.0	1.8	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	1.9	0.0	4.4	0.5	0.0	7.7	3.3	0.0	0.0	4.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.6	0.0	13.8	36.8	0.0	22.2	18.6	0.0	0.0	21.5	0.0	0.0
LnGrp LOS	D	A	B	D	A	C	B	A	A	C	A	A
Approach Vol, veh/h		594			636			293			384	
Approach Delay, s/veh		18.1			22.9			18.6			21.5	
Approach LOS		B			C			B			C	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.6	6.4	31.9		23.6	9.5	28.7				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		33.5	5.8	37.2		33.5	8.5	34.5				
Max Q Clear Time (g_c+I1), s		11.5	3.0	14.4		16.7	5.8	20.9				
Green Ext Time (p_c), s		1.8	0.0	3.0		2.4	0.1	3.4				

Intersection Summary			
HCM 6th Ctrl Delay			20.4
HCM 6th LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	373	216	131	0	0	0	0	872	207	171	658	0
Future Volume (veh/h)	373	216	131	0	0	0	0	872	207	171	658	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	405	235	142				0	948	225	186	715	0
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	3				0	3	3	3	3	0
Cap, veh/h	874	276	167				0	1620	723	224	2254	0
Arrive On Green	0.26	0.26	0.26				0.00	0.46	0.46	0.13	0.64	0.00
Sat Flow, veh/h	3428	1083	655				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	405	0	377				0	948	225	186	715	0
Grp Sat Flow(s),veh/h/ln	1714	0	1738				0	1763	1572	1767	1763	0
Q Serve(g_s), s	8.5	0.0	17.6				0.0	16.9	7.7	8.8	7.8	0.0
Cycle Q Clear(g_c), s	8.5	0.0	17.6				0.0	16.9	7.7	8.8	7.8	0.0
Prop In Lane	1.00		0.38				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	874	0	443				0	1620	723	224	2254	0
V/C Ratio(X)	0.46	0.00	0.85				0.00	0.59	0.31	0.83	0.32	0.00
Avail Cap(c_a), veh/h	1066	0	540				0	1620	723	321	2254	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.8	0.0	30.2				0.0	17.0	14.5	36.3	7.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	10.5				0.0	1.6	1.1	11.5	0.4	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
%ile BackOfQ(50%),veh/ln	3.3	0.0	8.1				0.0	6.5	2.7	4.4	2.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.2	0.0	40.7				0.0	18.6	15.6	47.8	7.3	0.0
LnGrp LOS	C	A	D				A	B	B	D	A	A
Approach Vol, veh/h		782						1173			901	
Approach Delay, s/veh		33.7						18.0			15.7	
Approach LOS		C						B			B	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	15.3	43.7		26.2		59.0						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	15.5	34.5		26.5		54.5						
Max Q Clear Time (g_c+I1), s	10.8	18.9		19.6		9.8						
Green Ext Time (p_c), s	0.2	6.4		2.1		5.9						

Intersection Summary			
HCM 6th Ctrl Delay			21.6
HCM 6th LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↳						↑↑	↱	↰	↑↑	
Traffic Volume (veh/h)	570	122	116	0	0	0	0	1180	314	556	1284	0
Future Volume (veh/h)	570	122	116	0	0	0	0	1180	314	556	1284	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	1856				0	1856	1856	1856	1856	0
Adj Flow Rate, veh/h	594	127	121				0	1229	327	579	1338	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3				0	3	3	3	3	0
Cap, veh/h	670	171	163				0	1254	559	591	2567	0
Arrive On Green	0.20	0.20	0.20				0.00	0.36	0.36	0.33	0.73	0.00
Sat Flow, veh/h	3428	874	832				0	3618	1572	1767	3618	0
Grp Volume(v), veh/h	594	0	248				0	1229	327	579	1338	0
Grp Sat Flow(s),veh/h/ln	1714	0	1706				0	1763	1572	1767	1763	0
Q Serve(g_s), s	19.9	0.0	16.2				0.0	40.7	20.0	38.3	19.6	0.0
Cycle Q Clear(g_c), s	19.9	0.0	16.2				0.0	40.7	20.0	38.3	19.6	0.0
Prop In Lane	1.00		0.49				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	670	0	334				0	1254	559	591	2567	0
V/C Ratio(X)	0.89	0.00	0.74				0.00	0.98	0.58	0.98	0.52	0.00
Avail Cap(c_a), veh/h	726	0	361				0	1254	559	591	2567	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.2	0.0	44.7				0.0	37.6	31.0	38.9	7.0	0.0
Incr Delay (d2), s/veh	12.1	0.0	7.5				0.0	21.1	4.4	31.7	0.8	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
%ile BackOfQ(50%),veh/ln	9.3	0.0	7.3				0.0	20.5	8.0	21.5	6.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.3	0.0	52.2				0.0	58.7	35.4	70.6	7.8	0.0
LnGrp LOS	E	A	D				A	E	D	E	A	A
Approach Vol, veh/h		842						1556			1917	
Approach Delay, s/veh		56.5						53.8			26.8	
Approach LOS		E						D			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	44.0	46.5		27.6		90.5
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	39.5	42.0		25.0		86.0
Max Q Clear Time (g_c+I1), s	40.3	42.7		21.9		21.6
Green Ext Time (p_c), s	0.0	0.0		1.2		15.6

Intersection Summary			
HCM 6th Ctrl Delay			42.3
HCM 6th LOS			D

APPENDIX D

Chapter 400 of Caltrans' Highway Design Manual (HDM)

CHAPTER 400
INTERSECTIONS AT GRADE

Intersections are planned points of conflict where two or more roadways join or cross. At-grade intersections are among the most complicated elements on the highway system, and control the efficiency, capacity, and safety for motorized and non-motorized users of the facility. The type and operation of an intersection is important to the adjacent property owners, motorists, bicyclists, pedestrians, transit operators, the trucking industry, and the local community.

There are two basic types of at grade intersections: crossing and circular. It is not recommended that intersections have more than four legs. Occasionally, local development and land uses create the need for a more complex intersection design. Such intersections may require a specialized intersection design to handle the specify traffic demands at that location. In addition to the guidance in this manual, see Traffic Operations Policy Directive (TOPD) Number 13-02: Intersection Control Evaluation (ICE) for direction and procedures on the evaluation, comparison and selection of the intersection types and control strategies identified in Index 401.5. Also refer to the Complete Streets Intersection Guide for further information.

Topic 401 - Factors Affecting Design

Index 401.1 - General

At-grade intersections must handle a variety of conflicts among users, which includes truck, transit, pedestrians, and bicycles. These recurring conflicts play a major role in the preparation of design standards and guidelines. Arriving, departing, merging, turning, and crossing paths of moving pedestrians, bicycles, truck, and vehicular traffic have to be accommodated within a relatively small area. The objective of designing an intersection is to effectively balance the convenience, ease, and comfort of the users, as well as the human factors, with moving traffic (automobiles, trucks, motorcycles, transit vehicles, bicycles, pedestrians, etc.).The safety and mobility needs of motorist, bicyclist and pedestrians as well as their movement patterns in intersections must be analyzed early in the planning phase and then followed through appropriately during the design phase of all intersections on the State highway. It is Departmental policy to develop integrated multimodal projects in balance with community goals, plans, and values.

The Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians contains a primer on the factors to consider when designing intersections. It is published by the California Division of Traffic Operations.

401.2 Human Factors

(1) *The Driver*. An appreciation of driver performance is essential to proper highway design and operation. The suitability of a design rests as much on how safely and efficiently drivers are able to use the highway as on any other criterion.

Motorist's perception and reaction time set the standards for sight distance and length of transitions. The driver's ability to understand and interpret the movements and crossing times of the other vehicle drivers, bicyclists, and pedestrians using the intersection is equally important when making decisions and their associated reactions. The designer needs to keep in mind the user's limitations and therefore design intersections so that they meet user expectation.

(2) *The Bicyclist.* Bicyclist experience, skills and physical capabilities are factors in intersection design. Intersections are to be designed to help bicyclists understand how to traverse the intersection. Chapter 1000 provides intersection guidance for Class I and Class III bikeways that intersect the State highway system. The guidance in this chapter specifically relates to bicyclists that operate within intersections on the State highway system.

(3) *The Pedestrian.* Understanding how pedestrians will use an intersection is critical because pedestrian volumes, their age ranges, physical ability, etc. all factor in to their startup time and the time it takes them to cross an intersection and thus, dictates how to design the intersection to avoid potential conflicts with bicyclists and motor vehicles. The guidance in this chapter specifically relates to pedestrian travel within

intersections on the State highway system. See Topic 105, Pedestrian Facilities, Design Information Bulletin 82 - "Pedestrian Accessibility Guidelines for Highway Projects," the AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, and the California Manual on Uniform Traffic Control Devices (California MUTCD) for additional guidance.

401.3 Traffic Considerations

Good intersection design clearly indicates to bicyclists and motorists how to traverse the intersection (see Figure 403.6A). Designs that encourage merging traffic to yield to through bicycle and motor vehicle traffic are desirable.

The size, maneuverability, and other characteristics of bicycles and motorized vehicles (automobiles, trucks, transit vehicles, farm equipment, etc.) are all factors that influence the design of an intersection. The differences in operating characteristics between bicycles and motor vehicles should be considered early in design.

Table 401.3 compares vehicle characteristics to intersection design elements.

A design vehicle is a convenient means of representing a particular segment of the vehicle population. See Topic 404 for a further discussion of the uses of design vehicles.

Transit vehicles and how their stops interrelate with an intersection, pedestrian desired walking patterns and potential transfers to other transit facilities are another critical factor to understand when designing an intersection. Transit stops and their placement needs to take into account the required maintenance operations that will be needed and usually supplied by the Transit Operator.

401.4 The Physical Environment

In highly developed urban areas, where right of way is usually limited, the volume of vehicular traffic, pedestrians, and bicyclists may be large, street parking exists, and transit stops (for both buses and light rail) are available. All interact in a variety of movements that contribute to and add to the complexity of a State highway and can result in busy intersections.

Industrial development may require special attention to the movement of large trucks.

Rural areas where farming occurs may require special attention for specialized farm equipment. In addition, rural cities or town centers (rural main streets) also require special attention.

Rural intersections in farm areas with low traffic volumes may have special visibility problems or require shadowing of left-turn vehicles from high speed approach traffic.

Table 401.3

Vehicle Characteristics	Intersection Design Element Affected
Length	Length of storage lane
Width	Lane width
Height	Clearance to overhead signs and signals
Wheel base	Corner radius and width of turning lanes
Acceleration	Tapers and length of acceleration lane
Deceleration	Tapers and length of deceleration lane

There are many factors to be considered in the design of intersections, with the goal to achieve a functional, safe and efficient intersection for all users of the facility. The location and level of use by various modes will have an impact on intersection design, and therefore should be considered early in the design process. In addition to current levels of use, it is important to consider future travel patterns for vehicles, including trucks; pedestrian and bicycle demand and the future expansion of transit.

401.5 Intersection Type

Intersection types are characterized by their basic geometric configuration, and the form of intersection traffic control that is employed:

(1) Geometric Configurations

(a) Crossing-Type Intersections - “Tee” and 4-legged intersections

(b) Circular Intersections –roundabouts, traffic circles, rotaries; however, only roundabouts are acceptable for State highways.

(c) Alternative Intersection Designs – various effective geometric alternatives to traditional designs that can reduce crashes and their severity, improve operations, reduce congestion and delay typically by reducing or altering the number of conflict points; these alternatives include geometric design features such as intersections with displaced left-turns or variations on U-turns.

(2) Intersection Control strategies, See California MUTCD and Traffic Operations Policy Directive (TOPD) Number 13-02, Intersection Control Evaluation for procedures and guidance on how to evaluate, compare and select from among the following intersection control strategies:

(a) Two-Way Stop Controlled - for minor road traffic

(b) All-Way Stop Control

(c) Signal Control

(d) Yield Control (Roundabout)

Historically, crossing-type intersections with signal or “STOP”-control have been used on the State highway system. However, other intersection types, given the appropriate circumstances may enhance intersection performance through fewer or less severe crashes and improve operations by reducing overall delay. Alternative intersection geometric designs should be considered and evaluated early in the project scoping, planning and decision-making stages, as they may be more efficient, economical and safer solutions than traditional designs. Alternative intersection designs can effectively balance the safety and mobility needs of the motor vehicle drivers, transit riders, bicyclists and pedestrians using the intersection.

401.6 Transit

Transit use may range from periodic buses, handled as part of the normal mix of vehicular traffic, to Bus Rapid Transit (BRT) or light rail facilities which can have a large impact on other users of the intersection. Consideration of these modes should be part of the early planning and design of intersections.

Topic 402 - Operational Features Affecting Design

402.1 Capacity

Adequate capacity to handle peak period traffic demands is a basic goal of intersection design.

(1) Unsignalized Intersections. The “Highway Capacity Manual”, provides methodology for capacity analysis of unsignalized intersections controlled by “STOP” or “YIELD” signs. The assumption is made that major street traffic is not affected by the minor street movement. Unsignalized intersections generally become candidates for signalization when traffic backups begin to develop on the cross street or when gaps in traffic are insufficient for drivers to yield to crossing pedestrians. See the California MUTCD, for signal warrants. Changes to intersection controls must be coordinated with District Traffic Branch.

(2) Signalized Intersections. See Topic 406 for analysis of simple signalized intersections, including ramps. The analysis of complex and alternative intersections should be referred to the District Traffic Branch; also see Traffic Operations Policy Directive (TOPD) Number 13-02.

(3) Roundabout Intersections. See TOPD Number 13-02 for screening process and the Intersection Control Evaluation(ICE) Process Informational Guide for operational analysis methods and tools.

402.2 Collisions

(1) General. Intersections have a higher potential for conflict compared to other sections of the highway because travel is interrupted, traffic streams cross, and many types of turning movements occur.

The type of traffic control affects the type of collisions. Signalized intersections tend to have more rear end and same-direction sideswipes than intersections with "STOP"-control on minor legs. Roundabouts experience few angle or crossing collisions. Roundabouts reduce the frequency and severity of collisions, especially when compared to the performance of signalized intersections in high speed environments. Other alternative intersection types are configurations to consider for minimizing the number of conflict points.

(2) *Undesirable Geometric Features.*

- Inadequate approach sight distance.
- Inadequate corner sight distance.
- Steep grades.
- Five or more approaches.
- Presence of curves within intersections(unless at roundabouts).
- Inappropriately large curb radii.
- Long pedestrian crossing distances.
- Intersection Angle <75 degrees (see Topic 403).

402.3 On-Street Parking

On-street parking generally decreases through-traffic capacity, impedes traffic flow, and increases crash potential. Where the primary service of the arterial is the movement of vehicles, it may be desirable to prohibit on-street parking on State highways in urban and suburban expressways and rural arterial sections. However, within urban and suburban areas and in rural communities located on State highways, on-street parking should be considered in order to accommodate existing land uses. Where adequate off-street parking facilities are not available, the designer should consider on-street parking, so that the proposed highway improvement will be compatible with the land use. On-street parking as well as off-street parking needs to comply with DIB82. See AASHTO, A Policy on Geometric Design of Highways and Streets for additional guidance related to on-street parking.

402.4 Consider All Users

Intersections should accommodate all users of the facility, including vehicles, bicyclists, pedestrians and transit. Bicycles have all the rights and responsibilities as motorist per the California Vehicle Code, but should have separate consideration of their needs, even separate facilities if volumes warrant. Pedestrians should not be prohibited from crossing one or more legs of an intersection, unless no other safe alternative exists. Pedestrians can be prohibited from crossing one or more legs of an intersection if a reasonable alternate route exists and there is a demonstrated need to do so. All pedestrian facilities shall be ADA compliant as outlined in DIB 82. Transit needs should be determined early in the planning and design phase as their needs can have a large impact on the performance of an intersection. Transit stops in the vicinity of intersections should be evaluated for their effect on the safety and operation of the intersection(s) under study. See Topic 108 for additional information.

402.5 Speed-Change Areas

Speed-change areas for vehicles entering or leaving main streams of traffic are beneficial to the safety and efficiency of an intersection. Entering traffic merges most efficiently with through traffic when the merging angle is less than 15 degrees and when speed differentials are at a minimum.

Topic 403 - Principles of Channelization

403.1 Preference to Major Movements

The provision of direct free-flowing high-standard alignment to give preference to major movements is good channelization practice. This may require some degree of control of the minor movements such as stopping, funneling, or even eliminating them. These controlling measures should conform to natural paths of movement and should be introduced gradually to promote smooth and efficient operation.

403.2 Areas of Conflict

Large multilane undivided intersection areas are undesirable. The hazards of conflicting movements are magnified when motorists, bicyclists, and pedestrians are unable to anticipate movements of other users within these areas. Channelization reduces areas of conflict by separating or regulating traffic movements into definite paths of travel by the use of pavement markings or traffic islands.

Multilane undivided intersections, even with signalization, are more difficult for pedestrians to cross. Providing pedestrian refuge islands enable pedestrians to cross fewer lanes at a time.

See Index 403.7 for traffic island guidance when used as pedestrian refuge. Curb extensions shorten crossing distance and increase visibility. See Index 303.4 for curb extensions.

403.3 Angle of Intersection

A right angle (90°) intersection provides the most favorable conditions for intersecting and turning traffic movements. Specifically, a right angle provides:

- The shortest crossing distance for motor vehicles, bicycles, and pedestrians.
- Sight lines which optimize corner sight distance and the ability of motorists to judge the relative position and speed of approach traffic.
- Intersection geometry that can reduce vehicle turning speeds so collisions are more easily avoided and the severity of collisions are minimized.
- Intersection geometry that sends a message to turning bicyclists and motorists that they are making a turning movement and should yield as appropriate to through traffic on the roadway they are leaving, to traffic on the receiving roadway, and to pedestrians crossing the intersection.

Minor deviations from right angles are generally acceptable provided that the potentially detrimental impact on visibility and turning movements for large trucks (see Topic 404) can be mitigated. However, large deviations from right angles may decrease visibility, hamper certain turning operations, and will increase the size of the intersection and therefore crossing distances for bicyclists and pedestrians, may encourage high speed turns, and may reduce yielding by turning traffic. When a right angle cannot be provided due to physical constraints, the interior angle should be designed as close to 90 degrees as is practical, but should not be less than 75 degrees. Mitigation should be considered for the affected intersection design features. (See Figure 403.3A). A 75 degree angle does not unreasonably increase the crossing distance or generally decrease visibility. Class II bikeway crossings at railroads follow similar guidance to Class I bikeway crossings at railroads, see Index 1003.5(3), and Figure 403.3B.

A characteristic of skewed intersection angles is that they result in larger intersections.

When existing intersection angles are less than 75 degrees, the following retrofit improvement strategies should be considered:

- Realign the subordinate intersection legs if the new alignment and intersection location(s) can be designed without introducing new geometric or operational deficiencies.
- Provide acceleration lanes for difficult turning movements due to radius or limited visibility.
- Restrict problematic turning movements; e.g. for minor road left turns with potentially limited visibility.
- Provide refuge areas for pedestrians at very long crossings.

For additional guidance on the above and other improvement strategies, consult with the District Design Liaison.

Particular attention should be given to skewed angles on curved alignment with regards to sight distance and visibility. Crossroads skewed to the left have more restricted visibility for drivers of vans and trucks than crossroads skewed to the right. In addition, severely skewed intersection angles, coupled with steep downgrades (generally over 4 percent) can increase the potential for high centered vehicles to overturn where the vehicle is on a downgrade and must make a turn greater than 90 degrees onto a crossroad. These factors should be considered in the design of skewed intersections.

403.4 Points of Conflict

Channelization separates and clearly defines points of conflict within the intersection. Bicyclists, pedestrians and motorists should be exposed to only one conflict or confronted with one decision at a time.

Speed-change areas for diverging traffic should provide adequate length clear of the through lanes to permit vehicles to decelerate after leaving the through lanes.

See AASHTO, A Policy on Geometric Design of Highways and Streets for additional guidance on speed-change lanes.

Figure 403.3A
Angle of Intersection
(Minor Leg Skewed to the Right)

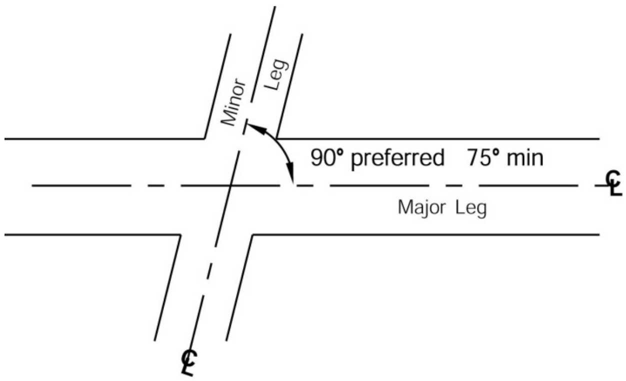
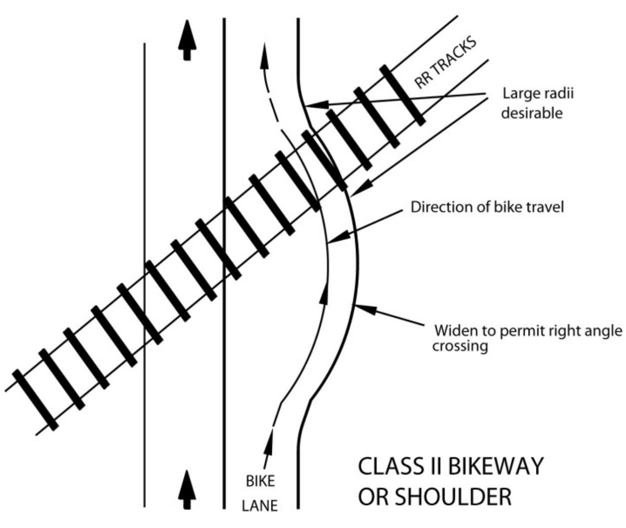


Figure 403.3.B
Class II Bikeway
Crossing Railroad



403.5 (Currently Not In Use)

403.6 Turning Traffic

A separate turning lane removes turning movements from the intersection area. Abrupt changes in alignment or sight distance should be avoided, particularly where traffic turns into a separate turning lane from a high-standard through facility.

For wide medians, consider the use of offset left-turn lanes at both signalized and unsignalized intersections. Opposing left-turn lanes are offset or shifted as far to the left as practical by reducing the width of separation immediately before the intersection. Rather than aligning the left-turn lane exactly parallel with and adjacent to the through lane, the offset left-turn lane is separated from the adjacent through lane. Offset left-turn lanes provide improved visibility of opposing through traffic. For further guidance on offset left-turn lanes, see AASHTO, A Policy on Geometric Design of Highways and Streets.

