INITIAL STUDY

SPEEDWAY COMMERCE CENTER SPECIFIC PLAN PROJECT

CITY OF IRWINDALE

LOS ANGELES COUNTY, CALIFORNIA

April 2022

This page intentionally left blank

INITIAL STUDY

SPEEDWAY COMMERCE CENTER SPECIFIC PLAN PROJECT
CITY OF IRWINDALE
LOS ANGELES COUNTY, CALIFORNIA

Prepared for:

City of Irwindale Community Development
5050 N. Irwindale Avenue
Irwindale, California 91706

Prepared by:

LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507
(951) 781-9310

LSA Project No. COI2001

LSA

April 2022

This page intentionally left blank

TABLE OF CONTENTS

APPENDICES

A: BIOLOGICAL REOURCE DATABASE SEARCHES
B: SANITARY SEWER CAPACITY STUDY
C: PRELIMINARY STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP) AND HYDROLOGY STUDY

FIGURES AND TABLES

FIGURES

TABLE

This page intentionally left blank

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
APN	Assessor's Parcel Number
AQMP	Air Quality Management Plan
Basin	South Coast Air Basin
BMP	Best Management Practice
CAL FIRE	California Department of Forestry and Fire Protection
CCAP	Community Climate Action Plan
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CGS	California Geological Survey
CH_4	Methane
City	City of Irwindale
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO_2	Carbon Dioxide
DIF	Development Impact Fee
EIR	Environmental Impact Report
FAR	Floor Area Ratio
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Map
FMMP	Farmland Mapping and Monitoring Program
FRAP	Fire and Resources Assessment Program
g	gravity
GCC	Global Climate Change
GHG	Greenhouse Gas
GSWC-SAS	Golden State Water Company's South Arcadia System
I-10	Interstate 10
I-210	Interstate 210
I-605	Interstate 605
IPD	Irwindale Police Department
IS	Initial Study
LACoFD	Los Angeles County Fire Department

LACSD	Los Angeles County Sanitation District
LOS	Level of Service
LRA	Local Responsibility Area
MBTA	Migratory Bird Treaty Act
MGD	Million Gallons per Day
MRF	Material Recovery Facility
MRZ	Mineral Resource Zone
MSDS	Material Safety Data Sheet
N_2O	Nitrous Oxide
NAHC	Native American Heritage Commission
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
PGA	Peak Ground Acceleration
$PM_{2.5}$	Fine Particulate Matter
PM_{10}	Coarse Particulate Matter
PRC	Public Resources Code
Project or proposed Project	Speedway Commerce Center Specific Plan Project
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCGC	Southern California Gas Company
SEA	Significant Ecological Area
SMARA	Surface Mining and Reclamation Act
Speedway	Irwindale Speedway
SRA	State Responsibility Area
SUSMP	Standard Urban Stormwater Mitigation Plan
SWPPP	Storm Water Pollution Prevention Plan
TIA	Transportation Impact Assessment
USFWS	United States Fish and Wildlife Service
VHFHSZ	Very High Fire Hazard Severity Zone
VMT	Vehicle Miles Traveled
WRP	Water Reclamation Plant
WSA	Water Supply Assessment

1.0 INTRODUCTION AND PURPOSE

1.1 INTRODUCTION

The City of Irwindale (City) is the lead agency for the Speedway Commerce Center Specific Plan Project (herein referred to interchangeably as the "proposed Project" or "Project"). The City has primary responsibility for compliance under the California Environmental Quality Act (CEQA) and consideration of the proposed Project. The City determined that a CEQA Initial Study (IS) needs to be prepared for the proposed Project to determine if potential impacts associated with the Project would require preparation of an Environmental Impact Report (EIR). Section 1.0 of this IS describes the purpose, environmental authorization, the intended uses of the IS, documents incorporated by reference, and the process and procedures governing the preparation of the environmental document.

1.2 PURPOSE

The purpose of the proposed Project is to repurpose the Project site from a speedway to Industrial/ Commercial/Business Park uses to increase employment opportunities in the City of Irwindale. Approval of the proposed Project requires discretionary approval of a Specific Plan to change the existing land use designation from Commercial/Recreation to Specific Plan, a Zone Change on the Project site from Heavy Commercial (C2) to Speedway Commerce Center Specific Plan, and an accompanying Zoning Ordinance text amendment. The proposed Project is considered a "private" action that requires approval by the City; therefore, the Project is subject to CEQA. CEQA requires that the proposed Project be reviewed to determine the environmental effects that would result if the Project were approved and implemented. As the lead agency under CEQA, the City has the responsibility for preparing and adopting the associated environmental documentation prior to consideration of the approval of the proposed Project.

This Initial Study has been prepared in accordance with the relevant provisions of the CEQA (California Public Resources Code Section 21000 et seq.) *Guidelines for Implementation of the California Environmental Quality Act* (*CEQA Guidelines*) and the rules, regulations, and procedures for implementing CEQA as adopted by the City. As listed in *CEQA Guidelines* Section 15063(c), the purpose of an Initial Study is to:

- Provide the Lead Agency with information to use as the basis for deciding whether to prepare an EIR or a Negative Declaration;
- Enable an applicant or Lead Agency to modify a project, mitigating adverse impacts before an EIR is prepared, thereby enabling the project to qualify for a Negative Declaration;
- Assist in the preparation of an EIR, if one is required, by:
  - Focusing the EIR on the effects determined to be significant.
  - Identifying the effects determined not to be significant.
  - Explaining the reasons for determining that potentially significant effects would not be significant, and

   - Identifying whether a program EIR, tiering, or another appropriate process can be used for analysis of the project's environmental effects.
- Facilitate environmental assessment early in the design of a project;
- Provide documentation of the factual basis for the finding in a Negative Declaration that a project will not have a significant effect on the environment;
- Eliminate unnecessary EIRs; and
- Determine whether a previously prepared EIR could be used with the project.

The objective of the Initial Study is to inform City decision-makers, representatives of other affected/ responsible agencies, the public, and other interested parties of the potential environmental consequences that may be associated with the approval and implementation of the proposed Project.

1.3 AUTHORIZATION

According to Section 15002 of the *CEQA Guidelines*, the basic purposes of CEQA are to:

- Inform government decision-makers and the public about the potential significant environmental effects of proposed activities;
- Identify ways that environmental damage can be avoided or significantly reduced;
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governing agency finds changes to be feasible; and
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

1.4 INTENDED USE OF THIS INITIAL STUDY

The City formally initiated the environmental process for the proposed Project with the preparation of this IS. The Initial Study is utilized to screen out those impacts that would be less than significant and do not warrant mitigation, while identifying those issues that require further mitigation to reduce impacts to less than significant. In the event that an IS identifies impacts that cannot be reduced to less than significant, then it is distributed together with a Notice of Preparation (NOP) to solicit comments to identify and determine the full range and scope of issues of concern to be fully examined in an EIR. As identified in the subsequent analysis contained in this IS, the following resource topics have been determined to be potentially significant: *Air Quality, Energy, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise, Transportation, Tribal Cultural Resources, and Utilities – Water Supply.* Based on these analytical conclusions, this IS supports the preparation of a Focused EIR for the proposed Project.

CEQA permits the incorporation by reference of all or portions of other documents that are generally available to the public. The IS has been prepared utilizing information from City planning and environmental documents, applicant-provided technical studies, and other publicly available data.

The documents utilized in the IS are listed in **Section 6.0** and are hereby incorporated by reference. These documents are available for review at the City of Irwindale Community Development Department, Planning Division and at the following website: https://www.irwindaleca.gov/581/500-Speedway-Drive---Speedway-Commerce-C.

The NOP will be distributed to responsible and trustee agencies, other affected agencies, and interested parties for a 30-day public review period. Written comments regarding the IS and the NOP should be addressed to:

Ms. Marilyn Simpson, AICP
Community Development Director
City of Irwindale, Community Development
5050 N. Irwindale Avenue
Irwindale, California 91706
Email: msimpson@irwindaleca.gov
Phone: (626) 430-2209

During the public review period of the IS and NOP, the City will conduct a public scoping meeting. The public scoping meeting has been scheduled for 6:00 p.m. on April 28, 2022 at the Irwindale Community Center (16102 Arrow Highway). Meeting participants may also join via Zoom at the following **URL: https://us02web.zoom.us/j/86184596671** or by phone at: US: **+1 669 900 6833, Webinar ID: 861 8459 6671.** After the 30-day public review period, consideration of comments raised during the public review period will be taken into account and addressed prior to completion of the EIR by the City of Irwindale.

This page intentionally left blank

2.0 PROJECT INFORMATION

1. Project Title:

Speedway Commerce Center Specific Plan Project (herein referred to as the “proposed Project” or “Project”)

2. Lead Agency Name and Address:

City of Irwindale
Community Development Department
5050 N. Irwindale Avenue
Irwindale, California 91706

3. Contact Person and Phone Number:

Marilyn Simpson, AICP
Community Development Director
(626) 430-2209
msimpson@irwindaleca.gov

4. Project Location:

The Project site is bordered by Live Oak Avenue and Park at Live Oak Business Park to the north, an active quarry to the south (Hanson Aggregates), Interstate 605 (I-605) to the east, and a trucking and distribution center (Old Dominion Freightline) to the west. Specifically, the Project site includes Assessor’s Parcel Numbers (APNs) 8532-004-022, 8532-004-026, and 8532-004-025, totaling 63.3 acres. The physical address of the Project site is 500 Speedway Drive in the City of Irwindale. **Figure 1: Regional Location** and **Figure 2: Project Location** show the location of the Project site on a regional and local basis, respectively.

5. Project Sponsor’s Name and Address:

Irwindale Outlet Partners, LLC
3270 Inland Empire Boulevard, Suite 400
Ontario, California 91764

6. General Plan Designation:

Existing: Commercial/Recreation. Proposed: Specific Plan

7. Zoning:

Existing: Heavy Commercial (C-2) Proposed: Speedway Commerce Center Specific Plan

8. Description of Project:

The proposed Project would include the demolition of the existing uses on the Project site and development of up to 1,378,000 square feet of building space for industrial business park uses and commercial/industrial flex uses within four Planning Areas.

The proposed Project includes a Specific Plan. All development within the Project Site would be required to comply with the development plan, development regulations, urban design requirements, and implementation criteria of the Specific Plan. Please refer to **Section 3.0** for a detailed description of the Project.

9. Surrounding Land Uses and Setting:

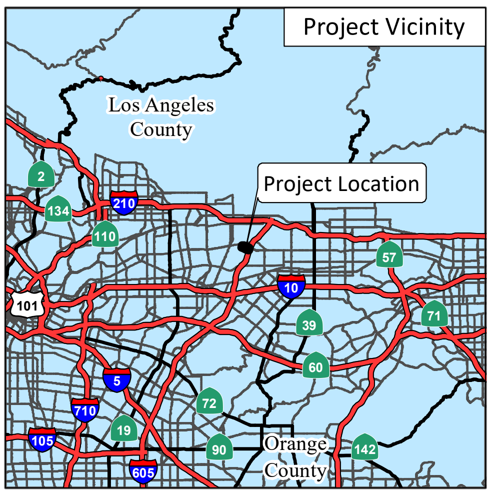
The Project site is bordered by Live Oak Avenue and Park at Live Oak to the north, an active quarry to the south (Hanson Aggregates), I-605 to the east, and a trucking and distribution center to the west. Two mining pits (generally filled with groundwater and runoff all year) are located to the northwest and south of the Project site.

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

City application entitlements, Building Permits, Grading Permits, National Pollutant Discharge Elimination System (NPDES) Permit, Utility Will-Serve Letters, Caltrans encroachment permits, Los Angeles Regional Water Board Construction General Permit.

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.?

The City of Irwindale will conduct Native American Tribal Consultation and the results will be documented in the EIR.



LEGEND

Project Location

FIGURE 1

0 2500 5000

FEET

SOURCE: Bing Maps (2022)

Speedway Commerce Center Specific Plan Project
Irwindale, California

Regional Location

I:\COI2001\GIS\MXD\Regional_Location.mxd (3/31/2022)

This page intentionally left blank

LSA

LEGEND

Project Site

FIGURE 2

N

Speedway Commerce Center Specific Plan Project
Irwindale, California

Project Location

NO SCALE

SOURCE: Kimley Horn

I:\COI2101\G\Project_Location.ai (3/31/2021)

This page intentionally left blank

3.0 PROJECT DESCRIPTION

3.1 BACKGROUND

The Project site was once occupied by Pacific Road Quarry, which mined sand and gravel for construction through the late 1960s. The quarry was backfilled as part of the former Nu-Way Landfill, which occupied the Project site from the mid-1970s to May 1993. The Nu-Way Landfill consisted of approximately 200 vertical feet of soil and non-hazardous demolition debris fill. The fill specifically consists of silty sand, clayey silt, and sandy silt plus asphalt concrete, brick fragments, concerted plastic, metallic wire, and wood. The underlying fill of the Project site may also include vehicles and tires. In May 1993, the Nu-Way Landfill on the Project site was closed and decommissioned. Between 1993 and 1999, the Project site was cleaned up and was used for outdoor swap meets. In March 1999, the Irwindale Speedway (Speedway) opened on the Project site and continues to operate in early 2022. The Irwindale Speedway consists of a one-half mile oval, one-third mile oval, and a one-eighth mile drag strip. The Speedway includes a large surface parking lot that can accommodate over 3,000 vehicles, stadium lighting around the drag strip and tracks, perimeter landscaping, and 6,000 stadium-style bleacher seats.

Between 2014 and 2015, the City prepared an EIR and supporting air quality, greenhouse gas emissions, noise, and traffic studies to assess potential impacts associated with a proposal for development of a regional shopping center on the Project site. This development proposal included an approximately 700,000-square foot commercial/retail outlet center that was proposed to be developed on the site occupied by Irwindale Speedway. The project that was assessed in the EIR included a Zone Change for General Plan consistency purposes, a Development Agreement, and a Site Plan and Design Review with exemption to the City's design guidelines to develop the retail outlet center. The *Irwindale Regional Shopping Center Final EIR (State Clearinghouse Number [SCH] 2014071042)* was certified by the City Council of Irwindale on March 25, 2015; however, the retail center was never developed on the site.

In 2020, an applicant approached the City of Irwindale with a new development plan with a mix of light industrial, business park, and commercial uses.

3.2 PROJECT LOCATION

The Project site is in the City of Irwindale within Los Angeles County, California at 500 Speedway Drive. The Project site is generally located west of Interstate 605 (I-605), south of Interstate 210 (I-210), and north of Interstate 10 (I-10) in the northwestern portion of the City of Irwindale. The Project site is specifically located at the southwest corner of the I-605/Live Oak Avenue interchange and approximately 750 feet east of Arrow Highway. The Project site consists of three parcels of land identified as APNs 8532-004-022 (13.07 acres), 8532-004-026 (27.6 acres), and 8532-004-025 (22.82 acres), totaling 63.49 acres.

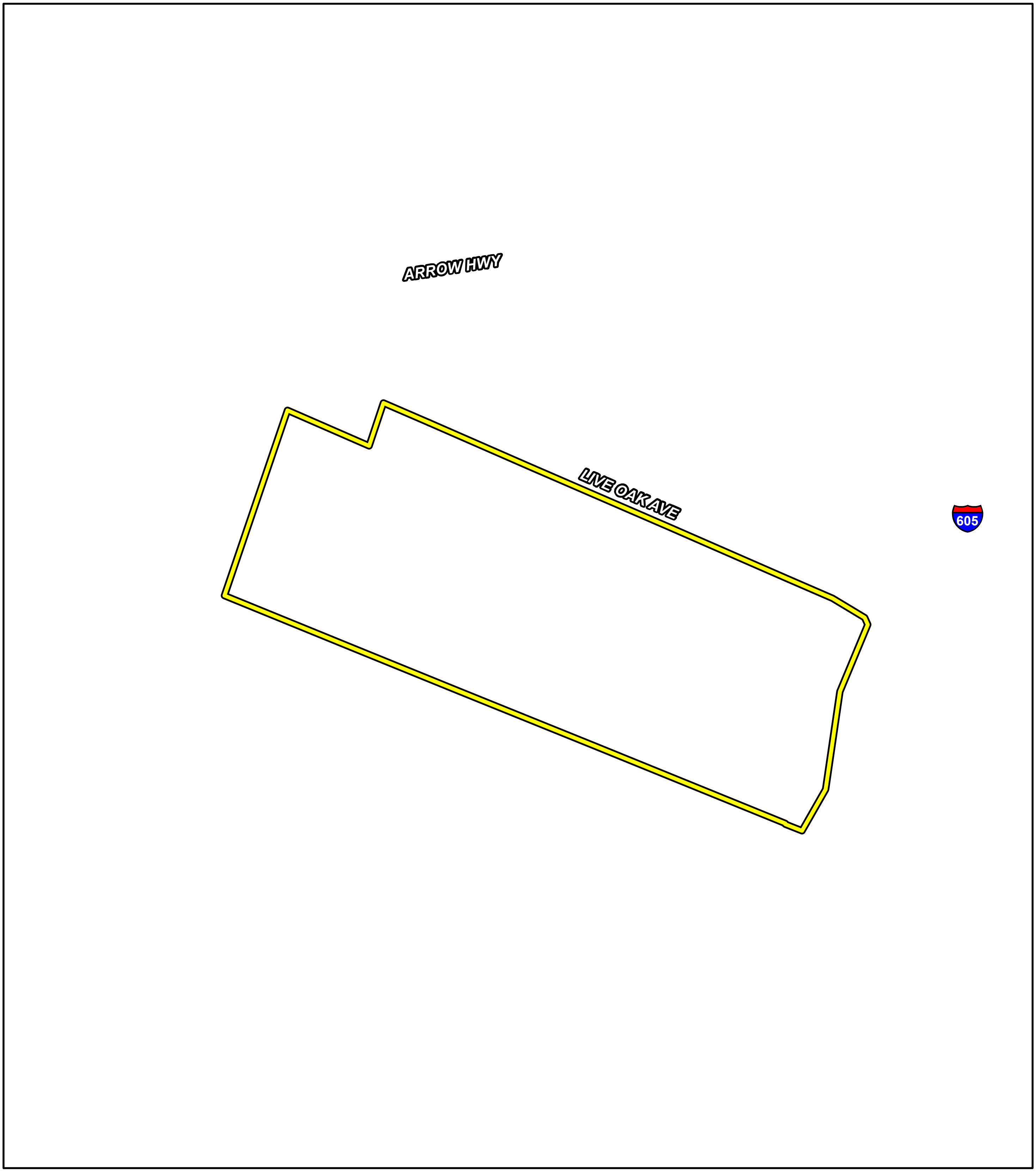
3.3 EXISTING CONDITIONS

The Project site is in an urbanized portion of Irwindale and is currently occupied by the Irwindale Speedway. The Irwindale Speedway was opened in 1999 and includes a one-half mile oval, third-mile oval, and a one-eighth mile long drag strip. The Speedway includes a large surface parking area that can accommodate over 3,000 vehicles, stadium lighting around the tracks and drag strip, perimeter landscaping, and 6,000 stadium style bleacher seats. The Speedway also includes ancillary administration and concessions buildings east of the grandstands and a pit (race car repair area) west of the racetrack. The facility is used daily for race training, fire and police training, filming commercials, television programs, and for racing events. The eastern portion of the Project site is also used for swap meets, special event operations, and vehicle and trailer shows. Irwindale Speedway, LLC declared bankruptcy after the 2011 season and vacated the property in early 2012. The previous owner, Nu-Way Industries, and the Irwindale Event Center operator, 211 Enterprises, entered a partnership shortly after the bankruptcy so that drag racing and other activities could take place in 2012. NASCAR racing returned to the facility in 2013. The Project site was purchased by Lindom Company in 2013, which planned on demolishing the facility and replacing it with a regional shopping center. The development plan fell through, and the Irwindale Speedway was scheduled to be closed on January 31, 2019; however, on Christmas Eve 2017, the current owners, Tim Huddleston and Justice Brothers Distribution purchased the facility and property.

The Project site is topographically flat and is underlain by soil designated as Urban Land, commercial-Soboba complex, 0 to 5 percent slopes.[1] The Project site includes three major drainage areas where the majority of runoff from the site drains from the southwest to the northeast and discharges into a curb inlet near the western driveway, which connects to a City storm drainage system. In addition, runoff also drains into the racetrack infield, which contains an inlet that is connected to a pump station near the northeast corner of the Project site. There is also an inlet in the southwest corner of the Project site, which is piped to the pump station. The pump station discharges the runoff westerly onto the westerly driveway. The runoff then flows north in the driveway discharging out onto Live Oak Avenue.

The Project site is designated as a Commercial/Recreation land use under the City of Irwindale General Plan Land Use Map and zoned as Heavy Commercial (C-2). Parcels to the north have a land use designation of Specific Plan, parcels to the west and east have a land use designation of Industrial/Business Park, and parcels to the south have a Quarry Overlay land use designation. Parcels to the north are zoned as The Park @ Live Oak Specific Plan; parcels to the west and east are zoned as Heavy Manufacturing (M2); and parcels to the south are zoned as Quarry (Q). **Figure 3: Existing General Plan Land Use Designations** and **Figure 4: Existing Zoning Designations** depict the existing land use designations and zoning designations of the Project site and surrounding parcels, respectively.

1 United States Department of Agriculture, Natural Resource Conservation Service, Websoil Survey, https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed December 15, 2020.



LSA

LEGEND

- Project Location
- Commercial/Recreation
- Industrial/Business Park
- Quarry Overlay
- Specific Plan

0 300 600
FEET

SOURCE: Google Imagery (2022); City of Irwindale (2/2022)

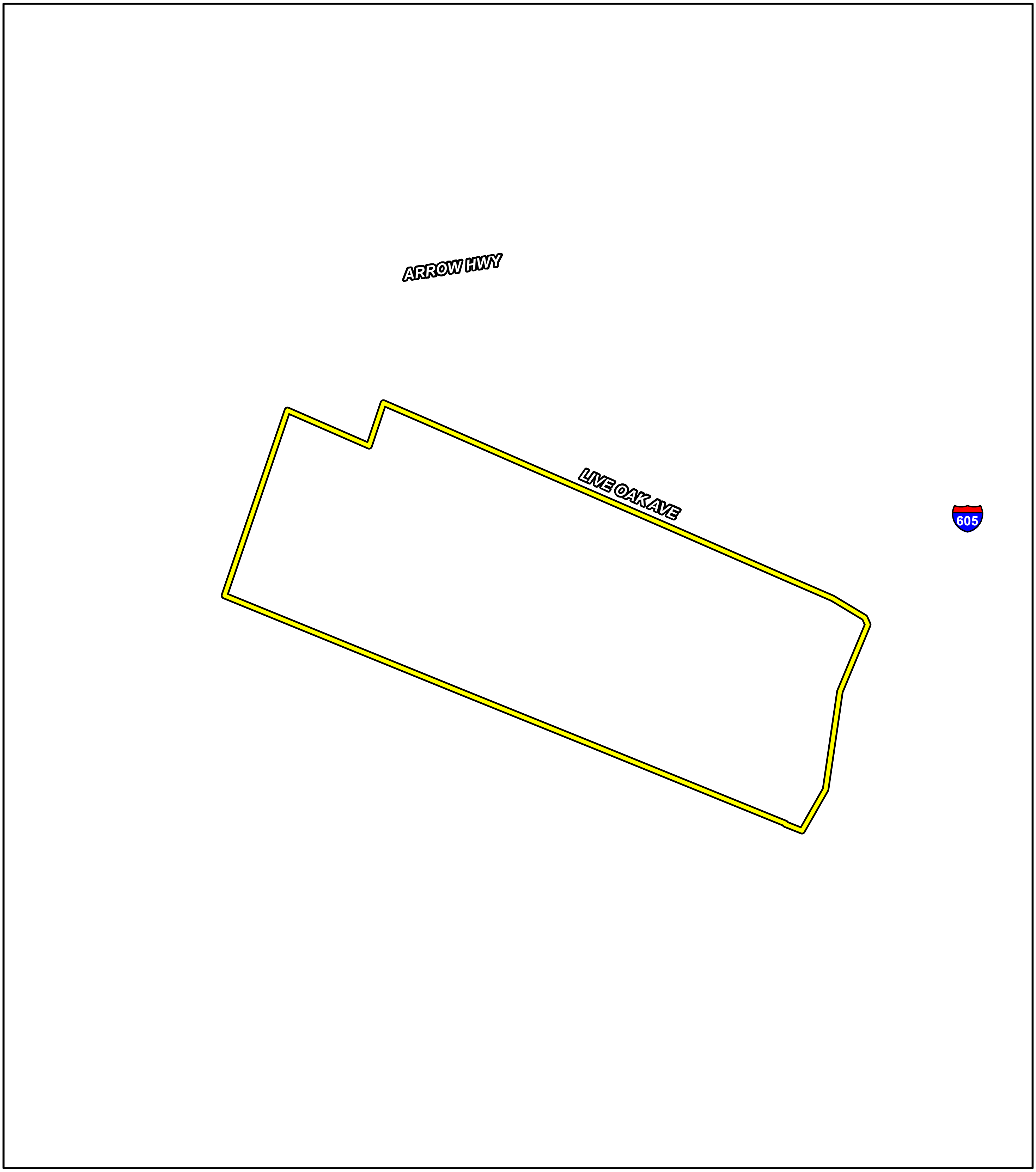
FIGURE 3

Speedway Commerce Center Specific Plan Project
Irwindale, California

Existing General Plan Land Use Designations

I:\COI2001\GIS\MXD\GPLU.mxd (3/31/2022)

This page intentionally left blank



LSA

LEGEND

Project Location

C2 - Heavy Commercial

M2 - Heavy Manufacturing

Q - Quarry

PLO - Park at Live Oak Specific Plan

N

0 300 600

FEET

FIGURE 4

Speedway Commerce Center Specific Plan Project

Irwindale, California

Existing Zoning Designations

SOURCE: Google Imagery (2022); City of Irwindale (2/2022)

I:\COI2001\GIS\MXD\Zoning.mxd (3/31/2022)

This page intentionally left blank

3.4 PROPOSED PROJECT

The proposed Project includes the approval of a Specific Plan for the site that would ensure development occurs in an organized and cohesive manner. The Specific Plan would incorporate a development framework for detailed land use, circulation, infrastructure including drainage, sewer, and water facilities, and urban design and landscape plans. A comprehensive set of design guidelines and development regulations are included in the Specific Plan to guide and regulate site planning, landscape, and architectural character within the site, ensuring that excellence and standardization in design is achieved during site development.

The proposed Project is designed to implement a series of Project-specific goals and objectives crafted to ensure the Project develops with a high-quality industrial development. The goals and objectives of the proposed Project include:

- Provide for the development of industrial and business park uses that take advantage of the site's location in proximity to major transportation arterials and the regional transportation network.
- Create a comprehensive plan for the redevelopment of a former quarry, landfill, and speedway to provide a flexible mixture of light industrial, business park, and commercial uses that attract capital investment to an underutilized property.
- Develop a flexible plan that meets the needs of a dynamic business market, allowing a range of industrial, light manufacturing, warehouse distribution and logistics uses designed to attract a wide range of users, while ensuring compliance with development standards and guidelines to implement a high-quality development.
- Create a high-quality industrial development that provides employment opportunities to area residents and expands and diversifies the industrial uses within the City of Irwindale.
- Provide industrial uses within the Project boundaries that are compatible with surrounding uses.
- Provide commercial opportunities along the frontage of Live Oak Avenue.
- Provide for roadways, infrastructure, and utilities to support on-site land uses as the Project is developed.
- Promote opportunities for water efficiency in the Project architecture and landscaping to promote water conservation.
- Facilitate the establishment of design guidelines and development standards consistent with the citywide design guidelines for commercial and industrial uses that create a unique, well-defined identity for the proposed Project.
- Positively contribute to the economy of the region through new capital investment and creation of new employment opportunities.

The proposed Project would include the demolition of the existing uses associated with the Irwindale Speedway. The Speedway Commerce Center Specific Plan consists of the development of four separate planning areas with up to 1,378,000 square feet of industrial and commercial uses (see Table A.) In addition to structures, development will consist of loading docks, truck trailer and automobile parking, and associated infrastructure improvements. Planning Areas 1, 2, and 3 would be developed to accommodate the large-scale industrial uses which may include light industrial buildings, research and development, warehousing and distribution, and showroom space. The industrial uses would occupy approximately 56 acres, or 89 percent of the Project site. Energy storage[2] as a use has been included as a conditional use; however, no more than 25 percent of the Project Site may be included for energy storage uses.

Within Planning Area 4, the commercial/industrial flex uses within the Project site would vary depending on market conditions and could contain a mixture of office, light industrial, and commercial uses. This area would encompass approximately 7.3 acres, or 11 percent of the Project site. Due to its location along the Live Oak Avenue frontage, uses in Planning Area 4 would provide the "face" of the Project sit. Because of this visibility, the architectural design of buildings in Planning Area 4 would reflect a commercial design character rather than the industrial style of proposed in Planning Areas 1, 2, and 3.

The proposed Project would be phased to:

- Provide for the orderly buildout of the Project site based upon market demand.
- Provide adequate infrastructure to service the Project site; and
- Phases may occur concurrently or in alternative order as long as the associated infrastructure and parking is provided.

Planning Area 4, fronting Live Oak Avenue, would be the final phase of development as commercial uses would likely follow in support of the industrial uses developed in the earlier construction phases. During the early parts of Project site construction, Planning Area 4 may temporarily be used for parking.

Table A: Land Use Summary provides details provides a summary of the proposed Planning Areas

[2] Energy Storage is defined in the Specific Plan as use of the land for battery system storage consisting of electrochemical storage batteries or similar technology along with associated inverters, transformers, switchgears, and associated equipment designed to store electrical power. Energy storage uses should be screened per the guidance in the design guidelines section of the Specific Plan.