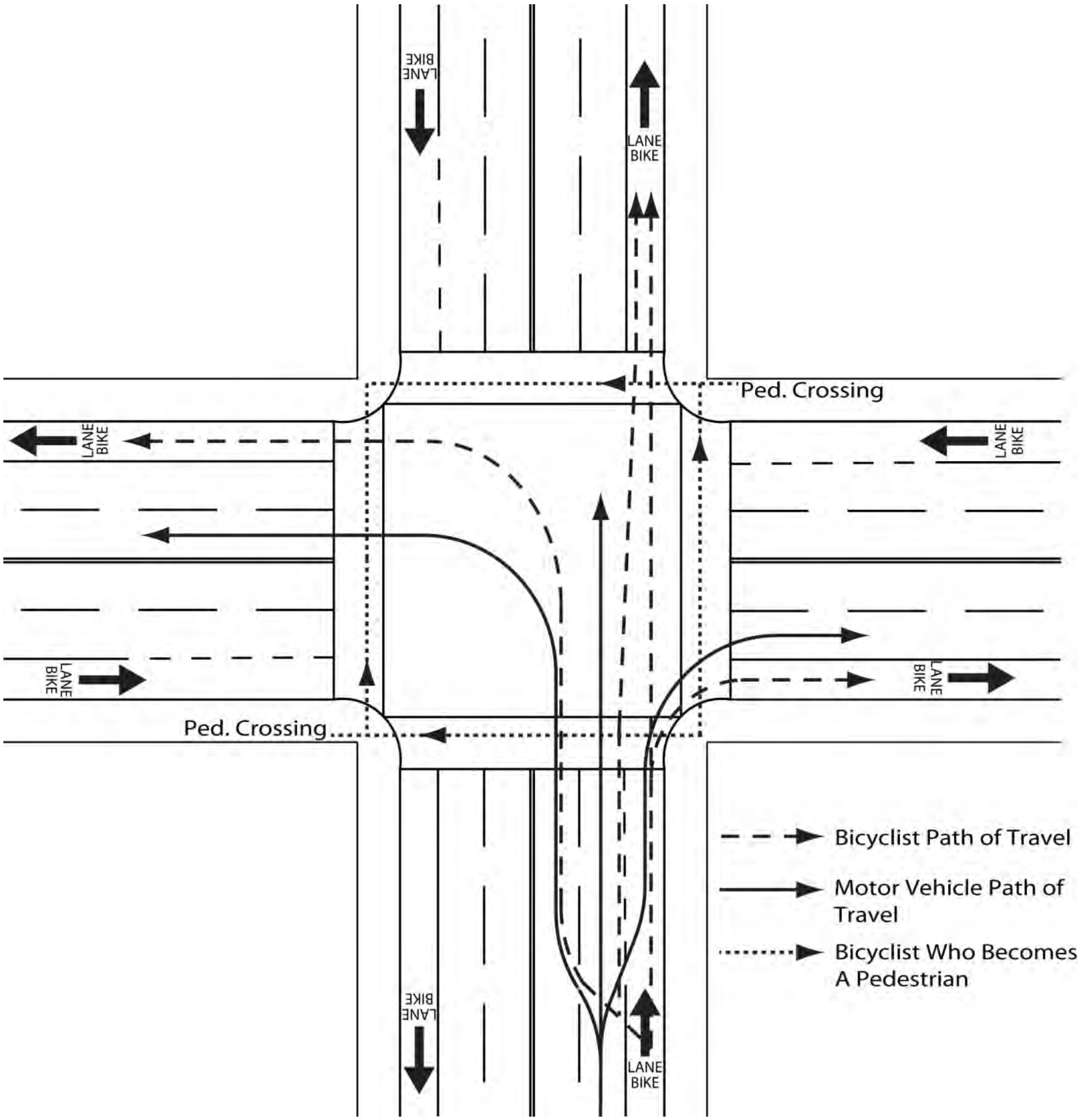
(1) *Treatment of Intersections with Right-Turn-Only Lanes.* Most motor vehicle/bicycle collisions occur at intersections. For this reason, intersection design should be accomplished in a manner that will minimize confusion by motorists and bicyclists, eliminate ambiguity and induce all road users to operate in accordance with the statutory rules of the road in the California Vehicle Code. Right-turn-only lanes should be designed to meet user expectations and reduce conflicts between vehicles and bicyclists.

Figure 403.6A illustrates a typical at-grade intersection of multilane streets without right-turn-only lanes. Bike lanes or shoulders are included on all approaches. Some common movements of motor vehicles and bicycles are shown. A prevalent crash type is between straight-through bicyclists and right-turning motorists, who do not yield to through bicyclists.

<u>Optional right-turn lanes should not be used in combination with right-turn-only lanes on roads where bicycle travel is permitted.</u> The use of optional right-turn lanes in combination with right-turn-only lanes is not recommended in any case where a Class II bike lane is present. This may increase the need for dual or triple right-turn-only lanes, which have

Figure 403.6A

Typical Bicycle and Motor Vehicle Movements at Intersections of Multilane Streets without Right-Turn-Only Lanes

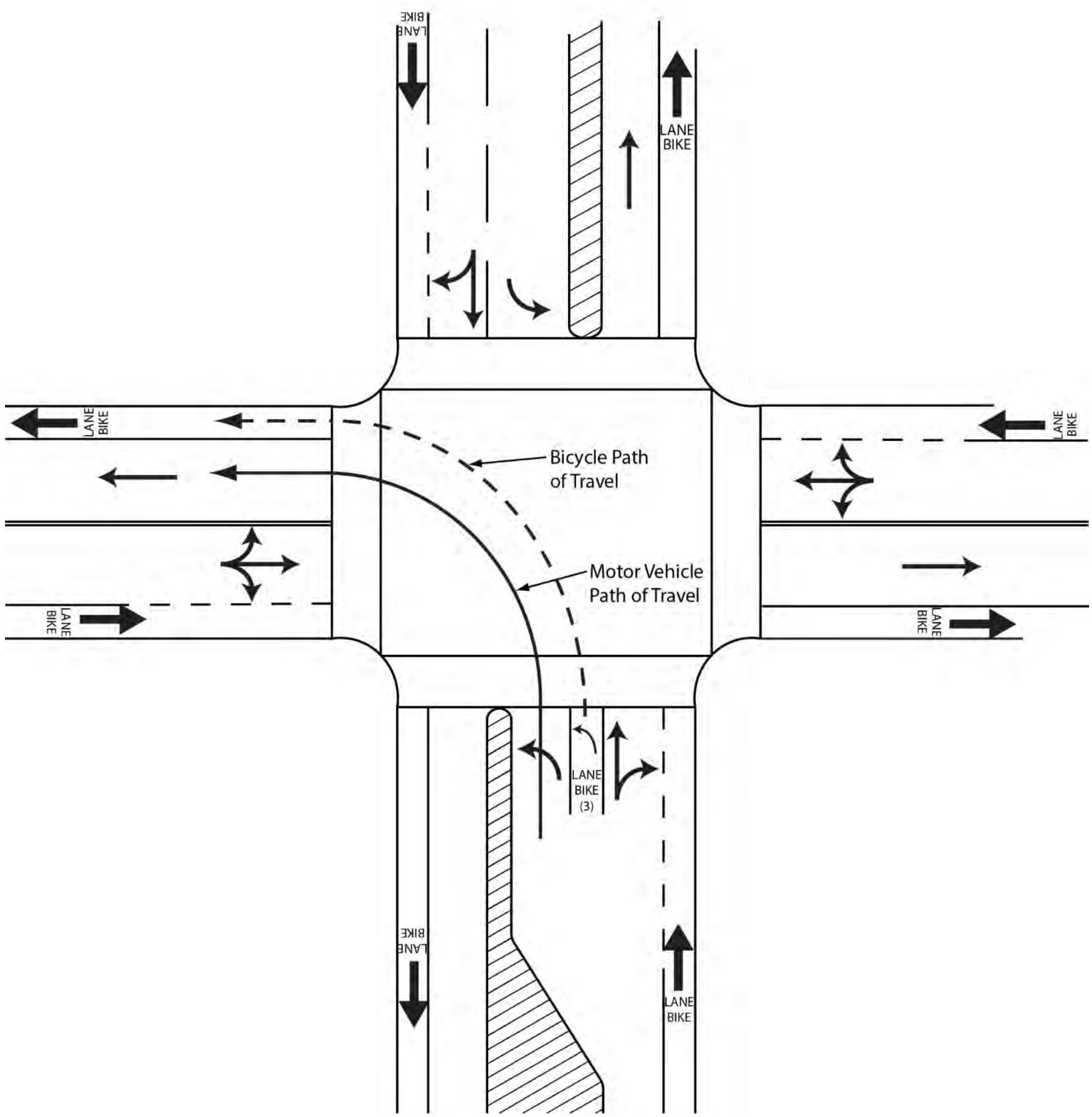


NOTE:

Only one direction is shown for clarity.

Figure 403.6B

Bicycle Left-Turn-Only Lane



NOTES:

(1) For bicycle lane markings, see the California MUTCD.

(2) Bicycle detectors are necessary for signalized intersections.

(3) Left-turn bicycle lane should have receiving bike lane or shoulder.

challenges with visibility between turning vehicles and pedestrians. Multiple right-turn-only lanes should not be free right-turns when there is a pedestrian crossing. If there is a pedestrian crossing on the receiving leg of multiple right-turn-only lanes, the intersection should be controlled by a pedestrian signal head, or geometrically designed such that pedestrians cross only one turning lane at a time.

Locations with right-turn-only lanes should provide a minimum 4-foot width for bicycle use between the right-turn and through lane when bikes are permitted, except where posted speed is greater than 40 miles per hour, the minimum width should be 6 feet. Configurations that create a weaving area without defined lanes should not be used.

For signing and delineation of bicycle lanes at intersections, consult District Traffic Operations.

Figure 403.6B depicts an intersection with a left-turn-only bicycle lane, which should be considered when bicycle left-turns are common. A left-turn-only bicycle lane may be considered at any intersection and should always be considered as a tool to provide mobility for bicyclists. Signing and delineation options for bicycle left-turn-only lanes are shown in the California MUTCD.

(2) *Design of Intersections at Interchanges.* The design of at-grade intersections at interchanges should be accomplished in a manner that will minimize confusion of motorists, bicyclists, and pedestrians. Higher speed, uncontrolled entries and exits from freeway ramps should not be used at the intersection of the ramps with the local road. The smallest curb return radius should be used that accommodates the design vehicle. Intersections with interior angles close to 90 degrees reduce speeds at conflict points between motorists, bicyclists, and pedestrians. The intersection skew guidance in Index 403.3 applies to all ramp termini at the local road.

403.7 Refuge Areas

Traffic islands should be used to provide refuge areas for bicyclists and pedestrians. See Index 405.4 for further guidance.

403.8 Prohibited Turns

Traffic islands may be used to direct bicycle and motorized vehicle traffic streams in desired directions and prevent undesirable movements. Care should be taken so that islands used for this purpose accommodate convenient and safe pedestrian and bicycle crossings, drainage, and striping options. See Topic 303.

403.9 Effective Signal Control

At intersections with complex turning movements, channelization is required for effective signal control. Channelization permits the sorting of approaching bicycles and motorized vehicles which may move through the intersection during separate signal phases. Pedestrians may also have their own signal phase. This requirement is of particular importance when traffic-actuated signal controls are employed.

The California MUTCD has warrants for the placement of signals to control vehicular, bicycle and pedestrian traffic. Pedestrian activated devices, signals or beacons are not required, but must be evaluated where directional, multilane, pedestrian crossings occur. These locations may include:

- Mid-block street crossings;
- Channelized turn lanes;
- Ramp entries and exits; and
- Roundabouts.

The evaluation, selection, programming and use of a chosen device should be done with guidance from District Traffic Operations.

403.10 Installation of Traffic Control Devices

Channelization may provide locations for the installation of essential traffic control devices, such as “STOP” and directional signs. See Index 405.4 for information about the design of traffic islands.

403.11 Summary

- Give preference to the major move(s).

- Reduce areas of conflict.
- Reduce the duration of conflicts.
- Cross traffic at right angles or skew no more than 75 degrees. (90 degrees preferred.)
- Separate points of conflict.
- Provide speed-change areas and separate turning lanes where appropriate.
- Provide adequate width to shadow turning traffic.
- Restrict undesirable moves with traffic islands.
- Coordinate channelization with effective signal control.
- Install signs in traffic islands when necessary but avoid building conflicts one or more modes of travel.
- Consider all users.

403.12 Other Considerations

- An advantage of curbed islands is they can serve as pedestrian refuge. Where curbing is appropriate, consideration should be given to mountable curbs. See Topic 303 for more guidance.
- Avoid complex intersections that present multiple choices of movement to the motorist and bicyclist.
- Traffic safety should be considered. Collision records provide a valuable guide to the type of channelization needed.

Topic 404 - Design Vehicles

404.1 General

Any vehicle, whether car, bus, truck, or recreational vehicle, while turning a curve, covers a wider path than the width of the vehicle. The outer front tire can generally follow a circular curve, but the inner rear tire will swing in toward the center of the curve.

Some terminology is vital to understanding the engineering concepts related to design vehicles. See Index 62.4 Interchanges and Intersection at Grade for terminology.

404.2 Design Considerations

It may not be necessary to provide for design vehicle turning movements at all intersections along the State route if the design vehicle's route is restricted or it is not expected to use the cross street frequently. Discuss with Traffic Operations and the local agency before a turning movement is not provided. The goal is to minimize possible conflicts between vehicles, bicycles, pedestrians, and other users of the roadway, while providing the minimum curb radii appropriate for the given situation.

Both the tracking width and swept width should be considered in the design of roadways for use of the roadway by design vehicles.

Tracking width lines delineate the path of the vehicle tires as the vehicle moves through the turn.

Swept width lines delineate the path of the vehicle body as the vehicle moves through the turn and will therefore always exceed the tracking width. The following list of criteria is to be used to determine whether the roadway can accommodate the design vehicle.

(1) Traveled way.

(a) To accommodate turn movements(e.g., at intersections, driveways, alleys, etc.),the travel way width and intersection design should be such that tracking width and swept width lines for the design vehicle do not cross into any portion of the lane for opposing traffic. Encroachment into the shoulder and bike lane is permitted.

(b) Along the portion of roadway where there are no turning options, vehicles are required to stay within the lane lines. **The tracking and swept widths lines for the design vehicle shall stay within the lane as defined in Index 301.1 and Table 504.3.** This includes no encroachment into Class II bike lanes.

(2) Shoulders. Both tracking width and swept width lines may encroach onto paved shoulders to accommodate turning. For design projects where the tracking width lines are shown to encroach onto paved shoulders, the shoulder pavement structure should be engineered to sustain the weight of the design vehicle. See Index 613 for general traffic loading

considerations and Index 626 for tied rigid shoulder guidance. At corners where no sidewalks are provided and pedestrians are using the shoulder, a paved refuge area may be provided outside the swept width of turning vehicle.

(3) *Curbs and Gutters*. Tires may not mount curbs. If curb and gutter are present and any portion of the gutter pan is likewise encroached, the gutter pan must be engineered to match the adjacent shoulder pavement structure. See Index 613.5(2)(c) for gutter pan design guidance.

(4) *Edge of Pavement*. To accommodate a turn, the swept width lines may cross the edge of pavement provided there are no obstructions. The tracking width lines must remain on the pavement structure, including the shoulder, provided that the shoulder is designed to support vehicular traffic. If truck volumes are high, consideration of a wider shoulder is encouraged in order to preserve the pavement edge.

(5) *Bicycle Lanes.* Where bicycle lanes are considered, the design guidance noted above applies. Vehicles are permitted to cross a bicycle lane to initiate or complete a turning movement or for emergency parking on the shoulder. See the California MUTCD for Class II bike lane markings.

To accommodate turn movements (e.g., intersections, driveways, alleys, etc. are present), both tracking width and swept width lines may cross the broken white painted bicycle lane striping in advance of the right-turn, entering the bicycle lane when clear to do so.

(6) *Sidewalks.* Tracking width and swept width lines must not encroach onto sidewalks or pedestrian refuge areas, without exception.

(7) *Obstacles.* Swept width lines may not encroach upon obstacles including, but not limited to, curbs, islands, sign structures, traffic delineators/channelizers, traffic signals, lighting poles, guardrails, trees, cut slopes, and rock outcrops.

(8) *Appurtenances.* Swept width lines do not include side mirrors or other appurtenances allowed by the California Vehicle Code, thus, accommodation to non-motorized users of the facility and appurtenances should be considered.

If both the tracking width and swept width lines meet the design guidance listed above, then the geometry is adequate for that design vehicle. Consideration should be given to pedestrian crossing distance, motor vehicle speeds, truck volumes, alignment, bicycle lane width, sight distance, and the presence of on-street parking.

Note that the STAA Design Vehicle has a template with a 56-foot (minimum) and a 67-foot (longer) radius and the California Legal Design Vehicle has a template with 50-foot (minimum) and 60-foot (longer) radii. These templates are shown in Figures 404.5A through 404.5D. The longer radius templates are more conservative. The longer radius templates develop less swept width and leave a margin of error for the truck driver. The longer radius templates should be used for conditions where the vehicle may not be required to stop before entering the intersection.

The minimum radius template can be used if the longer radius template does not clear all obstacles. The minimum radius templates demonstrate the tightest turn that the vehicles can navigate, assuming a speed of less than 10 miles per hour.

For offtracking lane width requirements on freeway ramps, see Topic 504.

404.3 Design Tools

District Truck Managers should be consulted early in the project to ensure compliance with the design vehicle guidance contained in Topic 404. Consult local agencies to verify the location of local truck routes. Essentially, two options are available – templates or computer software.

- The turning templates in Figures 404.5A through G are a design aid for determining the swept width and/or tracking width of large vehicles as they maneuver through a turn. The templates can be used as overlays to evaluate the adequacy of the geometric layout of a curve or intersection when reproduced on clear film and scaled to match the highway drawings. These templates assume a vehicle speed of less than 10 miles per hour.

- Computer software such as AutoTURN or AutoTrak can draw the swept width and/or tracking width along any design curve within a CADD drawing program such as MicroStation or AutoCAD. Dimensions taken from the vehicle diagrams in Figures 404.5A through G may be inputted into the computer program by creating a custom vehicle if the vehicle is not already included in the software library. The software can also create a vehicle turn template that conforms to any degree curve desired.

404.4 Design Vehicles and Related Definitions

(1) The Surface Transportation Assistance Act of 1982 (STAA).

(a) STAA Routes. STAA allows certain longer trucks called STAA trucks to operate on the National Network. After STAA was enacted, the Department evaluated State routes for STAA truck access and created Terminal Access and Service Access routes which, together with the National Network, are called the STAA Network. Terminal Access routes allow STAA access to terminals and facilities. Service Access routes allow STAA trucks one-mile access off the National Network, but only at identified exits and only for designated services. Service Access routes are primarily local roads. A “Truck Route Map,” indicating the National Network routes and the Terminal Access routes is posted on the Department’s Office of Commercial Vehicle Operations website and is also available in printed form.

(b) STAA Design Vehicle. The STAA design vehicle is a truck tractor-semitrailer combination with a 48-foot semitrailer, a 43-foot kingpin-to-rear-axle (KPRA) distance, an 8.5-foot body and axle width, and a 23-foot truck tractor wheelbase. Note, a truck tractor is a non-load-carrying vehicle. There is also a STAA double (truck tractor-semitrailer-trailer); however, the double is not used as the design vehicle due to its shorter turning radius. The STAA Design Vehicle is shown in Figures 404.5A and B.

The STAA Design Vehicle in Figures 404.5A or B should be used on the National Network, Terminal Access, California Legal, and Advisory routes.

(c) STAA Vehicle – 53-Foot Trailer. Another category of vehicle allowed only on STAA routes has a maximum 53-foot trailer, a maximum 40-foot KPRA for two or more axles, a maximum 38-foot KPRA for a single axle, and unlimited overall length. This vehicle is not to be used as the design vehicle as it is not the worst case for offtracking due to its shorter KPRA. The STAA Design Vehicle should be used instead.

(2) California Legal.

(a) California Legal Routes. Virtually all State routes off the STAA Network are California Legal routes. There are two types of California Legal routes, the regular California Legal routes and the KPRA Advisory Routes. Advisory routes have signs posted that state the maximum KPRA length that the route can accommodate without the vehicle offtracking outside the lane. KPRA advisories range from 30 feet to 38 feet, in 2-foot increments. California Legal vehicles are allowed to use both types of California Legal routes. California Legal vehicles can also use the STAA Network. However, STAA trucks are not allowed on any California Legal routes. The Truck Route Map indicating the California Legal routes is posted on the Department’s Office of Commercial Vehicle Operations website.

(b) California Legal Design Vehicle. The California Legal vehicle is a truck tractor-semitrailer with the following dimensions: the maximum overall length is 65 feet; the maximum KPRA distance is 40 feet for semitrailers with two or more axles, and 38 feet for semitrailers with a single axle; the maximum width is 8.5 feet. There are also two categories of California Legal doubles (truck tractor-semitrailer-trailer); however, the doubles are not used as the design vehicle due to their shorter turning radii. The California Legal Design Vehicle is shown in Figures 404.5C and D.

The California Legal Design Vehicle in Figures 404.5C and D should only be used when the STAA design vehicle is not feasible and with concurrence from the District Truck Manager.

(3) 40-Foot Bus.

(a) 40-Foot Bus Routes. All single-unit vehicles, including buses and motor trucks up to 40 feet in length, are allowed on virtually every route in California.

(b) 40-Foot Bus Design Vehicle. The 40-Foot Bus Design Vehicle shown in Figure 404.5E is an AASHTO standard. Its 25-foot wheelbase and 40-foot length are typical of city transit buses and some intercity buses. At intersections where truck volumes are light or where the predominate truck traffic consists of mostly 3-axle units, the 40-foot bus may be used. Its wheel path sweeps a greater width than 3-axle delivery trucks, as well as smaller buses such as school buses.

(4) 45-Foot Bus & Motorhome.

(a) 45-Foot Bus & Motorhome Routes. The "45-foot bus and motorhome" refers to bus and motorhomes over 40 feet in length, up to and including 45 feet in length. These longer buses and motorhomes are allowed in California, but only on certain routes.

The 45-foot tour bus became legal on the National Network in 1991 and later allowed on some State routes in 1995. The 45-foot motorhome became legal in California in 2001, but only on those routes where the 45-foot bus was already allowed. A Bus and Motorhome Map indicating where these longer buses and motorhomes are allowed and where they are not allowed is posted on the Department's Office of Commercial Vehicle Operations website.

(b) 45-Foot Bus and Motorhome Design Vehicle. The 45-Foot Bus & Motorhome Design Vehicle shown in Figure 404.5F is used by Caltrans for the longest allowable bus and motorhome. Its wheelbase is 28.5 feet. It is also similar to the AASHTO standard 45-foot bus. Typically this should be the smallest design vehicle used on a State highway. It may be used where the State highway intersects local streets without commercial or industrial traffic.

The 45-Foot Bus and Motorhome Design Vehicle shown in Figure 404.5F should be used in the design of all interchanges and intersections on all green routes indicated on the Bus and Motorhome Map for both new construction and rehabilitation projects. Check also the longer standard design vehicles on these routes as required – the STAA Design Vehicle and the California Legal Design Vehicle in Indexes 404.4(1) and (2).

(5) 60-Foot Articulated Bus.

(a) 60-Foot Articulated Bus Routes. The articulated bus is allowed a length of up to 60 feet per CVC 35400(b)(3)(A). This bus is used primarily by local transit agencies for public transportation. There is no master listing of such routes. Local transit agencies should be contacted to determine possible routes within the proposed project.

(b) 60-Foot Articulated Bus Design Vehicle. The 60-Foot Articulated Bus Design Vehicle shown in Figure 404.5G is an AASHTO standard. The routes served by these buses should be designed to accommodate the 60-Foot Articulated Bus Design Vehicle.