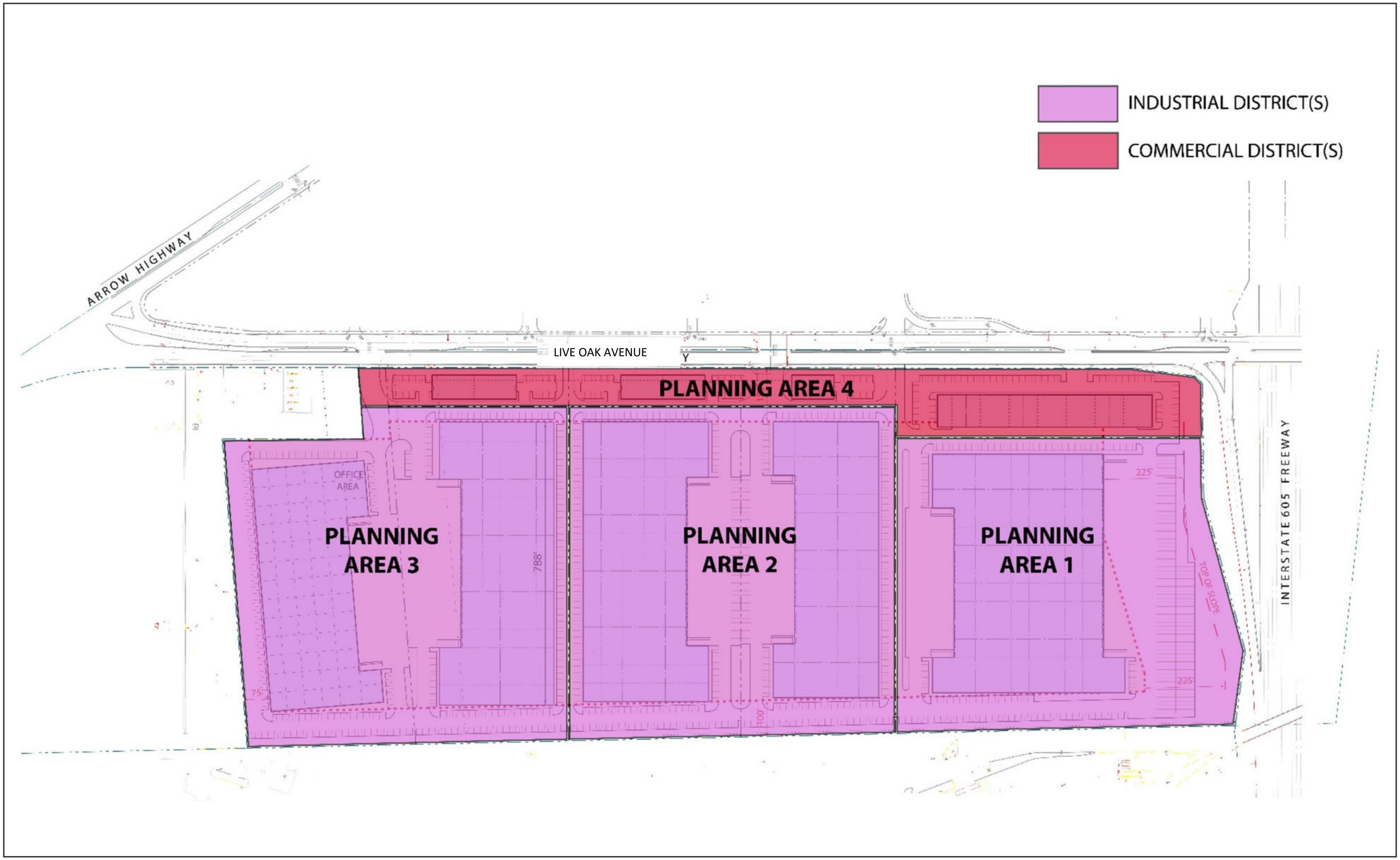
Table A: Land Use Summary

Planning Area	Land Use	Size (ac)	FAR	Building Area (sq. ft)[1]
1	Industrial	17.1	0.50	1,378,000
2	Industrial	19.3		
3	Industrial	19.6		
4	Commercial/Flex	7.3		
Total		63.3		

Source: Table 2-1*, Speedway Commerce Center Specific Plan*, November 2021.
1. Building square footage is based on the maximum allowable Floor Area Ratio. Final building area may change as a result of implementing projects so long as the total FAR and square footage is not exceeded.

Surface parking lots would be developed on site in accordance with Section 17.64 of the Irwindale Municipal Code to accommodate parking for employees and patrons. Access to the Project site would occur via five driveways off Live Oak Avenue and the internal circulation of the site would be developed to Los Angeles County Fire Department standards for emergency vehicles.

Figure 5: Conceptual Land Use Plan illustrates the overall vision for the Project and guide the development of the anticipated light industrial, warehouse, and flexible commercial uses. Individual Planning Area square footages and layout may vary as part of plot plan review so long as the FAR for each planning area does not exceed the maximum allowable FAR of 0.5.



LSA

Note: Underlying site plan shown for reference purposes as one potential layout. Final site planning will be provided as part of implementing project site plan review submittals.

FIGURE 5

0 200 400
FEET

SOURCE: Speedway Commerce Center Specific Plan

Speedway Commerce Center Specific Plan Project
Irwindale, California

Conceptual Land Use Plan

I:\COI2001\G\Land_Use_Plan.ai (4/21/2022)

This page intentionally left blank

3.4.1 Permitted Uses

The Specific Plan of the proposed Project provides the type of uses that could be developed in each Planning Area of the site. A use in the Specific Plan is either permitted by right (P), conditionally permitted (C), permitted by right provided the use is ancillary/allowed in conjunction with a primary or conditionally permitted use (A), or not permitted (X). **Table B: Permitted, Conditional, and Ancillary Uses** shows the uses that may be developed on each Planning Area of the Project site.

Table B: Permitted, Conditional, and Ancillary Uses

Use	Planning Areas 1,2, and 3 Industrial/Business Park	Planning Area 4 Commercial/Flex
Industrial. Warehousing, Assembly, and Manufacturing Uses		
High-cube Warehouses	P	X
E-Commerce, including fulfillment centers	P	X
Energy Storage (outside)	C	X
Heavy and Light Logistics, distribution and warehousing, including high-cube warehousing (including uses requiring refrigeration/cold storage of up to 400,000 square feet)	P	X
Uses with cold storage over 400,000 square feet	C	X
Industrial retail sales	P	P
Industrial robotics manufacturing and assembly	P	X
Joining and assembly manufacturing	P	X
Light Manufacturing and product asembly. Activities typically include, but are not limited to, the mechanical or chemical transformation of raw or semi-finishes materials or substances into new products, including manufacture of products, assembly of component parts (including required packaging for retail sale), and treatment and fabrication operation. Light manufacturing activities do not produce odors, noise, vibration, or particulates which would adversely affect uses within the same structure or site.	P	X
Research and Development	P	P
Shipping/parcel delivery hub and sorting center	P	X
Self-Storage (public)	C	X
Logistics Support	P	P
Fueling Facilities	C	X
Overnight truck parking	P	X
Truck service/repairs/storage	C	X
Vehicle cleaning/detailing		
Commercial-Retail Type Uses		
Administration and professional offices	A	P
Alcohol Beverage Sales – Activities typically include the sale, subject to required license for the sale of alcoholic beverages for on-site consumption associated with food service uses.	X	C
Appliances, household sale and repair (no outside displays)	A	P
Athletic Clubs (cross-fit, martial arts, club sports, volleyball, badminton, and similar)	P	P

Table B: Permitted, Conditional, and Ancillary Uses

Use	Planning Areas 1,2, and 3 Industrial/Business Park	Planning Area 4 Commercial/Flex
Auto Repair (Minor) - Activities include but are not limited to automotive and light truck repair; retail sales of goods and services for automobiles and light trucks; and the cleaning and washing of automobiles and light trucks. Uses typically include, but are not limited to, repair of brakes, tires, electrical, and car washes.	P	P
Auto Repair (Major) - In addition to the types of repair operations included as part of Automobile and Light Truck Repair - Major, activities typically include, but are not limited to, automotive body work, painting, and installation of major accessories; automobile customizing; engine and transmission repair/rebuild and towing facilities.	C	C
Automobile Fueling Station	P	P
Bakeries, including donut shops	P	P
Blueprinting and photocopying	P	P
Brewery with on- and off-site alcohol sales.	C	C
Commercial Recreation	C	C
Convenience Stores	X	P
Convenience Stores with Off-Site alcohol sales	X	C
Courier Services	A	P
Dry cleaning (retail)	X	P
Eating Establishments - Activities typically include, but are not limited to, the retail sale from the premises of food or beverages prepared for on premises consumption. Uses typically include, but are not limited to fast food, cafes, deli, coffee shop, and similar uses.	A	P
Electrical Supply	A	P
Frozen-food locker	A	A
Hotel/Motel, including extended stay	C	C
Medical and dental laboratories	A	P
Motion picture films, processing	A	P
General retail	A	P
Urgent Care	X	C
Other Uses		
Billboards (Freeway-oriented only)	Subject to Municipal Code Section 17.72, I-605 Edge Only	
Childcare	X	C
Schools (vocational, trade, higher education)	C	C
Churches/Places of Worship	C	C
Onsite Utility uses and structures	A	A
Property Maintenance facilities (maintenance vehicle storage and, nursery holding area during construction)	P	P
Telecommunications facilities/cell site associated with a permitted or conditionally permitted primary use	A	A
Telecommunications facilities/cell site, independent	A	A
Other uses not listed but similar in nature and consistent with the intent of the Specific Plan	Subject to Community Development Director/Manager or their Designee's Interpretation	

Source: Kimley Horn, Speedway Commerce Center Specific Plan, Draft November 2021,Table 3-1, pgs. 3-5 to 3-7.

Uses that are prohibited in the Specific Plan include: outdoor new or used car, truck, trailer, and equipment sales; residential uses; and temporary uses except those outlined above in **Table B**. For purposes of the analysis in this Initial Study, it has been verified through the City and Project applicant that various industrial uses will be developed in Planning Areas 1, 2, and 3 while commercial/flex uses will be developed in Planning Area 4.

3.5 REQUIRED APPROVALS

The discretionary actions anticipated to be taken by the City as part of the proposed Project include:

- Specific Plan No. 01-2020.
- Zone Change No. 01-2020
- Tentative Parcel Map No. 83248.
- Zone Ordinance Amendment: 01-2020

Other non-discretionary actions anticipated to be taken by the City at the Staff level as part of the proposed Project include:

- Review all on-site plans, including grading and on-site utilities, and approval of a Storm Water Pollution Prevention Plan (SWPPP) to mitigate site runoff during construction and a Standard Urban Stormwater Mitigation Plan (SUSMP) to mitigate for post-construction runoff flows; and
- Demolition permits for existing on-site structures.

Approvals and permits required by other agencies include:

- An NPDES permit from the Regional Water Quality Control Board (RWQCB) to ensure that construction site drainage volumes and velocities are equal to or less than the pre-construction conditions and downstream water quality if not worsened.
- Fire Department approval for the tentative Parcel Map and final Parcel Map
- Caltrans encroachment permit for construction and traffic control

4.0 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

4.1 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.

Marilyn Simpson

Signature

April 21, 2022

Date

This page intentionally left blank

5.0 CEQA ENVIRONMENTAL CHECKLIST

5.1 AESTHETICS

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

***No Impact*.** The City of Irwindale is a heavily urbanized area, and the City of Irwindale General Plan does not discuss potential effects of scenic vistas in the City. The Project site is in a portion of the City that is occupied by industrial uses, commercial uses, a landfill, and an active quarry. Implementation of the proposed Project would not be developed on or near a scenic vista nor would one be obstructed by the buildings that would be developed on the Project site. Sensitive viewers (residents to the northwest of the Project site) are 2,346 feet from the site, too far from the Project site to be affected by obstructed distant views to the southeast. Residential units to the southeast of the Project would continue to have unobstructed views of the San Gabriel Mountains to the north and northwest even with implementation of the Project. People looking at the site from public vantage points would continue to be able to have unobstructed views of the San Gabriel Mountains to the north and northwest. Implementation of the proposed Project would not have a substantial effect on a scenic vista. **No impact** would occur, and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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

***No Impact*.** There are two designated State scenic highways that are in Los Angeles County: State Route 2 (SR-2) and State Route 110 (SR-110), neither of which traverse through the City of Irwindale. The proposed Project site is occupied by Irwindale Speedway, accessory buildings, a surface parking lot, and ornamental landscaping. None of the structures on the site associated with Irwindale Speedway are historic as they were built in 1999 and beyond. No topographical outcroppings are present on the site. Implementation of the proposed Project would not substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway. **No impact** would occur and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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?

Less Than Significant Impact. The Project site is in a heavily urbanized area of the City of Irwindale. The site is surrounded by a business park currently under development (The Park @ Live Oak Specific Plan), I-605 to the east, an active quarry to the south, and industrial uses to the west. The proposed Project would include a zone amendment to change the current zoning of the site from Heavy Commercial (C-2) to Speedway Commerce Center Specific Plan to change the current land use designation from Commercial/Recreation to Specific Plan. . The proposed Project would be developed in compliance with building heights, building mass, Floor Area Ratio (FAR) requirements, and landscaping requirements of the Specific Plan. Title 17 –Zoning of the Irwindale Code of Ordinances does not set forth specific regulations pertaining to scenic quality. Overall, the proposed Project (located in an urbanized area) would not conflict with applicable zoning and other regulations governing scenic quality. Impacts would be **less than significant,** and no mitigation would be required. Further analysis of this topic in the EIR is not warranted.

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

No Impact. The existing buildings and racetrack on the Project site are not composed of materials that generate substantial glare. During nighttime activities, the racetrack, pit area and on-site buildings are illuminated by grandstand lights, security lights, and standard lighting fixtures. The existing lighting on the site is directed in such a way as to avoid spillover on adjacent properties and major routes (i.e., Interstate 605). Implementation of the proposed Project would remove all the light sources on the Project site. Light sources on the site under the proposed Project would include security lighting on sides of buildings and light standards in parking lot areas. Implementation of the proposed Project would substantially reduce the on-site light source compared to existing conditions. The buildings on the Project site would be developed with non-reflective material. Overall, the proposed Project would not create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area. **No impact** would occur, and no mitigation is required. For these reasons, further analysis of this topic in the EIR is not warranted.

5.2 AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

No Impact. The Project site is not designated Prime Farmland, Unique Farmland or Farmland of Statewide Importance (collectively referred to as "Important Farmland") pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Department of Conservation. The Project site was previously a landfill, then an outdoor swap meet, and currently contains a speedway on land that is designated as Urban and Built-up land pursuant to the FMMP. Implementation of the proposed Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland) to a non-agricultural use. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

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

No Impact. The Project site is currently zoned Heavy Commercial (C-2) and is not located on any designated agricultural zoned areas, nor is it under a Williamson Act contract. The City of Irwindale General Plan EIR indicates that there are no parcels within the City zoned for agricultural uses or under a Williamson Act Contract.[3] Implementation of the proposed Project would not conflict with existing zoning for agricultural use or a Williamson Act contract. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

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))?

No Impact. The Project site is currently zoned as Heavy Commercial (C-2) and is not located on any designated forest land, timberland, or timberland zoned Timberland Production areas. Aerial views of the Project site show that the site is currently developed, and no forested areas are located on the site. Implementation of the proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

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

No Impact. Aerial views of the Project site show that the site is currently developed and no forest land or conversion of forestland to non-forest use is present on or near the proposed Project site. Implementation of the proposed Project would not result in the loss of forest land or conversion of forest land to non-forest use. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

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?

No Impact. The existing environment around the Project site is currently designated as Urban and Built-up land pursuant to the FMMP and would therefore not directly or indirectly influence nearby agricultural land or forest land to be converted to non-agricultural and non-forest land. The Project site was previously a landfill, then an outdoor swap meet, and currently contains a speedway. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

3 City of Irwindale, City of Irwindale 2010 General Plan Draft Environmental Impact Report, Section 2.9.3 Agriculture and Forestry Resources Impacts, pg. 59, September 2006.

5.3 AIR QUALITY

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?	☐	☐	☒	☐

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

Potentially Significant Impact. The proposed Project is in the South Coast Air Basin (Basin) within the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino counties.[4] The 2016 Air Quality Management Plan (AQMP), approved on March 3, 2017, seeks to achieve multiple goals in partnership with other entities promoting reduction in criteria pollutant, greenhouse gases and toxic risk, as well as efficiencies in energy use, transportation, and goods movement.[5] Project construction and operational activities would generate air pollutant emissions that have the potential to exceed State and federal air quality standards for the Basin. An Air Quality Technical Report is being prepared as part of the Project EIR to assess potential Project impacts associated with emissions generation and whether implementation of the proposed Project would conflict with the AQMP. The proposed Project has the potential to conflict with or obstruct implementation of the AQMP and a **potentially significant impact** may occur. This topic will therefore be further discussed and analyzed in the EIR.

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?

Potentially Significant Impact. The Basin is designated as nonattainment for 1-hour ozone (federally and state), for 8-hour ozone (federally and state), for coarse particulate matter (PM_{10}) (State), and

4 South Coast Air Quality Management District, About South Coast AQMD. Revised 2021. Website: http://www.aqmd.gov/aq-spec/aboutscaqmd#whatis, Accessed (accessed January 6, 2021).

5 South Coast Air Quality Management District, Final 2016 Air Quality Management Plan, Revised 2017. Website: https://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp (accessed January 6, 2021).

for fine particulate matter ($PM_{2.5}$) (federally and State).[6] The proposed Project would generate construction and operational emissions that would contribute to air quality degradation. Development of the proposed Project along with development of cumulative projects could result in a cumulatively considerable net increase of criteria pollutants in the region and a **potentially significant impact** may occur. This topic will therefore be further discussed and analyzed in the EIR.

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

Potentially Significant Impact. Sensitive receptors are those parts of the population that can be severely affected by air pollution and include, but are not limited to, hospitals, schools, daycare facilities, elderly housing, and convalescent facilities.[7] The closest sensitive receptors to the Project site are single-family residential units 0.4 mile to the north of the site. The nearest schools are Olive Junior High School (13701 Olive Street in Baldwin Park) and Walnut Elementary School (4701 Walnut Street in Baldwin Park) both of which are approximately 0.5 mile southeast of the Project site. The nearest hospital, City of Hope Helford Clinical Research Hospital, is approximately 1.3 miles northeast of the Project site. Project construction activities could result in localized increased levels of short-term emissions and particulates. After construction, operation of the Project would generate increased vehicle activity within the industrial and commercial business park leading to potential increases in long-term emissions and pollutants. Additionally, the consumption of electricity and natural gas by the proposed Project would also generate long-term air pollutant emissions, resulting in **potentially significant impacts** to nearby sensitive receptors. For these reasons, this topic will be further discussed and analyzed in the EIR prepared for the Project.

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

Less Than Significant Impact. The Project could produce odors during construction activities resulting from construction equipment exhaust and applications of asphalt or architectural coatings. However, any odors emitted during construction would be temporary, short-term, and intermittent, and not likely to be noticeable beyond the Project boundaries. Project-generated solid waste could be a potential source of odor; however, in compliance with City solid waste practices, all Project-generated solid waste would be stored in covered containers and removed at regular intervals. Such actions would reduce odors related to solid waste on the project site. Based on the type of uses that would occupy the Project site, operational activities are not anticipated to generate odors that would adversely affect a substantial number of people in the vicinity of the site. Impacts would be **less than significant,** and no mitigation is required. Further analysis in the EIR is not warranted.

---

6 South Coast Air Quality Management District, *National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin*, Website: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf (accessed February 18, 2021).

7 Environmental Protection Agency, What are Sensitive Receptors? Revised 2017. Website: https://www3.epa.gov/region1/eco/uep/sensitivereceptors.html#:~:text=Sensitive%20receptors%20include%2C%20but%20are,%2C%20pesticides%2C%20and%20other%20pollutants (accessed December 23, 2020).

5.4 BIOLOGICAL RESOURCES

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?	☐	☐	☐	☒

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?

Less Than Significant with Mitigation Incorporated. The Project site is occupied by Irwindale Speedway and is in a heavily urbanized area of Irwindale. Natural habitat is not located on the Project site and only small areas of ornamental vegetation/landscaping occupy the site. Biological record searches of the California Natural Diversity Database (CNDDB), California Nature Plant Society (CNPS), and U.S. Fish and Wildlife Service species list were conducted on December 18, 2020 (attached as **Appendix A**). As the Project site is highly disturbed and mostly composed of asphalt, natural habitat that could support such species is highly unlikely.

Nesting bird species are protected by the Migratory Bird Treaty Act (MBTA) and Section 3503 of the California Fish and Wildlife Code. These laws make it unlawful to take, possess, or needlessly destroy the nest or eggs of any migratory bird or bird of prey. The proposed Project would be subject to compliance with the MBTA as construction activities would require the removal of the existing ornamental vegetation on site. As the Project site is occupied by ornamental vegetation (i.e., shrubs, grass, and palm trees), several bird species subject to the Migratory Bird Treaty Act have a low probability of occurrence on the site for purposes of nesting. To avoid potential impacts to nesting birds, **Mitigation Measure BIO-1** would be implemented to protect nesting bird species that may occur on the site and to ensure compliance with the MBTA.

Mitigation Measures. The following mitigation measure shall be implemented to reduce potential impacts to on-site nesting birds during construction.

> **BIO-1: Pre-construction Nesting Bird Survey.** If construction or other Project activities are scheduled to occur during the bird breeding season (February through August for raptors and March through August for most migratory bird species), a pre-construction nesting bird survey shall be conducted by a qualified biologist (retained by the Project Applicant and approved by the City of Irwindale Community Development) to ensure that active bird nests will not be disturbed or destroyed. The survey shall be completed not more than three days prior to initial demolition activities on the Project site. The nesting bird survey shall include the Project area and adjacent areas where proposed Project activities have the potential to affect active nests, either directly or indirectly due to construction activity or noise. If an active nest is identified, the qualified biologist shall establish an appropriate disturbance limit buffer around the nest using flagging or staking. Construction activities shall not occur within any disturbance limit buffer zones until the nest is deemed inactive by the qualified biologist. If during pre-construction surveys, active nesting sites are not found, demolition and construction activities can commence once the survey is completed, and the results are approved by City of Irwindale Community Development Staff.

With implementation of **Mitigation Measure BIO-1** for the protection of birds pursuant to the MBTA, the proposed Project would have a **less than significant impact with mitigation incorporated** on habitat modifications that could affect candidate, sensitive, or special-status bird species listed in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS). Further analysis on this topic in the EIR would not be warranted.

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 Impact. The Project site is in a heavily urbanized portion of Irwindale and is surrounded by industrial, and quarry uses. The Project site is currently occupied with the Irwindale Speedway facility, surface parking lot, ancillary buildings, a racecar pit area, and ornamental vegetation/ landscape. Natural vegetation is not located on the Project site and there is no riparian habitat or other sensitive natural community on the Project site. The closest riparian habitat or sensitive natural community is in the San Gabriel River Significant Ecological Area (SEA), 0.26 mile east of the Project site. Based on this information, implementation of the proposed Project would not 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 CDFW or USFWS. **No impact** would occur, and no mitigation measures are needed. Further analysis of this topic in the EIR is not warranted.

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?*

No Impact. Aerial views indicate that much of the Project site is occupied by impermeable surfaces with some areas of ornamental vegetation/landscaping. There are no areas on the site that would be delineated as a State or federally protected wetlands. As such, implementation of the proposed Project would not have a substantial adverse effect on State or federal protected wetlands through direct removal, filing, or other hydrological interruption. **No impact** would occur, and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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?*

Less Than Significant with Mitigation Incorporated. Habitat fragmentation occurs when a single, contiguous habitat area is divided into two or more areas, or where an action isolates the two or more new areas from each other. Isolation of habitat occurs when wildlife cannot move freely from one portion of the habitat to another or to/from one habitat type to another. Habitat fragmentation may occur when a portion of one or more habitats is converted into another habitat, as when scrub habitats are converted into annual grassland habitat because of frequent burning. Wildlife movement includes seasonal migration along corridors, as well as daily movements for foraging. Examples of migration corridors may include areas of unobstructed movement for deer, riparian corridors providing cover for migrating birds, routes between breeding waters and upland habitat for amphibians, and between roosting and feeding areas for birds.

The Project site is occupied by the Irwindale Speedway and is in a heavily urbanized portion of Irwindale that is mainly occupied by industrial and quarry uses. The Project site is not identified as a regionally important dispersal or seasonal migration corridor. There would be no effects to downstream waters because there is no hydrological connection coming from the site. Although no natural habitat exists on the site, the site does contain ornamental vegetation (e.g., palm trees) that may provide nesting habitat for migratory birds. Therefore, with implementation of **Mitigation Measure BIO-1** for the protection of birds pursuant to the MBTA, the proposed Project would have a **less than significant impact with mitigation incorporated** on the movement of native resident or migratory fish or wildlife species, native or migratory wildlife corridors or native wildlife nursery sites. Further analysis on this topic in the EIR would not be warranted.

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

***Less Than Significant with Mitigation Incorporated*.** The City of Irwindale Municipal Code and General Plan does not identify a tree preservation policy or ordinance to be implemented within the City. Resource Management Element Policy 4 of the General Plan has been implemented to protect the use of the City's natural resources through appropriate land use controls and planning. The Project site is occupied by various types of ornamental vegetation including several palm trees. Palm trees on the Project site have the potential to be occupied by nesting birds; as such, during Project construction, the potential exists that nesting birds could be disturbed if construction activities occur during bird breeding season. Implementation of **Mitigation Measure BIO-1** (as described above) would ensure that nesting birds are not disturbed on the Project site during construction. Impacts would be **less than significant with mitigation incorporated** and further analysis of this topic in an EIR is not warranted.

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?

No Impact. The City of Irwindale 2010 General Plan EIR does not indicate that there is an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan within the planning area of Irwindale.[8] However, the County of Los Angeles has designated the San Gabriel River floodplain and San Gabriel River as Significant Ecological Area (San Gabriel River SEA). The Project site is not within any habitat conservation plan, and it is 0.8 mile to the southwest of the San Gabriel River SEA. Implementation of the proposed Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan. **No impact** would occur, and no mitigation measures are required. Further analysis on this topic in the EIR is not warranted.

8 City of Irwindale, City of Irwindale 2010 General Plan Draft Environmental Impact Report, Section 3.8 Biological Resources Impacts, pgs. 50 to 53, September 2006.

5.5 CULTURAL RESOURCES

	Potentially Significant Impact (Will Be Evaluated in EIR)	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. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Less Than Significant Impact. The Project site was previously occupied by an active quarry, a landfill, swap meet, and now under existing conditions is occupied by Irwindale Speedway. All of the structures that are currently on the Project site were built in 1999; as such, they are not considered a historical resource pursuant to §15064.5. Past development of the Project site, previous to occupation by Irwindale Speedway, would have disturbed and/or removed any significant historical resources on the Project site. Therefore, it is unlikely that there are significant historical resources on the site that have been undiscovered during the various disturbance activities that have occurred on site. Impacts would be **less than significant,** and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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

Less Than Significant Impact. Based on the disturbance that has occurred on the Project site during its recent history, archaeological resources that would have been present previously more than likely are not on the site under existing conditions. Implementation of the proposed Project would more than likely not result in the discovery of archaeological resources. Impacts would be **less than significant,** and no mitigation measure are required. Further analysis of this topic in the EIR is not warranted.

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

Less Than Significant with Mitigation Incorporated. The Project site has been previously disturbed with various types of uses developed on site. No evidence exists to suggest the Project site has been utilized in the past for human burials; however, on-site construction could uncover previously undiscovered buried human remains, especially if grading and cut is deeper than previous disturbances occurring on the Project site. In the event of an accidental discovery or recognition of any suspected human remains, California State Health and Safety Code Section 7050.5 dictates that no further excavation or disturbance of the site (or any nearby area reasonably suspected to overlie adjacent human remains) may occur until the Los Angeles County Coroner determines that no investigation of the cause of death is required. If the coroner determines the remains to be Native American, the Native American Heritage Commission (NAHC) must be contacted within 24 hours, and **Mitigation Measure CUL-1** shall be implemented.

Mitigation Measures. The following mitigation measure shall be implemented to reduce potential impacts associated with the discovery or remains that could be of Native American heritage.

> **CUL-1 Disposition of Human Remains:** Disposition of human remains, if found during Project construction, shall occur in the manner provided in §5097.98 of the Public Resources Code. If the Coroner determines that the remains are not subject to his or her authority and if the coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission. Construction activity within 100 feet of the remains shall not be permitted until the NAHC has been contacted and a determination is made on collection procedures. Construction activity will be permitted to continue in areas outside of the 100-foot buffer around the remains found on site.

With implementation of **Mitigation Measure CUL-1,** impacts to human remains would be **less than significant with mitigation incorporated**. Further analysis in the EIR is not warranted.

5.6 ENERGY

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Potentially Significant Impact. Southern California Edison and the Gas Company provide electricity and natural gas service to the Project site, respectively. The energy consumption of the proposed Project during construction and operation would be evaluated in the EIR. The analysis in the EIR would determine if the proposed Project would cause a **potentially significant impact** due to wasteful, inefficient, or unnecessary consumption of energy resources.

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

Potentially Significant Impact. The proposed Project would be designed to comply with energy efficiency requirements pursuant to State and local policies. As the specific types of Project design features are still in the early stages of being reviewed, this topic would be analyzed in the EIR.

5.7 GEOLOGY AND SOILS

	Potentially Significant Impact (Will Be Evaluated in EIR)	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 wastewater?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

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. ii. Strong seismic ground shaking? iii. Seismic-related ground failure, including liquefaction? iv. Landslides?

(i). *Less than Significant Impact.* Fault Rupture. Known faults in the surrounding area include Duarte, Sierra Madre Fault-San Gabriel Fault Zone, San Andreas, Newport-Inglewood, Raymond Hill, Clamshell-Sawpit, and Whittier-Elsinore Faults.[9] However, the Project site is not located within an Alquist-Priolo Earthquake Fault Zone. The closest Alquist-Priolo Earthquake Fault Zone from the Project site is the Azusa Fault Zone located 2.6 miles north of the Project site.[10] Implementation of the proposed Project would not result in risk of loss, injury or death involving a fault rupture within

9 California Department of Conservation, Earthquake Zones of Required Investigation. Maps. Website: https://maps.conservation.ca.gov/cgs/EQZApp/ (accessed January 7, 2021).

10 California Department of Conservation, Earthquake Zones of Required Investigation. Maps Website: https://maps.conservation.ca.gov/cgs/EQZApp/ (accessed January 7, 2021).

an Alquist-Priolo Earthquake Fault Zone. Impacts would be **less than significant** and no mitigation is required. Further analysis in the EIR is not warranted.

(ii). *Potentially Significant Impact.* Seismic Shaking. The City of Irwindale is located within a seismically active region of southern California. According to the California Department of Conservation, Ground Motion Interpolator Website, the Project site could be exposed to a Peak Ground Acceleration (PGA) of 0.825 gravity (g), which is considered violent perceived shaking in correlation with the Mercalli scale.[11,12] Additionally, the shaking potential in the location of the Project site is 0.95 g.[13] The Project may expose people or structures to strong seismic ground shaking. A **potentially significant impact** may occur and will be further discussed and analyzed in the Project EIR.

(iii). *Potentially Significant Impact.* Seismically Induced Ground Failure and Liquefaction. Soil liquefaction takes place when loosely packed, water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking.[14] Factors influencing a sites potential for liquefaction include the region's seismicity, the type and characteristics of on-site soils, and the depth from surface of groundwater.[15] According to the California Department of Conservation, the Project site is not located in a known liquefaction zone.[16] The nearest liquefaction zone is located to the south and southwest in close proximity to the Project site. A Geotechnical Report will be prepared to assess potential Project impacts associated with seismic ground failure, including liquefaction. Due to the location of the Project site being within the vicinity of a liquefaction zone, impacts of seismic ground failure possible; therefore, a **potentially significant impact** may occur and will be further discussed and analyzed in the EIR.