404.5 Turning Templates & Vehicle Diagrams

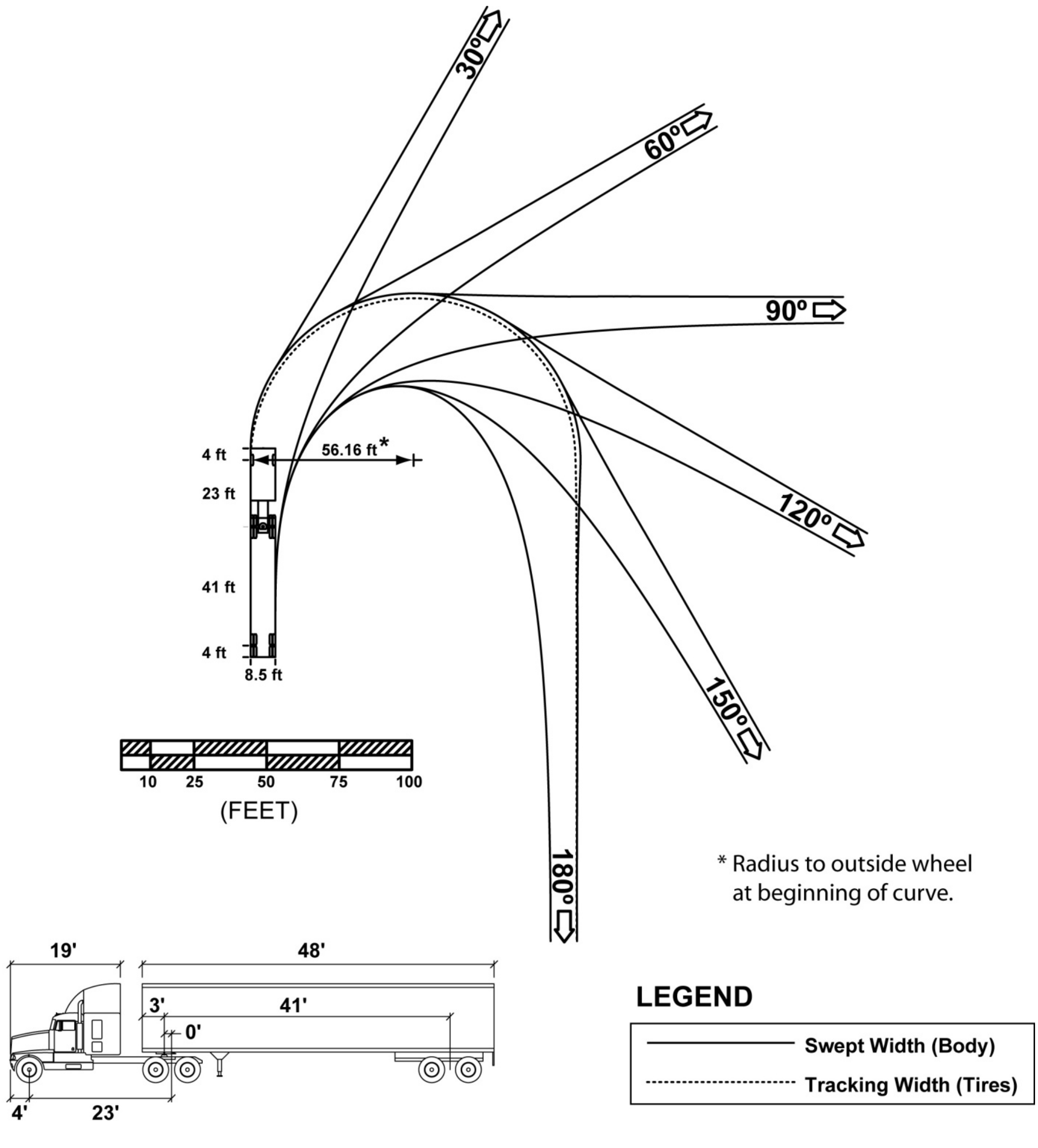
Figures 404.5A through G are computer-generated turning templates at an approximate scale of 1"=50' and their associated vehicle diagrams for the design vehicles described in Index 404.3. The radius of the template is measured to the outside front wheel path at the beginning of the curve. Figures 404.5A through G contain the terms defined as follows:

(1) Tractor Width - Width of tractor body.

(2) Trailer Width - Width of semitrailer body.

(3) Tractor Track - Tractor axle width, measured from outside face of tires.

Figure 404.5A
STAA Design Vehicle
56-Foot Radius



STAA - STANDARD

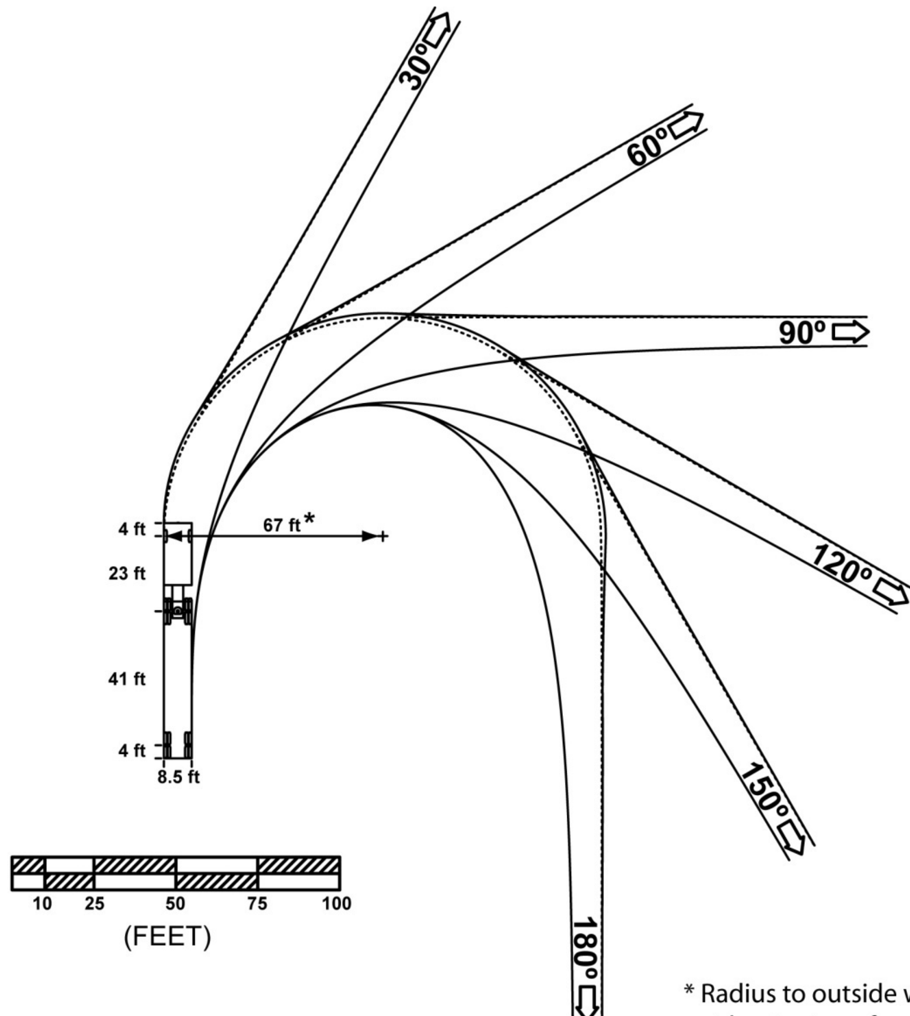
Tractor Width : 8.5'
Trailer Width : 8.5'
Tractor Track : 8.5'
Trailer Track : 8.5'

Lock to Lock Time : 6 seconds
Steering Lock Angle : 26.3 degrees
Articulating Angle : 70 degrees

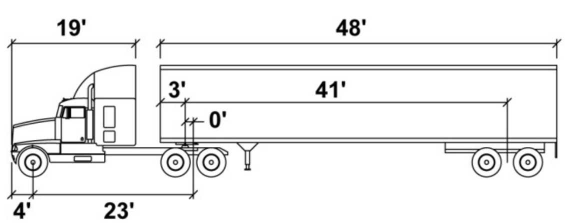
Note: For definitions, see Indexes 404.1 and 404.5.

Figure 404.5B

STAA Design Vehicle
67-Foot Radius



* Radius to outside wheel
at beginning of curve.



LEGEND

————	**Swept Width (Body)**
- - - - - -	**Tracking Width (Tires)**

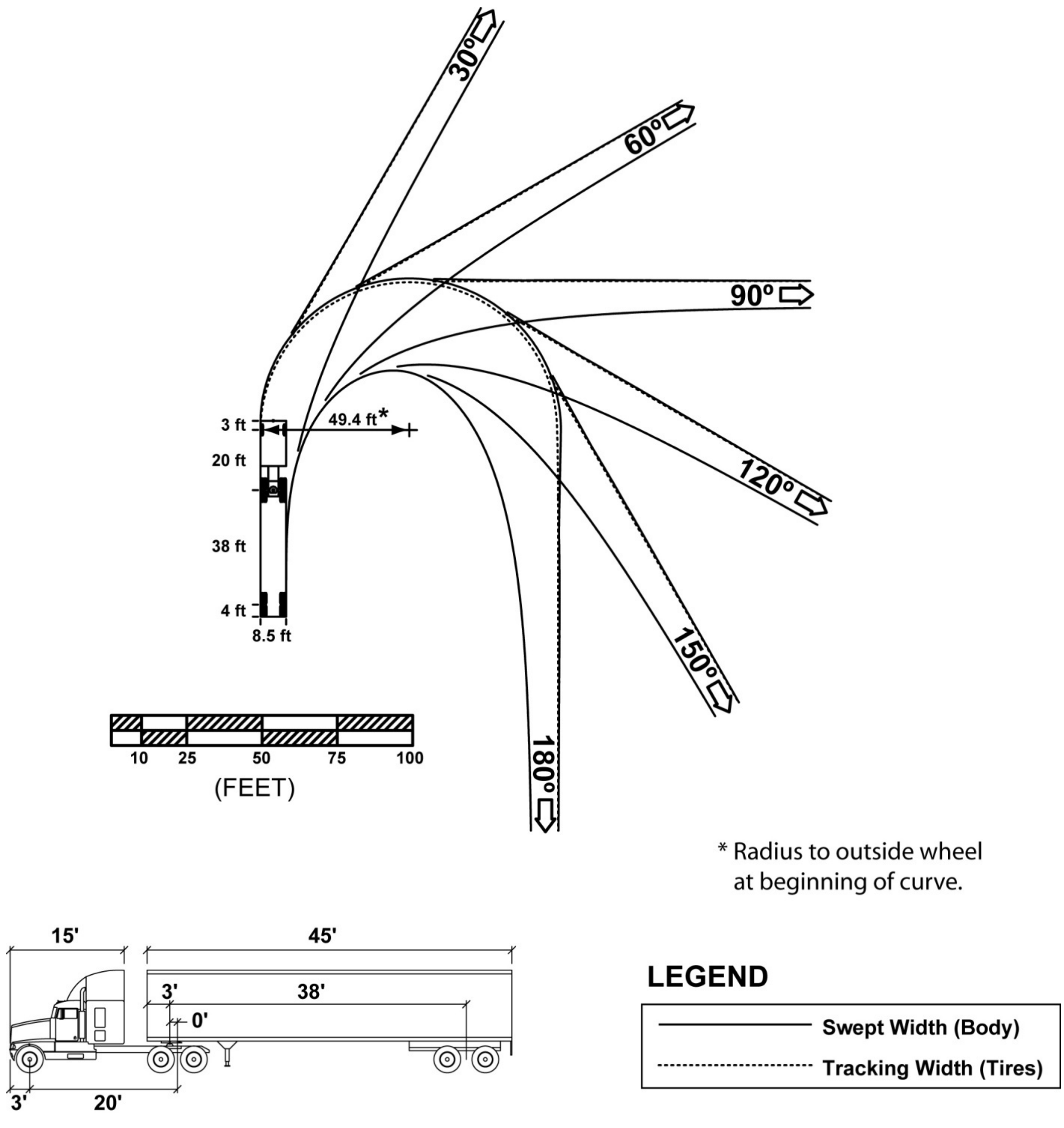
STAA - STANDARD

Tractor Width	**: 8.5'**	**Lock to Lock Time**	**: 6 seconds**
Trailer Width	**: 8.5'**	**Steering Lock Angle**	**: 26.3 degrees**
Tractor Track	**: 8.5'**	**Articulating Angle**	**: 70 degrees**
Trailer Track	**: 8.5'**		

Note: For definitions, see Indexes 404.1 and 404.5.

Figure 404.5C

California Legal Design Vehicle
50-Foot Radius



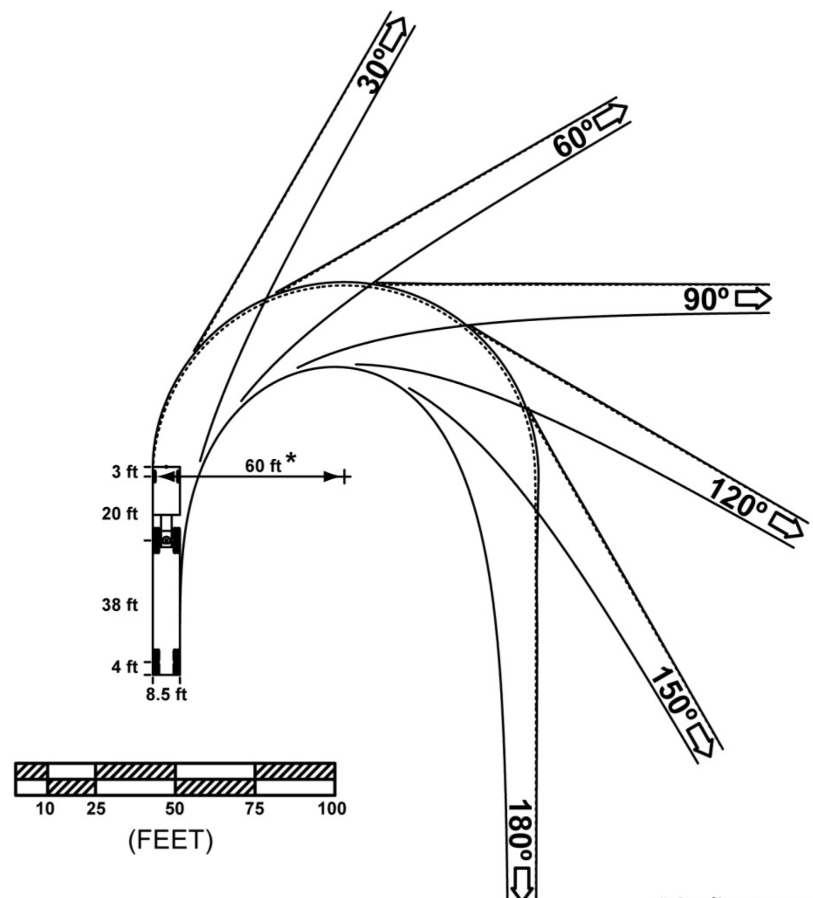
CA LEGAL - 65 FT

Tractor Width	: 8.5'	Lock to Lock Time	: 6 seconds
Trailer Width	: 8.5'	Steering Lock Angle	: 26.3 degrees
Tractor Track	: 8.5'	Articulating Angle	: 70 degrees
Trailer Track	: 8.5'		

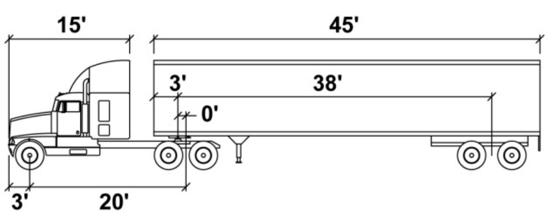
Note: For definitions, see Indexes 404.1 and 404.5.

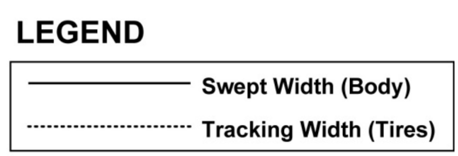
Figure 404.5D

California Legal Design Vehicle
60-Foot Radius



* Radius to outside wheel
at beginning of curve.





CA LEGAL - 65 FT

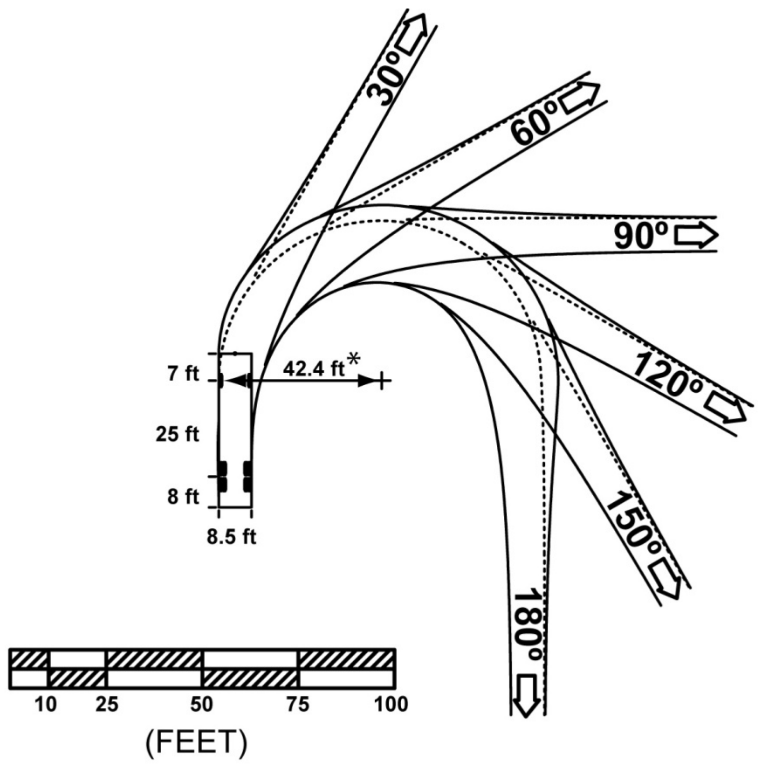
Tractor Width	: 8.5'
Trailer Width	: 8.5'
Tractor Track	: 8.5'
Trailer Track	: 8.5'

Lock to Lock Time	: 6 seconds
Steering Lock Angle	: 26.3 degrees
Articulating Angle	: 70 degrees

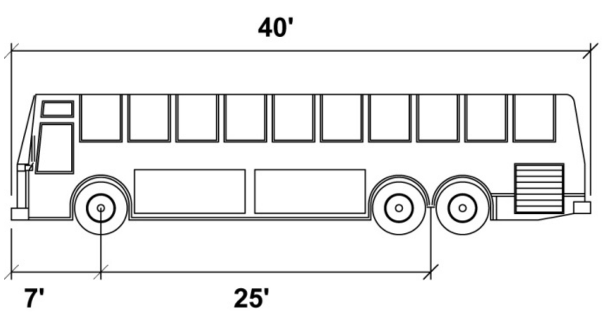
Note: For definitions, see Indexes 404.1 and 404.5.

Figure 404.5E

40-Foot Bus Design Vehicle



* Radius to outside wheel
at beginning of curve.



LEGEND

———— (solid line)	Swept Width (Body)
- - - - (dashed line)	Tracking Width (Tires)

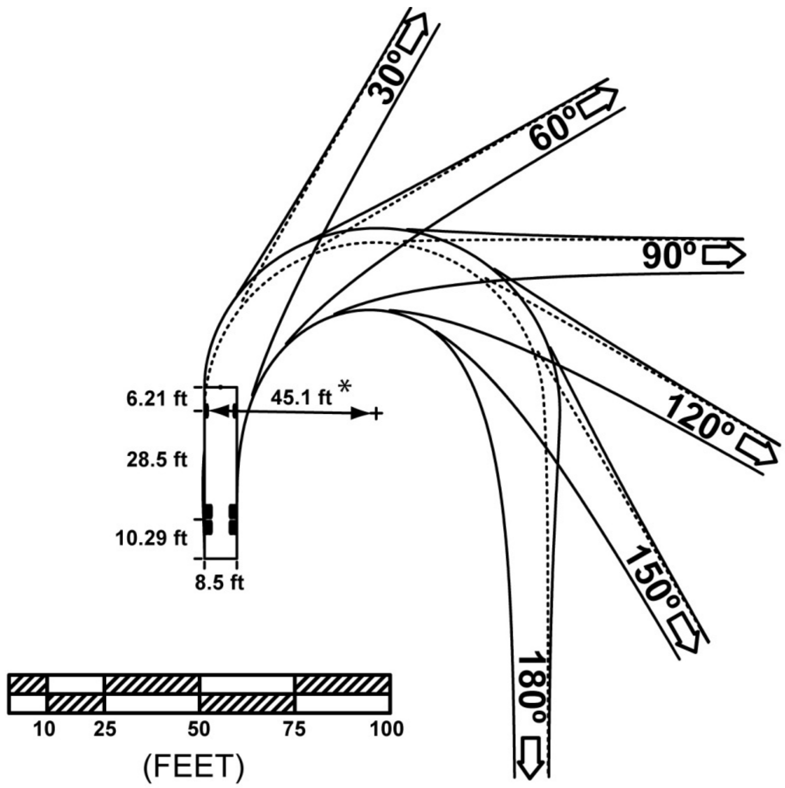
40' BUS

Width : 8.5'
Track : 8.5'
Lock to Lock Time : 6 seconds
Steering Lock Angle: 41.0 degrees

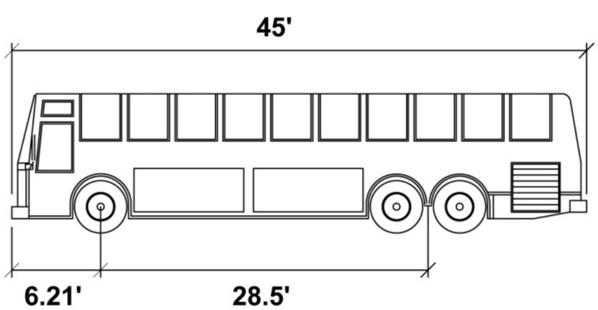
Note: For definitions, see
Indexes 404.1 and 404.5.

Figure 404.5F

45-Foot Bus & Motorhome Design Vehicle



* Radius to outside wheel
at beginning of curve.



LEGEND

————————	**Swept Width (Body)**
----------------	**Tracking Width (Tires)**

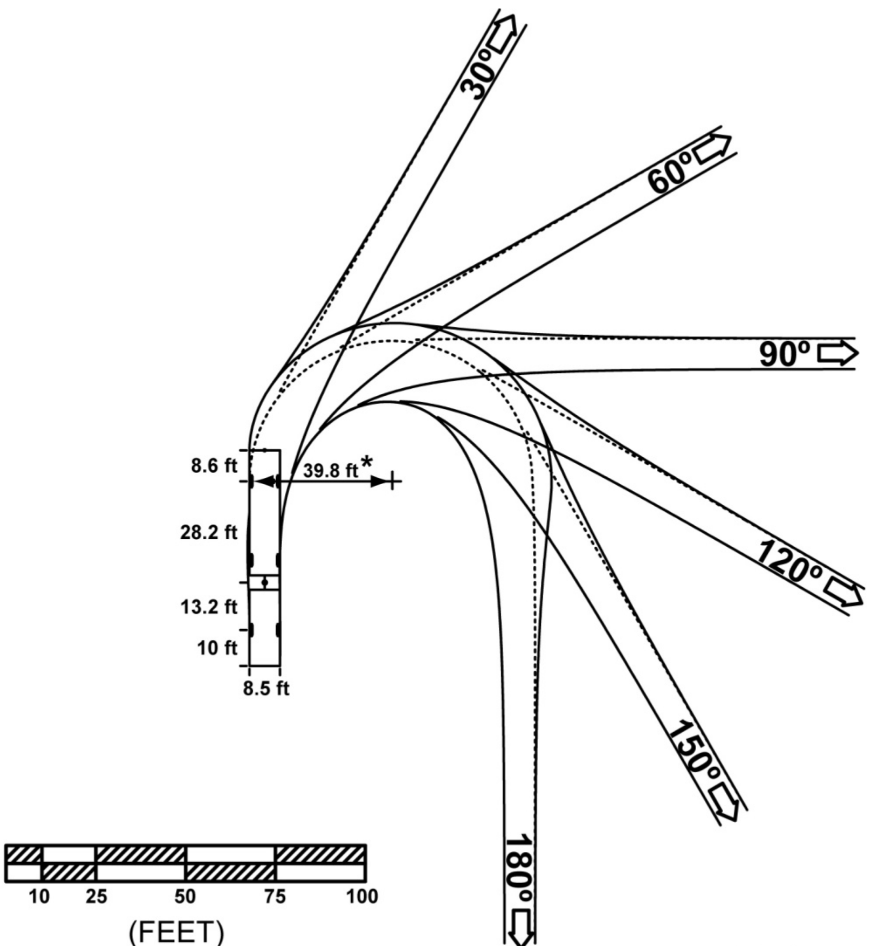
45' BUS

Width : 8.5'
Track : 8.5'
Lock to Lock Time : 6 seconds
Steering Lock Angle: 44.3 degrees

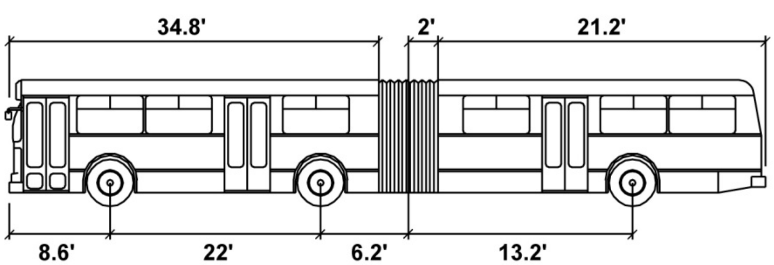
Note: For definitions, see Indexes 404.1, and 404.5.