(iv). *Potentially Significant Impact.* Landslides. Landslides are movements of a mass rock, debris, or earth down slope.[17] They occur on many different terrains are initiated in slopes already on the verge of movement and may be triggered by rainfall, snowmelt, changes in water level, stream erosion, changes in groundwater, earthquakes, volcanic activity, disturbance by human activities, or

---

11 California Department of Conservation, Ground Motion Interpolator, website: https://www.conservation.ca.gov/cgs/Pages/PSHA/ground-motion-interpolator.aspx (accessed January 7, 2021).

12 The Mercalli Scale is based on observable earthquake damage. From a scientific standpoint, the magnitude scale is based on seismic records while the Mercalli is based on observable data which can be subjective. Thus, the magnitude scale is considered scientifically more objective and therefore more accurate. For example a level I-V on the Mercalli scale would represent a small amount of observable damage. At this level doors would rattle, dishes break and weak or poor plaster would crack. As the level rises toward the larger numbers, the amount of damage increases considerably. Intensity X (10) is the highest value on the Mercalli scale

13 California Department of Conservation, Earthquake Zones of Required Investigation, website: https://maps.conservation.ca.gov/cgs/DataViewer/index.html (website accessed January 7, 2021).

14 United States Geological Survey, https://www.usgs.gov/faqs/what-liquefaction?qt-news_science_products=0#qt-news_science_products (accessed January 4, 2021).

15 California Department of Conservation. 1992. SP118 Recommended Criteria for Delineating Seismic Hazard Zones in California. Revised 2004. Website: https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Publications/SP_118.pdf (accessed January 4, 2021).

16 California Department of Conservation, California Earthquake Hazards Zone Application. Maps. Website: https://maps.conservation.ca.gov/cgs/DataViewer/index.html (accessed January 7, 2021).

17 United States Geological Survey, What is a Landslide and what causes one? Website: https://www.usgs.gov/faqs/what-a-landslide-and-what-causes-one?qt-news_science_products=0#qt-news_science_products (accessed January 4, 2021).

any combination of these factors. According to the Department of Conservation, designated landslide zones are present within the vicinity of the Project site with the nearest landslide zone located on the eastern edge of the Project site.[18] Therefore, a **potentially significant impact** may occur. This topic will be further discussed and analyzed in the EIR.

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

Potentially Significant Impact. During Project construction activities, soil erosion or the loss of topsoil has the potential to occur. The proposed Project is required to obtain a National Pollutant Discharge Elimination System (NPDES) Permit due to the development of the area involving more than 1 acre. A **potentially significant impact** may occur and this topic will be further discussed and analyzed in the EIR.

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?

Potentially Significant Impact. Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials.[19] Subsidence is caused by aquifer-system compaction associated with groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse, such as with sinkholes or thawing permafrost. The Project site is underlain by Quaternary geologic units, which is the geologic time period compromising about the last 1.65 million years.[20] The soils located on the Project site are Hanford Silt Loam and Tujunga Fine Sandy Loam, which contain a low clay content and therefore have a low potential for expansion within the Project site. However, the Project site is located within the vicinity of several off-site designated landslide zones along with one on-site landslide zone located on the eastern edge of the Project site.[21] Additionally, the Project site is also located within the vicinity of a liquefaction zone located in the vicinity of the Project's southern and southwestern boundary. A Geotechnical Report will be prepared to assess potential Project impacts associated with ground instability. A **potential significant impact** may occur and this topic will be further discussed and analyzed in the EIR.

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?

Potentially Significant Impact. Expansive soils contain minerals such as smectite clays that are capable of absorbing water while expanding soil. Soil on the Project site is designated as *Urban land,*

---

18 California Department of Conservation, California Earthquake Hazards Zone Application. Maps. Website: https://maps.conservation.ca.gov/cgs/DataViewer/index.html (accessed January 7, 2021).

19 United States Geological Survey, https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects. Date accessed January 4, 2021.

20 United States Geological Survey, https://www.usgs.gov/natural-hazards/earthquake-hazards/faults?qt-science_support_page_related_con=4#qt-science_support_page_related_con. Website accessed January 7, 2021.

21 California Department of Conservation, https://maps.conservation.ca.gov/cgs/DataViewer/index.html. Website accessed January 7, 2021.

commercial-Soboba complex, 0 to 5 percent slopes.[22] The shrink-swell (expansion) potential of this soil type is not described in the soil survey of the area; as such, the expansive potential of this soil cannot be determined. A Geotechnical Report will be prepared for the proposed project and this report would include soil sampling, which would determine the expansive nature of the on-site soils. Since the expansive nature of the on-site soils is not known at this time, a **potentially significant impact** could occur. As such, this topic will be further discussed in the EIR.

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 wastewater?

No Impact. The proposed Project will connect existing wastewater infrastructure in the roadways located around the Project site. Septic tanks and/or alternative wastewater disposal systems would not be included as part of the proposed Project. **No impact** would occur and no mitigation is required.

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

Less Than Significant Impact. The Project site is mapped as surficial Quaternary Alluvium, consisting of alluvial gravel comprising dense to very dense well graded sands and sandy gravels. The site has been previously disturbed by past mining and landfill operations and contains no unique geologic features. Excavations of the Project are not expected to exceed four feet below ground surface and are therefore not expected to encounter resources of high paleontological sensitivity. The potential for paleontological resources at the Project site is considered low due to the geological and topographical characteristics of the area. Impacts would be **less than significant** and no further analysis on this topic in the EIR is not warranted.

22 United States Department of Agriculture, Natural Resources Conservation Service, Websoil Survey, Website: https://websoilsurvey.nrcs.usda.gov/app/ (accessed February 18, 2021).

5.8 GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Potentially Significant Impact. Global climate change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases (GHGs) in the earth's atmosphere, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2, N_2O, CH_4, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the earth's atmosphere, but prevent radioactive heat from escaping, thus warming the earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. Construction activities associated with site demolition, site grading, site preparation, and Project development would generate GHG emissions. Operation of the Project would generate increased vehicle trips in the Project area, leading to generation of GHG operations emissions. Additionally, the consumption of electricity and natural gas by the proposed on-site uses as part of the Project would generate GHG emissions. An Air Quality/GHG/Energy Technical Report will be prepared to assess the potential Project impacts associated with GHG generation. **Potentially significant impacts** pertaining to GHG emissions with implementation of the proposed Project could occur; as such, this topic will be further analyzed in the EIR.

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

Potentially Significant Impact. The proposed Project would generate GHG emissions during both construction activities and operational activities. The Air Quality/GHG/Energy Technical Report will analyze and determine if the proposed Project would be consistent with statewide measures intended to reduce GHG emissions generation and consistency with the Los Angeles County 2020 Community Climate Action Plan (CCAP). **Potentially significant impacts** pertaining to the Project's consistency with the 2020 Los Angeles County CCAP and State GHG emission reduction standards could occur; therefore, this topic will be further analyzed in the EIR.

5.9 HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Less Than Significant Impact. Construction of the Project has the potential to create a hazard to the public or the environment through the routine transportation, use and disposal of construction-related hazardous materials such as fuels, oils, solvents, and other materials. These materials are typical materials delivered to construction sites. However, due to the limited quantities of these materials to be used by the proposed Project, they are not considered hazardous to the public at large. In accordance with the City of Irwindale's Hazardous Materials Policy, the transport, use and storage of hazardous materials during the construction and operation of the Project would be conducted pursuant to all applicable locale, State, and federal laws, and in cooperation with Los Angeles County's Department of Public Health. Title 49 of the Code of Federal Regulations (CFR) implemented by Title 13 of the California Code of Regulations (CCR) describes strict regulations for the safe transportation of hazardous materials. Compliance with all applicable local, State, and federal laws related to the transportation, use and storage of hazardous materials would reduce the likelihood and severity of accidents during transit, use, and storage.

Once operational, the proposed Project would be occupied by both commercial and industrial types of businesses. Small quantities of hazardous materials may be stored and used during business operations on the site; however, due to the limited quantities of these materials to be used during Project operation, they are not considered hazardous to the public at large. Additionally, each business on the project site using, storing, and handling hazardous materials would have Material Safety Data Sheets (MSDS) on hand in the event of an accident or release. The MSDS would include information on the type of materials used at the specific business and procedures to take in the event of a spill or release of the hazardous material.

Compliance with all applicable local, State, and federal laws, including but not limited to Title 49 of the CFR implemented by Title 13 of the CCR, would ensure that the proposed Project (during construction and operation) does not cause a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. Impacts would be **less than significant** and further analysis on this topic is not required in the EIR.

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?

Potentially Significant Impact. The Project site was occupied by a landfill from the mid-1970s to 1993. Although the Project has since been developed with the Irwindale Speedway, remnants of hazardous materials may be present in underlying soils. Construction activities associated with the proposed Project (including excavation and grading) could expose construction workers to hazardous materials in the site's soils that were unaccounted for during previous disturbances. Additionally, demolition of the existing Irwindale Speedway and associated buildings on site may release lead or asbestos due to the age of the materials used in construction of the speedway. A Phase 1 Environmental Assessment was previously prepared for another Project on the site; however, in consultation with the City and Project applicant, an updated Phase 1 Environmental Assessment would be prepared for the Project to assess potential impacts associated with the release of hazardous materials into the environment. As implementation of the proposed Project could cause a **potentially significant impact** associated with the release of hazardous materials, this resource topic will be further discussed and analyzed in the EIR.

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?

Less Than Significant Impact. The nearest schools to the Project site are Olive Junior High and Walnut Elementary School located at 13701 East Olive Street and 4701 North Walnut Avenue, respectively, both in the City of Baldwin Park. Both schools are approximately 0.5 mile southeast of the Project site. There are no existing or proposed schools located within a quarter mile of the Project site. Therefore, the Project would not affect schools within 0.25 mile by emitting hazardous emissions or acutely hazardous materials, substances, or waste. Impacts would be **less than significant,** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

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?

Potentially Significant Impact. According to the EnviroStor Database, the Project site is not designated as a hazardous materials site nor is it located within 1,000 feet of any hazardous materials sites.[23] However, the Project site was previously occupied by a landfill; as such, hazardous materials not previously disclosed could be located on the site. A Phase 1 Environmental Assessment will be prepared as part of the Project to assess potential hazardous materials on the Project site and to confirm that the Project site is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. As a **potentially significant impact** may occur, this topic will be further discussed and analyzed in the EIR.

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?

Less Than Significant Impact. The El Monte Airport, the closest airport to the Project site, is located approximately 2.5 miles to the southwest. The Project site is not located within the El Monte Airport land use plan boundary nor is the Project site located within a noise contour of the airport.[24] As such, implementation of the proposed Project would not result in an airport safety hazard or airport generated excessive noise for people residing or working in the Project area. Impacts would **be less than significant,** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

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

Less Than Significant Impact. The proposed Project is not expected to impair implementation of or interfere with the emergency response plan adopted by the City of Irwindale. The Project design proposes access to the site from two driveways along Live Oak Avenue and would be designed to comply with the Los Angeles County Fire Code and the City of Irwindale standards for emergency access. The internal circulation system would also be designed to comply with the most current Los Angeles County Fire Code Standards by accommodating emergency vehicles based on design widths of drive aisles and turn around locations. The proposed Project would also include design systems to be compliant with Fire Code regulations throughout the building and on the site (sprinkler systems in buildings, placement of fire hydrants, fire rated construction materials, etc.). I-605 located west of the Project site serves as the closest regional freeway that would lead people out of the Project area should evacuation be necessary. Additional evacuation routes closest to the Project site include Arrow Highway and Live Oak Avenue, which are located approximately 270 feet northwest of the proposed Project.

---

23 EnviroStor Database, Website: https://www.envirostor.dtsc.ca.gov/public/map/?myaddress=500+Speedway+dr.+Irwindale+ca+91706 (accessed January 14, 2021).

24 Los Angeles County Airport Land Use Plan, Website: https://planning.lacounty.gov/assets/upl/data/pd_alup.pdf, Pg. 10 (accessed January 18, 2021).

Project-related improvements to Live Oak Avenue would occur; however, no other off-site circulation improvements would occur within the City based on implementation of the proposed Project. Live Oak Avenue improvements would include:

- Construction of a 10-foot-wide parkway and meandering sidewalk along the Project frontage, located within the existing right-of-way and a 2-foot landscape and sidewalk easement;
- Addition of a traffic signal at the westernmost driveway;
- Removal of existing traffic signal on Live Oak Avenue and installation of a new traffic signal at the center driveway of the Project; and
- Modification of the center median on Live Oak Avenue.

None of these project-related improvements would impair or physically interfere with emergency response plans to the site or emergency evacuation plans from the site. Overall, impacts would be **less than significant,** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

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

Less Than Significant Impact. Areas of significant fire hazards in the state are assessed through the Fire and Resources Assessment Program (FRAP) under California Department of Forestry and Fire Protection (CAL FIRE). The Project site is surrounded by urban uses and mining and does not lie within any local or State responsibility areas designated as very high fire hazard severity zones (VHFHSZ). Section 5.20 of this IS further discusses wildland fire impacts. Implementation of the proposed Project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildlands fires. Impacts would be **less than significant,** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

5.10 HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact (Will Be Evaluated in EIR)	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 off site;	☒	☐	☐	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned storm water 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?

Potentially Significant Impact. A Hydrology Report and Water Quality Management Plan Report will be prepared by the Project applicant in compliance with County of Los Angeles requirements. These reports will determine if the proposed Project would violate water quality standards, waste discharge requirements, or degrade surface and groundwater quality. Since the proposed Project involves over one acre of ground disturbance, it is subject to National Pollutant Discharge Elimination System (NPDES) requirements and will be required to implement a Storm Water Pollution Prevention Plan (SWPPP). Site-specific best management practices (BMPs) would be described as part of the SWPPP and would be analyzed for their effect in reducing violations of water quality standards. As implementation of the proposed Project would result in a **potentially significant impact** pertaining to violation of water quality standards, this topic will be further analyzed in the EIR.

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?

Less Than Significant Impact. The proposed Project is located in the City of Irwindale, which overlays the Main San Gabriel Groundwater Basin. The Main San Gabriel Groundwater Basin has a surface area of 167 square miles and has the capacity to hold 2.8 trillion gallons of groundwater.[25] The Main San Gabriel Basin Watermaster is the agency charged with administering adjudicated water rights and managing groundwater resources within the watershed of the Main San Gabriel Groundwater Basin. A groundwater well (001S010W07R002S) located approximately 1.64 miles southeast of the Project site monitored by the United States Geologic Survey from June 17, 1932, to January 1, 2015, indicated that the groundwater level in the Project vicinity was at 205.79 feet below ground surface on its last reading in January 2015.[26]

Under existing conditions, the Project site is estimated to be occupied by at least 96 percent impervious surfaces. Implementation of the proposed Project would more than likely not reduce or increase the amount of impervious surfaces on the site as 11 buildings and surface parking lots would be developed on the Project site, replacing the Irwindale Speedway facility. Implementation of the proposed Project would not include massive substructures at depths that would significantly impair or alter the direction or rate of flow of groundwater in the Main San Gabriel Groundwater Basin. For these reasons, the proposed Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management. Impacts would be **less than significant,** and no mitigation is required. Further analysis of this topic in the EIR is not warranted.

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; (ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site; (iii) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff; or (iv) Impede or redirect flood flows?

(i) *Potentially Significant Impact.* The proposed Project would include the demolition of existing uses on the site pertaining to Irwindale Speedway followed by grading and site preparation activities to develop the 11 industrial/commercial/business park buildings and surface parking lot on site. BMPs would be implemented as part of the SWPPP prepared for the proposed Project to reduce substantial erosion or siltation on or off site. However, such activities could result in a **potentially significant impact**; as such, this topic will be further analyzed in the EIR that will be prepared for the proposed Project.

25 Main San Gabriel Basin Watermaster, *Five-Year Water Quality and Supply Plan, 2020-21 to 2024-25*, November 2020.

26 United States Geologic Survey, National Water Information System, Map View, website: https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=340535117573501&agency_cd=USGS&format=html (accessed December 21, 2020).

(ii) ***Potentially Significant Impact.*** A Hydrology Report will be prepared for the proposed Project. It is anticipated, due to the change of uses on the Project site, surface runoff volume could change when compared to existing conditions. This may result in a **potentially significant impact** pertaining to an increase in surface runoff to occur. As such, this topic will be further analyzed in the EIR that will be prepared for the proposed Project.

(iii) ***Potentially Significant Impact.*** A Hydrology Report will be prepared for the proposed Project. A new on-site storm water drainage system will be developed in accordance with the requirements set forth in the Hydrology Report and based on any increases in storm water runoff that could occur on the Project site. This could result in a **potentially significant impact**; as such, this topic will be further analyzed in the EIR that will be prepared for the proposed Project.

(iv) ***No Impact*.** According to the Federal Emergency Management Administration Flood Insurance Rate Map (FIRM) (Panel 06037C1700F effective 9/26/2008) the Project site is in a Zone X Area of Minimal Flood Hazard.[27] Buildings would be designed on the proposed Project site to drain storm water into the storm water drainage system that would serve the site. Implementation of the proposed Project would not impede or redirect flood flows. **No impact** would occur, and no mitigation is required. For these reasons, further analysis of this topic in the EIR is not warranted.

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

No Impact. The Project site is 28 miles east of the Pacific Ocean; as such, inundation by a tsunami, which would risk release of pollutants, would not occur. According to the Federal Emergency Management Administration FIRM Mapping (Panel 06037C1700F effective 9/26/2008) the Project site is in a Zone X Area of Minimal Flood Hazard.[28] As such, implementation of the proposed Project would not be subject to a flood hazard that would risk the release of pollutants. The proposed Project is near mining pits (to the northwest, south, and southwest) that are backfilled with water. Both pits are well below the elevation of the proposed Project site (100–130 feet below the site); as such, inundation by a seiche during a seismic event on the Project site from these features is highly unlikely. Furthermore, the Project site is not located in a seiche zone and therefore would not be a risk to release of pollutants due to Project inundation caused by a seiche. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis of this topic in the EIR is not warranted.

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

Potentially Significant Impact. A Hydrology Report and Water Quality Management Plan Report will be prepared as part of the Project in compliance with County of Los Angeles requirements. A **potentially significant impact** could occur as the Project may conflict with applicable water quality control plans or sustainable groundwater management plans or sustainable groundwater

---

27 Federal Emergency Management Administration, FIRM Mapping Website: https://msc.fema.gov/portal/home (accessed December 21, 2020).

28 Ibid.

management plans. If there is a conflict, Conditions of Approval, Regulatory Compliance Measures, or Mitigation would be presented in the EIR to ensure impacts are reduced to less than significant. As such, this topic will be further analyzed in the EIR.

5.11 LAND USE AND PLANNING

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

No Impact. The physical division of an established community typically refers to the construction of a physical feature (such as an interstate highway or railroad tracks) or removal of a means of access (such as a local road or bridge) that would impair mobility within an existing community, or between a community and outlying area. For instance, the construction of an interstate or railroad track through an existing community may constrain travel from one side of the community to another; similarly, such construction may also impair travel to areas outside the community.

The Project site is currently developed with the Irwindale Speedway and is bordered by Live Oak Avenue and an active landfill to the north, an active quarry, and Graham Access Road to the south, I-605 to the east and a truck distribution center to the west. Established neighborhoods are located approximately 0.57 mile to the northwest of the Project site and 0.62 mile southeast of the Project site. Uses (commercial/industrial/business park) that are like those surrounding the site would occupy the site once the Project is operational. The proposed Project does not include any off-site improvements (e.g., new roads, removal of bridges, new railroad tracks) that would physically divide an established community. As such, **no impact** would occur, and no mitigation measures are required. Further analysis in the EIR is not warranted.

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?

Potentially Significant Impact. The proposed Project would change the existing land use designation from Commercial/Recreation to Specific Plan. A zone change is proposed which would change the on-site zoning from Heavy Commercial (C2) Speedway Commerce Specific Plan. The Specific Plan adopted as part of the Project will guide the development of the site as the industrial/commercial/business park uses are developed. Te proposed Project would go through Design Review to ensure that buildings developed on site would be consistent with design requirements (e.g., building heights, floor area ratios, maximum/minimum building coverage of site, landscape coverage of site) as set forth by the Specific Plan. It should be noted that, according to CEQA, policy conflicts do not, in and of themselves, constitute a significant environmental impact. Policy conflicts are environmental impacts only when they would result in direct physical impacts or where those conflicts relate to avoiding or mitigating environmental impacts.

Nonetheless, as proposed project may result in direct physical impacts or conflicts related to avoiding or mitigating environmental impacts due to inconsistency with the City's land use policies. As **potentially significant impacts** could occur, this topic will be further discussed in the EIR prepared for the project.

5.12 MINERAL RESOURCES

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Less Than Significant Impact. The Surface Mining and Reclamation Act of 1975 (SMARA) mandated the initiation by the State Geologist of mineral land classification to help identify and protect mineral resources in areas within the State subject to urban expansion or other irreversible land uses which could preclude extraction.[29] According to the California Geological Survey (CGS), the Project site and its surrounding areas are classified as Mineral Resource Zone (MRZ) 2 areas. This classification indicates that significant mineral deposits are present, or it is judged that a high likelihood of their presence exists.[30] The Project site was once occupied by Pacific Rock Quarry, which mined sand and gravel for construction materials through the late 1960s. The quarry was backfilled as part of the former Nu-Way Landfill, which occupied the Project site from the mid-1970s to May 1993. It is assumed that the Pacific Rock Quarry exhausted the supply of aggregate material in the Project site and therefore was closed and used as a landfill starting in the mid-1970s. Based on the existing speedway use occupying the site, it is assumed that mineral/aggregate resources are no longer available beneath the Project site. Therefore, implementation of the proposed Project would not result in the loss of availability of a known mineral resource. South of the Project site is an active aggregate extraction quarry operated by Hanson Aggregates LLC.[31] However, the proposed Project would not interfere with the activities at the quarry as the Project uses would only occupy the proposed Project site. Impacts would be **less than significant** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

---

29 Department of Conservation. 2000. Guidelines for Classification and Designation of Mineral Lands. Website: https://www.conservation.ca.gov/smgb/Guidelines/Documents/ClassDesig.pdf (accessed January 14, 2021).

30 Gavric, J., Gonzalez, I., Kenline, G., Lane, J., Noushkam, N., April 2014, Updated Designation of Regionally Significant Aggregate Resources in the San Gabriel Valley Production-Consumption Region, State Mining and Geology Board; (12): 11-12.

31 California Department of Conservation, Mines Online. Maps. Website: https://maps.conservation.ca.gov/mol (accessed January 14, 2021).

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?

Less Than Significant Impact. According to the CGS, the Project site is considered an MRZ-2 area, which indicates that significant mineral deposits are present or that there is a high likelihood that their presence exists. However, the site has been previously disturbed due to past mining and landfill operations and is currently occupied by a speedway. Any important mineral resources located beneath the Project site have been feasibly extracted and are no longer obtainable from an economic feasibility standpoint. Implementation of the proposed Project would not 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. Impacts would be **less than significant,** and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

5.13 NOISE

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?	☐	☐	☐	☒

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?

Potentially Significant Impact. Project-related construction and operational activities have the potential to increase ambient noise levels temporarily or permanently in the area. Sensitive receptors (schools and residential units) are in close vicinity of the Project site to the northwest and southeast. Implementation of the proposed Project has the potential to exceed noise standards as set forth in the City of Irwindale General Plan as well as the City of Irwindale Municipal Code Chapter 9.28 Noise Regulation. A Noise Impact Analysis Report will be prepared to analyze noise impacts generated by the proposed Project. As implementation of the proposed Project could result in a **potentially significant impact** related to generation of noise levels that exceed applicable standards, further analysis will be conducted in the EIR prepared for the proposed Project.

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

Potentially Significant Impact. The proposed Project has the potential to generate groundborne vibrations or groundborne noise levels that exceed standards that protect nearby buildings and prevent annoyance of nearby people. Construction activities (e.g., grading, demolition activities) and operational activities (e.g., truck deliveries, industrial activities) could generate such vibrations. The Noise Impact Analysis Report that will be prepared for the proposed Project will quantify the potential impacts associated with the generation of Project groundborne vibrations. As an increase in groundborne vibrations could cause a **potentially significant impact,** further analysis will be conducted in the EIR prepared for the proposed Project.

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?

No Impact. The closest airport to the proposed Project is El Monte Airport (located at 4233 North Santa Anita Avenue in El Monte) 2.5 miles southwest of the Project site. The proposed Project is not located in the Airport Influence Area of El Monte Airport and is not within its 70 dBA Community Noise Equivalent Level (CNEL) noise contour.[32] Implementation of the proposed Project is not in 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, where the Project would expose people residing or working in the area to excessive airport related noise levels. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis of this topic will be discussed in the EIR.

[32] Los Angeles County Airport Land Use Commission, Los Angeles County Airport Land Use Plan, pg. 17, El Monte Airport Influence Area, May 13, 2003.

5.14 POPULATION AND HOUSING

	Potentially Significant Impact (Will Be Evaluated in EIR)	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)?

Less Than Significant Impact. It is anticipated that the proposed Project would not directly affect population growth in the City because it does not include the development of residential units. The proposed Project is expected provide new employment opportunities. Employment of the proposed Project would likely be filled by existing residents or residents in the surrounding region due to current unemployment rates. The City of Irwindale currently has a population of 1,441 residents, according to the California Department of Finance. [33] The unemployment rate for the City of Irwindale is 8.9 percent.[34] The unemployment rates of the surrounding cities include Duarte at 8.1 percent, Baldwin Park at 7.1 percent, El Monte at 7.1 percent, Covina at 7.6 percent, and Azusa at 6.0 percent.[35] Los Angeles County as a whole currently has an unemployment rate of 7.1 percent.[36] Short-term employment opportunities for construction of the proposed Project are also anticipated to be filled by residents who likely reside in the Project area and therefore the Project is not expected to generate an increase in population growth. The proposed Project would not induce substantial unplanned population growth in the City or surrounding area, either directly or indirectly. Impacts would be **less than significant,** and no mitigation is required. For these reasons, further analysis of this topic in the EIR is not warranted.

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

No Impact. The Project site is occupied by the Irwindale Speedway with no residential structures located within the Project limits. Implementation of the proposed Project would not displace

---

33 State of California Department of Finance. 2021. E-1 Cities, Counties, and the State Population Estimates with Annual Percentage. Revised January 1, 2021. Website: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/documents/E-1_2020_InternetVersion.xlsx (accessed December 30, 2021).

34 Employment Development Department. November 2021. Monthly Labor Force Data for Cities and Census Designated Places (CDP). Revised November 2021. Website: https://www.labormarketinfo.edd.ca.gov/data/unemployment-and-labor-force.html (accessed December 30, 2021).

35 Ibid.

36 Ibid.

substantial numbers of existing people or housing, and construction of replacement of housing would not be required. Employees that would be hired by the uses of the proposed Project would more than likely come from either the City of Irwindale or surrounding areas based on the high unemployment rates in the area. Such employees would already have housing in the City or other nearby jurisdictions. As such, the proposed Project would not indirectly necessitate the construction of housing. Overall, the proposed Project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere. **No impact** would occur, and no mitigation is required. For these reasons, further analysis in the EIR is not warranted.

5.15 PUBLIC SERVICES

	Potentially Significant Impact (Will Be Evaluated in EIR)	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? (ii) Police protection? (iii) Schools? (iv) Parks? (v) Other public facilities?

(i) ***Less Than Significant Impact.*** The Los Angeles County Fire Department (LACoFD) provides fire protection service to the City of Irwindale and the proposed Project site. The following four LACoFD fire stations serve the City of Irwindale: El Monte Fire Station No. 169, Duarte Station No. 44, Baldwin Park Station No. 29, and Irwindale Station No. 48.[37] El Monte Fire Station No. 169, which is located at 5112 North Peck Road in El Monte (approximately 1.5 miles south of the Project site) is the closest LACoFD fire station to the proposed Project. Fire station No. 169 is manned by 3 firefighters with a single 3-man engine and has an average response time of 5 minutes.[38] Buildings developed as part of the proposed Project would be designed to be compliant with the most current California Fire Code regulations (sprinkler systems, placement of fire extinguishers, fire alarms, fire rated construction materials, etc.). The Project's internal circulation system would be designed to accommodate emergency vehicles such as fire trucks and paramedic vehicles, based on design widths of drive aisles and turn-around locations in compliance with Los Angeles County Fire Code standards. The Project design also proposes access to the site from five driveways along Live Oak Avenue that would be designed to meet Los Angeles County Fire Code and the City of Irwindale standards for site access. The LACoFD would review final site plans to ensure that all Fire Code design requirements are implemented. Finally, the Project applicant would be required to pay LACoFD Development Impact Fees (DIFs), which would contribute to the purchase of new

37 Los Angeles County Fire Department, Martinez, Gustavo, Los Angeles County Fire Department Inspector for Irwindale. January 8, 2021. Personal Communication.

38 Los Angeles County Police Department, Matheny, John, Los Angeles County Public Information Officer. January 11, 2021. Personal Communication.

equipment as needed and improvements of existing fire stations or development of new fire stations as required. The proposed Project would not require the improvements of existing fire stations or development of new fire stations to adequately serve the site.

Implementation of the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered fire protection facilities, or result in the need for new or physically altered fire protection facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times or other performance objectives for LACoFD services. Impacts would be **less than significant,** and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

(ii) ***Less Than Significant Impact.*** The proposed Project is served by the Irwindale Police Department (IPD) (5050 North Irwindale Avenue) located approximately 2.8 miles east of the Project site.[39] The IPD consists of 30 full-time police officers, 7 civilian employees, 3 general detectives, and 2 specialty detectives. The IPD's enforcement tools include one motor unit, 14 black-and-white patrol units, 2 enforcement trucks, and 7 unmarked detective vehicles.[40] The average response time for priority one calls[41] for the IPD is 3 minutes and 42 seconds, which meets their overall response time goal for priority one calls.[42] According to the IPD, the proposed Project would not necessitate an increase in police service at this time.[43] However, additional development projects in the surrounding area may have an impact related to the need for additional police services in the future.[44]

Employee and site safety would be enhanced through the application of design considerations that contribute to the reduction in opportunities for crime ("Safety through Design"). Such "Safety through Design" features would be required by the City of Irwindale as a condition of approval. The concept of safety through design includes, but is not limited to, the following elements that would be incorporated as part of final design of the buildings on the Project site:

- *See and be Seen.* Use of natural surveillance (i.e., "eyes on the street") to maximize the visibility of people, parking, building entrances, and loading docks. Seating areas, circulation corridors, and individual building entries would be designed to be visible from as many areas as possible.
    - Site entries should be visible from a street or drive aisle.
    - Landscaping would be designed to limit hiding places and enhance visibility.
    - Lighting would be strategically placed to illuminate parking areas, docks/loading zones, and building entries.
    - Avoid dead end driveways and streets would be designed to increase surveillance.