Figure 404.5G

60-Foot Articulated Bus Design Vehicle



* Radius to outside wheel
at beginning of curve.



LEGEND

——— (solid line)	**Swept Width (Body)**
- - - - (dashed line)	**Tracking Width (Tires)**

ARTICULATED BUS

Width	**: 8.5'**
Track	**: 8.5'**
Lock to Lock Time	**: 6 seconds**
Steering Lock Angle	**: 38.3 degrees**
Articulating Angle	**: 50.0 degrees**

Note: For definitions, see Indexes 404.1 and 404.5.

(4) *Trailer Track* – Semitrailer axle width, measured from outside face of tires.

(5) *Lock To Lock Time* - The time in seconds that an average driver would take under normal driving conditions to turn the steering wheel of a vehicle from the lock position on one side to the lock position on the other side. The default in AutoTurn software is 6 seconds.

(6) *Steering Lock Angle* - The maximum angle that the steering wheels can be turned. It is further defined as the average of the maximum angles made by the left and right steering wheels with the longitudinal axis of the vehicle.

(7) *Articulating Angle* - The maximum angle between the tractor and semitrailer.

Topic 405 - Intersection Design Standards

405.1 Sight Distance

(1) *Stopping Sight Distance*. See Index 201.1 for minimum stopping sight distance requirements.

(2) *Corner Sight Distance*.

(a) General--At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle, bicyclist or pedestrian stopped on the minor road and the driver of an approaching vehicle on the major road that has no stop. Line of sight for all users should be included in right of way, in order to preserve sight lines.

Adequate time should be provided for the stopped vehicle on the minor road to either cross all lanes of through traffic, cross the near lanes and turn left, or turn right, without requiring through traffic to radically alter their speed. The visibility required for these maneuvers form a clear sight triangle with the corner sight distance b and the crossing distance a_1 or a_2 (see Figure 405.1 as an example of corner sight distance at a two-lane, two-way highway). Dimensions a_1 and a_2 are measured from the decision point to the center of the lane. The actual number of lanes will vary on the major and minor roads. There should be no sight obstruction within the clear sight triangle.

The methodology used for the driver on the minor road that is stopped to complete the necessary maneuver while the approaching vehicle travels at the design speed of the major road is based on gap-acceptance behavior. A 7-1/2 second criterion is applied to a passenger car (including pickup trucks) for a left turn from a stop on the minor road. However, this time gap does not account for a single-unit truck (no semitrailer), a combination truck (see Index 404.4 for truck tractor-semitrailer guidance), a right-turn from a stop, or for a crossing maneuver. See Table 405.1A for the time gap that addresses these situations for the assumed design vehicle making these maneuvers from the minor road.

In determining corner sight distance, a set back distance for the vehicle waiting on the minor road must be assumed as measured from the edge of traveled way of the major road. <u>Set back for the driver of the vehicle on the minor road should be a minimum of 10 feet plus the shoulder width of the major road but not less than 15 feet.</u> The location of the driver's eye for the set back is the decision point per Figure 405.1. Corner sight distance and the driver's eye set back are also illustrated in Figures 405.7 and 504.3I. Line of sight for corner sight distance for passenger cars is to be determined from a 3 and 1/2-foot height at the location of the driver of the vehicle in the center of the minor road lane to a 3 and 1/2-foot object height in the center of the approaching outside lane of the major road. This provides for reciprocal sight by both vehicles. The passenger car driver's eye height should be applied to all minor roads. In addition, a truck driver's eye height of 7.6 feet should be applied to the minor road where applicable. Additionally, if the major road has a median barrier, a 2-foot object height should be used to determine the median barrier set back. A median that is wide enough to accommodate a stopped vehicle should also provide a clear sight triangle.

The minimum corner sight distance (feet) should be determined by the equation: $1.47V_mT_g$, where V_m is the design speed (mph) of the major road and T_g is the time gap (seconds) for the minor road vehicle to enter the major road. The values given in Table 405.1A should be used to determine T_g based on the design vehicle, the type of maneuver, and whether the stopped vehicle's rear wheels are on an upgrade exceeding 3 percent. The distance from the edge of traveled way to the rear wheels at the minor road stop location should be assumed as: 20 feet for a passenger car, 30 feet for a single-unit truck, and 72 feet for a combination truck.

(b) Public Road Intersections (Refer to Topic 205)--At unsignalized public road intersections (see Index 405.7) corner sight distance applies.

At signalized intersections the corner sight distances should also be applied whenever possible. Even though traffic flows are designed to move at separate times, unanticipated conflicts can occur due to violation of signal, right turns on red, malfunction of the signal, or use of flashing red/yellow mode.

The minimum value for corner sight distance at signalized intersections should be equal to the stopping sight distance as given in Table 201.1, measured as previously described. This includes an urban driveway that forms a leg of the signalized intersection.

(c) Private Road Intersections (Refer to Index 205.2) and Rural Driveways (Refer to Index 205.4)--The minimum corner sight distance should be equal to the stopping sight distance as given in Table 201.1, measured as previously described.

(d) Urban Driveways (Refer to Index 205.3)--Corner sight distance requirements as described above are not applied to urban driveways. If parking is allowed on the major road, parking should be prohibited on both sides of the driveway per the California MUTCD, 3B.19.

(3) *Decision Sight Distance.* At intersections where the State route turns or crosses another State route, the decision sight distance values given in Table 201.7 should be used. In computing and measuring decision sight distance, the 3.5-foot eye height and the 0.5-foot object height should be used, the object being located on the side of the intersection nearest the approaching driver.

The application of the various sight distance requirements for the different types of intersections is summarized in Table 405.1B.

Table 405.1B
Application of Sight Distance Requirements

Intersection Types	Sight Distance		
	Stopping	Corner	Decision
Private Roads	X	X[1]	
Public Streets and Roads	X	X	
Signalized Intersections	X	X[2]	
State Route Inter-sections & Route Direction Changes, with or without Signals	X	X	X

NOTES:

(1) Per Index 405.1(2)(c), the minimum corner sight distance shall be equal to the stopping sight distance as given in Table 201.1. See Index 405.1(2)(a) for setback requirements.

(2) Apply corner sight distance requirements at signalized intersections whenever possible due to unanticipated violations of the signals or malfunctions of the signals. See Index 405.1(2)(b).

(4) *Acceleration Lanes for Turning Moves onto State Highways.* At rural intersections, with "STOP" control on the local cross road, acceleration lanes for left and right turns onto the State facility should be considered. At a minimum, the following features should be

Figure 405.1
Corner Sight Distance

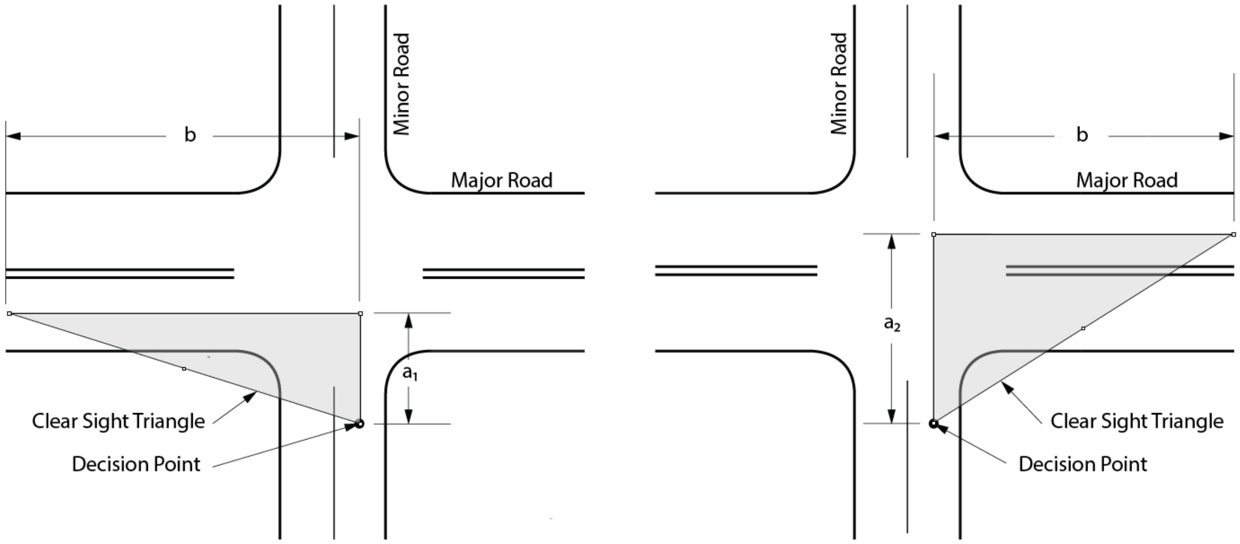


Table 405.1A
Corner Sight Distance Time Gap (T_g) for Unsignalized Intersections

Design Vehicle	Left-turn from Stop (s)	Right-turn from Stop and Crossing Maneuver (s)
Passenger Car	7½	6½
Private Road Intersection		
Rural Driveway		
Single-Unit Truck	9½	8½
Public Road Intersection		
Combination Truck	11½	10½
Major and Minor Roads on Routes:		
National Network		
Terminal or Service Access		
California Legal		
KPRA Advisory		

Notes: Time gaps are for a stopped vehicle to turn left, right or cross a two-lane highway with no median and with minor road grades of 3 percent or less. The table values should be adjusted as follows:

(1) For multilane highways—When crossing or making a left-turn onto a two-way major road with more than two lanes, add 0.5 s for passenger cars or 0.7 s for trucks for each additional lane to be crossed. Median widths should be converted to an equivalent number of lanes in applying the 0.5 s and 0.7 s criteria. For example, an 18-foot wide median is equivalent to 1.5 lanes; this requires an additional 0.75 s for a passenger car to cross or an additional 1.05 s for a truck to cross.

(2) For minor road approach grades—If the minor road approach grade is an upgrade that exceeds 3 percent and the rear wheels of the design vehicle are on the grade exceeding 3 percent, add 0.2 s for each percent grade for left-turns; or add 0.1 s for each percent grade for right-turns and crossing maneuvers. For example, a passenger car is turning right from a minor road and at the stop location its rear wheels are on a 4 percent upgrade; this requires an additional 0.4 s for the right-turn.

(3) Unique situations may necessitate a different design vehicle for a particular minor road than those listed here (e.g., predominant combination trucks out of a rural driveway). Additionally, for intersections at skewed angles less than 60 degrees, a further adjustment is needed. See the AASHTO "A Policy on Geometric Design of Highways and Streets" for guidance.

evaluated for both the major highway and the cross road:

- divided versus undivided
- number of lanes
- design speed
- gradient
- lane, shoulder and median width
- traffic volume and composition of highway users, including trucks and transit vehicles
- turning volumes
- horizontal curve radii
- sight distance
- proximity of adjacent intersections
- types of adjacent intersections

For additional information and guidance, refer to AASHTO, A Policy on Geometric Design of Highways and Streets, the District Traffic Engineer or designee, the District Design Liaison, and the Project Delivery Coordinator.

405.2 Left-turn Channelization

(1) *General.* The purpose of a left-turn lane is to expedite the movement of through traffic by, controlling the movement of turning traffic, increasing the capacity of the intersection, and improving safety characteristics.

The District Traffic Branch normally establishes the need for left-turn lanes.

(2) *Design Elements.*

(a) Lane Width – **The lane width for both single and double left-turn lanes on State highways shall be 12 feet.**

For conventional State highways with posted speeds less than or equal to 40 miles per hour and AADTT (truck volume) less than 250 per lane that are in urban, city or town centers (rural main streets), the minimum lane width shall be 11 feet.

When considering lane width reductions adjacent to curbed medians, refer to Index 303.5 for guidance on effective roadway width, which may vary depending on drivers' lateral positioning and shy distance from raised curbs.

(b) Approach Taper -- On conventional highways without a median, an approach taper provides space for a left-turn lane by moving traffic laterally to the right. The approach taper is unnecessary where a median is available for the full width of the left-turn lane. Length of the approach taper is given by the formula on Figures 405.2A, B and C.

Figure 405.2A shows a standard left-turn channelization design in which all widening is to the right of approaching traffic and the deceleration lane (see below) begins at the end of the approach taper. This design should be used in all situations where space is available, usually in rural and semi-rural areas or in urban areas with high traffic speeds and/or volumes.

Figures 405.2B and 405.2C show alternate designs foreshortened with the deceleration lane beginning at the 2/3 point of the approach taper so that part of the deceleration takes place in the through traffic lane. Figure 405.2C is shortened further by widening half (or other appropriate fraction) on each side. These designs may be used in urban areas where constraints exist, speeds are moderate and traffic volumes are relatively low.

(c) Bay Taper -- A reversing curve along the left edge of the traveled way directs traffic into the left-turn lane. The length of this bay taper should be short to clearly delineate the left-turn move and to discourage through traffic from drifting into the left-turn lane. Table 405.2A gives offset data for design of bay tapers. In urban areas, lengths of 60 feet and 90 feet are normally used. Where space is restricted and speeds are low, a 60-foot bay taper is appropriate. On rural high-speed highways, a 120-foot length is considered appropriate.

(d) Deceleration Lane Length -- Design speed of the roadway approaching the intersection

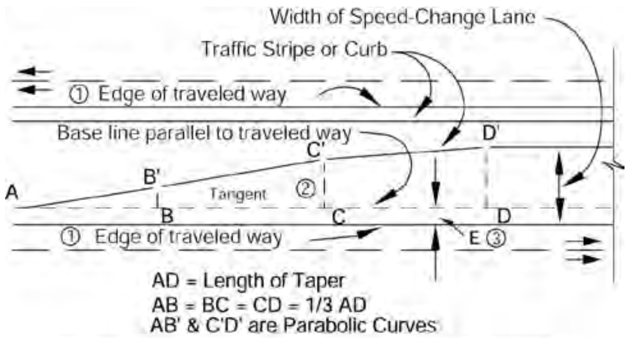
should be the basis for determining deceleration lane length. It is desirable that deceleration take place entirely off the through traffic lanes. Deceleration lane lengths are given in Table 405.2B; the bay taper length is included. Where partial deceleration is permitted on the through lanes, as in Figures 405.2B and 405.2C, design speeds in Table 405.2B may be reduced
10 miles per hour to 20 miles per hour for a lower entry speed. In urban areas where cross streets are closely spaced and deceleration lengths cannot be achieved, the District Traffic branch should be consulted for guidance.

(e) Storage Length -- At unsignalized intersections, storage length may be based on the number of turning vehicles likely to arrive in an average 2-minute period during the peak hour. At a minimum, space for 2 vehicles should be provided at 25 feet per vehicle. If the peak hour truck traffic is 10 percent or more, space for at least one passenger car and one truck should be provided. Bus usage may require a longer storage length and should be evaluated if their use is anticipated.

At signalized intersections, the storage length may be based on one and one-half to two times the average number of vehicles that would store per signal cycle depending on cycle length, signal phasing, and arrival and departure rates. At a minimum, storage length should be calculated in the same manner as unsignalized intersection. The District Traffic Branch should be consulted for this information.

When determining storage length, the end of the left-turn lane is typically placed at least 3 feet, but not more than 30 feet, from the nearest edge of shoulder of the intersecting roadway. Although often set by the placement of a crosswalk line or limit line, the end of the storage lane should always be located so that the appropriate turning template can be accommodated.

Table 405.2A
Bay Taper for Median Speed-change Lanes



	LENGTH OF TAPER - feet			OFFSET DISTANCE			
	60	90	120	DD' = 10'	DD' = 11'	DD' = 12'	
	Distance From Point "A"						
	-	-	-	0.00	0.00	0.00	
	5	7.5	10.0	0.16	0.17	0.19	
	10	15.0	20.0	0.62	0.69	0.75	
	15	22.5	30.0	1.41	1.55	1.69	
B'	20	30.0	40.0	2.50	2.75	3.00	B'
	30	45.0	60.0	5.00	5.50	6.00	
C'	40	60.0	80.0	7.50	8.25	9.00	C'
	45	67.5	90.0	8.59	9.45	10.31	
	50	75.0	100.0	9.38	10.31	11.25	
	55	82.5	110.0	9.84	10.83	11.81	
	60	90.0	120.0	10.00	11.00	12.00	

NOTES:

(1) The table gives offsets from a base line parallel to the edge of traveled way at intervals measured from point "A". Add "E" for measurements from edge of traveled way.
(2) Where edge of traveled way is a curve, neither base line nor taper between B & C will be a tangent. Use proportional offsets from B to C.
(3) The offset "E" is usually 2 ft along edge of traveled way for curbed medians; Use "E" = 0 ft. for striped medians.

Table 405.2B
Deceleration Lane Length

Design Speed (mph)	Length to Stop (ft)
30	235
40	315
50	435
60	530

(3) *Double Left-turn Lanes.* At signalized intersections on multilane conventional highways and on multilane ramp terminals, double left-turn lanes should be considered if the left-turn demand is 300 vehicles per hour or more. The lane widths and other design elements of left-turn lanes given under Index 405.2(2) applies to double as well as single left-turn lanes.

The design of double left-turn lanes can be accomplished by adding one or two lanes in the median. See "Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians", published by Headquarters, Division of Traffic Operations, for the various treatments of double left-turn lanes.

(4) *Two-way Left-turn Lane (TWLTL).* The TWLTL consists of a striped lane in the median of an arterial and is devised to address the special capacity and safety problems associated with high-density strip development. It can be used on 2-lane highways as well as multilane highways. Normally, the District Traffic Operations Branch should determine the need for a TWLTL.

The minimum width for a TWLTL shall be 12 feet (see Index 301.1). The preferred width is 14 feet. Wider TWLTL's are occasionally provided to conform with local agency standards. However, TWLTL's wider than 14 feet are not recommended, and in no case should the width of a TWLTL exceed 16 feet. Additional width may encourage drivers in opposite directions to use the TWLTL simultaneously.

405.3 Right-turn Channelization

(1) *General.* For right-turning traffic, delays are less critical and conflicts less severe than for left-turning traffic. Nevertheless, right-turn lanes can be justified on the basis of capacity, analysis, and crash experience.

In rural areas a history of high speed rear-end collisions may warrant the addition of a right-turn lane.

In urban areas other factors may contribute to the need such as:

- High volumes of right-turning traffic causing backup and delay on the through lanes.
- Conflicts between crossing pedestrians and right-turning vehicles and bicycles.
- Frequent rear-end and sideswipe collisions involving right-turning vehicles.

Where right-turn channelization is proposed, lower speed right-turn lanes should be provided to reduce the likelihood of conflicts between vehicles, pedestrians, and bicyclists.

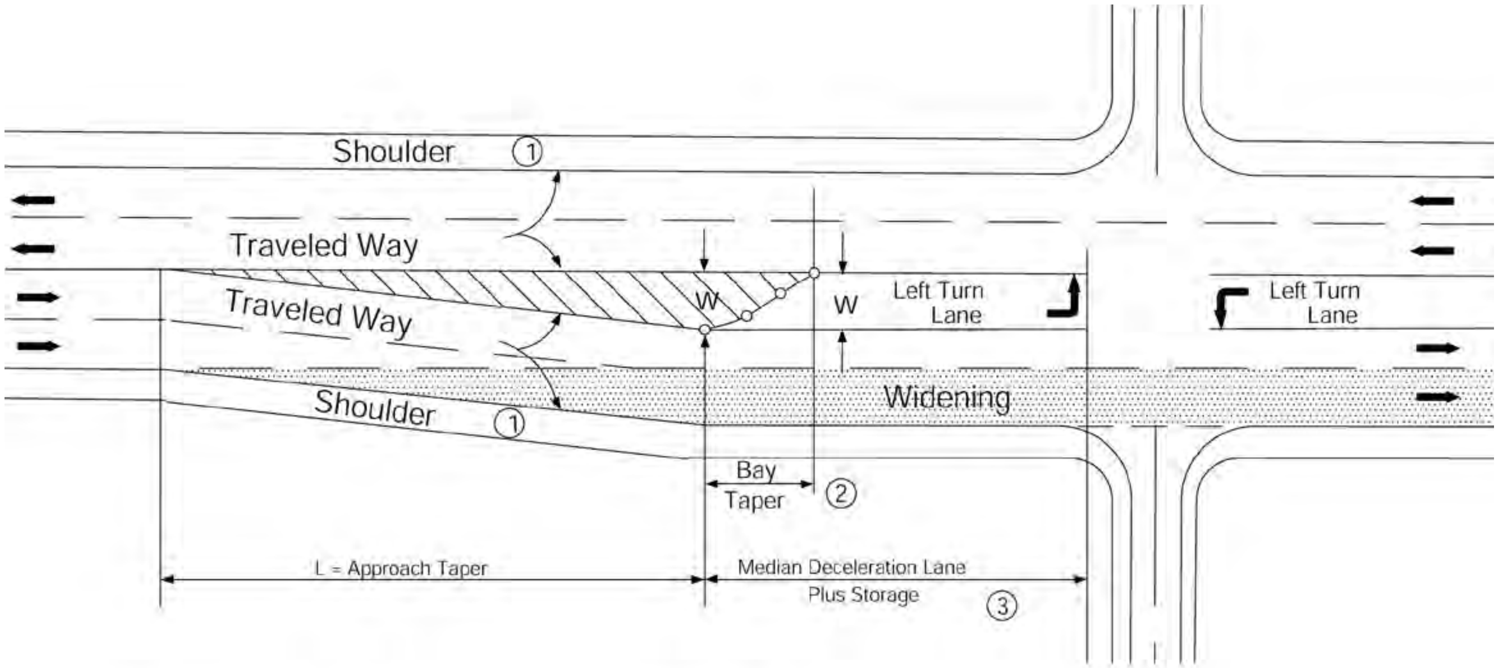
(2) *Design Elements.*

(a) Lane and Shoulder Width--**Index 301.1 shall be used for right-turn lane width requirements. Shoulder width shall be a minimum of 4 feet.** Although not desirable, lane and shoulder widths less than those given above can be considered for right-turn lanes under the following conditions pursuant to Index 82.2:

- In urban, city or town centers (rural main streets) with posted speeds less than 40 miles per hour in severely constrained situations, if truck or bus use is low, consideration may be given to reducing the right-turn lane width to 10 feet.
- Shoulder widths may also be considered for reduction under constricted situations. Whenever possible, at least a 2-foot shoulder should be provided where the right-turn lane is adjacent to a curb. Entire omission of the shoulder should only be considered in constrained situations and where an 11-foot lane can be constructed.

  Gutter pans can be included within a shoulder, but cannot be included as part of the travel lane width. Additional right of way for a future right-turn lane should be considered when an intersection is being designed.

Figure 405.2A
Standard Left-turn Channelization



EQUATION: L = Use WV, for $V \geq 45$mph ④
Or $WV^2/60$, for $V < 45$mph

Where L = Length of Approach Taper - feet
V = Design Speed - mph
W = Width of Median Lane - feet

NOTES:

① Where width is restricted, shoulder width may be reduced and parking restricted with an approved design exception pursuant to Index 82.2.
For bicycle use, a minimum 4-foot shoulder is required (5-foot if gutter is present).

② Bay taper length = 60 feet to 120 feet. (See Table 405.2A)

③ For deceleration lane length see Table 405.2B.

④ Where both sides of roadway are widened, use a fraction of "W" that is proportional to widening on each side.

Figure 405.2B
Minimum Median Left-turn Channelization
(Widening on one Side of Highway)

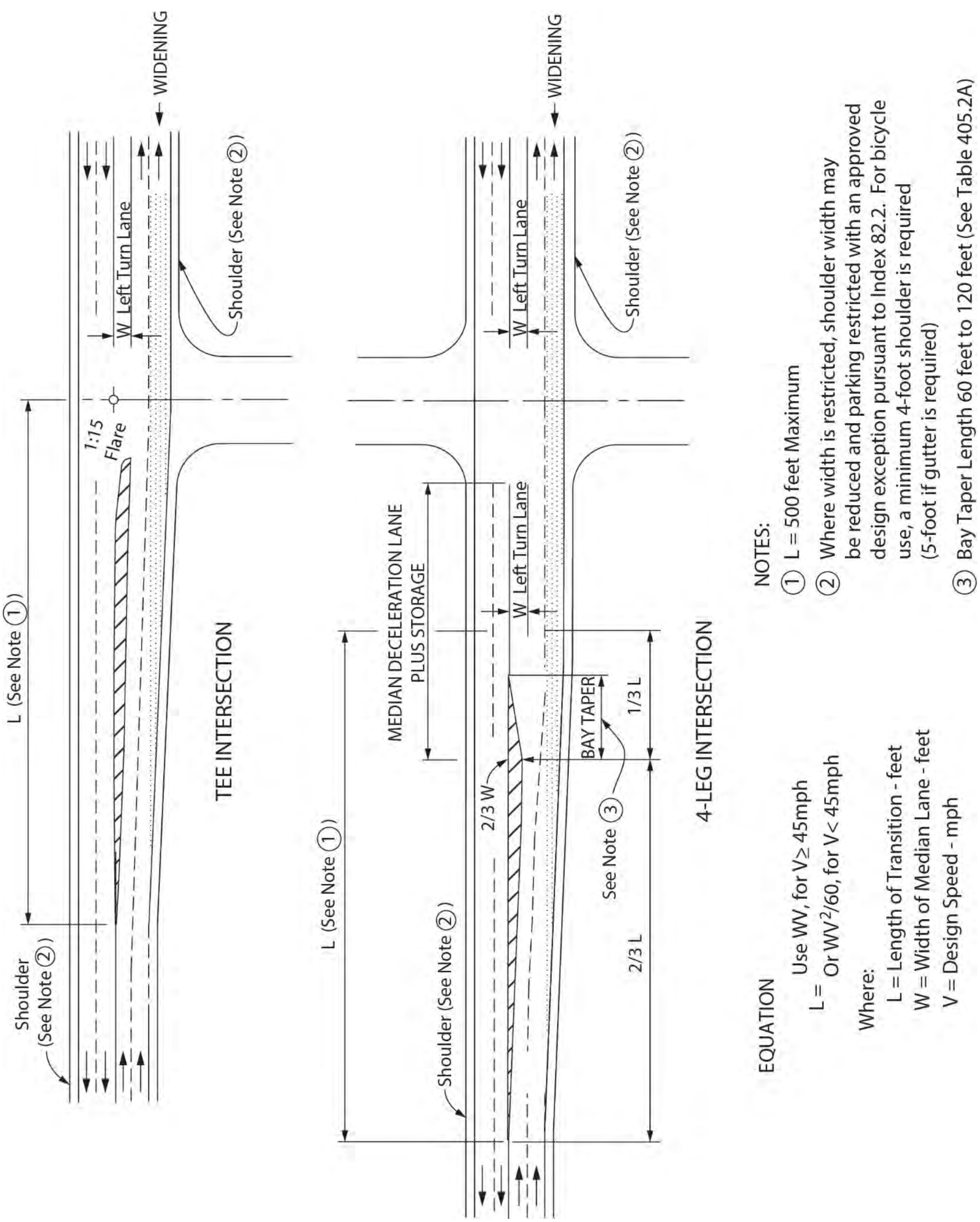
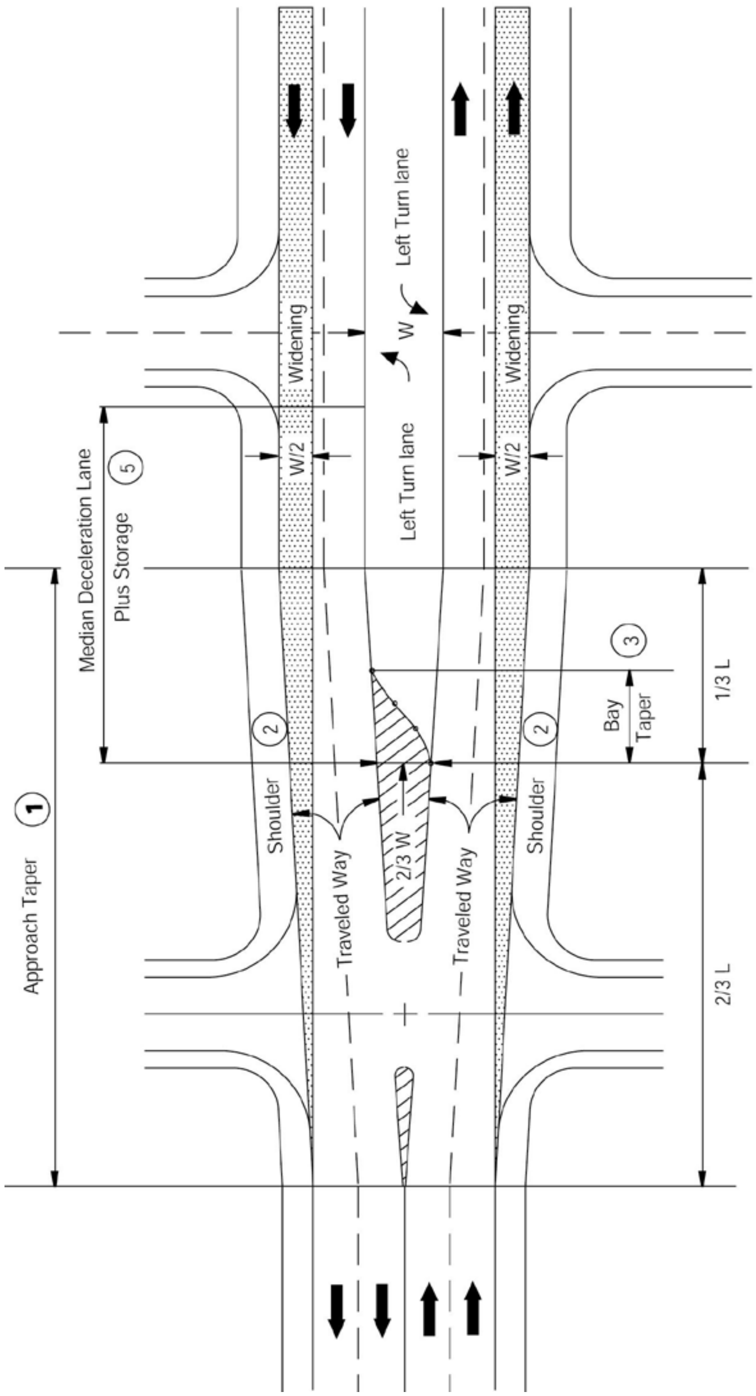


Figure 405.2C
Minimum Median Left-turn Channelization
(Widening on Both Sides in Urban Areas with Short Blocks)



NOTES:

1. L = 500 feet Maximum
2. Where width is restricted, shoulder width may be reduced and parking restricted with an approved design exception pursuant to Index 82.2. For bicycle use, a minimum 4 feet shoulder is required (5 feet if gutter is present).
3. Bay taper length = 60 feet to 120 feet. (See Table 405.2A)
4. Assumes equal widening each side. Where widening is unequal, use a fraction that is proportional to widening on each side.
5. For deceleration lane length see Table 405.2B.

EQUATION: (4)

L = Use $(1/2)WV$, for $V \geq 45$mph
Or $WV^2/120$, for $V < 45$mph

Where L = Length of Approach Taper - feet
W = Width of Median Lane - feet
V = Design Speed - mph

(b) Curve Radius--Where pedestrians are allowed to cross a free right-turning roadway, the curve radius should be such that the operating speed of vehicular traffic is no more than 20 miles per hour at the pedestrian crossing. See NCHRP Report 672, "Roundabouts: An Informational Guide" for guidance on the determination of design speed (fastest path) for turning vehicles. See Index 504.3(3) for additional information.

(c) Tapers--Approach tapers are usually unnecessary since main line traffic need not be shifted laterally to provide space for the right-turn lane. If, in some rare instances, a lateral shift were needed, the approach taper would use the same formula as for a left-turn lane.

Bay tapers are treated as a mirror image of the left-turn bay taper.

(d) Deceleration Lane Length--The conditions and principles of left-turn lane deceleration apply to right-turn deceleration. Where full deceleration is desired off the high-speed through lanes, the lengths in Table 405.2B should be used. Where partial deceleration is permitted on the through lanes because of limited right of way or other constraints, average running speeds in Table 405.2B may be reduced 10 miles per hour to 20 miles per hour for a lower entry speed. For example, if the main line speed is 50 miles per hour and a 10 miles per hour deceleration is permitted on the through lanes, the deceleration length may be that required for 40 miles per hour.

(e) Storage Length--Right-turn storage length is determined in the same manner as left-turn storage length. See Index 405.2(2)(e).

(3) Right-turn Lanes at Off-ramp Intersections. Diamond off-ramps with a free right-turn at the local street and separate right-turn off-ramps around the outside of a loop will likely cause conflict as traffic volumes increase. Serious conflicts occur when the right-turning vehicle must weave across multiple lanes on the local street in order to turn left at a major cross street close to the ramp terminal. Furthermore, free right-turns create sight distance issues for pedestrians and bicyclists crossing the off-ramp, or pedestrians crossing the local road. Also, rear-end collisions can occur as right-turning drivers slow down or stop waiting for a gap in local street traffic. Free right-turns usually end up with "YIELD", "STOP", or signal controls thus defeating their purpose of increasing intersection capacity.

405.4 Traffic Islands

A traffic island is an area between traffic lanes for channelization of bicycle and vehicle movements or for pedestrian refuge. An island may be defined by paint, raised pavement markers, curbs, pavement edge, or other devices. The California MUTCD should be referenced when considering the placement of traffic islands at signalized and unsignalized locations. For splitter island guidance at roundabouts, see Index 405.10(13).

Traffic islands usually serve more than one function. These functions may be:

(a) Channelization to confine specific traffic movements into definite channels;

(b) Divisional to separate traffic moving in the same or opposite direction; and

(c) Refuge, to aid users crossing the roadway.

Generally, islands should present the least potential conflict to approaching or crossing bicycles and vehicles, and yet perform their intended function.

(1) Design of Traffic Islands. Island sizes and shapes vary from one intersection to another. They should be large enough to command attention. Channelizing islands should not be less than 50 square feet in area, preferably 75 square feet. Curbed, elongated divisional median islands should not be less than 4 feet wide and 20 feet long. All traffic islands placed in the path of a pedestrian crossing must comply with DIB 82. See the Standard Plans for typical island passageway details.

The approach end of each island should be offset 3 feet to the left and 5 feet to the right of approaching traffic, using standard 1:15 parabolic flares, and clearly delineated so that it does not surprise the motorist or bicyclist. These offsets are in addition to the shoulder widths shown in Table 302.1. Table 405.4 gives standard parabolic flares to be used in island design. On curved alignment, parabolic flares may be omitted for small triangular traffic islands whose sides are less than 25 feet long.

The approach nose of a divisional island should be highly visible day and night with appropriate use of signs (reflectorized or illuminated) and object markers. The approach nose should be offset 3 feet from the through traffic to minimize accidental impacts.

(2) *Delineation of Traffic Islands.* Generally, islands should present the least potential conflict to approaching traffic and yet perform their intended function. See Index 303.2 for appropriate curb type. Islands may be designated as follows:

(a) Raised paved areas outlined by curbs.

(b) Flush paved areas outlined by pavement markings.

(c) Unpaved areas (small unpaved areas should be avoided).

On facilities with posted speeds over 40 miles per hour, the use of any type of curb is discouraged. Where curbs are to be used, they should be located at or outside of the shoulder edge, as discussed in Index 303.5.

In rural areas, painted channelization supplemented with raised pavement markers may be more appropriate than a raised curbed channelization. This design is as forgiving as possible and decreases the consequence of a driver's or bicyclist's failure to detect or recognize the curbed island. Consideration for snow removal operations should be determined where appropriate.

In urban areas, posted speeds less than or equal to 40 miles per hour allow more frequent use of curbed islands. Local agency requirements and matching existing conditions are factors to consider.

(3) *Pedestrian Refuge*

Pedestrian refuge islands allow pedestrians to cross fewer lanes at a time while judging conflicts separately. They also provide a refuge so slower pedestrians can wait for a gap in traffic while reducing total crossing distance.

At unsignalized intersections in rural city/town centers (rural main streets), suburban, or urban areas, a pedestrian refuge should be provided between opposing traffic where pedestrians are allowed to cross 2 or more through traffic lanes in one direction of travel, at marked or unmarked crosswalks. Pedestrian islands at signalized crosswalks should be considered, taking into account crossing distance and pedestrian activity. Note that signalized pedestrian crossings must be timed to allow for pedestrians to cross. See the California MUTCD, Chapter 4E, for further guidance.

Traffic islands used as pedestrian refuge are to be large enough to provide a minimum of 6 feet in the direction of pedestrian travel, without exception.

All traffic islands placed in the path of a pedestrian crossing must be accessible, refer to DIB 82 and the Standard Plans for further guidance. An example of a traffic island that serves as a pedestrian refuge is shown on Figure 405.4.

405.5 Median Openings

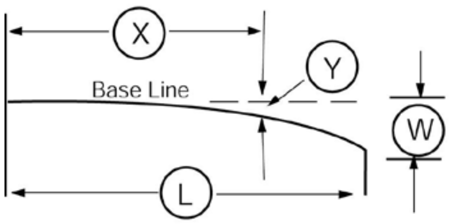
(1) *General.* Median openings, sometimes called crossovers, provide for crossings of the median at designated locations. Except for emergency passageways in a median barrier, median openings are not allowed on urban freeways.

Median openings on expressways or divided conventional highways should not be curbed except when the median between openings is curbed, or it is necessary for delineation of traffic signal standards and other necessary hardware, or for protection of pedestrians. In these special cases B4 curbs should be used. An example of a median opening design is shown on Figure 405.5.

(2) *Spacing and Location.* By a combination of interchange ramps and emergency passageways, provisions for access to the opposite side of a freeway may be provided for law enforcement, emergency, and maintenance vehicles to avoid extreme out-of-direction travel. Access should not be more frequent

Table 405.4

Parabolic Curb Flares Commonly Used



$$Y = \frac{W X^2}{L^2}$$

(L) = Length of flare in feet

(W) = Maximum offset in feet

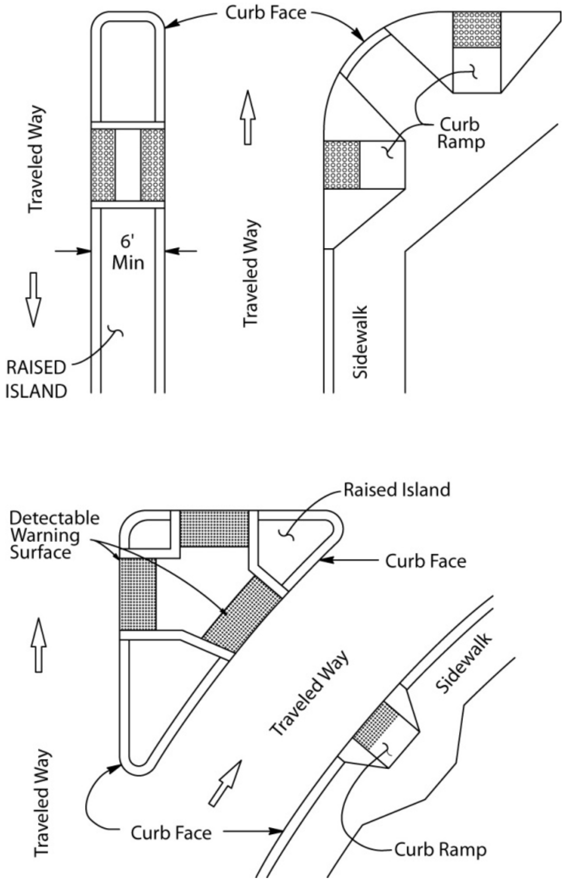
(X) = Distance along base line in feet

(Y) = Offset from base line in feet

(W) is shown in table thus

Length of Flare (L) \ Distance (X)	10	15	20	25	30	40	45	50	60	70	75	80	90	100	110	120
OFFSET IN FEET FOR GIVEN "X" DISTANCE																
1:5 FLARES																
25	0.80	1.80	3.20	5.00												
50	0.40		1.60		3.60	6.40		10.00								
1:10 FLARES																
50	0.20		0.80		1.80	3.20		5.00								
100	0.10		0.40		0.90	1.60		2.50	3.60	4.90		6.40	8.10	10.00		
1:15 FLARES																
45	0.15		0.59		1.33	2.37	3.00									
75	0.09		0.36		0.80	1.42		2.22	3.20	4.36	5.00					
90	0.07		0.30		0.67	1.19		1.85	2.67	3.63		4.74	6.00			
120	0.06		0.22		0.50	0.89		1.39	2.00	2.72		3.56	4.50	5.56	6.72	8.00

Figure 405.4
Pedestrian Refuge Island



than at three-mile intervals. See Traffic Safety Systems Guidance for additional information on the design of emergency passageways.

Emergency passageways should be located only where decision sight distance is available (see Table 201.7).

Median openings at close intervals on other types of highways create conflicts with high speed through traffic. Median openings should be spaced at intervals no closer than 1600 feet. If a median opening falls within 300 feet of an access opening, it should be placed opposite the access opening.

(3) *Length of Median Opening.* For any three or four-leg intersection on a divided highway, the length of the median opening should be at least as great as the width of the crossroads pavement, median width, and shoulders. An important factor in designing median openings is the path of the design vehicle making a minimum left turn at 5 miles per hour to 10 miles per hour. The length of median opening varies with width of median and angle of intersecting road.

Usually a median opening of 60 feet is adequate for 90 degree intersections with median widths of 22 feet or greater. When the median width is less than 22 feet, a median opening of 70 feet is needed. When the intersection angle is other than 90 degrees, the length of median opening should be established by using truck turn templates (see Index 404.3).

(4) *Cross Slope.* The cross slope in the median opening should be limited to 5 percent. Crossovers on curves with super elevation exceeding 5 percent should be avoided. This cross slope may be exceeded when an existing 2-lane roadbed is converted to a 4-lane divided highway. The elevation of the new construction should be based on the 5 percent cross slope requirement when the existing roadbed is raised to its ultimate elevation.

(5) *References.* For information related to the design of intersections and median openings, "A Policy on Geometric Design of Highways and Streets," AASHTO, should be consulted.

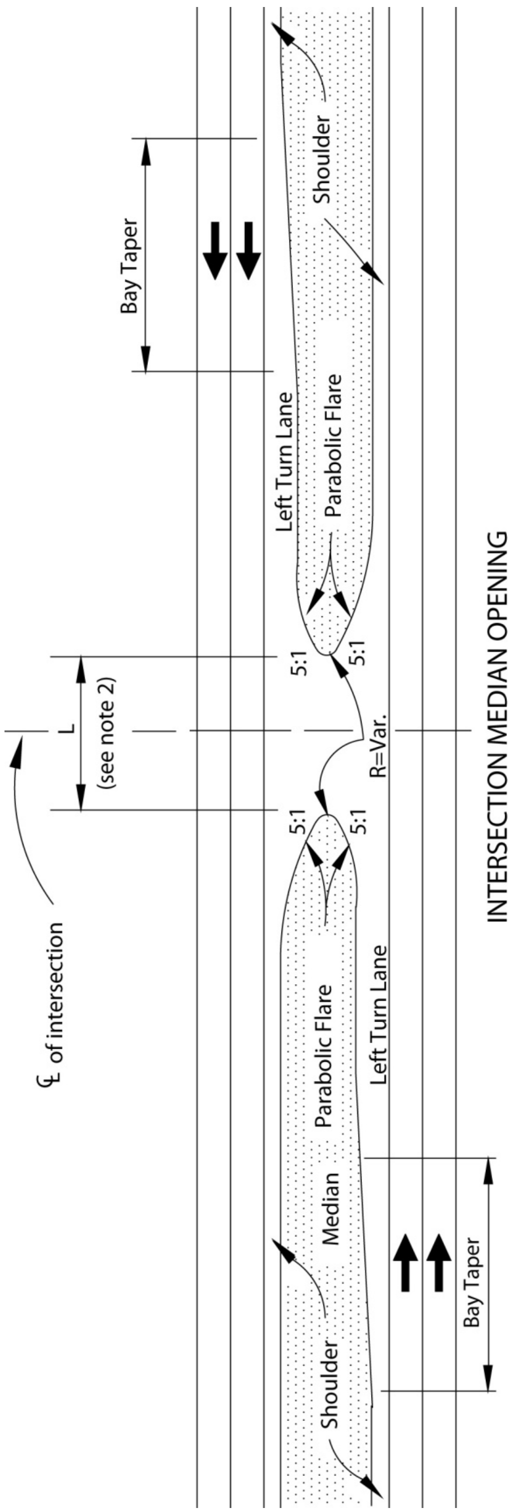
405.6 Access Control

The basic guidance which govern the extent to which access rights are to be acquired at interchanges (see Topic 104, Index 205.1 and 504.8 and the PDPM) also apply to intersections at grade on expressways. Cases of access control which frequently occur at intersections are shown in Figure 405.7. This illustration does not presume to cover all situations. Where required by traffic conditions, access should be extended in order to ensure proper operation of the expressway lanes. Reasonable variations which observe the basic principles referred to above are acceptable.

However, negative impacts on the mobility needs of pedestrians, bicyclists, equestrians, and transit users need to be assessed. Pedestrians and bicyclists are sensitive to additional out of direction travel.

Figure 405.5

Typical Design for Median Openings



NOTES:

① For length of bay taper, see Table 405.2A.

② L = Length of median opening: varies with width of median and angle of intersecting road. Usually for 90° intersection, L = 60 feet for median of 22 feet and wider. L = 70 feet for medians narrower than 22 feet.

③ See Index 405.2.

④ Pedeistrain and bicycle features are not shown on figure.

405.7 Public Road Intersections

The basic design to be used at right-angle public road intersections on the State Highway System is shown in Figure 405.7. The essential elements are sight distance (see Index 405.1) and the treatment of the right-turn on and off the main highway. Encroachment into opposing traffic lanes by the turning vehicle should be avoided or minimized.

(1) *Right-turn Onto the Main Highway.* The combination of a circular curve joined by a 2:1 taper on the crossroads and a 75-foot taper on the main highway is designed to fit the wheel paths of the appropriate turning template chosen by the designer.

It is desirable to keep the right-turn as tight as practical, so the "STOP" or "YIELD" sign on the minor leg can be placed close to the intersection.

(2) *Right-turn Off the Main Highway.* The combination of a circular curve joined by a 150-foot taper on the main highway and a 4:1 taper on the crossroads is designed to fit the wheel paths of the appropriate turning template and to move the rear of the vehicle off the main highway. Deceleration and storage lanes may be provided when necessary (see Index 405.3).

(3) *Alternate Designs.* Offsets are given in Figure 405.7 for right angle intersections. For skew angles, roadway curvature, and possibly other reasons, variations to the right-angle design are permitted, but the basic rule is still to approximate the wheel paths of the design vehicle.

A three-center curve is an alternate treatment that may be used at the discretion of the designer.

Intersections are major consideration in bicycle path design as well. See Indexes 403.6 and 1003.1(5) for general bicycle path intersection design guidance. Also see Section 5.3 of the AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities.

405.8 City Street Returns and Corner Radii

The pavement width and corner radius at city street intersections is determined by the type of vehicle to be accommodated and the mobility needs of pedestrians and bicyclists, taking into consideration the amount of available right of way, the types of adjoining land uses, the place types, the roadway width, and the number of lanes on the intersecting street.