39 Irwindale Police Department, Fraijo, John, Lieutenant. January 6, 2021. Personal Communication.
40 Ibid.
41 Priority one calls are defined (by the IPD) as felony in progress or life threatening medical emergency/injury traffic collision calls.
42 Irwindale Police Department, Fraijo, John, Lieutenant. January 6, 2021. Personal Communication.
43 Ibid.
44 Ibid.

- Lighting along entrance paths to buildings would be provided at the same level as street lighting.
- Back drive aisles and loading docks would be well lit.
- Internal walkways would be well lit and visible from buildings.
- Lighting would illuminate entrapment areas such as the entrances to loading/unloading areas.
- Parking lots would be visible from the street and well lit for night shift employees.

- *Access Control,* including clear wayfinding to guide visitors and vehicles to appropriate site and entries building and perimeter fencing to avoid trespass.
- *Maintenance.* Properly maintained properties are less likely to attract unwanted activity. Landscape, signage, and lighting would be kept in good condition to avoid an appearance of neglect. Reporting of burnt out or vandalized lights would be encouraged.

Implementation of "Safety through Design" features as part of the proposed Project would reduce calls for service from the IPD. Finally, in compliance with the Irwindale Municipal Code Title 3 Chapter 3.50 Development Impact Fees, the Project applicant would be required to pay current (prior to final plan approval) DIFs, a portion of which would provide fair-share funding to the IPD for improvements to existing IPD stations or development of new IPD station(s) as warranted. The DIFs would be calculated and implemented as a condition of approval for the proposed Project.

Implementation of the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered law enforcement facilities, need for new or physically altered law enforcement facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times or other performance objectives for IPD services. Impacts would be **less than significant,** and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

(iii) ***Less Than Significant Impact.*** Both Olive Junior High School and Walnut Elementary School, the closest schools to the proposed Project, are located approximately 0.5 mile southeast of the site. In 2019–2020, Olive Junior High School had an enrollment of 490 students and Walnut Elementary School had an enrollment of 526 students.[45] The number of students enrolled in the schools or school districts serving the site would not increase as the proposed Project would not include the development of residential units (student-generating uses). Employees of the proposed Project are anticipated to come from the City of Irwindale and/or surrounding areas and would already be established in the area. School-aged children of such employees would be assumed to already be attending local schools. Prior to the Project final plan approval, the school district where the Project is located would have the chance to review the Project and, if DIFs are required, they would be implemented as conditions of approval for the proposed Project. The DIFs would go toward the general fund of the local school district to help in classroom and facility expansions as required.

45 California Department of Education, Data Quest, Website: https://dq.cde.ca.gov/dataquest/dqcensus/EnrGrdLevels.aspx?cds=19642876011514&agglevel=school&year=2019-20 (accessed January 19, 2021).

Implementation of the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered schools, need for new or physically altered schools, the construction of which could cause significant environmental impacts, to maintain acceptable education services. Impacts would be **less than significant,** and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

(iv) ***Less Than Significant Impact*.** The proposed Project would not include the development of park or recreational facilities. The nearest park to the Project site, Kare Youth League Park (located at 1417 Arrow Highway), is located approximately 0.60-mile northeast of the Project site. The San Gabriel River Bike Trail is located 0.71-mile northeast of the Project site. The proposed Project does not include the development of residential units; as such, it would not generate a population of people that would use nearby park and recreational facilities. Employees of the Project site may use the local park and recreational facilities during their breaks (lunch and rest breaks); however, such use would be minimal, and it is anticipated that the proposed Project would not cause a significant increase in the use of existing nearby parks or other recreational facilities to the point where there would be overuse or degradation of such facilities. In compliance with the Irwindale Municipal Code Title 3 Chapter 3.50 Development Impact Fees, the Project applicant would be required to pay current (prior to final plan approval) DIFs, a portion of which would provide fair-share funding to the City's parks and recreational facilities for improvements to existing park/recreational facilities, or development of new parks/recreational facilities as warranted. The DIFs would be calculated and implemented as a condition of approval for the proposed Project.

Implementation of the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered park and recreation facilities, need for new or physically altered park and recreation facilities, the construction of which could cause significant environmental impacts, to maintain acceptable parks and recreation services. Impacts would be **less than significant,** and no mitigation measures are required. For these reasons further analysis in the EIR is not warranted.

(v) ***No Impact.*** The proposed Project would include the development of a commercial/industrial/ business park and would not include residential units that could be growth inducing. As employees of the proposed Project are anticipated to come from the City of Irwindale or surrounding jurisdictions, such populations are already established, and assumed to be using existing public services (libraries, City public facilities, etc.). As such, implementation of the proposed Project would not 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, to maintain acceptable performance objectives for other public services. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

5.16 RECREATION

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Less Than Significant Impact. The proposed Project does not include a residential component and would not increase local or regional populations. The proposed Project would include the development of industrial/commercial/business park uses. The closest park to the proposed Project site is Kare Youth League Park, located at 1417 Arrow Highway in Irwindale, approximately 0.60-mile northeast of the Project site. The San Gabriel River Bike Trail is located 0.71-mile northeast of the Project site. The proposed Project does not include the development of residential units; as such, the proposed Project would not generate a population of people that would use nearby park and recreational facilities. Employees of the Project site may use the local park and recreational facilities during their breaks (lunch and rest breaks); however, such use would be minimal, and it is anticipated that the proposed Project would not cause a significant increase in the use of existing nearby parks or other recreational facilities to the point where there would be overuse or degradation of such facilities. In compliance with the Irwindale Municipal Code Title 3 Chapter 3.50 Development Impact Fees, the Project applicant would be required to pay current (prior to final plan approval) DIFs, a portion of which would provide fair-share funding to the City's parks and recreational facilities for improvements to existing park/recreational facilities, or development of new parks/recreational facilities as warranted. The DIFs would be calculated and implemented as a condition of approval for the proposed Project.

Overall, the proposed Project would not 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. Impacts would be **less than significant,** and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

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?

No Impact. The proposed Project would develop the site with commercial/industrial/business park uses and no park or recreational facilities would be included on the site as part of the Project design. As the proposed Project would not include a residential component, the Project would not induce growth in the area, which may lead to more people using park and recreational facilities in the area. People employed by the uses on the proposed Project are anticipated to come from the existing population in the City of Irwindale or nearby jurisdictions; as such, employees of the Project would already be using park and recreational facilities in the area. Based on the above, the proposed Project does not include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment. **No impact** would occur, and no mitigation measures are required. For these reasons, further analysis in the EIR is not warranted.

5.17 TRANSPORTATION

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Potentially Significant Impact. The proposed Project would be developed in a portion of Irwindale that consists mainly of industrial, commercial, landfill, and mining uses. Most of the traffic from such uses consists of employees traveling to and from work and truck traffic making deliveries to industrial and commercial uses, delivering solid waste to the landfill uses, and transporting mineral resources from the mining facilities. To determine the effect that vehicle trip generation from the proposed Project would have on the surrounding roadways of the City and regionally, a Transportation Impact Assessment (TIA) will be prepared for the Project. The TIA will determine if intersections and roadway Level of Service (LOS) in the Project study area will be degraded because of Project implementation. The TIA will also examine potentially significant impacts to the existing circulation system, transit system, and bicycle and pedestrian facilities. As implementation of the proposed Project may result in a **potentially significant impact,** this topic will be further discussed and analyzed in the EIR prepared for the proposed Project.

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

Potentially Significant Impact. The 2019 *CEQA Guidelines* were updated to remove vehicle delay and LOS from consideration under CEQA pertaining to transportation impacts. With the change in the 2019 *CEQA Guidelines*, transportation impacts are to be evaluated based on a project's effect on vehicle miles traveled (VMT). The San Gabriel Valley Council of Governments has developed a *Regional Vehicle Miles Traveled Analysis Tool* that the City of Irwindale uses to determine VMT for various projects developed within its jurisdiction. The TIA prepared for the proposed Project will include a VMT analysis. Due to the type of Project that would be implemented on the site and the distance from transit centers, implementation of the proposed Project may exceed VMT standards and could result in a **potentially significant impact**. For these reasons, this topic will be further analyzed in the EIR being prepared for the proposed Project.

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)?

Potentially Significant Impact. The proposed Project would include the development of 11 buildings that would be occupied by industrial/commercial/business park uses and a surface parking lot that would serve employees and visitors to the buildings on site. Frontage improvements along Live Oak Avenue would be required by the City to provide access (via five driveways) to the Project site. Based on the design of the entrances to the Project site from Live Oak Avenue, geometric features/design could increase hazards to on-site employees and vehicular traffic along Live Oak Avenue. The areas surrounding the Project site are occupied by a landfill to the north, I-605 to the east, mining facilities and pits to the south, and industrial/commercial uses to the east. As such, development of the proposed Project site with 11 buildings that would be occupied by industrial, commercial, and/or business park uses would not be incompatible with the uses surrounding the Project site. Due to geometric design features of the entrances to the site from Live Oak Avenue **potential impacts** could occur. For these reasons, this topic will be further analyzed in the EIR being prepared for the proposed Project.

d. Would the project result in inadequate emergency access?

***Potentially Significant Impact*.** The proposed Project would be developed with five access points, via driveways, along Live Oak Avenue. The driveways would be designed to Los Angeles County Fire Code and City of Irwindale standards for emergency access (e.g., driveway width, line of sight views along Live Oak Avenue). The internal circulation system would be designed to accommodate emergency vehicles based on design widths of drive aisles and turn-around locations in compliance with Los Angeles County Fire Code standards. Prior to approval of the final site plans for the proposed Project, both the City of Irwindale staff and LACoFD would review the site plans to ensure all design features are up to emergency fire standards and that adequate emergency access is available to the Project site. Due to design of entrances to the site along Live Oak Avenue, the proposed Project may result in inadequate emergency access by generating blocked line of sight views, resulting in **potential impacts**. For these reasons, this topic will be further analyzed in the EIR being prepared for the proposed Project.

5.18 TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact (Will Be Evaluated in EIR)	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.

(i and ii) Potentially Significant Impact. Chapter 532, Statutes of 2014 (i.e., AB 52), requires Lead Agencies (in this case, the City of Irwindale) evaluate the Project's potential to impact "tribal cultural resources." Such resources include "[s]ites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that are eligible for inclusion in the California Register of Historical Resources or included in a local register of historical resources." Assembly Bill (AB) 52 also gives Lead Agencies the discretion to determine, supported by substantial evidence, whether a resource qualifies as a "tribal cultural resource." Per AB 52 (specifically Public Resources Code [PRC] 21080.3.1), Native American consultation is required upon request by a California Native American Tribe that has previously requested that the City of Irwindale provide it with notice of such projects. Pursuant to provisions of AB 52, the City will contact Native American

Tribes to commence with the AB 52 process. **Potentially significant impacts** could occur under this resource topic; as such, a discussion and analysis of the AB 52 process and any mitigation measures suggested will be included in the EIR.

5.19 UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact (Will Be Evaluated in EIR)	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 storm water 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 storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Potentially Significant Impact. The proposed Project would tie into existing utility infrastructure surrounding the Project site. A Water Supply Assessment (WSA) as required by California Senate Bill 610 (SB 610) will be prepared for the proposed Project as more than 500,000 square feet of commercial/industrial/business park uses would be developed on the site. Potential significant impacts associated with the need for relocation, construction, or expansion of utilities to adequately serve the Project site could occur. A discussion of each utility is provided below.

Water (*Potentially Significant Impact*). The Golden State Water Company's South Arcadia System (GSWC-SAS) would provide both potable and non-potable water to the proposed Project site. Water would be delivered to the Project site through an existing 12-inch water line in Live Oak Avenue and within an easement running parallel to Live Oak Avenue. Domestic water would be provided by extending laterals from the existing water mains into the site within drive aisles servicing individual industrial and commercial buildings. The existing water line within the site paralleling Live Oak would be relocated within setback areas, and associated easements relocated. Since the proposed Project includes the development of more than 500,000 square feet of commercial/industrial/business park uses, a WSA will be prepared for the Project. The WSA would determine the water demand for the proposed Project, identify any infrastructure improvements that would be needed to adequately serve the Project site, and the water supply reliability of the GSWC-SAS. Relocation or construction of new or expanded water infrastructure may result in potentially significant impacts to the environment. For these reasons, this resource topic will be further discussed/analyzed in the EIR.

Wastewater (*Less Than Significant Impact*). The information in this section is based on *Sanitary Sewer Capacity Study* prepared for the proposed Project by Kimley Horn on January 22, 2021 (**Appendix B**). The Los Angeles County Sanitation District 22 (LACSD) would treat wastewater generated by the proposed Project. The wastewater generated by the proposed Project would be conveyed and treated at the San Jose Creek Water Reclamation Plant (WRP) located at 1965 S. Workman Mill Road in Whittier. The WRP has an average daily flow intake of 64.1 million gallons per day (MGD) and has an existing capacity of 100 MGD (the WRP is currently operating at 64.1 percent of its design capacity).[46]

Currently, the site is served by the existing wastewater system via two 8-inch laterals connecting to a 15-inch mainline running west on Live Oak Avenue. The Live Oak Avenue sewer main stops short of Speedway Drive and does not continue east of Speedway Drive. The existing 15-inch mainline that starts approximately 210 feet west of Speedway Drive up Live Oak Avenue runs for 1,710 feet northwest until it connects to the existing sewer line along Arrow Highway at a manhole. The existing 15-inch mainline is composed of 6 segments with slopes of 0.3 and 0.4 percent. The two 8-inch lines connecting the site to the mainline are located 210 and 556 feet west of Speedway Drive up Live Oak Avenue heading south into the site, each connecting to an existing building on site. The two 8-inch laterals are sloped at 0.4 percent and 1 percent throughout at various lengths and have a current capacity of 0.48 MGD. The maximum capacity for the 15-inch main in Live Oak Avenue is 2.26 MGD.

The proposed Project would install two 8-inch sewer lines flowing north, then west perpendicular from Live Oak Avenue. Both of these proposed 8-inch lines would have a capacity of 2.262 MGD. The east 8-inch lines would connect to an existing manhole on the southern side of Live Oak Avenue. The west 8-inch line would connect to a proposed "T" with the 15-inch mainline in Live Oak Avenue. The western 8-inch line would continue south from the "T" approximately 1,000 feet and connect to proposed Buildings 4 and 5 on the Project site. The eastern 8-inch line would also continue east 100 feet from the existing manhole then south for 110 feet before connecting to the "T." From the "T," the southern direction pipe would continue south for 770 feet before connecting into proposed Buildings 2 and 3 on the Project site. The eastern 8-inch pipe would continue east for 500 feet and connect into proposed Buildings 1, 2, and 6 on the Project site. All the wastewater flows from the proposed Project would be conveyed by the two proposed 8-inch lines connecting to the existing 15-inch mainline in Live Oak Avenue. The wastewater generated would be conveyed from the existing 15-inch mainline in Live Oak Avenue to a 20-inch main and 21-inch main in Arrow Highway. From there, the 21-inch main would connect to an existing 21-inch trunk line in Myrtle Avenue. Building sewer laterals developed on the Project site will include 6-inch lines all of which will be privately maintained.

---

[46] County Sanitation Districts of Los Angeles County, *NOP Response for The Park @ Live Oak Specific Plan Project*, May 1, 2018, Website: https://www.irwindaleca.gov/DocumentCenter/View/4648/Technical-Appendix-J3---Sewer-Area-Study-FINAL?bidId= (accessed February 23, 2021). The Park @ Live Oak Specific Plan Project is adjacent to the northern boundary of the Project site, north of Live Oak Avenue.

The proposed Project is estimated to generate 0.69 MGD of wastewater, which would be conveyed into the two 8-inch on-site lines, into the 15-inch main in Live Oak Avenue, and eventually into the 20- and 21-inch lines in Arrow Highway. Capacity analysis of the lines that would serve the proposed Project site indicated that the 15-inch main in Live Oak Avenue would have approximately 42 percent remaining capacity with the addition of Project flows and flows from nearby entitled projects. The existing 20-inch sewer main would still have approximately 38 percent remaining capacity with the addition of Project flows and flows from nearby entitled projects. The 21-inch sewer main would still have approximately 62 percent remaining capacity with the addition of Project flows and flows from nearby entitled projects. With the addition of 0.69 MGD of flow from the proposed Project to the San Jose Creek WRP, the average intake flow of the WRP would increase to 64.79 MGD; as such, the WRP would have a remaining capacity of 35.21 percent. The WRP would therefore have adequate capacity to serve the wastewater disposal needs of the proposed Project.

Based on the discussion above, implementation of the proposed Project would not require or result in the relocation or construction of new or expanded wastewater treatment infrastructure, the construction or relocation of which would cause significant environmental effects. Impacts would be **less than significant,** and no mitigation measures are required. Analysis/discussion of wastewater infrastructure is not required in the EIR.

Storm Water (*Less Than Significant Impact*). The information in this section is based on the *Preliminary Standard Urban Stormwater Mitigation Plan (SUSMP) and Hydrology Study* prepared for the proposed Project by Kimley-Horn in February 2021 (**Appendix C**). Existing storm water surface flow on the Project site drains toward northwest and discharges into a public catch basin in Live Oak. A portion of the Project site discharges directly to the Live Oak gutter via a parkway drain. The speedway track drainage is pumped into a 48-inch storm drain stub at the northwest corner of the Project site. The Live Oak Avenue Storm Drain system can currently accommodate 1.2 cubic feet per second (cfs) per acre of storm water from the Project site (or 76 cfs for the 63.3 net acre Project site).

The proposed Project site would be improved with an on-site storm water conveyance system that would consist of catch basins, roof drains, and underground storm drainpipes. Storm water on the Project site would collect into the on-site storm drainpipes and be routed to an underground detention basin located in the northeast corner of the site. The underground detention basin would be sized to accommodate 25-year flowrates from the proposed Project, which would equate to 73.5 cfs. The underground detention basin would operate in a “flow-through” configuration with a 42-inch diameter outlet to restrict the peak flow into the Live Oak Avenue Storm Drain System.

Since the proposed Project would generate a peak flowrate of 73.5 cfs and the Live Oak Avenue Storm Drain System can accommodate 76 cfs (Q allowable) of storm water, the peak flow rates of the proposed Project would be adequately accommodated. As such, the proposed Project would not require or result in the relocation or construction of new or expanded storm water drainage, the construction or relocation of which could cause significant environmental effects. Impacts would be **less than significant,** and no mitigation measures are required. Analysis/discussion of storm water infrastructure is not required in the EIR. It should be noted that water quality associated with Project storm water generation is discussed in Section 5.10 of this IS and will be discussed in the EIR.

Electricity (*Potentially Significant Impact*). Southern California Edison (SCE) provides electricity to the Project site. Existing aboveground electrical lines are present on the north side of Live Oak Avenue and an existing transformer is present on the northwest corner of the site. Electrical service will be extended to the Project site to serve the buildings that would be developed as part of the proposed Project. All new on-site electrical lines will be required to be undergrounded. The Project applicant and construction contractor will be required to coordinate with SCE to underground the on-site electrical infrastructure, to relocate electrical infrastructure as needed, and connect to the existing off-site electrical infrastructure. As detailed in Section 5.6 of this IS, the Project's daily and annual electricity demand would be analyzed/discussed in the EIR. **Potentially significant impacts** could occur if insufficient electrical supplies are available to serve the Project. For these reasons, this topic will be further analyzed/discussed in the EIR.

Natural Gas (*Potentially Significant Impact*). The Southern California Gas Company (SCGC) is the service provider of natural gas to the proposed Project. Natural gas lines that exist in Live Oak Avenue will be extended into the site as needed based on specific needs of each building that would be developed on the site. The Project applicant and construction contractor will be required to coordinate with SCGC to connect to the existing off-site natural gas infrastructure. As detailed in Section 5.6 of this IS, the Project's daily and annual natural gas demand will be analyzed/discussed in the EIR. **Potentially significant impacts** could occur if insufficient natural gas supplies are available to serve the Project. For these reasons, this topic will be further analyzed/discussed in the EIR.

Telecommunications Facilities (*Less Than Significant Impact*). Telecommunications for the Project site are provided by Spectrum/Charter. The Project applicant and construction contractor will be required to coordinate with Spectrum/Charter to connect to the existing off-site telecommunications infrastructure. The proposed Project would not require or result in the relocation or construction of new or expanded telecommunications infrastructure, the construction or relocation of which could cause significant environmental effects. Impacts would be **less than significant,** and no mitigation measures are required. Analysis/discussion of telecommunications infrastructure is not required in the EIR.

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?

Potentially Significant Impact. GSWC-SAS is the service provider for both potable and non-potable water to the proposed Project site. Water would be delivered to the Project site through an existing 12-inch water line in Live Oak Avenue and within an easement running parallel to Live Oak Avenue. Domestic water would be provided by extending laterals from the existing water mains into the site within drive aisles servicing individual industrial and commercial buildings. The existing water line within the site paralleling Live Oak would be relocated within setback areas, and associated easements relocated. Since the proposed Project includes the development of more than 500,000 square feet of commercial/industrial/business park uses a WSA will be prepared for the Project. The WSA would determine the water demand for the proposed Project and the water supply reliability of the GSWC-SAS during normal, dry, and multiple dry year scenarios. **Potentially significant impacts** could occur if insufficient water supplies are available to serve the Project. For these reasons, this topic will be further analyzed/discussed in the EIR.

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?

Less Than Significant Impact. Please refer to Section 5.19, Threshold A (wastewater) above. The analysis indicates that both the off-site wastewater infrastructure system and the San Jose Creek WRP would have adequate capacity to convey and treat wastewater generated by the proposed Project at operation. Impacts would be **less than significant,** and no mitigation measures are required. Further analysis/discussion of this resource topic is not warranted in the EIR.

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?

Less Than Significant Impact. Athens Services provides solid waste and recycling pickup and disposal in the City of Irwindale and for businesses that would be developed as part of the proposed Project. Athens Services owns and operates two Material Recovery Facilities (MRFs): City of Industry MRF and Sun Valley MRF. Waste that is collected by Athens Services in the City of Irwindale is taken to one of these two MRFs where it is sorted and recycled. Organic materials such as food waste are delivered to Athens' compost facility, American Organics, in Victorville. Any materials that are not composted or recycled by Athens Services is transferred to the Mid-Valley Sanitary Landfill in the City of Rialto. The Mid-Valley Sanitary Landfill has a maximum permitted capacity of 101,300,000 cubic yards of solid waste, and as of June 30, 2019, has a remaining capacity of 61,219,377 cubic yards of solid waste.[47] The Mid-Valley Sanitary Landfill has a maximum daily intake of 7,500 tons of solid waste.[48] It should be noted that the Athens Irwindale Materials Recovery Facility and Transfer Site, located at 2200 Arrow Highway in Irwindale has commenced with construction as of March 2022.

Implementation of the proposed Project would require the demolition of the Irwindale Speedway as well as ancillary buildings and surface parking lots that currently occupy the site. The demolition company retained by the Project applicant would be required to recycle as much of the building materials, asphalt, and concrete from existing on-site uses as possible. The asphalt and concrete would be used on the Project site to fill in the oval racetrack. Once operational, based on a solid waste generation rate of approximately 2.5 pounds per 100 square feet of building per day and approximately 1,275,240 square feet of building proposed to be developed on site, the proposed Project would generate 31, 881 pounds of solid waste daily or 15.94 tons of solid waste daily (5,818.28 tons annually).[49] This represents a conservative 0.21 percent of the landfill's permitted daily maximum. This amount would likely be smaller due to the sorting and recycling that would occur at Athens owned/operated City of Industry MRF and Sun Valley MRF. It should also be noted that two additional landfills are in the service area of Irwindale:

---

47 CalRecycle, SWIS Facility/Site Activity Details, Mid-Valley Sanitary Landfill (36-AA-0055), website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1880?siteID=2662 (accessed February 24, 2021).

48 Ibid.

49 1,275,240 square feet of building ÷ 100 × 2.5 = 31,881 pounds ÷ 2,000 = 15.94 tons of solid waste daily (15.94 × 365 = 5,818.28 tons of solid waste annually).

- *Calabasas Sanitary Landfill.* This landfill is located at 5300 Lost Hills Road in Agoura Hills, approximately 46 miles from the Project site. As of December 2014, this landfill had a remaining capacity of 14,500,000 cubic yards and a maximum daily intake of 3,500 tons of solid waste.[50] This landfill is scheduled to cease operation in 2029.
- *Scholl Canyon Landfill.* This landfill is located at 3001 Scholl Canyon Road in the City of Glendale, approximately 16 miles from the Project site. As of 2011, this landfill had a remaining capacity of 9,900,000 cubic yards and a maximum daily intake of 3,400 tons of solid waste. This landfill is schedule to cease operation in 2030.[51]

As adequate daily surplus capacity exists at the Mid-Valley Sanitary Landfill (and other landfills noted above), development of the proposed Project would not significantly affect current operations or the expected lifetimes of the landfills serving the Project site. Impacts would be **less than significant,** and no mitigation measures are required. Additional analysis/discussion of this topic is not required in the EIR.

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

Less Than Significant Impact. Federal, State, and local governments have enacted a variety of laws and established programs to deal with the transport, use, storage, and disposal of hazardous materials to reduce the risks to public health and the environment. These laws and programs supplement existing regulations designed to control the contamination of air and water resources. The proposed project would not transport or produce hazardous waste. However, the California Highway Patrol is responsible for the inspection of motor carriers that haul hazardous wastes. Inspections are made on roadways, at freeway truck scales and truck yards. The shipment of hazardous materials by truck or rail is regulated by federal safety standards under the jurisdiction of the United States Department of Transportation. Federal safety standards are also included in the California Administrative Code, Environmental Health Division. The United States Environmental Protection Agency ensures that containers of hazardous materials are properly labeled with instructions for use. The California Department of Industrial Relations, Cal-OSHA Division regulates the use of hazardous materials in the workplace. Regulations governing the storage and use of hazardous materials are also contained in the Uniform Building Code and the Uniform Fire Code.

The City of Irwindale compels its waste hauler, Athens Services, to comply with Assembly Bill 341 (Chapter 476, Statutes of 2011) as amended by Senate Bill 1018, which became effective July 1, 2012, by providing the necessary education, outreach, and monitoring programs and by processing the solid waste from the City's commercial customers through the City of Industry MRF and Sun Valley MRF. Programs implemented by the City to satisfy the mandated reduction in solid waste include, but are not limited to, the following:

- Public outreach via print and electronic media (public education);

---

50 CalRecycle, SWIS Facility/Site Activity Details, Calabasas Landfill, website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/3579?siteID=1041 (accessed February 24, 2021).

51 CalRecycle, SWIS Facility/Site Activity Details, Scholl Canyon Landfill (19-AA-0012), website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/3531?siteID=1000 (accessed February 24, 2021).

- Municipal solid waste ordinances and product and landfill bans (policy incentives); and
- Operation of material recovery and composting facilities (facility recovery).

Solid waste and recyclables are collected and transported by Athens Services in the City of Irwindale. The proposed Project would be required to coordinate with Athens Services to develop collection of its solid waste on a common schedule as set forth in applicable local, regional, and State programs. Recyclable materials will be extracted by either the City of Industry MRF or the Sun Valley MRF. The commercial/industrial/business park tenets could also recycle paper products, glass, aluminum, and plastic on site.

Additionally, the proposed Project would be required to comply with applicable elements of AB 1327, Chapter 18 (California Solid Waste Reuse and Recycling Access Act of 1991), SB 1383, and other applicable local, State, and federal solid waste disposal standards, thereby ensuring that the solid waste stream to regional landfills are reduced in accordance with existing regulations. Impacts are considered **less than significant** and require no mitigation. Additional analysis/discussion of this topic is not required in the EIR.

5.20 WILDFIRE

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?	☐	☐	☐	☒

The California Department of Forestry and Fire Protection (CAL FIRE) has mapped areas of significant fire hazards in the State through its Fire and Resources Assessment Program (FRAP). These maps place areas of California into different Fire Hazard Severity Zones (FHSZs), based on a hazard scoring system using subjective criteria for fuels, fire history, terrain influences, housing density, and occurrence of severe fire weather where urban brushfire could result in catastrophic losses. As part of this mapping system, land where CAL FIRE is responsible for wildland protection and generally located in unincorporated areas is classified as a State Responsibility Area (SRA). Where local fire protection agencies (e.g., LACoFD) are responsible for wildfire protection, the land is classified as a Local Responsibility Area (LRA). In addition to establishing local or State responsibility for wildfire protection in a specific area, CAL FIRE designates areas as Very High Fire Hazard Severity Zones (VHFHSZ) or non-VHFHSZ. The Project site is not within an SRA or LRA Very High Fire Hazard Severity Zone; however, an area designated as an LRA VHFHSZ is located approximately 0.50-mile northeast of Project site.[52]

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

No Impact. The City of Irwindale has prepared the Emergency Operations Plan and Continuing of Operations Plan (EOP/COOP) that was adopted by the City Council on March 24, 2021. This document provides the strategic guidance for response and recovery to a full range of natural, technological, human-caused and terrorism-related emergencies and disasters. LACoFD does implement the "Ready, Set, Go" Program to educate residents on wildfire preparedness and evacuation guides. The proposed Project would be developed with two driveways that will be designed to City of Irwindale and LACoFD standards. These driveways would connect to Live Oak

[52] California Department of Forestry and Fire Protection, Fire and Resources Assessment Program, Map Website: https://frap.fire.ca.gov/mapping/maps/ (accessed December 16. 2020).

Avenue to provide access to the site for employees and visitors. The Project site is located adjacent to I-605, which can be easily accessed from the Project site off Live Oak Avenue in the event of an emergency or emergency evacuation order. I-605 leads out of the City and connects to other interstate systems to take traffic out of the region. The proposed Project will be required to ensure that accessibility to evacuation routes is maintained and not affected as part of operation of the Project. As such, the proposed Project would not substantially impair the City of Irwindale's Emergency Operations Plan and Continuing of Operations Plan. **No impact** would occur, and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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?*

Less Than Significant Impact. Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildland fire would likely double. Wind events magnify the risks of wildfire spread and have the potential to expose inhabitants of the City of Irwindale to elevated pollutant concentrations from a wildfire and the uncontrolled spread of wildfire from open space areas in the foothills of the San Gabriel Mountains (north of the Project site). The Project site is topographically flat with an elevation ranging from 370 to 390 feet above mean sea level. Prior to the issuance of building permits, LACoFD and City of Irwindale will require that the site plans and building plans to ensure development is occurring in compliance with the most current California Fire Code at the time of building permit approval. Because of this, the proposed Project would not exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be **less than significant,** and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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?*

No Impact. The proposed Project involves the development of eleven buildings of various sizes that will be occupied by industrial/commercial/business park uses. A surface parking lot would also be developed onsite to accommodate employees and visitors to the site. Electrical lines exist underground on the Project site and may need to be relocated during Project construction. The construction contractor will be required to coordinate with the electrical service provider (Southern California Edison [SCE]) to ensure proper relocation activities are implemented. Overall, 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 may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment. **No impact** would occur, and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

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?

***No Impact*.** The Project site is relatively level, and there are no hills/mountains near the site that would contribute to the site being inundated by a landslide. The Federal Emergency Management Administration Flood Map Service Center indicates the Project site is in an "Area of Minimal Flood Hazard Zone X" (Map Number 06037C1700F September 26, 2008).[53] As such, the likelihood of the Project site being inundated by flooding is low. Overall, implementation of the proposed Project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, because of runoff, post-fire slope instability, or drainage changes. **No impact** would occur, and no mitigation measures are required. Further analysis of this topic in the EIR is not warranted.

53 Federal Emergency Management Administration, FEMA Flood Map Service, Website: https://msc.fema.gov/portal/search?AddressQuery=500%20Speedway%20Drive%20Irwindale#searchresultsanchor (accessed December 17, 2020).

5.21 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact (Will Be Evaluated in EIR)	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?

Potentially Significant Impact. The Project site is currently occupied by Irwindale Speedway, surface parking lots, and ancillary buildings supporting the racetrack. The site does not support habitat for special-status plant or animal species. Trees and shrubs do exist on the proposed Project site; as such, to protect potential nesting birds on site, **Mitigation Measure BIO-1** would be implemented. The structures currently located on the site are not historic in nature and due to the developed nature of the site, cultural resources are not anticipated to be found during Project construction activities. Nevertheless, if unknown burial sites are discovered on the site during Project construction, **Mitigation Measure CUL-1** would be implemented to reduce such impacts. With mitigation, 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; or (5) reduce the number or restrict the range of a rare or endangered plant or animal.

Tribal Consultation by the City would occur and would be disclosed in the EIR. If appropriate, Tribal Cultural Resource mitigation measures would be provided in the EIR in the event such resources are discovered during Project construction activities. As **potentially significant impacts** to Tribal Cultural Resources could occur, this topic will be further discussed/analyzed in the EIR.

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.)*

***Potentially Significant Impact*.** CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable, or which can compound to increase other environmental impacts." Section 15130 of the *CEQA Guidelines* requires evaluation of potential environmental impacts when the project's incremental effect is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of "reasonably foreseeable probable future" projects, per *CEQA Guidelines* Section 15355. Cumulative impacts can result from a combination of the proposed Project together with other closely related projects that cause an adverse change in the environment. Cumulative impacts can result from individually minor but collectively significant projects taking place over time.

As discussed in this Initial Study, potentially significant impacts related to air quality, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, transportation, tribal cultural resources, and utilities may result from the proposed Project. These impacts, as well as any cumulatively considerable impacts that may result from the proposed Project related to these issues, will be evaluated in the EIR.

All the remaining impacts of the proposed Project would be individually limited and not cumulatively considerable, because these impacts are either temporary in nature (i.e., limited to the construction period) or are limited to the Project site (e.g., potential discovery of unknown cultural resources). 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 and cultural resources.

Regarding the topics of aesthetics, agricultural and forestry resources, land use and planning, mineral resources, population and housing, public services, recreation, and wildfires, the Project would result in 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 because of the proposed Project would be reduced to a less than significant level through the implementation of the mitigation measures recommended in this document (**Mitigation Measures BIO-1** and **CUL-1**).

When future development proposals are considered by the City of Irwindale, these proposals would undergo environmental review pursuant to CEQA and, when necessary, mitigation measures would be adopted as appropriate. In most cases, the environmental review and compliance with project conditions of approval, relevant policies and mitigation measures, and the General Plan, and compliance with applicable regulations would ensure that significant impacts would be avoided or otherwise mitigated to less than significant levels.

Implementation of these measures would ensure that the impacts of the Project and other projects within the vicinity 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 because of Project development. Therefore, impacts 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?

Potentially Significant Impact. The proposed Project's potential to result in environmental effects that could directly or indirectly affect human beings has been evaluated in this Initial Study. The proposed Project's potential to result in environmental effects related to air quality, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, transportation, tribal cultural resources, and utilities that could directly or indirectly affect human beings will be evaluated in the EIR.

This page intentionally left blank

6.0 REFERENCES

California Department of Conservation. California Earthquake Hazards Zone Application. Maps Website: https://maps.conservation.ca.gov/cgs/DataViewer/index.html. Accessed January 7, 2021.

California Department of Conservation, Earthquake Zones of Required Investigation. Maps Website: https://maps.conservation.ca.gov/cgs/EQZApp/. Accessed January 7, 2021.

California Department of Conservation. Ground Motion Interpolator. Website: https://www.conservation.ca.gov/cgs/Pages/PSHA/ground-motion-interpolator.aspx. Accessed January 7, 2021.

Department of Conservation. 2000. Guidelines for Classification and Designation of Mineral Lands. Website: https://www.conservation.ca.gov/smgb/Guidelines/Documents/ClassDesig.pdf. Accessed January 14, 2021.

California Department of Conservation. 1992. SP118 Recommended Criteria for Delineating Seismic Hazard Zones in California. Revised 2004. Website: https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Publications/SP_118.pdf. Accessed January 4, 2021.

California Department of Conservation. Mines Online. Maps Website: https://maps.conservation.ca.gov/mol. Accessed January 14, 2021.

California Department of Education. Data Quest. Website: https://dq.cde.ca.gov/dataquest/dqcensus/EnrGrdLevels.aspx?cds=19642876011514&agglevel=school&year=2019-20. Accessed January 19, 2021.

California Department of Forestry and Fire Protection, Fire and Resources Assessment Program, Map Website: https://frap.fire.ca.gov/mapping/maps/. Accessed December 16. 2020.

CalRecycle, SWIS Facility/Site Activity Details, Calabasas Landfill, Website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/3579?siteID=1041. Accessed February 24, 2021.

CalRecycle, SWIS Facility/Site Activity Details, Mesquite Regional Landfill (13-AA-0026), Website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/4197?siteID=609. Accessed February 24, 2021.

CalRecycle, SWIS Facility/Site Activity Details, Mid-Valley Sanitary Landfill (36-AA-0055), Website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1880?siteID=2662. Accessed February 24, 2021.

CalRecycle, SWIS Facility/Site Activity Details, Scholl Canyon Landfill (19-AA-0012), Website: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/3531?siteID=1000. Accessed February 24, 2021.

City of Irwindale, *2010 General Plan Draft Environmental Impact Report*, September 2006.

County Sanitation Districts of Los Angeles County, NOP Response for The Park @ Live Oak Specific Plan Project, May 1, 2018, Website: https://www.irwindaleca.gov/DocumentCenter/View/4648/Technical-Appendix-J3---Sewer-Area-Study-FINAL?bidId=. Accessed February 23, 2021.

Employment Development Department. November 2021. Current Month Unemployment Rate and Labor Force Summary. Monthly Labor Force Data for Cities and Census Designated Places (CDP). Revised November 2021. Website: https://www.labormarketinfo.edd.ca.gov/data/unemployment-and-labor-force.html. Accessed December 30, 2021.

EnviroStor Database. Sites and Facilities. Website: https://www.envirostor.dtsc.ca.gov/public/map/?myaddress=500+Speedway+dr.+Irwindale+ca+91706. Accessed January 14, 2021.

Environmental Protection Agency. What are Sensitive Receptors? Revised 2017. Website: https://www3.epa.gov/region1/eco/uep/sensitivereceptors.html#:~:text=Sensitive%20receptors%20include%2C%20but%20are,%2C%20pesticides%2C%20and%20other%20pollutants. Accessed December 23, 2020.

Federal Emergency Management Administration, FEMA Flood Map Service, Website: https://msc.fema.gov/portal/search?AddressQuery=500%20Speedway%20Drive%20Irwindale#searchresultsanchor. Accessed December 17, 2020.

Federal Emergency Management Administration, FIRM Mapping Website: https://msc.fema.gov/portal/home. Accessed December 21, 2020.

Gavric, J., Gonzalez, I., Kenline, G., Lane, J., Noushkam, N., April 2014, Updated Designation of Regionally Significant Aggregate Resources in the San Gabriel Valley Production-Consumption Region, State Mining and Geology Board; (12): 11-12.

Irwindale Police Department, Fraijo, John, Lieutenant. January 6, 2021. Personal Communication.

Kimley Horn, *Speedway Commerce Center Specific Plan* Draft June 2021.

Los Angeles County Airport Land Use Commission, Los Angeles County Airport Land Use Plan, pg. 17, El Monte Airport Influence Area, May 13, 2003.

Los Angeles County Fire Department, Martinez, Gustavo, Los Angeles County Fire Department Inspector for Irwindale. January 8, 2021. Personal Communication.

Los Angeles County Police Department, Matheny, John, Los Angeles County Public Information Officer. January 11, 2021. Personal Communication.

LSA Associates, Inc. 2015. *City of Irwindale 2010 General Plan Draft Environmental Impact Report.* Report Prepared for City of Irwindale Community Development Department. March 6. Irwindale, California.

Main San Gabriel Basin Watermaster, *Five-Year Water Quality and Supply Plan, 2020-21 to 2024-25,* November 2020.

South Coast Air Quality Management District. About South Coast AQMD. Revised 2021. Website: http://www.aqmd.gov/aq-spec/aboutscaqmd#whatis. Accessed January 6, 2021.

South Coast Air Quality Management District. 2016. Final 2016 Air Quality Management Plan. Revised 2017. Website: https://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp. Accessed January 6, 2021.

South Coast Air Quality Management District. 2016. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin Website: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf. Accessed February 18, 2021.

State of California Department of Finance. 2021. Cities, Counties, and the State Population Estimates with Annual Percentage. Revised January 1, 2021. Website: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/documents/E-1_2020_InternetVersion.xlsx. Accessed December 30, 2021.

United States Department of Agriculture. Natural Resources Conservation Service, Websoil Survey. Website: https://websoilsurvey.nrcs.usda.gov/app/. Accessed February 18, 2021.

United States Geological Survey. Faults. Website: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults?qt-science_support_page_related_con=4#qt-science_support_page_related_con. Accessed January 7, 2021.

United States Geological Survey. Land Subsidence. https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects. Accessed January 4, 2021.

United States Geologic Survey, National Water Information System, Map View, Website: https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=340535117573501&agency_cd=USGS&format=html. Accessed December 21, 2020.

United States Geological Survey. What is a Landslide and What Causes One? Website: https://www.usgs.gov/faqs/what-a-landslide-and-what-causes-one?qt-news_science_products=0#qt-news_science_products. Accessed January 4, 2021.

United States Geological Survey. What is Liquefaction? Website: https://www.usgs.gov/faqs/what-liquefaction?qt-news_science_products=0#qt-news_science_products. Accessed January 4, 2021.

This page intentionally left blank

APPENDIX A

BIOLOGICAL RESOURCE DATABASE SEARCHES

This page intentionally left blank

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Yorba Linda (3311787) OR La Habra (3311788) OR Whittier (3311881) OR San Dimas (3411717) OR Baldwin Park (3411718) OR El Monte (3411811) OR Glendora (3411727) OR Azusa (3411728) OR Mt. Wilson (3411821))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
Aimophila ruficeps canescens southern California rufous-crowned sparrow	ABPBX91091	None	None	G5T3	S3	WL
Ammodramus savannarum grasshopper sparrow	ABPBXA0020	None	None	G5	S3	SSC
Anaxyrus californicus arroyo toad	AAABB01230	Endangered	None	G2G3	S2S3	SSC
Anniella stebbinsi Southern California legless lizard	ARACC01060	None	None	G3	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Arctostaphylos glandulosa ssp. gabrielensis San Gabriel manzanita	PDERI042P0	None	None	G5T3	S3	1B.2
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Asio otus long-eared owl	ABNSB13010	None	None	G5	S3?	SSC
Aspidoscelis tigris stejnegeri coastal whiptail	ARACJ02143	None	None	G5T5	S3	SSC
Astragalus brauntonii Braunton's milk-vetch	PDFAB0F1G0	Endangered	None	G2	S2	1B.1
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Atractelmis wawona Wawona riffle beetle	IICOL58010	None	None	G3	S1S2	
Atriplex parishii Parish's brittlescale	PDCHE041D0	None	None	G1G2	S1	1B.1
Bombus crotchii Crotch bumble bee	IIHYM24480	None	Candidate Endangered	G3G4	S1S2	
Brodiaea filifolia thread-leaved brodiaea	PMLIL0C050	Threatened	Endangered	G2	S2	1B.1
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
California Walnut Woodland California Walnut Woodland	CTT71210CA	None	None	G2	S2.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Calochortus clavatus var. gracilis slender mariposa-lily	PMLIL0D096	None	None	G4T2T3	S2S3	1B.2
Calochortus plummerae Plummer's mariposa-lily	PMLIL0D150	None	None	G4	S4	4.2
Calochortus weedii var. intermedius intermediate mariposa-lily	PMLIL0D1J1	None	None	G3G4T2	S2	1B.2
Calystegia felix lucky morning-glory	PDCON040P0	None	None	G1Q	S1	1B.1
Campylorhynchus brunneicapillus sandiegensis coastal cactus wren	ABPBG02095	None	None	G5T3Q	S3	SSC
Canyon Live Oak Ravine Forest Canyon Live Oak Ravine Forest	CTT61350CA	None	None	G3	S3.3	
Castilleja gleasoni Mt. Gleason paintbrush	PDSCR0D140	None	Rare	G2	S2	1B.2
Catostomus santaanae Santa Ana sucker	AFCJC02190	Threatened	None	G1	S1	
Centromadia parryi ssp. australis southern tarplant	PDAST4R0P4	None	None	G3T2	S2	1B.1
Chorizanthe parryi var. parryi Parry's spineflower	PDPGN040J2	None	None	G3T2	S2	1B.1
Cladium californicum California saw-grass	PMCYP04010	None	None	G4	S2	2B.2
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G3G4	S2	SSC
Crotalus ruber red-diamond rattlesnake	ARADE02090	None	None	G4	S3	SSC
Cuscuta obtusiflora var. glandulosa Peruvian dodder	PDCUS01111	None	None	G5T4?	SH	2B.2
Cypseloides niger black swift	ABNUA01010	None	None	G4	S2	SSC
Dodecahema leptoceras slender-horned spineflower	PDPGN0V010	Endangered	Endangered	G1	S1	1B.1
Dudleya cymosa ssp. crebrifolia San Gabriel River dudleya	PDCRA040A8	None	None	G5T2	S2	1B.2
Dudleya densiflora San Gabriel Mountains dudleya	PDCRA040B0	None	None	G2	S2	1B.1
Dudleya multicaulis many-stemmed dudleya	PDCRA040H0	None	None	G2	S2	1B.2
Empidonax traillii extimus southwestern willow flycatcher	ABPAE33043	Endangered	Endangered	G5T2	S1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Ensatina eschscholtzii klauberi large-blotched salamander	AAAAD04013	None	None	G5T2?	S3	WL
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
Eriastrum densifolium ssp. sanctorum Santa Ana River woollystar	PDPLM03035	Endangered	Endangered	G4T1	S1	1B.1
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC
Falco columbarius merlin	ABNKD06030	None	None	G5	S3S4	WL
Fimbristylis thermalis hot springs fimbristylis	PMCYP0B0N0	None	None	G4	S1S2	2B.2
Galium grande San Gabriel bedstraw	PDRUB0N0V0	None	None	G1	S1	1B.2
Gila orcuttii arroyo chub	AFCJB13120	None	None	G2	S2	SSC
Glyptostoma gabrielense San Gabriel chestnut	IMGASB1010	None	None	G2	S2	
Gonidea angulata western ridged mussel	IMBIV19010	None	None	G3	S1S2	
Horkelia cuneata var. puberula mesa horkelia	PDROS0W045	None	None	G4T1	S1	1B.1
Icteria virens yellow-breasted chat	ABPBX24010	None	None	G5	S3	SSC
Imperata brevifolia California satintail	PMPOA3D020	None	None	G4	S3	2B.1
Lasiurus blossevillii western red bat	AMACC05060	None	None	G5	S3	SSC
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Lasiurus xanthinus western yellow bat	AMACC05070	None	None	G5	S3	SSC
Lasthenia glabrata ssp. coulteri Coulter's goldfields	PDAST5L0A1	None	None	G4T2	S2	1B.1
Laterallus jamaicensis coturniculus California black rail	ABNME03041	None	Threatened	G3G4T1	S1	FP
Lepidium virginicum var. robinsonii Robinson's pepper-grass	PDBRA1M114	None	None	G5T3	S3	4.3
Lepus californicus bennettii San Diego black-tailed jackrabbit	AMAEB03051	None	None	G5T3T4	S3S4	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Linanthus concinnus San Gabriel linanthus	PDPLM090D0	None	None	G2	S2	1B.2
Muhlenbergia californica California muhly	PMPOA480A0	None	None	G4	S4	4.3
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Navarretia prostrata prostrate vernal pool navarretia	PDPLM0C0Q0	None	None	G2	S2	1B.2
Nyctinomops femorosaccus pocketed free-tailed bat	AMACD04010	None	None	G4	S3	SSC
Nyctinomops macrotis big free-tailed bat	AMACD04020	None	None	G5	S3	SSC
Open Engelmann Oak Woodland Open Engelmann Oak Woodland	CTT71181CA	None	None	G2	S2.2	
Orcuttia californica California Orcutt grass	PMPOA4G010	Endangered	Endangered	G1	S1	1B.1
Orobanche valida ssp. valida Rock Creek broomrape	PDORO040G2	None	None	G4T2	S2	1B.2
Ovis canadensis nelsoni desert bighorn sheep	AMALE04013	None	None	G4T4	S3	FP
Palaeoxenus dohrni Dohrn's elegant eucnemid beetle	IICOL5K010	None	None	G3?	S3?	
Phacelia stellaris Brand's star phacelia	PDHYD0C510	None	None	G1	S1	1B.1
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Polioptila californica californica coastal California gnatcatcher	ABPBJ08081	Threatened	None	G4G5T2Q	S2	SSC
Pseudognaphalium leucocephalum white rabbit-tobacco	PDAST440C0	None	None	G4	S2	2B.2
Rana boylii foothill yellow-legged frog	AAABH01050	None	Endangered	G3	S3	SSC
Rana muscosa southern mountain yellow-legged frog	AAABH01330	Endangered	Endangered	G1	S1	WL
Rhinichthys osculus ssp. 3 Santa Ana speckled dace	AFCJB3705K	None	None	G5T1	S1	SSC
Ribes divaricatum var. parishii Parish's gooseberry	PDGRO020F3	None	None	G5TX	SX	1A
Riparia riparia bank swallow	ABPAU08010	None	Threatened	G5	S2	
Riversidian Alluvial Fan Sage Scrub Riversidian Alluvial Fan Sage Scrub	CTT32720CA	None	None	G1	S1.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Salvadora hexalepis virgultea coast patch-nosed snake	ARADB30033	None	None	G5T4	S2S3	SSC
Scutellaria bolanderi ssp. austromontana southern mountains skullcap	PDLAM1U0A1	None	None	G4T3	S3	1B.2
Senecio aphanactis chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
Setophaga petechia yellow warbler	ABPBX03010	None	None	G5	S3S4	SSC
Southern California Arroyo Chub/Santa Ana Sucker Stream Southern California Arroyo Chub/Santa Ana Sucker Stream	CARE2330CA	None	None	GNR	SNR	
Southern Coast Live Oak Riparian Forest Southern Coast Live Oak Riparian Forest	CTT61310CA	None	None	G4	S4	
Southern Sycamore Alder Riparian Woodland Southern Sycamore Alder Riparian Woodland	CTT62400CA	None	None	G4	S4	
Southern Willow Scrub Southern Willow Scrub	CTT63320CA	None	None	G3	S2.1	
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Symphyotrichum defoliatum San Bernardino aster	PDASTE80C0	None	None	G2	S2	1B.2
Symphyotrichum greatae Greata's aster	PDASTE80U0	None	None	G2	S2	1B.3
Taricha torosa Coast Range newt	AAAAF02032	None	None	G4	S4	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thamnophis hammondii two-striped gartersnake	ARADB36160	None	None	G4	S3S4	SSC
Thelypteris puberula var. sonorensis Sonoran maiden fern	PPTHE05192	None	None	G5T3	S2	2B.2
Vireo bellii pusillus least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	
Walnut Forest Walnut Forest	CTT81600CA	None	None	G1	S1.1	

Record Count: 99

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

58 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3411821, 3411728, 3411727, 3411811, 3411718, 3411717, 3311881 3311788 and 3311787;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	State Listing Status	Federal Listing Status
Acanthoscyphus parishii var. parishii	Parish's oxytheca	Polygonaceae	annual herb	Jun-Sep	4.2	S3S4		
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	4.2	S3S4		
Arctostaphylos glandulosa ssp. gabrielensis	San Gabriel manzanita	Ericaceae	perennial evergreen shrub	Mar	1B.2	S3		
Asplenium vespertinum	western spleenwort	Aspleniaceae	perennial rhizomatous herb	Feb-Jun	4.2	S4		
Astragalus brauntonii	Braunton's milk-vetch	Fabaceae	perennial herb	Jan-Aug	1B.1	S2		FE
Atriplex serenana var. davidsonii	Davidson's saltscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S1		
Berberis nevinii	Nevin's barberry	Berberidaceae	perennial evergreen shrub	(Feb)Mar-Jun	1B.1	S1	CE	FE
Brodiaea filifolia	thread-leaved brodiaea	Themidaceae	perennial bulbiferous herb	Mar-Jun	1B.1	S2	CE	FT
Calochortus catalinae	Catalina mariposa lily	Liliaceae	perennial bulbiferous herb	(Feb)Mar-Jun	4.2	S3S4		
Calochortus clavatus var. gracilis	slender mariposa lily	Liliaceae	perennial bulbiferous herb	Mar-Jun(Nov)	1B.2	S2S3		
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	perennial bulbiferous herb	May-Jul	4.2	S4		
Calochortus weedii var. intermedius	intermediate mariposa lily	Liliaceae	perennial bulbiferous herb	May-Jul	1B.2	S2		

Calystegia felix	lucky morning-glory	Convolvulaceae	annual rhizomatous herb	Mar-Sep	1B.1	S1		
Castilleja gleasoni	Mt. Gleason paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	May-Jun(Sep)	1B.2	S2	CR	
Centromadia parryi ssp. australis	southern tarplant	Asteraceae	annual herb	May-Nov	1B.1	S2		
Chorizanthe parryi var. fernandina	San Fernando Valley spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	CE	FC
Chorizanthe parryi var. parryi	Parry's spineflower	Polygonaceae	annual herb	Apr-Jun	1B.1	S2		
Cladium californicum	California sawgrass	Cyperaceae	perennial rhizomatous herb	Jun-Sep	2B.2	S2		
Convolvulus simulans	small-flowered morning-glory	Convolvulaceae	annual herb	Mar-Jul	4.2	S4		
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Convolvulaceae	annual vine (parasitic)	Jul-Oct	2B.2	SH		
Diplacus johnstonii	Johnston's monkeyflower	Phrymaceae	annual herb	(Apr)May-Aug	4.3	S4		
Dodecahema leptoceras	slender-horned spineflower	Polygonaceae	annual herb	Apr-Jun	1B.1	S1	CE	FE
Dudleya cymosa ssp. crebrifolia	San Gabriel River dudleya	Crassulaceae	perennial herb	Apr-Jul	1B.2	S2		
Dudleya densiflora	San Gabriel Mountains dudleya	Crassulaceae	perennial herb	Mar-Jun	1B.1	S2		
Dudleya multicaulis	many-stemmed dudleya	Crassulaceae	perennial herb	Apr-Jul	1B.2	S2		
Fimbristylis thermalis	hot springs fimbristylis	Cyperaceae	perennial rhizomatous herb	Jul-Sep	2B.2	S1S2		
Galium angustifolium ssp. gabrielense	San Antonio Canyon bedstraw	Rubiaceae	perennial herb	Apr-Aug	4.3	S3		
Galium grande	San Gabriel bedstraw	Rubiaceae	perennial deciduous shrub	Jan-Jul	1B.2	S1		
Galium johnstonii	Johnston's bedstraw	Rubiaceae	perennial herb	Jun-Jul	4.3	S4		
Heuchera caespitosa	urn-flowered alumroot	Saxifragaceae	perennial rhizomatous herb	May-Aug	4.3	S3		
Horkelia cuneata var. puberula	mesa horkelia	Rosaceae	perennial herb	Feb-Jul(Sep)	1B.1	S1		
Imperata brevifolia	California satintail	Poaceae	perennial rhizomatous herb	Sep-May	2B.1	S3		
Juglans californica	Southern California black walnut	Juglandaceae	perennial deciduous tree	Mar-Aug	4.2	S4		
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2		
Lepechinia fragrans	fragrant pitcher sage	Lamiaceae	perennial shrub	Mar-Oct	4.2	S3		

Lepidium virginicum var. robinsonii	Robinson's pepper-grass	Brassicaceae	annual herb	Jan-Jul	4.3	S3
Lilium humboldtii ssp. ocellatum	ocellated Humboldt lily	Liliaceae	perennial bulbiferous herb	Mar-Jul(Aug)	4.2	S4?
Lilium parryi	lemon lily	Liliaceae	perennial bulbiferous herb	Jul-Aug	1B.2	S3
Linanthus concinnus	San Gabriel linanthus	Polemoniaceae	annual herb	Apr-Jul	1B.2	S2
Linanthus orcuttii	Orcutt's linanthus	Polemoniaceae	annual herb	May-Jun	1B.3	S2
Muhlenbergia californica	California muhly	Poaceae	perennial rhizomatous herb	Jun-Sep	4.3	S4
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2
Orobanche valida ssp. valida	Rock Creek broomrape	Orobanchaceae	perennial herb (parasitic)	May-Sep	1B.2	S2
Phacelia hubbyi	Hubby's phacelia	Hydrophyllaceae	annual herb	Apr-Jul	4.2	S4
Phacelia ramosissima var. austrolitoralis	south coast branching phacelia	Hydrophyllaceae	perennial herb	Mar-Aug	3.2	S3
Phacelia stellaris	Brand's star phacelia	Hydrophyllaceae	annual herb	Mar-Jun	1B.1	S1
Pseudognaphalium leucocephalum	white rabbit-tobacco	Asteraceae	perennial herb	(Jul)Aug-Nov(Dec)	2B.2	S2
Quercus durata var. gabrielensis	San Gabriel oak	Fagaceae	perennial evergreen shrub	Apr-May	4.2	S3
Quercus engelmannii	Engelmann oak	Fagaceae	perennial deciduous tree	Mar-Jun	4.2	S3
Ribes divaricatum var. parishii	Parish's gooseberry	Grossulariaceae	perennial deciduous shrub	Feb-Apr	1A	SX
Romneya coulteri	Coulter's matilija poppy	Papaveraceae	perennial rhizomatous herb	Mar-Jul(Aug)	4.2	S4
Rupertia rigida	Parish's rupertia	Fabaceae	perennial herb	Jun-Aug	4.3	S4
Scutellaria bolanderi ssp. austromontana	southern mountains skullcap	Lamiaceae	perennial rhizomatous herb	Jun-Aug	1B.2	S3
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2
Senecio astephanus	San Gabriel ragwort	Asteraceae	perennial herb	May-Jul	4.3	S3
Symphyotrichum defoliatum	San Bernardino aster	Asteraceae	perennial rhizomatous herb	Jul-Nov(Dec)	1B.2	S2
Symphyotrichum greatae	Greata's aster	Asteraceae	perennial rhizomatous herb	Jun-Oct	1B.3	S2
Thelypteris puberula var. sonorensis	Sonoran maiden fern	Thelypteridaceae	perennial rhizomatous herb	Jan-Sep	2B.2	S2

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 17 December 2020].

Search the Inventory

Simple Search

Advanced Search

Glossary

Information

About the Inventory

About the Rare Plant Program

CNPS Home Page

About CNPS

Join CNPS

Contributors

The Calflora Database

The California Lichen Society

California Natural Diversity Database

The Jepson Flora Project

The Consortium of California Herbaria

CalPhotos

Questions and Comments

rareplants@cnps.org

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Carlsbad Fish And Wildlife Office
2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385
Phone: (760) 431-9440 Fax: (760) 431-5901
http://www.fws.gov/carlsbad/

In Reply Refer To: December 17, 2020
Consultation Code: 08ECAR00-2021-SLI-0392
Event Code: 08ECAR00-2021-E-00876
Project Name: COI2001

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Carlsbad Fish And Wildlife Office
2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385
(760) 431-9440

Project Summary

Consultation Code: 08ECAR00-2021-SLI-0392

Event Code: 08ECAR00-2021-E-00876

Project Name: COI2001

Project Type: DEVELOPMENT

Project Description: COI2001

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/34.10932265550005N117.98628276940894W

Counties: Los Angeles, CA

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Coastal California Gnatcatcher *Polioptila californica californica* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8178	Threatened
Least Bell's Vireo *Vireo bellii pusillus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5945	Endangered
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

APPENDIX B

SANITARY SEWER CAPACITY STUDY

This page intentionally left blank

Kimley»Horn

SANITARY SEWER CAPACITY STUDY

for

Irwindale Speedway Commerce Center

Irwindale, California

June 1, 2021

Prepared for:
Irwindale Outlet Partners.
3270 Inland Empire Blvd, Suite 400
Ontario, CA 91764

KHA Project # 194279001

TABLE OF CONTENTS

Narrative Sections

Appendix Sections

I. Project Description

The Irwindale Speedway Commerce Center (hereinafter referenced as the proposed Project) is located on the former Irwindale Speedway property, in Irwindale, California. The Site has been used for a variety of purposes over the years, beginning as a swap meet site which was converted to a quarry as part of the former Pacific Rock Quarry that operated through the late 1960s. The quarry was backfilled as part of the former Nu-Way landfill from mid-1972 through 1993, with approximately 200 feet of fill comprised of soils and demolition debris. In 1999 the Irwindale Speedway was opened, comprised of paved 1/2- and 1/3-mile oval tracks and a 1/8-mile drag strip, parking, bleacher seating, and support uses. The facility has been used for race training, fire and police training, filming, special events, swap meets, and vehicle and trailer shows. Racing of various types has occurred through 2020. In 2015 the property was entitled for a regional shopping center, which was never constructed. The Site is bounded by Live Oak Avenue to the North, The 605 Freeway to the East, A mining operation to the south, and an Industrial distribution facility to the West. The gross site area is 63.31 acres. No street dedications are currently proposed.

II. Existing Conditions

The 63.31 acre site is bound by an adjacent property from the north to west, Hanson Aggregates from the west to south, Live Oak Avenue from north to east, and Interstate 605 from the east to south, forming a rectangularly shaped project site. The existing project site is a speedway with surrounding parking, landscape, and a few buildings throughout. Most of the site is impervious with moderate slopes that generally run from southeast to northwest except for the speedway itself which slopes from all edges down towards the middle of the speedway.