At urban intersections, the California truck or the Bus Design Vehicle template may be used to determine the corner radius. Where STAA truck access is allowed, the STAA Design Vehicle template should be used giving consideration to factors mentioned above. See Index 404.3.

Smaller radii of 15 feet to 25 feet are appropriate at minor cross streets where few trucks or buses are turning. Local agency standards may be appropriate in urban and suburban areas.

Encroachment into opposing traffic lanes must be avoided.

405.9 Widening of 2-lane Roads at Signalized Intersections

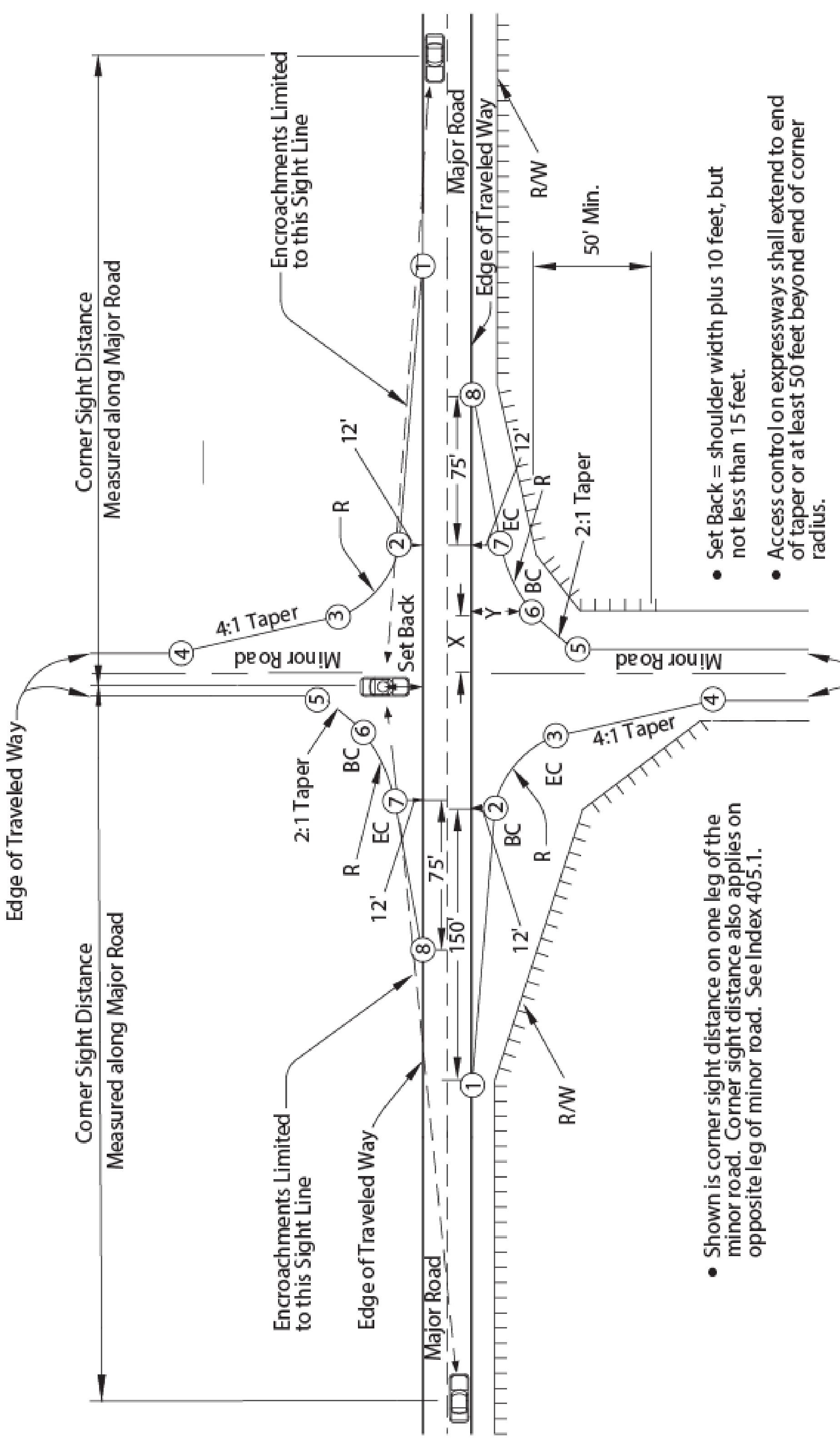
Two-lane State highways may be widened at intersections to 4-lanes whenever signals are installed. Sometimes it may be necessary to widen the intersecting road. The minimum design is shown in Figure 405.9. More elaborate treatment may be warranted by the volume and pattern of traffic movements. Unusual turning movement patterns may possibly call for a different shape of widening.

The impact on pedestrian and bicycle traffic mobility of larger intersections should be assessed before a decision is made to widen an intersection.

405.10 Roundabouts

Roundabout intersections on the State highway system must be developed and evaluated in accordance with National Cooperative Highway Research Program (NCHRP) Report 672 entitled "Roundabouts: An Informational Guide, 2nd ed." (NCHRP Guide 2) dated October 2010 and Traffic Operations Policy Directive (TOPD) Number 13-02. Also see Index 401.5 for general information and guidance. See Figure 405.10 Roundabout Geometric Elements for nomenclature associated with roundabouts. Signs, striping and markings at roundabouts are to comply with the California MUTCD.

Figure 405.7
Public Road Intersections

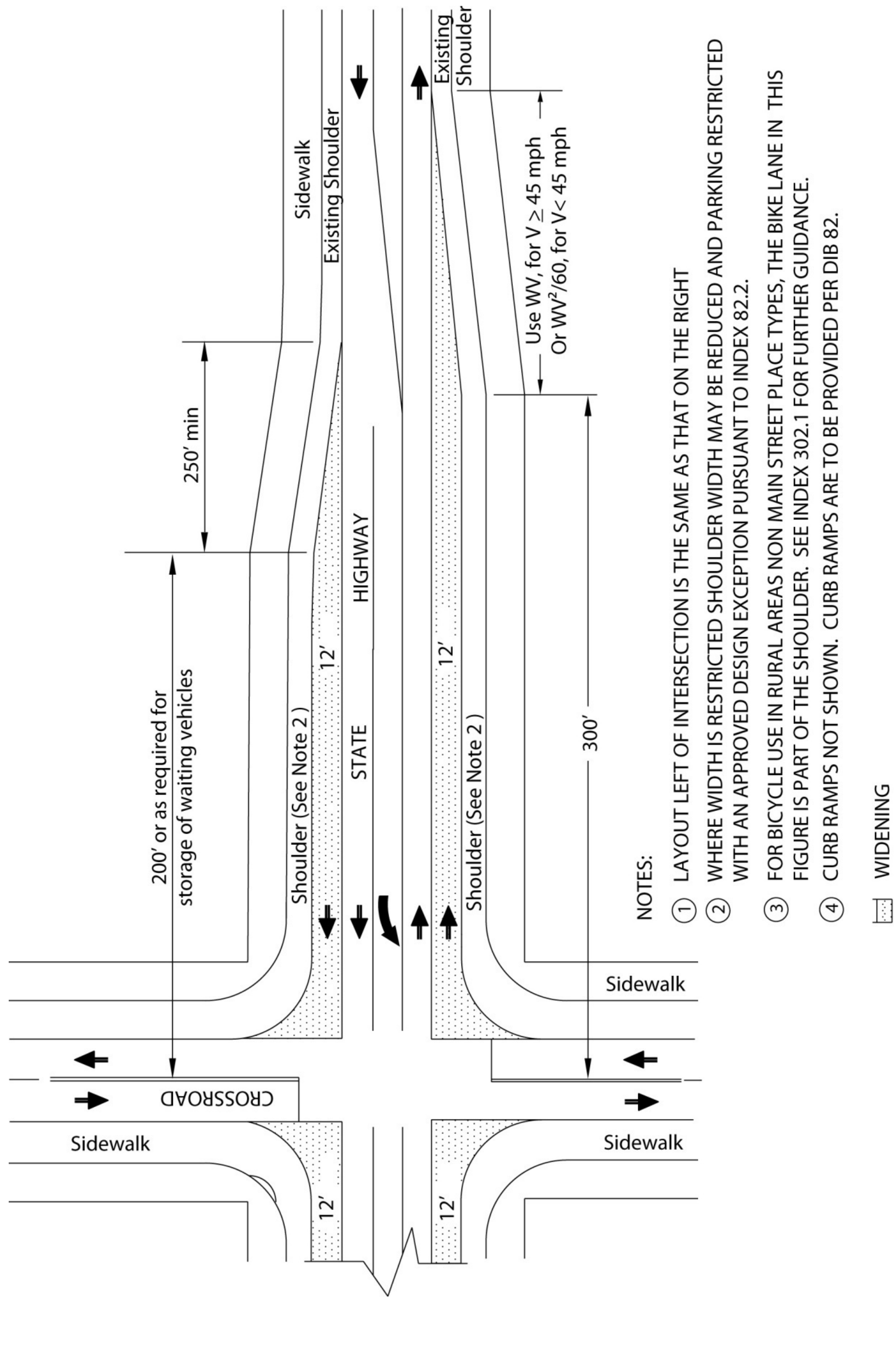


- Shown is corner sight distance on one leg of the minor road. Corner sight distance also applies on opposite leg of minor road. See Index 405.1.
- Set Back = shoulder width plus 10 feet, but not less than 15 feet.
- Access control on expressways shall extend to end of taper or at least 50 feet beyond end of corner radius.

X - Distance measured from centerline of minor road along major road - feet.
Y - Offset distance measured from edge of traveled way of major road to any given point - feet.

Radius of Curve	Design Vehicle	Pt ①		Pt ②		Pt ③		Pt ④		Pt ⑤		Pt ⑥		Pt ⑦		Pt ⑧	
		X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
30'	Bus	204.20	0.0	54.20	12.0	27.49	34.63	12.0	96.58	12.0	40.66	18.23	28.21	40.32	12.0	115.32	0.0
40'	California	215.08	0.0	65.08	12.0	29.46	42.17	12.0	112.03	12.0	53.35	21.87	33.61	51.33	12.0	126.33	0.0
50'	STAA	226.09	0.0	76.09	12.0	31.57	49.71	12.0	127.98	12.0	75.63	30.31	39.01	67.13	12.0	142.13	0.0

Figure 405.9
Widening of Two-lane Roads at Signalized Intersections



A roundabout is a form of circular intersection in which traffic travels counterclockwise around a central island and entering traffic must yield to the circulating traffic. Roundabouts feature, among other things, a central island, a circulatory roadway, and splitter islands on each approach. Roundabouts rely upon two basic and important operating principles:

(a) Speed reduction at the entry and through the intersection will be achieved through geometric design and,

(b) The yield-at-entry rule, which requires traffic entering the intersection to yield to traffic that is traveling in the circulatory roadway.

Benefits of roundabouts are:

- Fewer conflict points typically result in fewer collisions with less severity. Over half of vehicle to vehicle points of conflict associated with intersections are eliminated with the use of a roundabout. Additionally, a roundabout separates the points of conflict which eases the ability of the users to identify a conflict and helps prevent conflicts from becoming collisions.
- Roundabouts are designed to reduce the vehicular speeds at intersections. Lower speeds lessens the vehicular collision severity. Likewise, studies indicate that pedestrian and bicyclist collisions with motorized vehicles at lower speeds significantly reduce their severity.
- Roundabouts allow continuous free flow of vehicles and bicycles when no conflicts exist. This results in less noise and air pollution and reduces overall delays at roundabout intersections.

Except as indicated in this Index, the standards elsewhere in this manual do not apply to roundabouts. For the application of design standards, the approach ends of the splitter islands define the boundary of a roundabout intersection, see Figure 405.10. The design standards elsewhere in this manual apply to the approach legs beyond the approach ends of the splitter islands.

(1) Design Period.

First consider the design of a single lane roundabout per the design period guidance in Index 103.2. If a second lane is not needed until 10 or more years, it may be better to phase the improvements. Construct the first phase of the roundabout so at the 20-year design period, an additional lane can be easily added. In order to comply with the 20-year design period, the initial project must provide the right of way needed for utility relocations, a shared-use path designed for a Class I Bikeway, and all other features other than pavement, lighting, and striping in their ultimate locations.

In some locations, it may not be practical to build a single lane roundabout that will operate for 10 years. Geometric constraints and other conflicts may preclude widening to the ultimate configuration. In such cases, other intersection configurations or control strategies addressed in Index 401.5 may need to be considered.

When staging improvements, see NCHRP Guide 2, Section 6.12.

(2) Design Vehicles - See Topic 404.

The turning path for the design vehicle, see Index 404.5, dictates many of the roundabout dimensions. The design vehicle tracking and swept width are to be used when designing all the entries and exits, where design vehicles are unrestricted (see Index 404.2), and the circulatory roadway. The percentage of trucks and their lane utilization is an important consideration on multilane roundabouts when determining if the design will allow trucks to stay within their own lane or encroach into the adjacent lane. If permit vehicles larger than the design vehicle occasionally use the proposed roundabout, they can be accommodated by having removable signs or other removable features in the central island or around the circular path to ensure their swept path can negotiate the roundabout. Roundabouts should not be overdesigned for the occasional permit vehicle.

To accurately simulate the design vehicle swept width traveling through a roundabout, the minimum speed of the design vehicle used in computer simulation software (e.g., Auto

TURN) should be 10 miles per hour through the roundabout.

(3) *Inscribed Circle Diameter.*

At single lane roundabouts, the size of the inscribed circle is largely dependent upon the turning requirements of the design vehicle. The inscribed circle diameter (ICD) must be large enough to accommodate: (a) the STAA design vehicle for all roundabouts on the National Network and on Terminal Access routes; and, (b) the California Legal design vehicle on all non-STAA route intersections on California Legal routes and California Legal KPRA Advisory routes, while maintaining adequate deflection curvature to ensure appropriate travel speeds for smaller vehicles. The design vehicle is to navigate the roundabout with the front tractor wheels off the truck apron, if one is present. Transit vehicles, fire engines and single-unit delivery vehicles are also to be able to navigate the roundabout without using the truck apron, if one is present. The inscribed circle diameter for a single lane roundabout generally ranges between 105 feet to 150 feet to accommodate the California Legal design vehicle and 130 feet to 180 feet to accommodate the STAA design vehicle.

At multilane roundabouts, the inscribed circle diameter is to achieve adequate alignment of the natural vehicle path while maintaining deflection curvature to ensure appropriate travel speeds. To achieve both of these design objectives requires a slightly larger diameter than used for a single lane roundabout. The inscribed circle diameter for a multilane (2-lane) roundabout generally ranges between 150 feet to 220 feet to accommodate the California Legal design vehicle for non-STAA route intersections on California Legal routes and California Legal KPRA Advisory routes, and 165 feet to 220 feet to accommodate the STAA design vehicle for roundabouts on the National Network and on Terminal Access routes. Similar to a single lane roundabout, the design vehicle is to be able to navigate a multilane roundabout with the front tractor wheels staying off the truck apron, if one is present. Transit vehicles, fire engines and single-unit delivery vehicles are also to be able to navigate the roundabout without using the truck apron, if one is present.

The inscribed diameter ranges given above are typical values, design may be larger or smaller. Site location constraints and performance checks will determine if the diameter is appropriate for the location.

(4) *Entry Speeds.*

Lowering the speed of vehicles entering and traveling through the roundabout is a primary design objective that is achieved by approach alignment and entry geometry.

<u>The following entry speeds should not be exceeded</u>:

- <u>Single lane entry, 25 miles per hour.</u>
- <u>Multilane entry, 30 miles per hour.</u>

A bypass lane is not included in the number of entry lanes. A bypass prohibits entry into the circulatory roadway.

Entry speeds are to be determined through fastest path analysis. Fastest path is the smoothest, flattest path possible for a single vehicle in the absence of other traffic and ignoring all lane markings. The fastest path analysis should begin at least 165 feet from the inscribed circle diameter and should not bring the path closer than 3 feet from a stripe nor 5 feet from the face of a curb. These distances are minimums and the fastest path may occur further away from the curbs and striping depending on the roundabout configuration. For fastest path evaluation, see NCHRP Guide 2, Section 6.7.1.

(5) *Exit Design.*

Similar to entry design, exit design flexibility is required to achieve the optimal balance between competing design variables and project objectives to provide adequate capacity and, essentially, safety while minimizing excessive property impacts and costs. Thus, the selection of a curved versus tangential design is to be based upon the balance of each of these criteria. Exit design is influenced by the place type, pedestrian demand, bicyclist needs, the design vehicle and physical constraints. The exit curb radii are usually larger than the entry curb radii in order to minimize the likelihood of congestion and crashes at the exits. However, the desire to minimize congestion at the exits needs to be balanced with the need to maintain an appropriate operating speed through the pedestrian crossing. Therefore, the exit path radius should not be significantly greater than the circulating path radius to ensure low speeds are maintained at the pedestrian crossing.

(6) Number of Legs Serving the Roundabout.

Intersections with more than four legs are often difficult to manage operationally. Roundabouts are a proven traffic control device in such situations. However, it is necessary to ensure that the design vehicle can maneuver through all unrestricted legs of the roundabout.

(7) Pedestrian Use.

Sidewalks around the circular roadway are to be designed as shared-use paths, see Index 405.10(8)(c). However, the guidance in Design Information Bulletin (DIB) 82 Pedestrian Accessibility Guidelines for Highway Projects must also be followed when designing these shared-use facilities around a roundabout. If there is a difference in the standards, the guidance in DIB 82 is to be followed. In addition,

(a) Pedestrian curb ramps need to be differentiated from bike ramps:

- The detectable warning surface (truncated domes) differentiates a pedestrian curb ramp from a bicycle ramp.
- Detectable warning surface is required on curb ramps. They are not to be used on a bike ramp.

(b) Truck aprons and mountable curbs are not to be placed in the pedestrian crossing areas.

(c) See the California MUTCD for the signs and markings used at roundabouts.

(d) At pedestrian crossing locations the accessibility design will be treated as a midblock pedestrian street crossing. See DIB 82 for more information.

(8) Bicyclist Use.

(a) General. Bicyclists may choose to travel in the circular roadway of a roundabout by taking a lane, while others may decide to travel using the shared-use path to bypass the circular roadway. Therefore, the approach and circular roadways, as well as the shared-use path all need to be designed for the mobility needs of bicyclists. See the California MUTCD for the signs and markings used at roundabouts.

(b) Bicyclist Use of the Circular Roadway. Single lane roundabouts do not require bicyclists to change lanes in the circular roadway to select the appropriate lane for their direction of travel, so they tend to be comfortable for bicyclists to use. Even two-lane roundabouts, which may have straighter paths of travel that can lead to faster vehicular traveling speeds, appear to be comfortable for bicyclists that prefer to travel like vehicles. Roundabouts that have more than two circular lanes can create complexities in signing and striping (see the California MUTCD for guidance), and their operating speed may cause some bicyclists to decide to bypass the circular roadway and use the bicycle ramp that provides access to the shared-use path around the roundabout.

(c) Bicyclists Use of the Shared-Use Path. The shared-use path is to be designed using the guidance in Index 1003.1 for Class I Bikeways and in NCHRP Guide 2 Section 6.8.2.2. However, the accessibility guidance in DIB 82 must also be followed when designing these shared-use facilities around a roundabout. If there is a difference in the standards, the accessibility guidance in DIB 82 is to be followed to ensure the facility is accessible to pedestrians with disabilities.

Bicycle ramps are to be located to avoid confusion as curb ramps for pedestrians. Also see Index 405.10(7) for guidance on how to differentiate the two types of ramps.

The design details and width of the ramp are also important to the bicyclist. Bicyclists approaching the bicycle ramp need to be provided the choice of merging left into the lane or moving right to use the bicycle ramp. Bicycle ramps should be placed at a 35 to 45 degree angle to the departure roadway and the sidewalk to enable the bicyclists to use the ramp and discourage bicyclists from entering the shared-use path at a speed that is detrimental to the pedestrians. The shared-use path should be designated as Class I Bikeways; however, appropriate regulatory signs may need to be posted if the local jurisdiction has a law(s) that prohibit bicyclists from riding on a sidewalk.

A landscape buffer or strip between the shared-use/Class I Bikeway and the circular roadway of the roundabout is needed and should be a minimum of 2 feet wide.

Pedestrian crossings may also be used by bicyclists; thus, these shared-use crossings need to be designed for both bicyclist and pedestrian needs.

(9) *Transit Use.*

Transit vehicles and buses will not have difficulty negotiating a roundabout when it has been designed using the California Legal design vehicle or the STAA design vehicle. However, to minimize passenger discomfort, a roundabout should be designed such that the transit vehicle or bus does not use the truck apron, if one is present.

(10) *Stopping Sight Distance and Visibility.*

See Index 201.1 for stopping sight distance guidance at roundabouts.

A domed or mounded central island, between 3.5 to 6 feet high, is needed to focus attention on the approach and through roundabout alignment. A domed central island provides a visual screen from downstream alignment and other distractions and provides a visual cue for vehicles approaching the roundabout.

In high speed environments, additional lighting of, and vertical elements in the central island (i.e., landscaping and esthetic features) may be needed.

(11) *Speed Consistency.*

Consistency in operating speeds between the various movements within the roundabout can minimize collisions between traffic streams. The operating speeds between competing traffic streams and between consecutive geometric elements should be minimized such that the maximum speed differential between them is no more than 15 miles per hour; it is preferred that the operating speed differential be less than 10 miles per hour.

(12) *Path Alignment (Natural Path).*

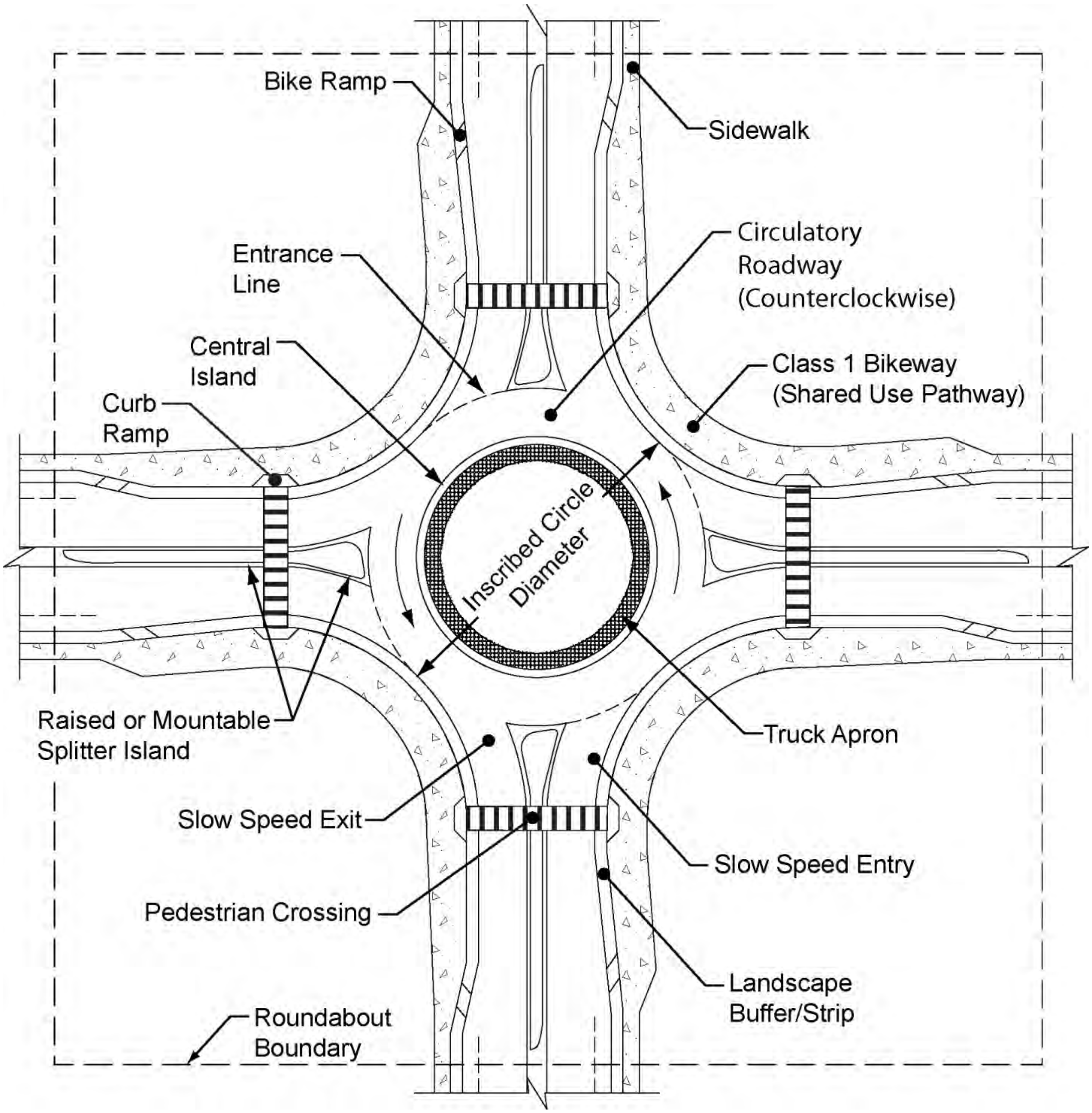
As two traffic streams approach the roundabout in adjacent lanes, drivers and bicyclists will be guided by lane markings up to the entrance line. At the yield point, they will continue along their natural trajectory into the circulatory roadway. The speed and orientation of the design vehicle at the entrance line determines what can be described as its natural path. The geometry of the exits also affects the natural path that the design vehicle travels. The natural path of two vehicles are not to overlap, see NCHRP Guide 2, Section 6.7.2.