Currently, the site is served by the existing sanitary sewer system via two 8-inch laterals connecting to the 15-inch mainline running west on Live Oak Ave. The Live Oak Avenue sewer main stops short of Speedway Drive and does not continue east of Speedway Drive Based upon record drawings and previous available sewer studies. The existing 15-inch sewer line that starts approximately 210-feet west of Speedway Drive up Live Oak Avenue runs for 1710-feet Northwest until it connects to the existing sewer line along Arrow

Highway at a manhole. (See Aerial of Project Area Exhibit 2 in Appendix 1). This existing 15-inch sewer mainline is made up of 6 segments with slopes of 0.3% and 0.4%. The two 8-inch pipes connecting the site to the mainline are located at 210, and 556-feet west of Speedway Drive up Live Oak Avenue heading south into the site each connecting to a building on site. The two 8-inch laterals are sloped at 0.4% and 1% throughout at various lengths.

Maximum sewer capacity for the 15-inch line along Live Oak Avenue was obtained from FlowMaster as 3.50cfs. This capacity assumed 75% capacity and subcritical flow.

III. Proposed Conditions

The Proposed Site will install three 8-inch sewer lines flowing southerly perpendicular from Live Oak Avenue. The east 8-inch sewer lines will connect to the existing east sewer lateral on the southern side of Live Oak Avenue. The middle 8" sewer line will connect to the west existing sewer lateral on the southern side of Live Oak Avenue. The west 8-inch sewer line will connect to a proposed Tee with the 15-inch mainline. The western proposed 8-inch sewer line will continue south from the Tee approximately 1,000-feet and connect to proposed buildings four and five. The middle proposed 8-inch sewer line will continue south approximately 800-feet and connect to buildings 2 and 3. The eastern proposed 8-inch sewer line will also continue east 100' from the existing manhole then south 110-feet before connecting to a tee. From the tee the southern direction pipe continues south for 770-feet before connecting into proposed buildings two and three. The eastern direction pipe continues east for 500-feet and connecting to proposed buildings one, two, and six. All the flows from the Proposed Site will be contained and treated by the two proposed 8-inch sewer lines and connect to the existing 15-inch sewer line. The proposed 8-inch sewer lines each have the capacity to carry the 0.69 MGD flows produced from the Proposed Site. (See tables below) This Sewer Study is to ensure that the existing 15-inch sewer line has enough additional capacity to carry the new flows coming from the proposed project north of Live Oak Avenue.

IV. Analysis

The available capacity of the existing 8-inch, 15-inch, 20-inch, and 21-inch sewer lines were calculated via FlowMaster and from available information from Record Drawings (See Appendix 3). Using the Sanitary Sewer Typical Loading by Zone table in Appendix 2 and acreages of the individual parcels, the Proposed Site will produce 0.69 MGD of flow as shown in Table 2 (See Exhibit 2 in Appendix 1 for parcel breakdown). The Future project on the North

Side of Live Oak Ave is also included in this analysis to ensure that the existing 15” sewer main has enough capacity to carry flow once that project is completed. The future 76 acre Site to the North will produce 0.86 MGD. After finding that the existing 15” sewer line had enough capacity to handle flows from the Proposed site and future North lot, the existing sewer main on E live Oak Ave. needed to be analyzed to see if could accommodate the proposed flows. Approximately 85 acres of Industrial land is tributary to the existing 20-inch and 21-inch sewer main that runs South West along E. Live Oak Ave. The same Typical Loading by Zone table was used to determine the existing flows carried within this segment of the sewer main (See Table 3). The proposed flows from the Project Site and future north lot, were added to these existing flows to ensure that the existing 20-inch and 21-inch sewer main had the capacity to take on the flow produced by the project.

V. Conclusion

The available minimum capacity of the existing 8-inch, 15-inch, 20-inch, and 21-inch sewer mains are available in the Table 1 below. The proposed flow of existing sewer system was determined based on the surrounding areas that are tributary to each of the different sized sewer lines. The Proposed Site and future north lot produce a total of 1.55 MGD of flow. Since the existing 15” sewer main has a minimum capacity of 2.10 MGD, it will still have approximately 26% of its total capacity remaining after the addition of flows from the Proposed Sites (See table 1). The existing 20-inch sewer main requires the highest capacity since it takes the most offsite tributary area along with the additional 1.55 MGD of proposed flow. This segment has a minimum capacity of 4.49 MGD. Even with the addition of 1.55 MGD of new flow, the 20-inch segment of existing sewer main still has approximately 45% of its total capacity remaining. In conclusion. All existing sewer infrastructure has the capacity to carry new flow produced by the Proposed Site and future North lot.

TABLE 1: EXISTING SEWER PIPE CAPACITIES AND PROPOSED FLOWS

Stations/Location	Pipe Diameter	Min. Slope	Min Pipe Capacity (MGD)	Flow Depth (% of Diameter)	Tributary Areas	Proposed Flow (MGD)	Percent Capacity Remaining
1+19.50 to 18+97.07	20"	0.30%	4.49	75%	P1-8,Fut,O1-10	2.49	44.56
25+97.07 to 42+34.52	21"	0.40%	5.91	75%	P1-8,Fut,O1-4	2.08	64.84
44+94.45 to 59+26.38	15"	0.30%	2.10	75%	P1-8,Fut.	1.55	26.19
Ex. West lateral	8"	0.40%	0.25	50%	P3&4	0.22	12.74
Ex. East lateral	8"	0.40%	0.25	50%	P5,7,8	0.24	3.64

*See Appedix 3 Record Drawings for Existing Sewer line stationing
*See Exhibit 2 in Appendix 1 for Tributary Areas

TABLE 2: Sewer Flow for Proposed Properties Tributary to Sewer Line on Live Oak Ave.

Sewer Generation Rates for LA County
Industrial Rate= 0.021 cfs/AC
Commercial Rate= 0.015 cfs/AC

		ACRE	GENERATION RATE	PEAK FLOW (CFS)	PEAK FLOW (MGD)	
Parcel	1	9.60	0.021	0.20	0.11	
Parcel	2	10.00	0.021	0.21	0.11	
Parcel	3	10.20	0.021	0.21	0.12	
Parcel	4	9.10	0.021	0.19	0.10	
Parcel	5	17.10	0.021	0.36	0.19	
Parcel	6	1.30	0.015	0.02	0.01	
Parcel	7	2.30	0.015	0.03	0.02	
Parcel	8	3.60	0.015	0.05	0.03	
Future Lot		76.00	0.021	1.60	0.86	
				TOTAL=	1.55	MGD

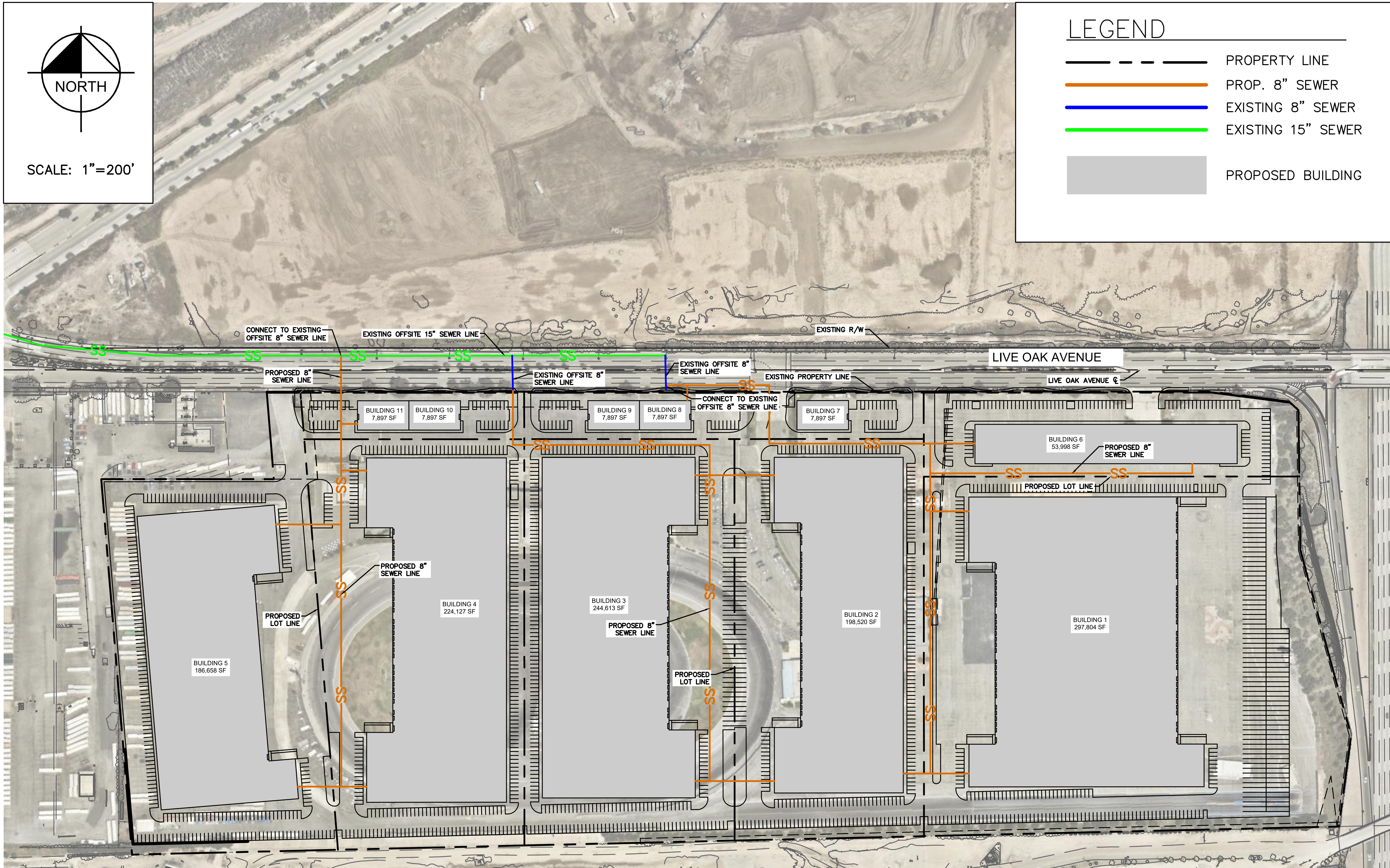
TABLE 3: Sewer Flow for Offsite Properties Tributary to Sewer Line on E Live Oak Ave.

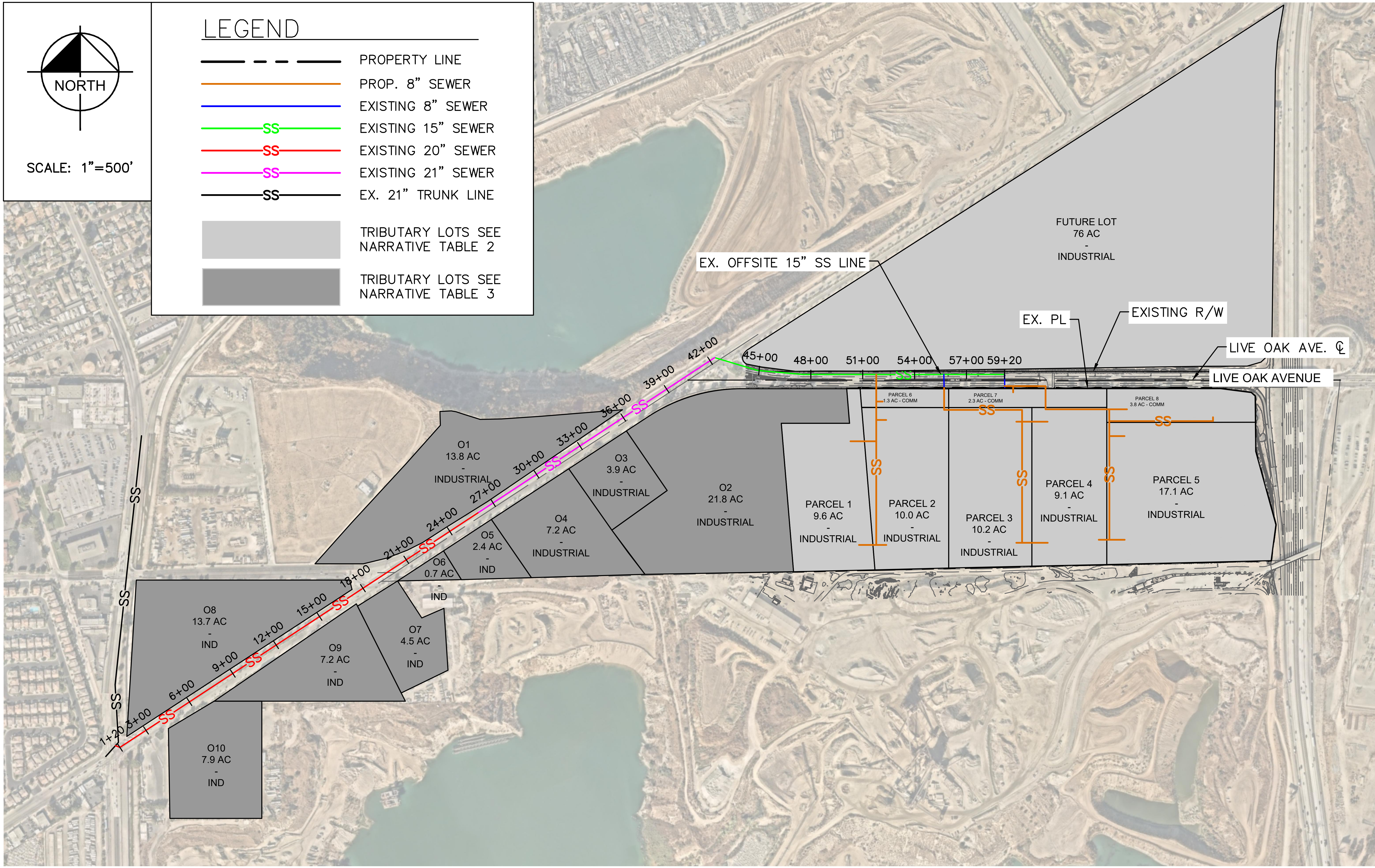
Sewer Generation Rates for LA County
Industrial Rate= 0.021 cfs/AC
Commercial Rate= 0.015 cfs/AC

		ACRE	GENERATION RATE	PEAK FLOW (CFS)	PEAK FLOW (MGD)	
Site	O1	13.80	0.021	0.29	0.16	
Site	O2	21.80	0.021	0.46	0.25	
Site	O3	3.90	0.021	0.08	0.04	
Site	O4	7.20	0.021	0.15	0.08	
Site	O5	2.40	0.021	0.05	0.03	
Site	O6	0.70	0.021	0.01	0.01	
Site	O7	4.50	0.021	0.09	0.05	
Site	O8	13.70	0.021	0.29	0.15	
Site	O9	7.20	0.021	0.15	0.08	
Site	O10	7.90	0.021	0.17	0.09	
				TOTAL=	0.94	MGD

Appendix 1

Aerial of Project Area and Existing Sewer Lines


NORTH
SCALE: 1"=200'
LEGEND
PROPERTY LINE
PROP. 8" SEWER
EXISTING 8" SEWER
EXISTING 15" SEWER
PROPOSED BUILDING
LIVE OAK AVENUE
LIVE OAK AVENUE ℄
EXISTING R/W
EXISTING PROPERTY LINE
CONNECT TO EXISTING OFFSITE 8" SEWER LINE
EXISTING OFFSITE 15" SEWER LINE
EXISTING OFFSITE 8" SEWER LINE
PROPOSED 8" SEWER LINE
PROPOSED LOT LINE
BUILDING 1 297,804 SF
BUILDING 2 198,520 SF
BUILDING 3 244,613 SF
BUILDING 4 224,127 SF
BUILDING 5 186,658 SF
BUILDING 6 53,998 SF
BUILDING 7 7,897 SF
BUILDING 8 7,897 SF
BUILDING 9 7,897 SF
BUILDING 10 7,897 SF
BUILDING 11 7,897 SF
SS



NORTH
SCALE: 1"=500'
LEGEND
PROPERTY LINE
PROP. 8" SEWER
EXISTING 8" SEWER
EXISTING 15" SEWER
EXISTING 20" SEWER
EXISTING 21" SEWER
EX. 21" TRUNK LINE
TRIBUTARY LOTS SEE NARRATIVE TABLE 2
TRIBUTARY LOTS SEE NARRATIVE TABLE 3
FUTURE LOT
76 AC
-
INDUSTRIAL
EX. OFFSITE 15" SS LINE
EX. PL
EXISTING R/W
LIVE OAK AVE. ℄
LIVE OAK AVENUE
1+20
3+00
6+00
9+00
12+00
15+00
18+00
21+00
24+00
27+00
30+00
33+00
36+00
39+00
42+00
45+00
48+00
51+00
54+00
57+00 59+20
O1
13.8 AC
-
INDUSTRIAL
O2
21.8 AC
-
INDUSTRIAL
O3
3.9 AC
-
INDUSTRIAL
O4
7.2 AC
-
INDUSTRIAL
O5
2.4 AC
-
IND
O6
0.7 AC
-
IND
O7
4.5 AC
-
IND
O8
13.7 AC
-
IND
O9
7.2 AC
-
IND
O10
7.9 AC
-
IND
PARCEL 1
9.6 AC
-
INDUSTRIAL
PARCEL 2
10.0 AC
-
INDUSTRIAL
PARCEL 3
10.2 AC
-
INDUSTRIAL
PARCEL 4
9.1 AC
-
INDUSTRIAL
PARCEL 5
17.1 AC
-
INDUSTRIAL
PARCEL 6
1.3 AC - COMM
PARCEL 7
2.3 AC - COMM
PARCEL 8
3.8 AC - COMM
SS

Appendix 2

Sanitary Sewer Typical Loading Table

AREA STUDY
SEWAGE FLOW COEFFICIENTS

34 43
29 37
312

BASIS OF FLOW COMPUTATION				AVER. FLOW COEFF.	PEAK FLOW COEFF.*
AREA & LAND USE				cfs/acre	cfs/ac
Residential					
ensity Type	Average Area Per Dwelling	Dwellings per Acre	Persons per Acre		
ral 1	5 acres	.2	0.7	.00008	.0002
ral 2	1¼ acres	.8	2.7	.00025 .0003	.0006 .00075
gh Desert	1 acre	1.0	3.3	.0004	.0010
ery Low RL	20,000 sq.ft.	1.7	6	.0006	.0015
(R-1) RS	7,000 sq.ft.	4.9	16	.002	.005
edium (R-2) RM	3,200 sq.ft.	10.8	25	.0048	.012
lium High (R-3)	1,800 sq.ft.	18.8	38	.006	.015
h (R-4)	1,400 sq.ft.	30.0	52	.0092	.023
Commercial				.006	.015
Industrial				.0084	.021
RESIDENTIAL UNIT**				cfs/unit	cfs/unit
1 & 2 bedroom units				.00032	.0008
3 & 4 bedroom units	avg.			.00044	.0011
Mobile Home Parks				.0002	.0005
POPULATION***				cfs/capita	cfs/capita
Resident Population				.00012	.0003

ased on Peak Factor of 2.5, for use up to a peak flow rate of 5.0 cfs. For ger flows, use a lower peak factor per the Average Flow-Peak Flow graph.

hese coefficients are based on the following average flows:
& 2 bedroom - 200 g.p.d./unit; 3 & 4 bedroom - 285 g.p.d./unit; and
bile Home - 130 g.p.d./unit

is coefficient based on 80 g.p.d./capita.

USE OF FLOW COEFFICIENTS

For general studies based on zoning, use the area coefficients listed. f known densities vary from this table, adjust the coefficient accordin hen estimating flows from developments where numb...

Appendix 3

FlowMaster Calculations and Results

Worksheet for 20" Segment

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	15.0 in
Diameter	20.0 in

Results

Discharge	4.49 MGD
Flow Area	1.8 ft²
Wetted Perimeter	3.5 ft
Hydraulic Radius	6.0 in
Top Width	1.44 ft
Critical Depth	11.9 in
Percent Full	75.0 %
Critical Slope	0.006 ft/ft
Velocity	3.96 ft/s
Velocity Head	0.24 ft
Specific Energy	1.49 ft
Froude Number	0.633
Maximum Discharge	5.30 MGD
Discharge Full	4.92 MGD
Slope Full	0.002 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	15.0 in
Critical Depth	11.9 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for 21" Segment

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.004	ft/ft
Normal Depth	15.8	in
Diameter	21.0	in

Results		
Discharge	5.91	MGD
Flow Area	1.9	ft²
Wetted Perimeter	3.7	ft
Hydraulic Radius	6.3	in
Top Width	1.52	ft
Critical Depth	13.5	in
Percent Full	75.0	%
Critical Slope	0.006	ft/ft
Velocity	4.72	ft/s
Velocity Head	0.35	ft
Specific Energy	1.66	ft
Froude Number	0.737	
Maximum Discharge	6.97	MGD
Discharge Full	6.48	MGD
Slope Full	0.003	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	0.0	%
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	15.8	in
Critical Depth	13.5	in
Channel Slope	0.004	ft/ft
Critical Slope	0.006	ft/ft

Worksheet for 15" Segment

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.003 ft/ft
Normal Depth	11.3 in
Diameter	15.0 in

Results

Discharge	2.10 MGD
Flow Area	1.0 ft²
Wetted Perimeter	2.6 ft
Hydraulic Radius	4.5 in
Top Width	1.08 ft
Critical Depth	8.7 in
Percent Full	75.3 %
Critical Slope	0.006 ft/ft
Velocity	3.27 ft/s
Velocity Head	0.17 ft
Specific Energy	1.11 ft
Froude Number	0.601
Maximum Discharge	2.46 MGD
Discharge Full	2.29 MGD
Slope Full	0.003 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	50.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.3 in
Critical Depth	8.7 in
Channel Slope	0.003 ft/ft
Critical Slope	0.006 ft/ft

Worksheet for 8" Segment

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.004 ft/ft
Normal Depth	4.0 in
Diameter	8.0 in

Results

Discharge	0.25 MGD
Flow Area	0.2 ft²
Wetted Perimeter	1.0 ft
Hydraulic Radius	2.0 in
Top Width	0.67 ft
Critical Depth	3.5 in
Percent Full	50.0 %
Critical Slope	0.007 ft/ft
Velocity	2.19 ft/s
Velocity Head	0.07 ft
Specific Energy	0.41 ft
Froude Number	0.754
Maximum Discharge	0.53 MGD
Discharge Full	0.49 MGD
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.0 in
Critical Depth	3.5 in
Channel Slope	0.004 ft/ft
Critical Slope	0.007 ft/ft

<u>Appendix 4</u>

Record Drawings and County Facilities Exhibit

BENCHMARK ELEV. 353.87

C.G. 2637 BASELINE (1975)
F.C. BRASS CAP 67-76, 1959 IN SO. END OF WING WALL OF BRIDGE 964 @ THE S/E COR. PECK RD. & LIVE OAK AVE. 48' SO. & 82' EAST OF APPROX. ℄ INT.

PROFILE SCALE
HORIZ. 1"=40'
VERT. 1"=4'

NOTE:
INSTALL CLASS 52 PIPE BETWEEN STA. 4+00 & STA. 14+00

SEE SANITATION DISTRICT FOR SPECIAL CONNECTION CHARGES. (310) 699-7411 Extension 2713

SCALE: 1"=40'

Underground Service Alert of Southern California

Call: TOLL FREE 1-800 422-4133

TWO WORKING DAYS BEFORE YOU DIG

THE CONSOLIDATED SEWER MAINTENANCE DISTRICT DOES NOT ASSUME LIABILITY FOR THE HIGHER THAN NORMAL MAINTENANCE OF THIS SANITARY SEWER SYSTEM BECAUSE IT DOES NOT MEET THE MINIMUM DESIGN REQUIREMENTS. HOWEVER, NORMAL ROUTINE MAINTENANCE INSPECTIONS WILL BE PERFORMED BY THE DISTRICT.

Carlos Alvarado 11/13/92
CITY ENGINEER DATE

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY: Carlos Alvarado C19857 R.C.E. DATE: 11/13/92

NOTE:
THE EXISTENCE & LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED PROFESSIONAL ENGINEER KENNETH I. MULLEN No. 9692 Exp. 12/31/92 CIVIL STATE OF CALIFORNIA

REV.	DATE	BY	DESCRIPTION

SUBMITTED: Kenneth I. Mullen 9692 R.C.E. 9/30/92 DATE
FOR THE CONSULTANT
APPROVED: DATE

DESIGNED: R.S.
DRAWN: R.S.
CHECKED: K.I.M.

SCALE: AS SHOWN

KENNETH I. MULLEN, CONSULTING ENGINEERS, INC.
KIM
ARCADIA
(818) 445-2212

CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
FROM STA. 0+91.50 TO STA. 11+97.07

SHEET 2 OF 8 SHEETS

NOV 13 1992

Std. 6.02 2/82

THE CONSOLIDATED SEWER MAINTENANCE DISTRICT DOES NOT ASSUME LIABILITY FOR THE HIGHER THAN NORMAL MAINTENANCE OF THIS SANITARY SEWER SYSTEM BECAUSE IT DOES NOT MEET THE MINIMUM DESIGN REQUIREMENTS. HOWEVER, NORMAL ROUTINE MAINTENANCE INSPECTIONS WILL BE PERFORMED BY THE DISTRICT.

Carlos Alvarado 11/13/92
CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER KENNETH I. MULLEN No. 9692 Exp. 12/31/92 CIVIL STATE OF CALIFORNIA

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY: Carlos Alvarado C19857 R.C.E. DATE: 11/13/92

SUBMITTED: Kenneth I. Mullen 9692 R.C.E. 9/30/92 DATE
FOR THE CONSULTANT
APPROVED: DATE

REV.	DATE	BY	DESCRIPTION

DESIGNED: R.S.
DRAWN: R.S.
CHECKED: K.I.M.

SCALE: AS SHOWN

KENNETH I. MULLEN, CONSULTING ENGINEERS, INC.
ARCADIA
(818) 445-2212

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

NOTE: THE EXISTENCE & LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
FROM STA. 11+97.07 TO STA. 22+47.07

SHEET 3 OF 8 SHEETS

NOV 13 1992

Std.6.02 2/82

SEE SANITATION DISTRICT FOR SPECIAL CONNECTION CHARGES. (310) 699-7411 Extension 2713

Underground Service Alert of Southern California
CALL BEFORE YOU DIG
Call: TOLL FREE 1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

NOTE:
THE EXISTENCE & LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

THE CONSOLIDATED SEWER MAINTENANCE DISTRICT DOES NOT ASSUME LIABILITY FOR THE HIGHER THAN NORMAL MAINTENANCE OF THIS SANITARY SEWER SYSTEM BECAUSE IT DOES NOT MEET THE MINIMUM DESIGN REQUIREMENTS. HOWEVER, NORMAL ROUTINE MAINTENANCE INSPECTIONS WILL BE PERFORMED BY THE DISTRICT.

Carlos Alvarado 11/13/92
CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER KENNETH I. MULLEN No. 9692 Exp. 12/31/92 CIVIL STATE OF CALIFORNIA

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY: Carlos Alvarado C19857 R.C.E. DATE: 11/13/92

REV.	DATE	BY	DESCRIPTION

SUBMITTED: Kenneth I. Mullen 9692 R.C.E. 9/30/92 DATE
FOR THE CONSULTANT
APPROVED: DATE

DESIGNED: R.S.
DRAWN: R.S.
CHECKED: K.I.M.

SCALE: AS SHOWN

KENNETH I. MULLEN, CONSULTING ENGINEERS, INC.
KIM
ARCADIA
(818) 445-2212

CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
FROM STA. 22+47.07 TO STA. 32+97.07

SHEET 4 OF 8 SHEETS

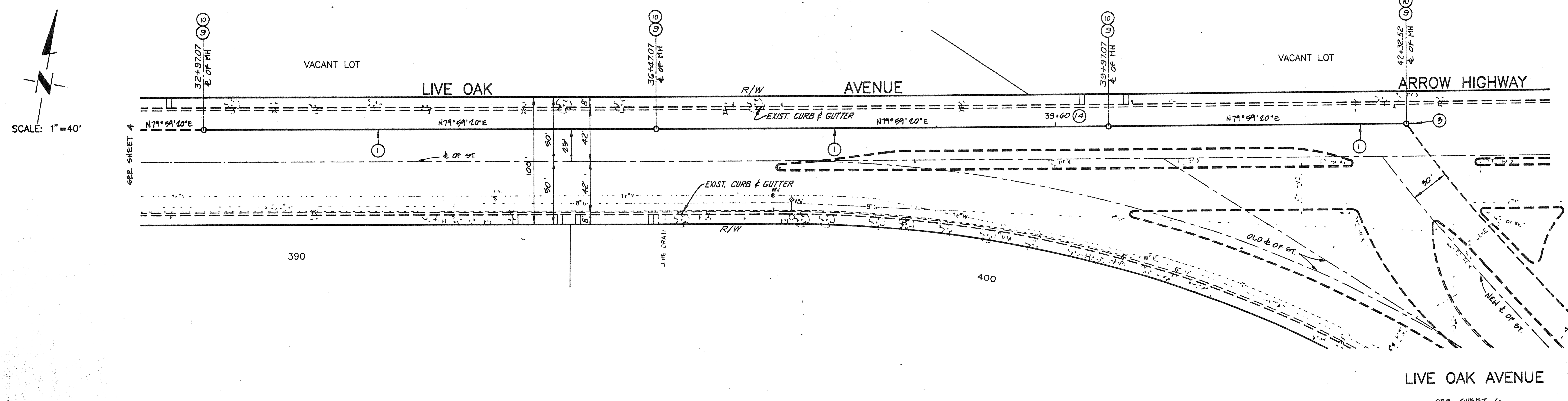
NOV 13 1992

BENCHMARK ELEV. 353.87

C.G. 2637 BASELINE (1975)
F.C. BRASS CAP 67-76, 1959 IN SO. END OF WING-WALL OF BRIDGE 964 @ THE S/E COR. PECK RD. & LIVE OAK AVE. 48' SO. & 82' EAST OF APPROX. ℄ INT.

PROFILE SCALE
HORIZ. 1" = 40'
VERT. 1" = 4'

SEE SANITATION DISTRICT FOR SPECIAL CONNECTION CHARGES. (310) 699-7411 Extension 2713



Underground Service Alert of Southern California

Call: TOLL FREE 1-800 422-4133

TWO WORKING DAYS BEFORE YOU DIG

NOTE:
THE EXISTENCE & LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY: Carlos Alvarado C19857 R.C.E. DATE: 11/13/92

THE CONSOLIDATED SEWER MAINTENANCE DISTRICT DOES NOT ASSUME LIABILITY FOR THE HIGHER THAN NORMAL MAINTENANCE OF THIS SANITARY SEWER SYSTEM BECAUSE IT DOES NOT MEET THE MINIMUM DESIGN REQUIREMENTS. HOWEVER, NORMAL ROUTINE MAINTENANCE INSPECTIONS WILL BE PERFORMED BY THE DISTRICT.

Carlos Alvarado 11/13/92
CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
KENNETH I. MULLEN
No. 9692
Exp. 12/31/92
CIVIL
STATE OF CALIFORNIA

REV.	DATE	BY	DESCRIPTION

SUBMITTED: Kenneth I. Mullen 9692 R.C.E. 9/24/92 DATE
FOR THE CONSULTANT
APPROVED: DATE

DESIGNED: R.S.
DRAWN: R.S.
CHECKED: K.I.M.

SCALE: AS SHOWN

KENNETH I. MULLEN, CONSULTING ENGINEERS, INC.
KIM
ARCADIA
(818) 445-2212

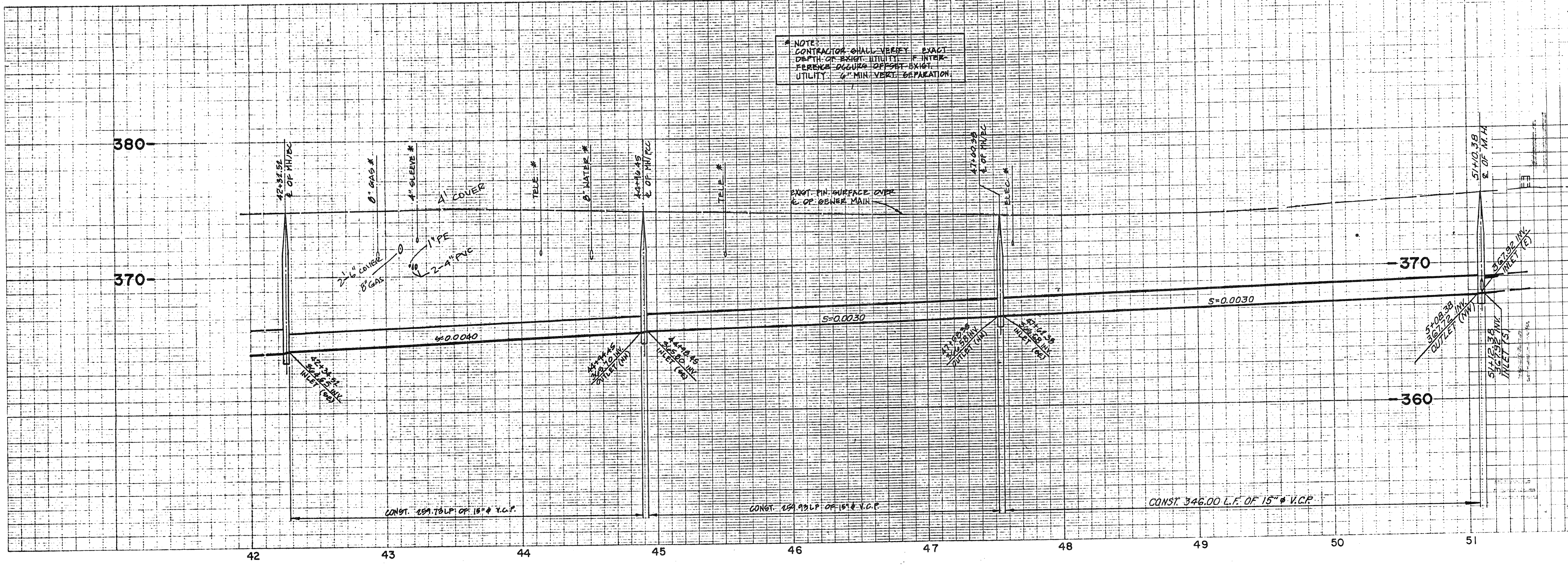
CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
FROM STA. 32+97.07 TO STA. 42+32.52

SHEET 5 OF 8 SHEETS

Std. 6.02 2/82

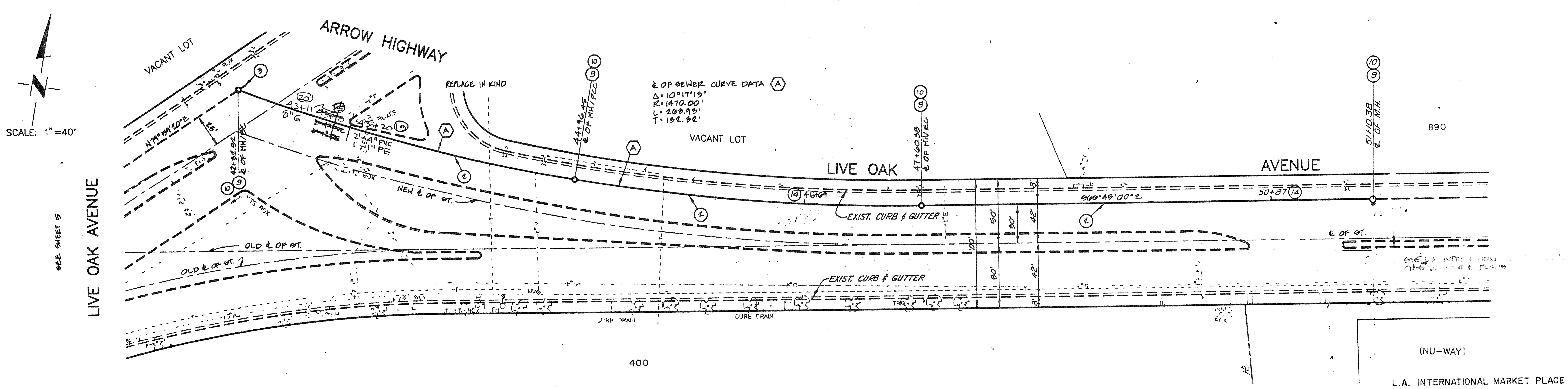
BENCHMARK ELEV. 353.87

C.G. 2637 BASELINE (1975)
F.C. BRASS CAP 67-76, 1959 IN SO. END OF WING WALL OF BRIDGE 964 @ THE S/E COR. PECK RD. & LIVE OAK AVE. 48' SO. & 82' EAST OF APPROX. ℄ INT.



PROFILE SCALE
HORIZ. 1"=40'
VERT. 1"=4'

SEE SANITATION DISTRICT FOR SPECIAL CONNECTION CHARGES. (310) 699-7411 Extension 2713



Underground Service Alert of Southern California
Call: TOLL FREE 1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

NOTE:
THE EXISTENCE & LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

THE CONSOLIDATED SEWER MAINTENANCE DISTRICT DOES NOT ASSUME LIABILITY FOR THE HIGHER THAN NORMAL MAINTENANCE OF THIS SANITARY SEWER SYSTEM BECAUSE IT DOES NOT MEET THE MINIMUM DESIGN REQUIREMENTS. HOWEVER, NORMAL ROUTINE MAINTENANCE INSPECTIONS WILL BE PERFORMED BY THE DISTRICT.

Carlos Alvarado 11/13/92
CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER KENNETH I. MULLEN No. 9692 Exp. 12/31/92 CIVIL STATE OF CALIFORNIA

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY: Carlos Alvarado C19857 R.C.E. DATE: 11/13/92

SUBMITTED: Kenneth I. Mullen 9692 R.C.E. 9/30/92 DATE
FOR THE CONSULTANT
APPROVED: DATE

REV.	DATE	BY	DESCRIPTION

DESIGNED: R.S.
DRAWN: R.S.
CHECKED: K.I.M.

SCALE: AS SHOWN

KENNETH I. MULLEN, CONSULTING ENGINEERS, INC.
KIM
ARCADIA
(818) 445-2212

CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
FROM STA. 42+32.52 TO STA. 51+59.50.

SHEET 6 OF 8 SHEETS

Std.6.02 2/82

NOTE
CONTRACTOR SHALL VERIFY EXACT DEPTH OF EXIST. UTILITIES IF INTERFERENCE OCCURS OFFSET EXIST. UTILITIES. 6" MIN. SEPERATION.

BENCHMARK ELEV. 353.87
C.G. 2637 BASELINE (1975)
F.C. BRASS CAP 67-76, 1959 IN SO. END OF WING WALL OF BRIDGE 964 @ THE S/E COR. PECK RD. & LIVE OAK AVE. 48' SO. & 82' EAST OF APPROX. ℄ INT.

PROFILE SCALE
HORIZ. 1"=40'
VERT. 1"=4'

SEE SANITATION DISTRICT FOR SPECIAL CONNECTION CHARGES. (310) 699-7411 Extension 2713

CONSTRUCTION NOTES

1. CONSTRUCT 15" DIA. EXTRA STRENGTH V.C.P. TYPE "G" JOINTS PER S.S.P.W.C. SECTION 207-8 & 208-2.
2. CONSTRUCT 4 L.F. OF 12" DIA. V.C.P. STUB & PLUG END.
3. CONSTRUCT STD. MANHOLE PER L.A.C.D.P.W. STD. 2001-0.
4. CONSTRUCT MANHOLE FRAME & COVER PER APWA STD. PLAN 210-1.
5. CONSTRUCT 8" DIA. EXTRA STRENGTH VCP W/ TYPE "G" JOINTS PER S.S. P.W.C. SECTIONS 207-8 & 208-2.

NOTE:
THE EXISTENCE & LOCATION OF UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS DRAWING. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN & ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED PROFESSIONAL ENGINEER
BARBARA L. HALL
No. 42206
Exp. 03/31/96
CIVIL
STATE OF CALIFORNIA

APPROVED: CITY OF IRWINDALE
COUNTY OF LOS ANGELES, CALIFORNIA
CARLOS ALVARADO - CITY ENGINEER
BY Carlos Alvarado C19857 R.C.E. 4/6/93 DATE

SUBMITTED:
Barbara L. Hall 42206 R.C.E. 3/10/93 DATE

REV.	DATE	BY	DESCRIPTION

DESIGNED: B.L.H.
DRAWN: I.C.
CHECKED: B.L.H.

SCALE:
1"=40' HORIZ.
1"=4' VERT.

CIVILTEC engineering inc.
855 WEST FOOTHILL BLVD.
MONROVIA, CA. 91016
(818) 357-0588

CITY OF IRWINDALE
LIVE OAK AVE. SANITARY SEWER IMPROVEMENTS
PARCEL MAPS 16615 AND 21968
FROM STA. 51+10.38 TO STA. 59+28.38

SHEET 2 OF 2 SHEETS

RIVERSIDE BLUEPRINT - RIVERSIDE, CALIF.

APPENDIX C

PRELIMINARY STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP) AND HYDROLOGY STUDY

This page intentionally left blank

PRELIMINARY
STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP)
AND HYDROLOGY STUDY

for

Irwindale Speedway Commerce Center
500 Speedway Drive
Irwindale, CA

February 2021

<u>Prepared for</u>:
Irwindale Outlet Partners.
3270 Inland Empire Blvd, Suite 400
Ontario, CA 91764

KHA Project # 194279001

TABLE OF CONTENTS

1. Background

The Irwindale Speedway Commerce Center (hereinafter referenced as the proposed Project) is located on the former Irwindale Speedway property, in Irwindale, California. The site has been used for a variety of purposes over the years, beginning as a swap meet site which was converted to a quarry as part of the former Pacific Rock Quarry that operated through the late 1960s. The quarry was backfilled as part of the former Nu-Way landfill from mid-1972 through 1993, with approximately 200 feet of fill comprised of soils and demolition debris. In 1999 the Irwindale Speedway was opened, comprised of paved 1/2- and 1/3-mile oval tracks and a 1/8-mile drag strip, parking, bleacher seating, and support uses. The facility has been used for race training, fire and police training, filming, special events, swap meets, and vehicle and trailer shows. Racing of various types has occurred through 2020. In 2015 the property was entitled for a regional shopping center, which was never constructed. The site is bounded by Live Oak Avenue to the North, The 605 Freeway to the East, A mining operation to the south, and an Industrial distribution facility to the West. The gross site area is 63.31 acres. No street dedications are currently proposed.

2. Existing (Predevelopment) Conditions

In the existing condition, the majority of the site drains toward to the north west via surface flow and discharges into a Live Oak public catch basin. A portion of the property discharges directly to the Live Oak gutter via a parkway drain. The speedway track drainage is pumped into a 48” storm drain stub at the North west corner of the site.

The City of Irwindale owns and maintains several drains in the vicinity of the Project. The City’s Live Oak Avenue Storm Drain system (see Appendix F) is sized to accommodate the drainage from the Site up to a pre-determined limit based on system hydraulics. The County has reported that up to 1.2 cubic feet per second (cfs) per acre can be discharged from the Site into the Live Oak Avenue Storm Drain.

3. Proposed (Post-development) Conditions

Overall Drainage Layout

The proposed drainage will be routed to the existing 48” Live Oak Avenue Street storm drain stub at the north west corner of the site. Storm water will be collected and conveyed via an underground drainage system to an underground detention basin.

Detention Basin Layout and Design

A system of catch basins, roof drains, and underground storm drain pipes will be routed to an underground detention basin located in the North East corner of the site. The underground basin is sized to attenuate the design storm to the allowable connection rate provided by the county. The base will operate in a “flow-through” configuration with a 42” diameter outlet to restrict the peak flow.

For information on the basin, see Table A below:

Table A: Basin Information

Site Area (Ac)	Allowable Connection Rate (CFS/Ac)	Allowable Flowrate	Allowable Flowrate per Asbuilt	Undetained 25 Year Peak flowrate	Proposed Detention Volume	Detained Peak 25 Year Flowrate
63.3	1.2	76 CFS	72 CFS	116 CFS	2.89 ACFT	73.5 CFS

See Appendix C for the Proposed Hydrology Map.

4. Water Quality Design Summary

The water quality design for the Project complies with the 2014 Los Angeles County Low Impact Development (LID) Manual, which implements the requirements of the Los Angeles Regional Water Quality Control Board Order No. R4-2012-0175, NPDES No. CAS00400, effective December 28, 2012, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County (the “Los Angeles County MS4 Permit”), in those areas of Los Angeles County served by storm drainage facilities operated by the Los Angeles County Department of Public Works. The LID goals of increasing groundwater recharge, enhancing water quality, and preventing degradation to downstream natural drainage courses, as outlined in LID Manual, were used in considering treatment method alternatives.

The LID manual outlines LID BMPs and establishes a hierarchy of treatment methods as flows:

1. BMPs that promote infiltration
2. BMPs that storage and beneficially use stormwater runoff
3. BMPs that utilize the runoff for water conservation uses (Biofiltration)

The highest level on the hierarchy is required to be used unless it is technically infeasible to do so. Infiltration BMPs are considered feasible if the underlying soil infiltration rates are 0.3 inches per hour. The Manual also outlines a maximum drawdown time of 96 hours to minimize vector control issues.

The County requires treatment of the 85th percentile rainfall depth or 0.75 inches, whichever is greater. The 85th percentile rainfall at the Site is 1.1 inches, per the latest information from the County (see Appendix B). The site soils have been tested by the geotechnical engineer to determine the suitability for infiltration. Due to being on a former landfill, infiltration is not recommended. Subsurface soils are susceptible to hydrocollapse settlement. Therefore, subsurface infiltration BMPs are not proposed. The Site is not in an area of the County where hydromodification analysis is required.

Proprietary biofiltration will be utilized to meet the LID stormwater treatment requirements set forth in the Los Angeles Department of Public Works Low Impact Development Standards Manual (2014). Site stormwater will be treated at each curb inlet via a WetlandMod biofiltration system

Table B below depicts the required treatment volume and the proposed Wetland Mod System provided in the design.

Table B: Required and Provided Treatment Volumes

DMA	Area (AC)	Impervious (%)	Storm Depth (inch)	Required Treatment Volume (CF)	Provided Treatment Volume (CF)	Proposed BMP
A1	5.00	90	1.1	24,400	TBD	WM 11-23
A2	8.88	90	1.1	43,300	TBD	WM 11-37
A3	1.62	90	1.1	7,900	TBD	WM 6-17
B1	1.36	90	1.1	6,700	TBD	WM 6-15
B2	1.17	90	1.1	5,700	TBD	WM 6-14
B3	6.97	90	1.1	34,000	TBD	WM 11-31
B4	0.36	90	1.1	1,800	TBD	WM 6-8
B5	1.42	90	1.1	7,000	TBD	WM 6-16
B6	1.70	90	1.1	8,300	TBD	WM 6-18
B7	0.70	90	1.1	3,500	TBD	WM 6-11
B8	0.51	90	1.1	2,500	TBD	WM 6-9
B9	1.06	90	1.1	5,200	TBD	WM 6-13
B10	8.51	90	1.1	41,500	TBD	WM 11-36
C1	8.94	90	1.1	43,600	TBD	WM 11-38
C2	1.75	90	1.1	8,600	TBD	WM 11-12
D1	3.63	90	1.1	17,560	TBD	WM 11-18
D2	5.37	90	1.1	26,340	TBD	WM 11-23
E1	0.65	90	1.1	3,200	TBD	WM 11-8
E2	0.69	90	1.1	3,400	TBDS	WM 11-8

See Appendix C for water quality calculations.

5. Hydrologic Design Criteria

Typically, County of Los Angeles drainage policy requires site drainage design to accommodate a 25-year storm event (the Urban Flood level of protection) or the 50-year storm event (the Capital Flood level of protection.) DPW provides the following guidance on the required storm event:

> "The Capital Flood level of protection applies to all facilities constructed to drain natural depressions or sumps. These facilities include channels, closed conduits, retention basins, detention basins, pump stations, and highway underpasses. A depression or sump is an area from which there is no surface flow outlet and must meet one or more of the following conditions during a Capital Flood:
>
> 1. Ponded depth of 3 feet or greater.
>
> 2. Ponded water surface elevations within one foot below the base of adjacent dwellings resulting from construction of facilities with less than the Capital Flood capacity. This condition does not apply if ponded water can escape as surface flow before reaching the base of adjacent dwellings during the Capital Flood.
>
> All drainage facilities in developed areas not covered under the Capital Flood protection conditions must meet the Urban Flood level of protection. The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed. A 25-year frequency design storm has a probability of 1/25 of being equaled or exceeded in any year."

Based on the DPW policies, the 25-year storm is the appropriate design storm event for the Project. The County's HydroCalc software was utilized to determine the peak flow rate and time of concentration for the overall project site. PondPack, a detention basin routing software package, was utilized to compute the peak flow rates exiting the detention basin. Since the site contributes a large percentage of the flow capacity in the public storm drain system, it is not reasonable to assume a free outfall in the detention analysis. Therefore, a variable tailwater was modeled varying from pipe invert to the maximum HGL shown on the as-built drawing. The tailwater elevation-time relationship was developed by relating a 30-minute Tc hydrograph flow pattern to the minimum and maximum tailwater elevations. The proposed peak flow rates will be compared to the allowable connection flow rates for the purposes of discussion.

6. Maintenance Summary

Three structural BMPs are proposed for the site that will require maintenance. See Table C below to describe maintenance activities and frequencies:

Table C: Maintenance Summary

Structural BMP	Frequency	Design Storage Description
WetlandMod	Annually	See Appendix H for maintenance form and manufacturer maintenance recommendations
Underground Detention System	Quarterly	See Appendix H for maintenance form and manufacturer maintenance recommendations
Catch Basin Stenciling	Annually	Re-paint stencil as necessary

7. Conclusions

The peak flow rate exiting the site and connecting to the County storm drain system is 73.5 cfs. The allowable connection flow rate is 76 cfs (63.3 net acres times 1.2 cfs per acre).

Since the proposed peak flow rates are lower than the allowable connection flow rates, the Project will not negatively impact the downstream drainage conditions.

APPENDIX A

Los Angeles County 85th Percentile Isohyte Map, County 50-Year Isohyte Map, County Soils Map

APPENDIX B

Water Quality Calculations

APPENDIX C

Proposed Hydrology Map

APPENDIX D

Geotechnical Recommendations

APPENDIX E

Hydrology Calculations

APPENDIX F

Live Oak Avenue Storm Drain As-Builts

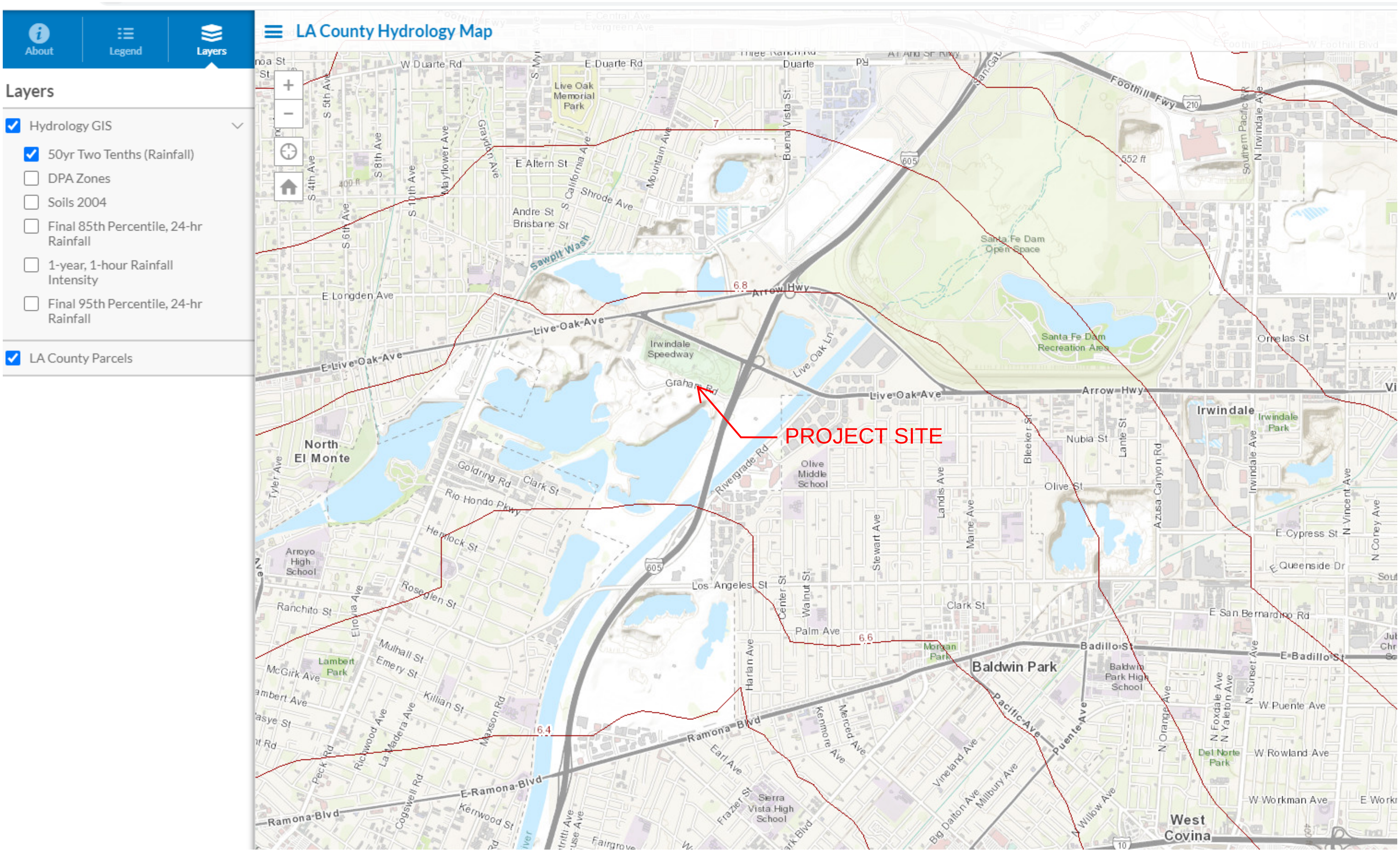
APPENDIX G

BMP Maintenance Literature

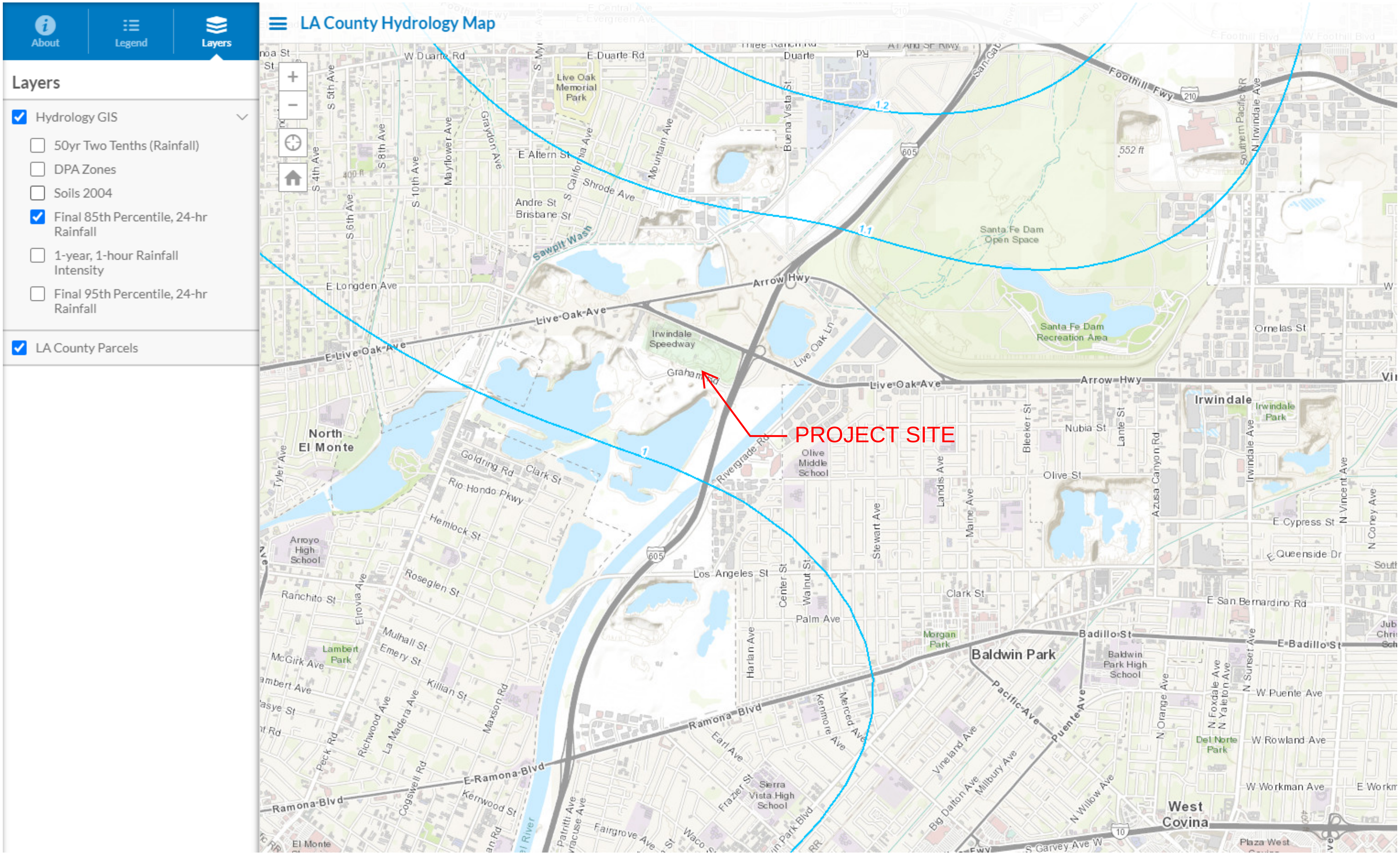
APPENDIX A

Los Angeles County 85th Percentile Isohyte Map, County 50-Year Isohyte Map, County Soils Map

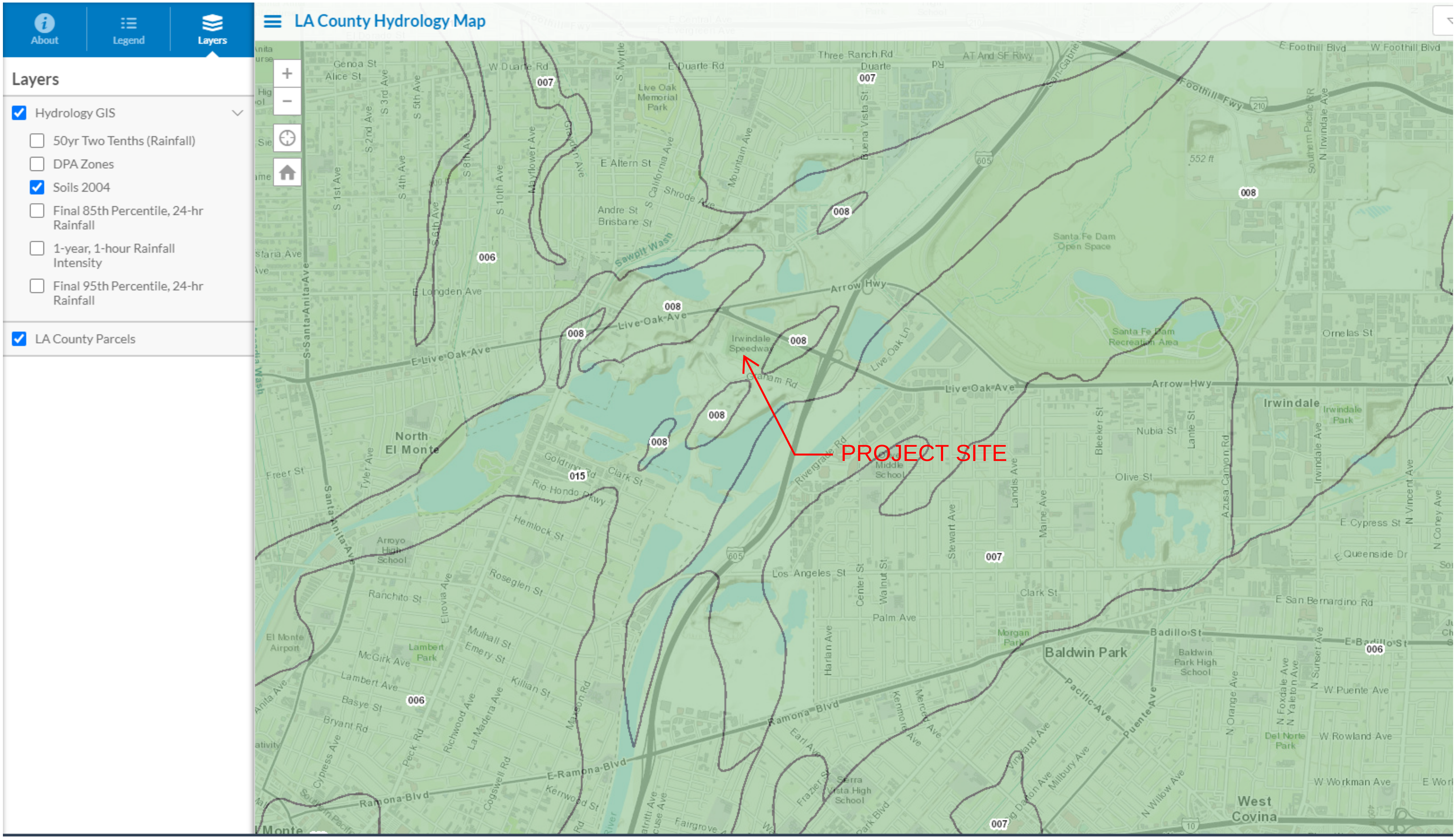
50 YEAR TWO TENTHS RAINFALL



85th PERCENTILE, 24 HOUR RAINFALL



SOILS MAP



About
Legend
Layers
LA County Hydrology Map
Layers
Hydrology GIS
50yr Two Tenths (Rainfall)
DPA Zones
Soils 2004
Final 85th Percentile, 24-hr Rainfall
1-year, 1-hour Rainfall Intensity
Final 95th Percentile, 24-hr Rainfall
LA County Parcels
PROJECT SITE
006
007
008
015
North El Monte
Irwindale
Baldwin Park
West Covina
Santa Fe Dam Open Space
Santa Fe Dam Recreation Area
Live Oak Ave
Arrow Hwy
Ramona Blvd