(13) *Splitter Islands.*

Splitter islands (also called separator islands, divisional islands, or median islands) will be provided on all roundabouts. The purpose is to provide refuge for pedestrians, assist in controlling speeds, guide traffic into the roundabout, physically separate entering and exiting traffic streams, and deter wrongway movements.

The total length of the raised island should be at least 50 feet although 100 feet is desirable. On higher speed roadways, splitter island lengths of 150 feet or more is beneficial. Additionally, the splitter island should extend beyond the end of the exit curve to prevent

Figure 405.10
Roundabout Geometric Elements



NOTE:

This figure is provided to only show nomenclature and is not to be used for design details.

exiting traffic from crossing into the path of approaching traffic. The splitter island width should be a minimum of 6 feet at the pedestrian crossing to adequately provide refuge for pedestrians.

Posted speeds on the approach roadway greater than or equal to 45 miles per hour require the splitter island length, as measured from the inscribed circle diameter, to be 200 feet. In some instances, a longer splitter island may be desirable. Concrete curb is to be provided on the right side of the approach roadway equal to the length of the splitter island from the inscribed circle diameter.

(14) *Access Control.*

The access control standards in Index 504.3(3) and 504.8 apply to roundabouts at interchange ramp intersections. The dimensions shown in Index 504.8 are to be measured from the inscribed circle diameter.

Driveways should not be placed within 100 feet from the inscribed circle diameter.

(15) *Lighting.*

Lighting is required at all roundabouts. See NCHRP Report 672 Chapter 8, the Traffic Manual Chapter 9 as well as consult with the District Traffic Safety Engineer.

(16) *Landscaping.*

Landscaping should be designed such that drivers and bicyclists can observe the signing and shape of the roundabout as they approach, allowing adequate visibility for making decisions within the roundabout. The landscaping of the central island can enhance the intersection by making it a focal point, by promoting lower speeds and by breaking the headlight glare of oncoming vehicles or bicycles. It is desirable to create a domed or mounded central island, between 3.5 to 6 feet high, to increase the visibility of the intersection on the approach. Contact the District Landscape Architecture Unit to provide technical assistance in designing the roundabout landscaping.

(17) *Vertical Clearance.*

The vertical clearance guidance provided in Index 309.2 applies to roundabouts.

(18) *Drainage Design.*

See Chapter 800 to 890 for further guidance.

(19) *Maintenance.*

Contact the District Maintenance Engineer and appropriate Regional Manager for maintenance strategies and practices including seasonal operations, maintenance resources, and specialized equipment. Maintenance responsibilities may also include multiple state, county, and city agencies where coordination of maintenance efforts and funding is needed.

Consider maintenance of the central island. Provide a maintenance vehicle pullout within the central island beyond the truck apron, so maintenance vehicles will not conflict with circulating trucks.

(20) *Snow Areas.*

In climate regions where snowfall requires the use of snow removal equipment, consider the equipment to be used. Design ICD's as well as entrance and exit geometry to accommodate snow removal equipment and plow limitations. Check with District Maintenance for their requirements and limitations. Geometric elements to consider that facilitate snow removal are; mountable curb, tapering the ends of curbs down to allow plows to ride over curbs, plowing accommodation in both directions, providing snow storage space within the central island, and providing minimum entry/exit widths to accommodate the plow blade. Mountable curb may be used if sidewalk/shared use path is not contiguous to the curb. Provide a planter or textured pavement between the path and the roadway. Snow storage areas must be designed to prevent snow melt from entering the circulating lanes where it can freeze. Snow storage areas must not block pedestrian paths.

(21) Utilities.

Utility access openings (manholes) should not be located within the traveled way within the boundary of the roundabout. Roundabouts do not have shoulders to accommodate traffic while manholes are accessed. Manholes should not be allowed within the circulating roadway to avoid closing down the intersection during access. If a manhole is absolutely necessary within the boundary of the inscribed diameter, place it in the central island and off of the truck apron. Provide a maintenance vehicle pullout to allow access to the manhole without blocking truck traffic.

Topic 406 - Ramp Intersection Capacity Analysis

The following procedure for ramp intersection analysis may be used to estimate the capacity of any signalized intersection where the phasing is relatively simple. It is useful in analyzing the need for additional turning and through traffic lanes. For a more complete analysis refer to the Highway Capacity Manual.

(a) Ramp Intersection Analysis--For the typical local street interchange there is usually a critical intersection of a ramp and the crossroads that establishes the capacity of the interchange. The capacity of a point where lanes of traffic intersect is 1500 vehicles per hour. This is expressed as intersecting lane vehicles per hour (ILV/hr). Table 406 gives values of ILV/hr for various traffic flow conditions.

If a single-lane approach at a normal intersection has a demand volume of 1000 vph, for example, then the intersecting single-lane approach volume cannot exceed 500 vph without delay.

The three examples that follow illustrate the simplicity of analyzing ramp intersections using this 1500 ILV/hr concept.

(b) Diamond Interchange--The critical intersection of a diamond type interchange must accommodate demands of three conflicting travel paths. As traffic volumes approach capacity, signalization will be needed. For the spread diamond (Figure 406A), basic capacity analysis is made on the assumption that 3-phase signalization is employed. For the tight diamond (Figure 406B), it is assumed that 4-phase signal timing is used.

(c) 2 Quadrant Cloverleaf--Because this interchange design (Figure 406C) permits 2-phase signalization, it will have higher capacities on the approach roadways. The critical intersection is shared two ways instead of three ways as in the diamond case.

Table 406

Vehicle Traffic Flow Conditions at Intersections at Various Levels of Operation

ILV/hr	Description
< 1200:	Stable flow with slight, but acceptable delay. Occasional signal loading may develop. Free midblock operations.
1200-1500:	Unstable flow with considerable delays possible. Some vehicles occasionally wait two or more cycles to pass through the intersection. Continuous backup occurs on some approaches.
1500 (Capacity):	Stop-and-go operation with severe delay and heavy congestion(1). Traffic volume is limited by maximum discharge rates of each phase. Continuous backup in varying degrees occurs on all approaches. Where downstream capacity is restrictive, mainline congestion can impede orderly discharge through the intersection.

NOTE:

(1) The amount of congestion depends on how much the ILV/hr value exceeds 1500. Observed flow rates will normally not exceed 1500 ILV/hr, and the excess will be delayed in a queue.

Figure 406A
Spread Diamond

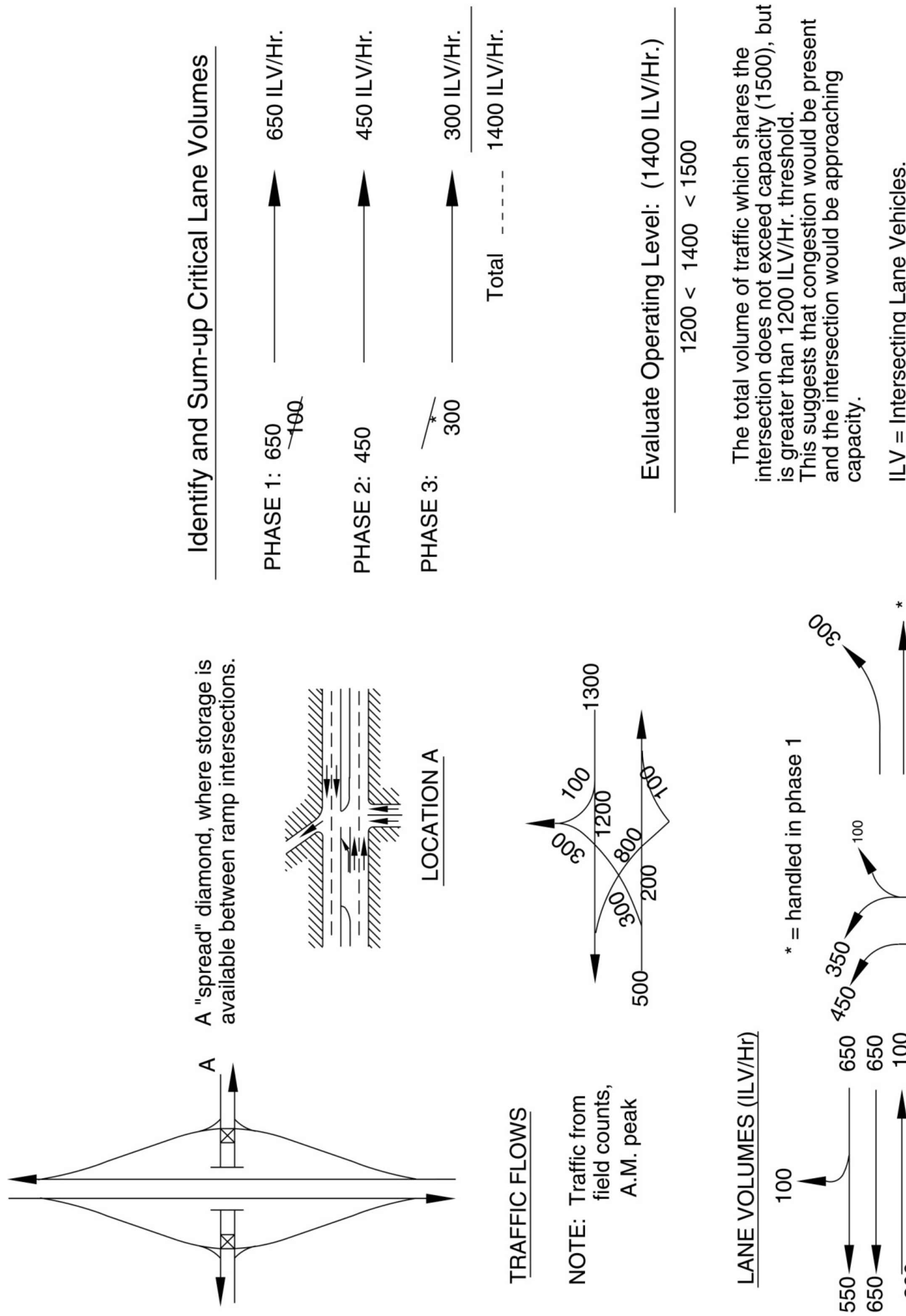
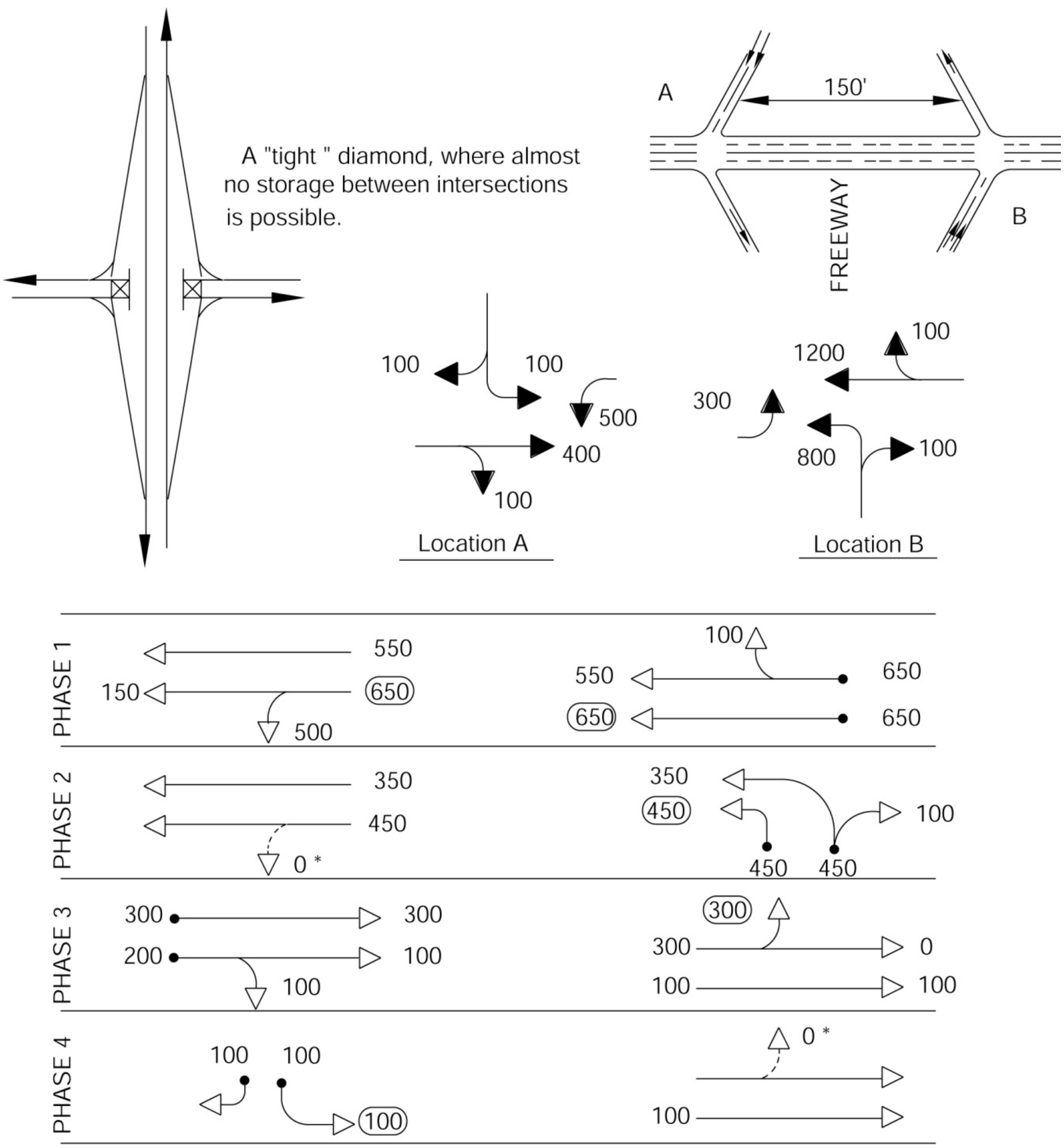


Figure 406B
Tight Diamond



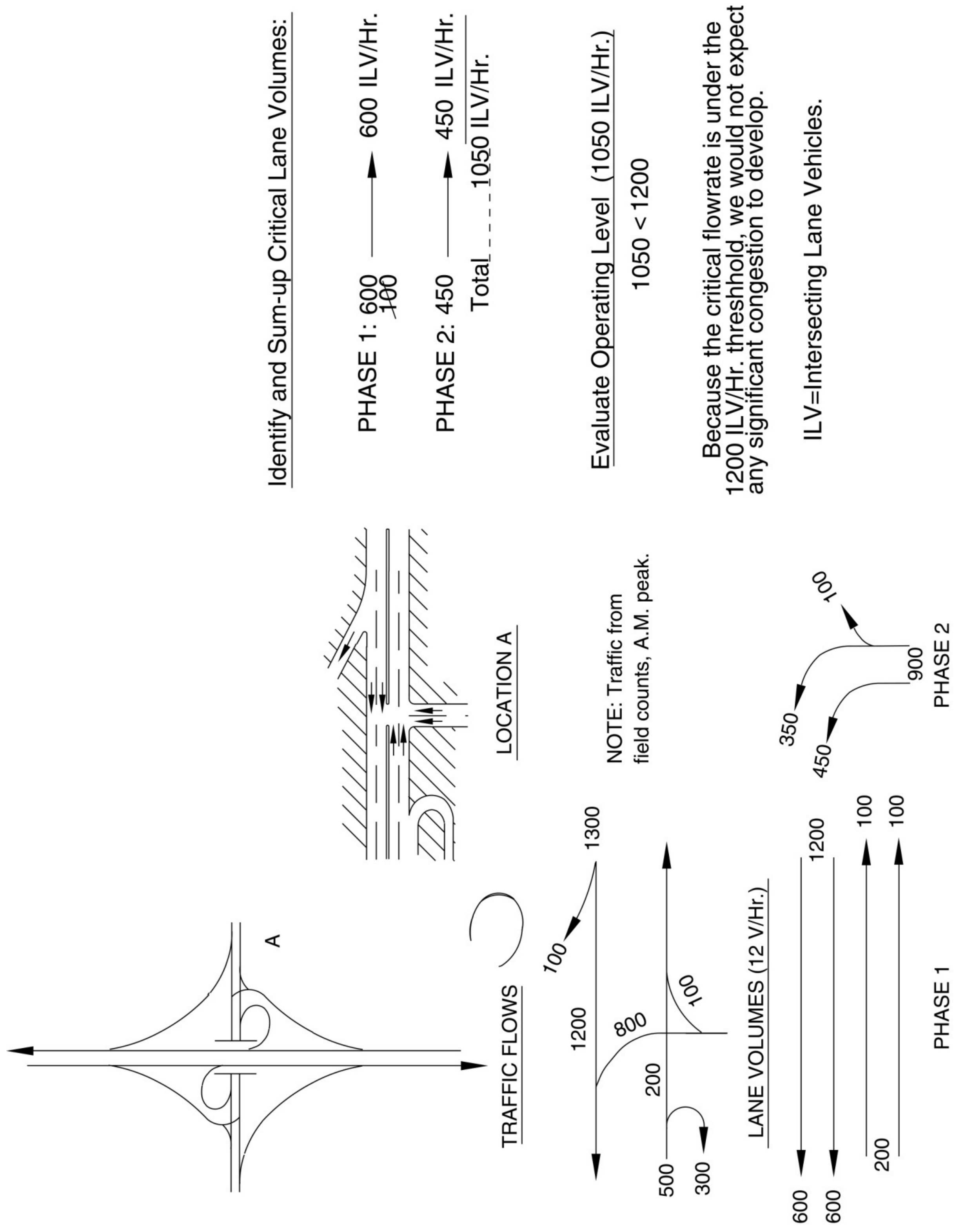
*NOTE: When no storage at all is permitted, left-turn movement is cleared during this phase.

Critical Lane Volumes:

650
450
300
100
1500 ILV/Hr.

ILV=Intersecting Lane Vehicles.

Figure 406C
Two-quadrant Cloverleaf

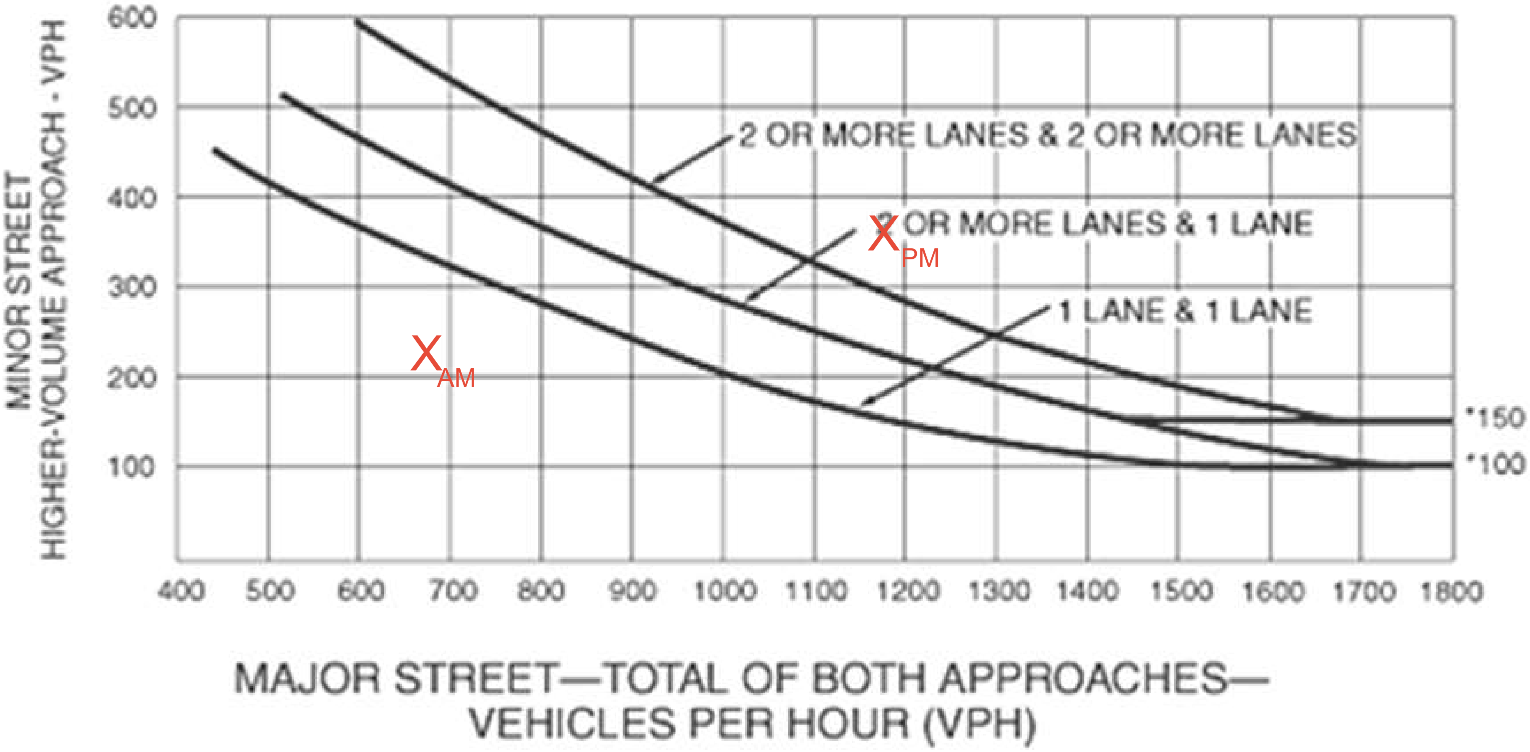


APPENDIX E

Peak Hour Traffic Signal Warrant Worksheets

Campus Drive / 7th Street

Figure 4C-3. Warrant 3, Peak Hour

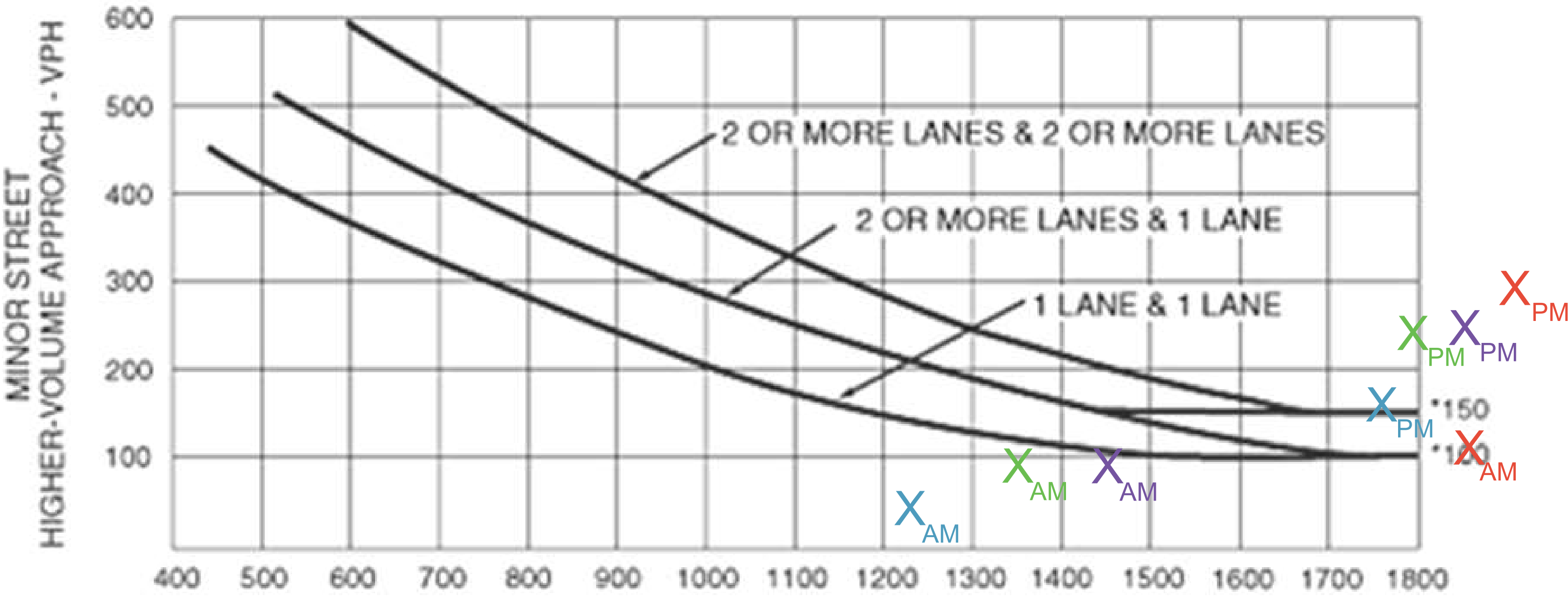


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

LEGEND
X_{AM} X_{PM} Cumulative Year 2042 Plus Project

12th Avenue / Glendale Avenue

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

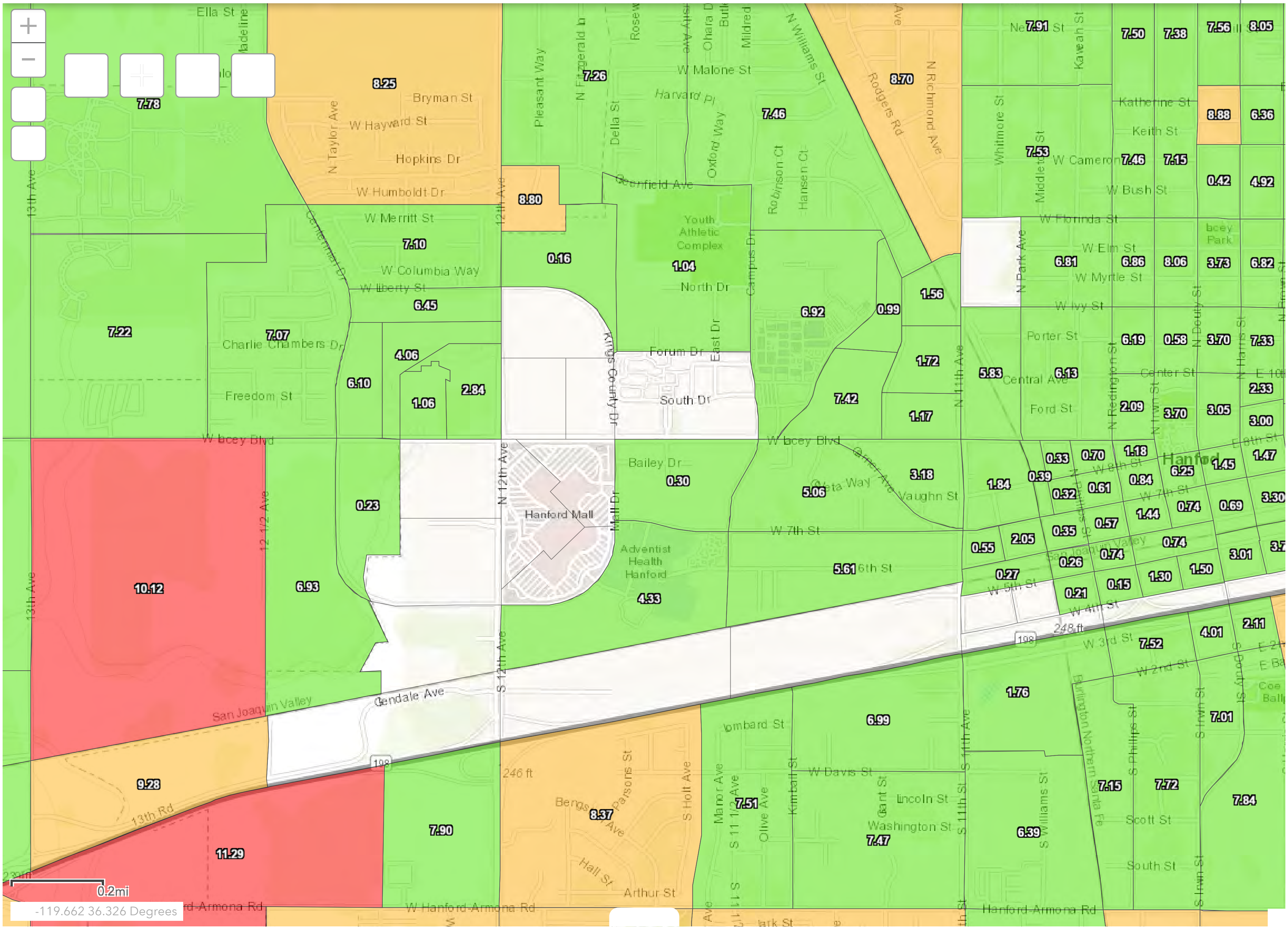
LEGEND
X_{AM} X_{PM} Existing
X_{AM} X_{PM} Existing Plus Project
X_{AM} X_{PM} Near-Term Plus Project
X_{AM} X_{PM} Cumulative Year 2042 Plus Project

APPENDIX F

VMT Analysis Maps

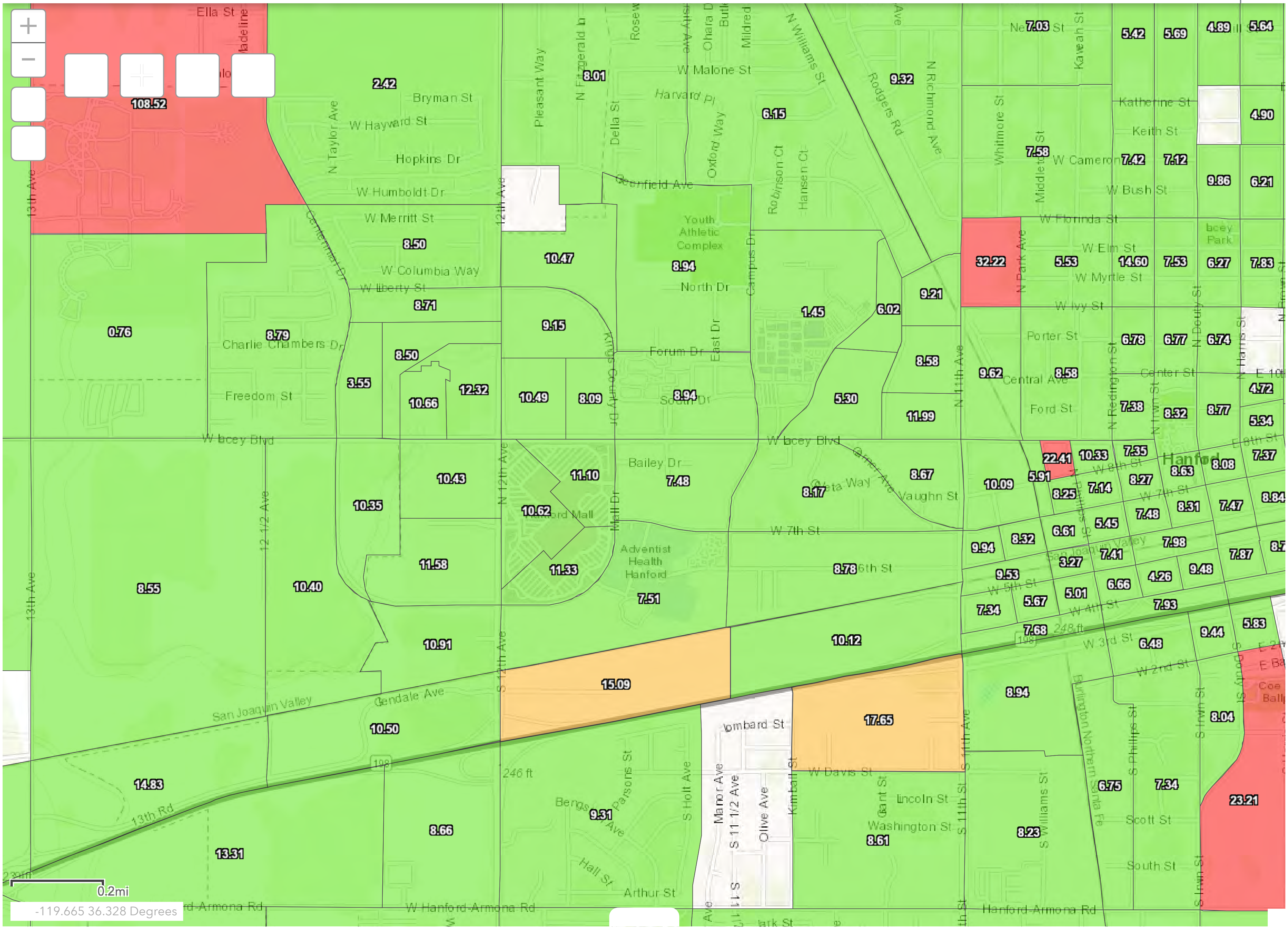
Kings County Online VMT Mapping Tool

VMT per Capita



Kings County Online VMT Mapping Tool

VMT per Employee



APPENDIX G

HANFORD PLACE MEDICAL MIXED-USE DEVELOPMENT PROJECT VEHICLE MILES TRAVELED (VMT) ANALYSIS MEMORANDUM

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LSA

CARLSBAD
CLOVIS
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: March 08, 2023

TO: Steve Brandt, AICP

FROM: Ambarish Mukherjee, P.E., AICP

SUBJECT: Hanford Place Medical Mixed-use Development Project Vehicle Miles Traveled (VMT) Analysis Memorandum

LSA has prepared this Vehicle Miles Traveled (VMT) analysis for the Hanford Place medical development project (project) in the City of Hanford (City). The 39.23-acre vacant project site is located between State Route 198 (SR-198) and the San Joaquin Valley Railroad in the City, in Kings County (County). 5th Street passes through the project site in an east/west direction and Campus Drive passes through the project in a north/south direction. In addition, the Peoples Ditch runs through the project site.

The project proposes to develop a medical and mixed-use development and would construct 15 buildings consisting of medical outpatient clinic services, a hotel and conference center, specialized education, retail, medical office, skilled nursing and assisted living, and multi-family residential uses. The project requires a General Plan Amendment (GPA) to convert the project site from Highway Commercial to Service Commercial and High-Density Residential. Detailed proposed project land uses are shown in Table A below.

Table A: Detailed Project Land uses

Building	Total Square Feet	Number of Units
Ambulatory Surgery Center	22,525	-
Specialty Clinic	12,445	-
Medical Office Building	24,890	2 buildings
Psychiatric Health Facility	12,445	-
Hotel and Conference Center	100,000	105 rooms
Nursing College	35,000	8-10 classrooms
Skilled Nursing Facility	54,611	59 units
Memory Care	34,480	40 units
Assisted Living Facility	34,380	-
Multi-Family Apartment	76,500	90 units
Medical/Commercial	41,500	-

BACKGROUND AND ANALYSIS METRICS

On December 28, 2018, the California Office of Administrative Law cleared the revised California Environmental Quality Act (CEQA) guidelines for use. Among the changes to the guidelines was removal of vehicle delay and level of service from consideration under CEQA. With the adopted guidelines, transportation impacts are to be evaluated based on a project generated VMT.

The City has recently adopted its Senate Bill 743 (SB 743) guidelines – City of Hanford VMT Thresholds and Implementation Guidelines (guidelines), November 2022. Therefore, the project VMT analysis was conducted using the methodology and significant threshold criteria identified in the guidelines. As previously mentioned, the project includes residential, multiple medical uses, and commercial land uses. As per the guidelines, mixed-use projects should be evaluated separately for each component of the project using the applicable VMT metric.

VMT Metrics and Thresholds

The guidelines recommend use of VMT per capita metric to evaluate residential land uses, VMT per service population for uses such as medical offices and hospitals and "net change in VMT" to evaluate commercial land uses. The guidelines also indicate that VMT per service population can be used for land uses that include trips and VMT from both visitors and employees. Though most of the project land uses are medical related that include considerable visitor trips, project uses such as Memory Care, Assisted Living, and Skilled Nursing facility only include trips from its employees and the trips/VMT from visitors on a daily basis is nominal. Therefore, to evaluate these project land uses, VMT per employee was considered as the applicable metric. The following table, Table B shows the project land uses and applicable VMT metrics used to evaluate the project land uses.

Table B: Project land uses and applicable VMT metrics

Land use	VMT metric
Ambulatory Surgery Center	VMT per service population
Specialty Clinic	VMT per service population
Medical Office Building	VMT per service population
Psychiatric Health Facility	VMT per service population
Hotel and Conference Center	VMT per service population
Nursing College	VMT per service population
Skilled Nursing Facility	VMT per employee
Memory Care	VMT per employee
Assisted Living Facility	VMT per employee
Multi-Family Apartment	VMT per capita
Medical/Commercial	Net change in roadway VMT

The guidelines also established Kings County as the region and 13% as the threshold for comparison of VMT metrics. Therefore, if the project VMT per capita, VMT per employee, or VMT per service population exceeds 87% of corresponding Kings County baseline average, the project would have a significant VMT impact. Similarly, for the evaluation of retail component, if the regional roadway VMT is greater in the "with project" scenario compared to the "no project" scenario, the project will have a significant VMT impact.

The guidelines also provide multiple screening criteria to screen out land use projects from a detailed VMT analysis. As mentioned above, as per the guidelines, mixed-use projects should be evaluated separately for each component of the project using applicable VMT metrics. Similarly, each component of the project can be evaluated against the screening criteria established in the guidelines. The following table, Table C shows various screening criteria from the guidelines and their applicability to the project land uses. As shown in Table C, only the retail component of the project can be screened out of detailed VMT analysis. However, the retail component was included in the project model run to appropriately account for the internal capture that will occur due to the mixed use nature of the project.

Table C: Project Land use Screening Evaluation

Project Land use	VMT metric	Within Transit Priority Area	Retail less than 55 TSF	Redevelopment	Affordable Housing	Low VMT area (Screening Maps) *	Screened Out
Ambulatory Surgery Center	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Specialty Clinic	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Medical Office Building	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Psychiatric Health Facility	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Hotel and Conference Center	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Nursing College	VMT per service population	No	N/A	N/A	N/A	N/A	**No**
Skilled Nursing Facility	VMT per employee	No	N/A	N/A	N/A	N/A	**No**
Memory Care	VMT per employee	No	N/A	N/A	N/A	N/A	**No**
Assisted Living Facility	VMT per employee	No	N/A	N/A	N/A	N/A	**No**
Multi-Family Apartment	VMT per capita	No	N/A	N/A	N/A	N/A	**No**
Medical/Commercial	Net Change in roadway VMT	No	Yes	N/A	N/A	N/A	**Yes**

**: Use of screening maps is not applicable for projects that require a GPA*

The guidelines include an additional screening criterion for total trips generated by the project. While other screening criteria are applicable for individual project components, this criterion should be applied to entire project. The project requires a GPA and therefore if the project generates less than 500 daily trips, the project can be screened out of a VMT analysis. Based on project daily trip generation, the project generates more than 500 daily trips and therefore, the daily trip criterion is not applicable to the project. Given that the project land uses other than retail cannot be screened out, a detailed VMT analysis was conducted for these land uses. The VMT analysis is described in detail in the following sections.

METHODOLOGY

For projects that require a detailed VMT analysis, the guidelines recommend use of Kings County Association of Governments (KCAG) travel demand model to conduct the VMT analysis. Therefore, KCAG model was used for the VMT evaluation of the project.

Numerical values for the regional thresholds (VMT per capita, VMT per employee, and VMT per service population) have been obtained from the guidelines document – Table E: Significance Thresholds for VMT Analysis.

Project Traffic Analysis Zone Update

To calculate the project's VMT metrics, the first step was to update the traffic analysis zones (TAZs) in the model that include the project area. KCAG model includes capability to add new zones or conduct zone splits. Ideally, the project needs to be isolated to isolate the project VMT. Based on the review of project land uses, it was determined that addition of six new TAZs (one for multifamily residential, one for hotel/conference center, one for memory care, assisted living, and skilled nursing facility, one for specialty clinic, medical office, ambulatory surgery center, and psychiatric facility, one for nursing college, and one for commercial/retail land uses) would be adequate to incorporate the project in the model. Similar project land uses were grouped together for modeling purposes. Therefore, six new TAZ s were added in the project location within the model, and the proposed project socioeconomic data were added within these TAZs for purposes of this analysis.

The project traffic impact study – Draft Hanford Place Development Traffic Impact Study, December 2020 by VRPA Technologies Inc (TIS), included employee information for some of the project land uses. Number of employees information for available project land uses was obtained from the project TIS. For remaining project land uses, number of employees information was estimated using Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. ITE trip generation manual includes trip rates for land uses by different units (thousand square feet- TSF, employees) which can be used to estimate number of employees per TSF for land uses. LSA converted the project land uses into model socioeconomic categories using the process described above. The KCAG model socioeconomic database for the baseline (2015) scenario was updated with the project socioeconomic data within the six project TAZs.

Based on project description, vehicular access to the site would be provided by Glendale Avenue, 5th Street, and Campus Drive. The extension of these roadways would be constructed to City standards and would be dedicated as public right of way. Therefore, model roadway network was updated to include these extensions (Glendale Ave, 5th Street, and Campus Drive).

Model run was conducted for this updated model and the outputs from this model run were used to estimate project VMT metrics for each of the project land uses.

Project Service Population

Also as indicated in the guidelines, for land uses that include substantial user base like hotels, hospitals, medical offices, and other similar uses, a significant amount of trips and VMT is generated by visitors, or patients. As such, as stated in the City's VMT guidelines, customers/consumers must be included as part of the service population calculations to calculate project VMT per service population.

For the project land uses such as medical office building, ambulatory surgery center, and hotel, majority of trips and VMT would be generated by patients and visitors. Therefore, LSA used information from the KCAG TDM run to estimate the number of patients/visitors for the project for each of the applicable uses. Trip purpose information from the travel model was used to differentiate between employee trips and patient/visitor trips. Trips for all project TAZs were extracted by trip purpose in order to identify trips made by patients/visitors. Estimation of visitors using trip purpose information from the model is shown in detail in Table 2 of Appendix A.

VMT ANALYSIS

Table D shows the result of the VMT analysis. As shown in Table D, the project VMT per capita for residential component of the project is 39.9 percent lower than the regional threshold. Similarly, the project VMT per employee for the memory care, assisted living, and skilled nursing facility uses is 62.7 percent lower than the corresponding regional threshold. Also, the VMT per service population for rest of non-residential uses (except retail/commercial) is 43.6 percent lower than the regional threshold. As such, based on the project's VMT analysis, the project will not have a significant VMT impact.

Table D: Project VMT metrics and Regional Threshold Comparison

2015	Project	City of Hanford Threshold *	Difference	% Difference
VMT Per Capita	5.40	8.99	-3.59	-39.9%
VMT per Employee	6.32	16.95	-10.63	-62.7%
VMT per service population	12.32	21.84	-9.52	-43.6%

** Obtained from City of Hanford VMT Thresholds and Implementation Guidelines, November 2022. (Table E: Significance Thresholds for VMT Analysis)*

Detailed VMT calculation worksheet is included in Appendix A.

ATTACHMENTS

Appendix A: VMT Calculation Worksheet

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Appendix A

Table 1 - VMT Calculations

Multi Family	Project	City of Hanford Threshold *
Total Households (a)	90	
Total Population (b)	211	
Homebased (HB) VMT (c')	1,138	
HB VMT per capita (d = c/b)	5.40	8.99

Memory care, Assisted Living, and Skilled Nursing Facility	Project	City of Hanford Threshold *
Total Employment (a)	24	
Homebased Work (HBW) VMT (b)	152	
HBW VMT per employee (c = b/a)	6.32	16.95

Ambulatory Surgery Center, Specialty Clinic, Medical Office Building, Psychiatric Health Facility	Project	City of Hanford Threshold *
Total Employment (a)	159	
Total consumers/patients (b)	85	
Total service population (c = b+a)	244	
Origin-Destination (OD) VMT (d)	3,165	
VMT per service population (e=d/c)	12.99	21.84

Hotel/Conference Center	Project	City of Hanford Threshold *
Total Employment (a)	59	
Total visitors (b)	90	
Total service population (c = b+a)	148	
Origin-Destination (OD) VMT (d)	1,808	
VMT per service population (e=d/c)	12.19	21.84

Nursing College	Project	City of Hanford Threshold *
Total Employment (a)	10	
Total Students (b)	96	
Total service population (c = b+a)	106	
Origin-Destination (OD) VMT (d)	1,162	
VMT per service population (e=d/c)	10.96	21.84

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Combined - Ambulatory Surgery Center Specialty Clinic, Medical Office Building, Psychiatric Health Facility, Hotel, and Nursing College	Project	City of Hanford Threshold *
Total Employment (a)	227	
Total consumers/patients (b)	271	
Total service population (c = b+a)	498	
Origin-Destination (OD) VMT (d)	6,136	
VMT per service population (e=d/c)	12.32	21.84

** Tripends for appropriate trip purposes are identified as customer tripends*

As a conservative estimate, vehicle trips are used as number of customers

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Table 2 - Estimation of Customer Population

Vehicle Trips by Trip purpose - Ambulatory Surgery Center, Specialty Clinic, Medical Office Building, Psychiatric Health Facility

Trip Purpose	Productions	Attractions
Homebased Work (HW)	-	142
Homebased Shop (HS)	-	39
Homebased School (HK)	-	-
Homebased College (HC)	-	-
Homebased Other (HO)	-	48
Workbased Other (WO)	13	13
Otherbased Other (OO)	110	109
Highway Commercial (HY)	-	-
Total	123	350
Total Customer trips *		**85**

** Attractions for HO, WO, OO trip purposes are considered for trips by customers (48+13+ 109 =170)*

Trip ends are divided by 2 to account for trips (from/to) (170/2 = 85)

Also as a conservative estimate vehicle trips are considered as person trips/total customers

Vehicle Trips by Trip purpose - Hotel/Conference Center

Trip Purpose	Productions	Attractions
Homebased Work (HW)	-	56
Homebased Shop (HS)	-	52
Homebased School (HK)	-	-
Homebased College (HC)	-	-
Homebased Other (HO)	-	41
Workbased Other (WO)	11	11
Otherbased Other (OO)	129	128
Highway Commercial (HY)	-	-
Total	140	288
Total Customer trips *		**90**

** Attractions for HO, WO, OO trip purposes are considered for trips by customers (41 + 11 + 128 = 180)*

Trip ends are divided by 2 to account for trips (from/to) (180/2 = 90)

Also as a conservative estimate vehicle trips are considered as person trips/total customers