APPENDIX B

Water Quality Calculations

Project	Subarea	Area	Length	Slope	Depth	Imperviousness	Soil	Frequency	**Design Volume (CF)**
Irwindale Speedway	A1	5	300	0.005	1.1	0.9	15	85th Percentile Storm	24,400
Irwindale Speedway	A2	8.88	300	0.005	1.1	0.9	15	85th Percentile Storm	43,300
Irwindale Speedway	A3	1.62	300	0.005	1.1	0.9	15	85th Percentile Storm	7,900
Irwindale Speedway	B1	1.36	300	0.005	1.1	0.9	15	85th Percentile Storm	6,700
Irwindale Speedway	B2	1.17	300	0.005	1.1	0.9	15	85th Percentile Storm	5,700
Irwindale Speedway	B3	6.97	300	0.005	1.1	0.9	15	85th Percentile Storm	34,000
Irwindale Speedway	B4	0.36	300	0.005	1.1	0.9	15	85th Percentile Storm	1,800
Irwindale Speedway	B5	1.42	300	0.005	1.1	0.9	15	85th Percentile Storm	7,000
Irwindale Speedway	B6	1.7	300	0.005	1.1	0.9	15	85th Percentile Storm	8,300
Irwindale Speedway	B7	0.7	300	0.005	1.1	0.9	15	85th Percentile Storm	3,500
Irwindale Speedway	B8	0.51	300	0.005	1.1	0.9	15	85th Percentile Storm	2,500
Irwindale Speedway	B9	1.06	300	0.005	1.1	0.9	15	85th Percentile Storm	5,200
Irwindale Speedway	B10	8.51	300	0.005	1.1	0.9	15	85th Percentile Storm	41,500
Irwindale Speedway	C1	8.94	300	0.005	1.1	0.9	15	85th Percentile Storm	43,600
Irwindale Speedway	C2	1.75	300	0.005	1.1	0.9	15	85th Percentile Storm	8,600
Irwindale Speedway	D1	3.63	300	0.005	1.1	0.9	15	85th Percentile Storm	17,560
Irwindale Speedway	D2	5.37	300	0.005	1.1	0.9	15	85th perrcentile Storm	26,340
Irwindale Speedway	E1	0.65	300	0.005	1.1	0.9	15	85th Percentile Storm	3,200
Irwindale Speedway	E2	0.69	300	0.005	1.1	0.9	15	85th Percentile Storm	3,400

APPENDIX C

Proposed Hydrology Map

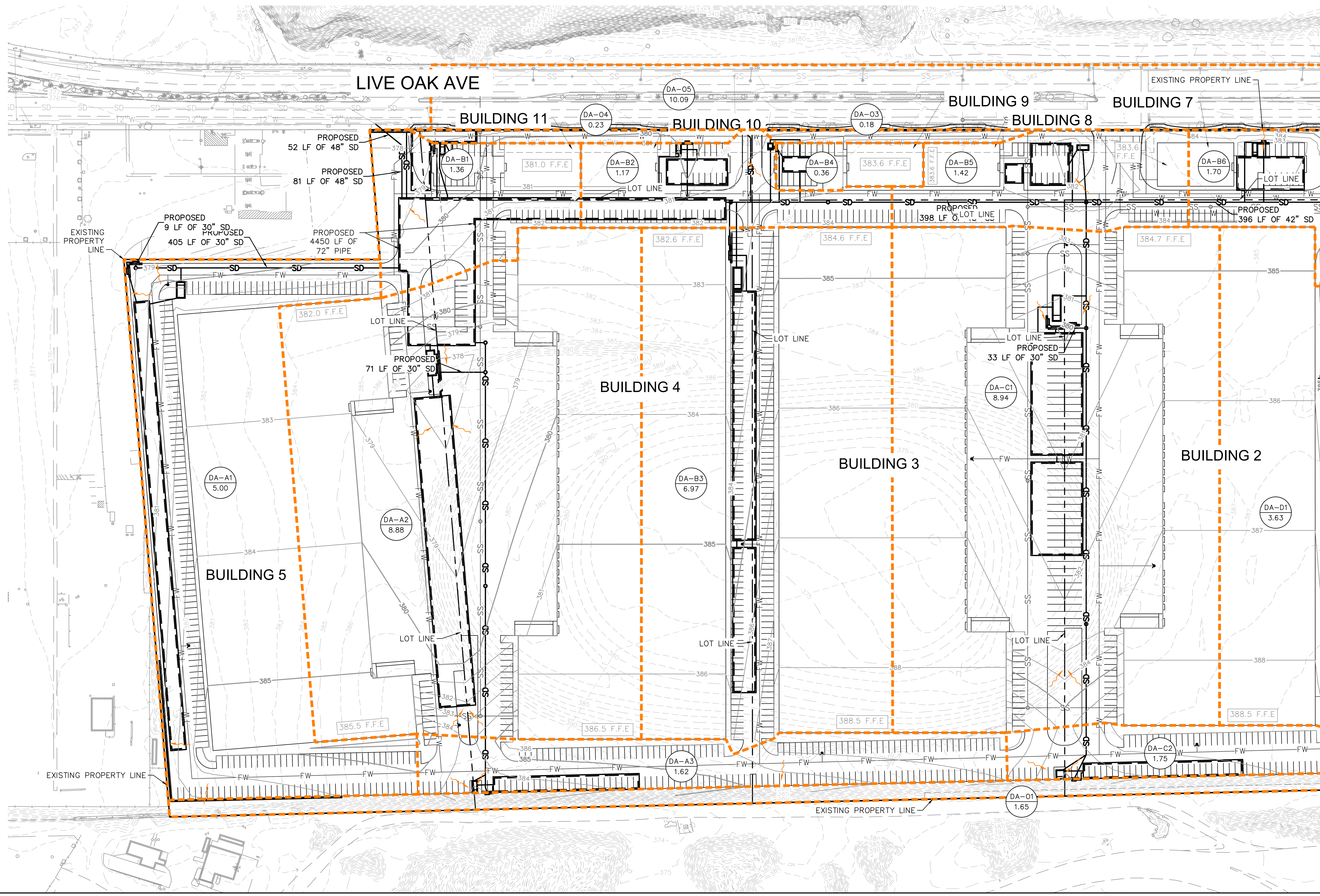
HYDROLOGIC AREA SUMMARY

LEGEND

- RIGHT OF WAY/ PROPERTY LINE
- CENTERLINE
- 147 EXISTING CONTOURS
- 147 PROPOSED CONTOURS
- FLOW LINE
- DMA BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN >12" IN DIA
- SD PROPOSED STORM DRAIN ≤12" IN DIA
- PROPOSED CATCH BASIN/MODULAR WETLAND
- D PROPOSED STORM DRAIN MANHOLE
- DIRECTION OF WATER FLOW
- XXX AES NODE
- PROPOSED UNDERGROUND DETENTION SYSTEM
- DA ID / ACRES DRAINAGE AREA LABEL
- LANDSCAPE AREA

NORTH

GRAPHIC SCALE IN FEET
0 40 80 160



No.	REVISIONS	DATE	BY

Kimley»Horn

© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488
WWW.KIMLEY-HORN.COM

REGISTERED PROFESSIONAL ENGINEER · JASON A. MARECHAL · RCE NO. 63764 · CIVIL · STATE OF CALIFORNIA

KHA PROJECT	194279001
DATE	08/12/2020
SCALE	AS SHOWN
DESIGNED BY	ML
DRAWN BY	CL
CHECKED BY	JM

PROPOSED HYDROLOGY MAP

IRWINDALE SPEEDWAY COMMERCE CENTER
PREPARED FOR
IRWINDALE OUTLET PARTNERS
IRWINDALE CALIFORINA

SHEET NUMBER
1 OF 2

Know what's below. Call 811 before you dig.

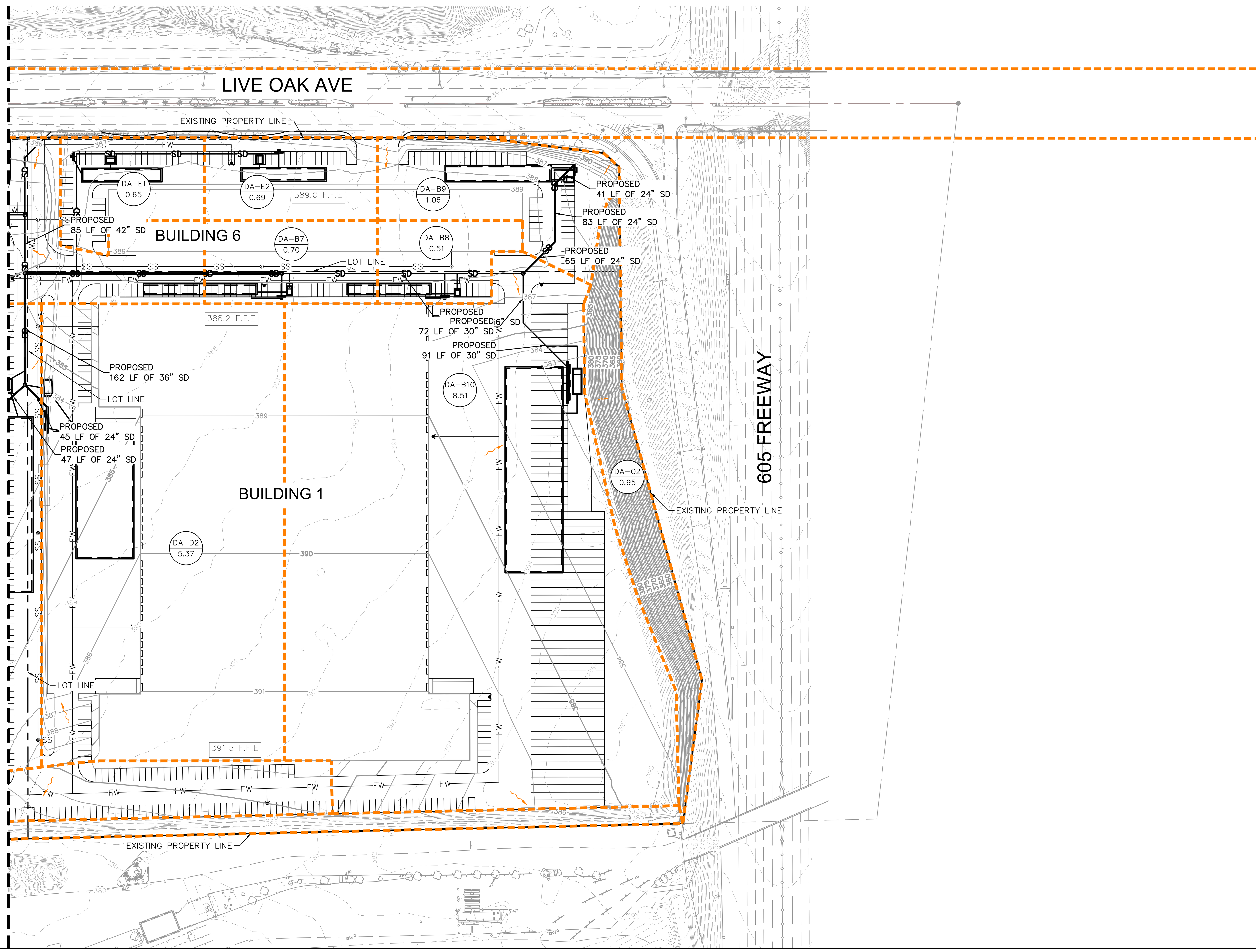
HYDROLOGIC AREA SUMMARY

LEGEND

- RIGHT OF WAY/ PROPERTY LINE
- CENTERLINE
- 147 EXISTING CONTOURS
- 147 PROPOSED CONTOURS
- FLOW LINE
- DMA BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN >12" IN DIA
- SD PROPOSED STORM DRAIN ≤12" IN DIA
- PROPOSED CATCH BASIN/MODULAR WETLAND
- D PROPOSED STORM DRAIN MANHOLE
- DIRECTION OF WATER FLOW
- XXX AES NODE
- PROPOSED UNDERGROUND DETENTION SYSTEM
- DA ID / ACRES DRAINAGE AREA LABEL
- LANDSCAPE AREA

NORTH

GRAPHIC SCALE IN FEET
0 40 80 160



Plotted By:Butler, Patrick Sheet Set:Kha Layout:2 PROPOSED HYDROLOGY MAP February 04, 2021 02:11:31pm K:\ORA_LDEV\194279001-Irwindale Speedway Commerce Center\CAD\Exhibits\EXHB 01 - Prop Prelim Hydrology.dwg

811 Know what's below. Call 811 before you dig.

No.	REVISIONS	DATE	BY

Kimley»Horn

765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488
WWW.KIMLEY-HORN.COM

REGISTERED PROFESSIONAL ENGINEER JASON A. MARECHAL RCE NO. 63764 CIVIL STATE OF CALIFORNIA

KHA PROJECT	194279001
DATE	08/12/2020
SCALE	AS SHOWN
DESIGNED BY	ML
DRAWN BY	CL
CHECKED BY	JM

PROPOSED HYDROLOGY MAP

IRWINDALE SPEEDWAY COMMERCE CENTER
PREPARED FOR
IRWINDALE OUTLET PARTNERS
IRWINDALE CALIFORINA

SHEET NUMBER
1 OF 2

APPENDIX D

Geotechnical Recommendations

Geotechnical Engineering ● Engineering Geology

Geotechnical Design Report
IRWINDALE SPEEDWAY REDEVELOPMENT
Irwindale, California

Prepared for:

Irwindale Outlet Partners, LLC
c/o JWL Associates
1221 S. Hacienda Blvd.
Hacienda Heights, CA 91745

Prepared by:

Tetra Tech BAS GeoScience
1360 Valley Vista Drive
Diamond Bar, California 91765

October 20, 2017
Project No. LIN 15-01E

Project No. LIN 15-01E
October 20, 2017

Mr. Haixiao Lin
Irwindale Outlet Partners, LLC
328 S Atlantic Boulevard #268
Monterey Park, CA 91754

c/o Peter K. Wang, P.E.
JWL Associates
1221 S. Hacienda Blvd.
Hacienda Heights, CA 91745

Subject: **GEOTECHNICAL DESIGN REPORT**
PROPOSED IRWINDALE SPEEDWAY REDEVELOPMENT
500 Speedway Drive
Irwindale, California

Dear Mr. Lin:

Presented herein is Tetra Tech BAS GeoScience's Geotechnical Design Report for the proposed redevelopment of the existing Irwindale Speedway facility. At present, several development concepts are being considered including an outlet mall and a commercial complex consisting of warehouse, retail and entertainment facilities. Although these two concepts are referenced in this document, the provided recommendations are largely applicable to any development concept with similar-sized buildings.

The purpose of this study is to evaluate the subsurface conditions and to provide recommendations for the design and construction of the proposed redevelopment. This report includes a brief description of the proposed redevelopment, discussions regarding the site history, description of field and laboratory investigative efforts, subsurface conditions and engineering seismology, estimation of settlement of the reclamation backfill, numerical modeling of settlement manifestation at the surface, and geotechnical conclusions and recommendations for design and construction of the proposed redevelopment. The appendices to the report include logs of borings, results of laboratory tests, results of numerical modeling, historical aerial photos and topographic descriptions, results of geophysical subsurface investigations, and results of slope stability analyses.

We appreciate the opportunity to provide our professional services on this project. If you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned.

Respectfully submitted,
Tetra Tech BAS GeoScience

Yonglang Li, Ph.D., P.E.
Project Engineer

Jeffrey Geraci, C.E.G.
Senior Engineering Geologist

Peter Skopek, Ph.D., G.E.
Principal Engineer

Distribution: Addressee (2 hardcopies + pdf by email peterwang@jwldesign.net)

Filename: 2017-10-20 Irwindale Speedway Redevelopment RPT.docx

TABLE OF CONTENTS

Page

TETRA TECH BAS GEOSCIENCE

Plates

Appendices

TETRA TECH BAS GEOSCIENCE

1 PROJECT OVERVIEW AND LIMITATIONS

This section of the report is intended to introduce key assumptions, results, recommendations, and limitations. This section is not an executive summary, rather this section is an intrinsic part of the report.

1.1 Proposed Project

The considered redevelopment concepts include an outlet mall or a commercial warehouse, retail and entertainment complex consisting of buildings, typically about 25 to 30 feet high, rectangular in footprint, ranging in size typically from about 130 x 100 to 400 x 250 feet, i.e., 13,000 to 100,000 square feet in footprint area, and associated walkway corridors, plazas, and parking areas. Additional appurtenances will include infrastructure enclosures, signs, and drainage facilities. Although the specifics of the proposed development are not yet finalized, it is expected that the eventual development will consist of buildings of similar sizes and therefore the recommendations provided herein will remain applicable.

1.2 Project Site and Existing Conditions

The project site is about 63-acre portion of a former aggregate quarry, historically known as Pacific Rock Quarry. This quarry operated through the late 1960s after which it was backfilled as a landfill mostly with soil and construction inert debris and occasionally with tires and generally non-organic mixed solid waste (trash). The landfill refuse extending from the low elevation of about 175 feet is up to about 200 feet thick. The existing backfilled grade slopes east to west from about elevation 390 feet to elevation 375 feet. The high groundwater at the site since the completion of backfilling operations in 1993 was at an elevation of about 270 feet in the 1993 to 1999 period and currently fluctuates between elevations 170 and 180 feet.

Following the backfilling operations and closure of the landfill, the site was redeveloped in 1999 into a motorsports facility called the Irwindale Event Center and is often referred to as the Irwindale Speedway. The facility has a ½ mile racetrack, a 6,000-seat grandstand, 6 operations / maintenance / concession buildings, and associated parking areas. The entire site was graded and covered by pavements and improvements with the exception of 2 larger lawn areas within the track and several small localized planter areas throughout the site. Although no as-built documentation was available for our review, based on the Law/Crandall geotechnical report (1998) and personal communication with site personnel, the subgrade preparation and foundation types for the site facilities are summarized in the table below.

Structure	Subgrade Preparation (overexcavation/recompaction)	Foundation
Buildings	5 feet	18 to 24 inches thick reinforced concrete mat foundations
Pavements	1 foot	4 to 5 inches asphalt concrete (no aggregate base) (based on investigative borings)
Track	2 feet	- 4 to 8 inches thick asphalt concrete (no base) in the track infield (based on investigative borings) - Unknown 1/2 –mile racetrack asphalt pavement thickness
Grandstand	Unknown, 1 or 2 feet estimated	18- to 24-inch diameter 10 feet long cast-in-drilled-hole (CIDH) piles reportedly connected by grade beams

1.3 Site Performance (until Summer 2017)

As observed during our detailed site inspection in the Fall 2015 and subsequent site visits through the Summer 2017, performance of the Irwindale Speedway site buildings, track, and grandstand, 18 years after construction, is remarkably good even with the minimal reported subgrade preparation and conventional foundations adopted for the on-site buildings. The asphalt pavement areas definitely show effects of differential settlement and excessive cracking but with the exception of one location at the northeast corner of the site the surface is relatively flat and without excessive undulations. Similarly, the concrete flatwork in the grandstand area is cracked but with minimal vertical offsets and not to a level that would be considered extraordinary. All on-site one-story buildings founded on conventional mat foundations are in very good condition with no reported exterior or interior distress. The grandstand is a flexible steel structure with no signs of distress but localized offsets and separations were observed at the top deck estimated approximately 60 feet above ground, i.e., at an elevation where the deformation effects are amplified by the high projection. The oval racetrack asphalt pavement is contains cracks but is generally in acceptable condition.

Overall the site is performing well although far from perfect. It is understood that the performance expectations for the proposed redevelopment will be much higher and therefore the acceptable performance of the existing relatively simple improvements cannot and should not be directly extrapolated for expectations of performance for the proposed development. Therefore, significantly more substantial subgrade preparation and foundation systems are advisable and herein recommended.

The performance of the site to-date does, however, provide an indicator of the "upper-bound" level of distress for the pavement areas. In other words, a systematic subgrade preparation for the proposed pavements is likely to results in substantially better pavement performance.

1.4 Remediation Concept

The proposed remediation concept for this landfill site and the associated design analyses are largely based on engineering judgement rooted in observations of the to-date performance of on-site facilities and pavements constructed in 1999, substantial site-specific field investigation, review of site historic aerial photographs, provided documents, and published information on properties and performance of similar materials. No Standard of Practice exists for redevelopment of landfills and a case-by-case site-specific and purpose-based design approach is usually adopted. It must be understood that without complete material excavation and recompaction of the backfill in a controlled and engineered manner no landfill can be treated as a conventional site.

The key design consideration for landfill redevelopment is control of total and differential settlement. This is proposed to be accomplished by designing an Improved Zone of processed on-site reclamation backfills to be constructed on top of the existing, unimproved materials in combination with use of enhanced foundations for the proposed buildings. The Improved Zone is expected to be relatively incompressible, i.e., not subject to further settlement. Based on various considerations described later in this report, it is estimated that the existing unimproved landfill materials up to about 130 to 150 feet in thickness that will remain below the Improved Zone can experience further settlement due to long term compression, hydrocollapse, and/or seismic shaking. A conservative estimate of the settlement of this unimproved zone is about 0.9 percent of the total thickness or about 14 to 17.5 inches within the central, deepest, portions of the site. This settlement of the unimproved materials takes place under the Improved Zone and an analysis is performed that considers various thicknesses of the Improved Zone to evaluate how the settlement of the underlying unimproved materials is mitigated at the surface where the proposed structures will be supported.

It must be understood that if the unimproved materials under the Improved Zone were to settle in a more or less uniform manner, the beneficial effects of the Improved Zone would be more or less negligible because the Improved Zone would settle about the same amount. However, a <u>uniform</u> settlement does not present the main geotechnical or even structural design challenge as numerous case histories exist of well performing, continuously operated structures subject to large uniform settlements. For instance, apartment hi-rises in Santos, Brazil were subject to 3 feet of settlement without loss of use. Perhaps the best known case of a significant structure subject to large uniform settlement is the Palace of Fine Arts in Mexico City which settled 12 feet also without loss of use. It is the <u>differential</u> settlement that is deemed the critical design parameter and it is the purpose of the geotechnical design of the Improved Zone to mitigate it.

The differential settlement at the finished grade of the Improved Zone will be caused by the differential settlement of the underlying unimproved materials. The distribution of the differential settlement of unimproved materials under the Improved Zone is impossible to predict and therefore can be based only on engineering judgement. The Improved Zone will be very effective for mitigating the differential settlement if a random settlement distribution varying over short distances were considered, because it will effectively smooth out all peaks and valleys of the settlement distribution. Although this is a very likely scenario, analyses presented in this report conservatively assumed that the transition between the *maximum* and *minimum* settlement, i.e., not a *random* settlement magnitude within this range, would occur over distances of 50 and 70 feet. These distances were selected because they are deemed a conceivable, albeit very conservative, scenario. It should be noted that various other settlement patterns applied at the bottom of the Improved Zone were analyzed to develop a better feel and to augment our engineering judgement but only the analyses described above and selected for the design are presented herein for clarity and brevity.

The numerical modeling was performed using the finite difference code Fast Lagrangian Analysis of Continua (FLAC) considering a non-linear elastic-plastic model with Mohr-Coulomb yield criterion. The numerical modeling runs were tested for consistency of results and for numerical stability for a reasonably conservative range of assumed input parameters. The design runs were then performed to quantify the effects of the thickness of the Improved Zone on the surface settlement magnitudes and distribution.

1.5 Improved Zone

The Improved Zone is recommended to consist of 2 layers. The upper layer would consist of overexcavated, processed, and recompacted material (O&R zone) that will support the proposed improvements and grades and accommodate buried utilities. The underlying layer would be improved by in-situ deep dynamic compaction (DDC zone). The O&R zone thickness may be varied depending on the desired level of improvement, whereas the thickness of the DDC zone is generally determined by the characteristics of the used equipment, i.e., weight and drop height of the DDC tamper.

In our numerical modeling the O&R zone was assumed to vary in thickness from 10 feet, deemed a necessary minimum for accommodating of foundations and underground utilities, to 30 feet which is deemed a reasonable practical limit for efficient grading operation. The results predictably indicated that the thicker the Improved Zone, the smoother deformation pattern. Eventually, 20 feet thick O&R zone is expected to provide the best balance between the constructability and the degree of settlement pattern mitigation, although thicker or thinner zones may also be acceptable depending on the selection of the building foundation and superstructure structural system.

Given the nature of the on-site materials consisting of large pieces of construction debris and in the absence of groundwater within depth of influence, the DDC is expected to be notably effective and for a typical 25-ton tamper dropped from 80 feet the depth of improvement is expected to be about 30 feet or even deeper. The numerical modeling analyses conservatively assumed a depth of DDC improvement of 30 feet. Thus, in total, Improved Zone thicknesses ranging from 10 (O&R) + 30 (DDC) = 40 to 30 + 30 = 60 feet were evaluated in the numerical modeling.

The remediation design may include any variation of the proposed Improved Zone components depending on the desired balance of construction effort and risk of post-construction maintenance. For example, for parking areas a thinner Improved Zone consisting of only overexcavation or only DDC may be chosen based on lesser construction costs while recognizing that more frequent maintenance and pavement repairs may be eventually needed. A thicker Improved Zone will likely be chosen to support buildings. Generally, improvements between closely spaced building, e.g., walkway and plaza areas, should be supported on the same Improved Zone as the buildings.

1.6 Design Risk

The design criteria presented below are intended to minimize distress to building superstructure and foundations. Given the intrinsic limitations of accuracy of geotechnical site characterizations in general and characterization of non-engineered landfill sites in particular, it is impossible to fully capture the spatial and material variability of the subsurface materials and in so doing to provide reasonable design criteria that would guarantee a distress-free performance. Therefore, it should be anticipated that localized exceedance of the design criteria can conceivably occur that could result in need for localized maintenance and/or repair. Conversely, the design criteria may be further relaxed in acceptance of increased risk of maintenance and/or repair. The proposed Improved Zone is designed to reduce the adverse effects of the total and differential settlement and prevent catastrophic response in an extreme event such as excessive settlement due to earthquake or hydrocollapse. However, higher than "regular/normal" risk for increased maintenance and repairs still remains. The provided Improved Zone design recommendations are intended to significantly reduce such risk but do not eliminate it.

1.7 Design Criteria

The proposed criteria for the selection of the improvement level in building areas and for the structural design are as follows:

Maximum total settlement across a building footprint is deemed a tertiary design concern as the distribution of the settlement is considered the governing/primary design parameter, but an excessive total settlement could increase potential for excessive differential settlement and angular distortion. The maximum total settlement will vary depending on the location of the building. Also, because the proposed building footprint sizes vary significantly from about 130 x 100 feet to about 400 x 250 feet, the total settlement across the building footprint should be adjusted depending on the building size. A criterion of **3 inches of total settlement per each 100-foot segment of a building footprint** is recommended. Thus, for the proposed on-site buildings, the maximum total settlement can range from about 3 inches for the smaller buildings and up to 12 inches in the long direction of the largest building.

Maximum differential settlement within a building footprint, i.e., maximum settlement difference between two points within a building perimeter, is deemed a secondary design concern similarly to the maximum total settlement as it may increase potential for excessive angular distortion. A criterion of **1.5 inch of differential settlement per each 100- foot segment of a building footprint** is recommended. Thus for the proposed on-site buildings the maximum total differential settlement can range from about 1.5 inches for the smaller buildings and up to about 6 inches in the long direction of a building.

Maximum angular distortion within a building, i.e., differential settlement over a standard distance of 30 feet anywhere within a building footprint, is the primary design concern regardless of the size of the building. Whereas in conventional construction 1 inch differential settlement over a distance of 30 feet is considered a standard, a slightly relaxed criterion of **2 inches of differential settlement over a distance of 30 feet**, is herein recommended in recognition of the unusual site conditions.

Maximum deflection ratio within a building footprint, i.e., curvature of the subgrade, is a lesser used design parameter even though it is of a primary design concern when constructing flatwork over non-uniform subgrade. The deflection ratio is independent of the size of a building and is expressed as the difference in settlement between the actual and average settlement in the middle of any 30-foot segment. An acceptance criterion of **maximum 0.75 inch difference in settlement in the middle of any 30-foot segment** is herein recommended.

The Improved Zone performance under buildings should be monitored by performing a floor level survey 4 to 6 months after completion of the floor building slabs, to establish a reference baseline and re-surveying the foundation and floor slabs if distress is observed.

1.8 Need for Import Materials

The processing and recompaction of the reclamation fills and the use of DDC for the construction of the Improved Zone will result in significant grade lowering across the improved areas. Lowering of the grade by DDC on the order 1 to 2 feet is typical. Processing and recompaction of the reclamation fill can result in volume shrinkage in excess of 10 percent. Additionally, due to the anticipated settlement of the site up to about 16 inches (depending on the thickness of the Improved Zone), overbuilding of grades to ensure long term performance of drainage grades and gravity utilities, i.e., storm drains, sewer, is desirable. As a result, a significant volume of import fill material will be needed.

1.9 Utility Connections

Special considerations will be needed for the design of the utility connections entering the site. It is expected that most of the utilities will enter the site from Live Oak Avenue and will then cross over variable thickness fill zone along the pit perimeter (transition zone) to reach the destinations within the site. Whereas the total settlement within the interior of the site is not a significant design concern for the buildings and the associated improvements because of its anticipated uniformity, the entry of utilities from outside of the site and crossing the transition zone will require flexible connections capable of accommodating the anticipated total settlement. In addition, storm drains and sewer lines exiting the site should be provided with enhanced gradients in order to accommodate the expected settlement.

1.10 Purpose and Limitations

This study is intended to provide recommendations for the design and construction of the proposed aforementioned redevelopment concepts. Further design refinements may be needed to address the eventual specific project layout, e.g., construction within the transition zone, irregular buildings, to coordinate with the structural designer, and to accommodate regulatory feedback.

This report includes geotechnical recommendations suitable for civil and structural design and for development of preliminary cost estimates. Therefore, this report is intended to be suitable for submittal to regulatory agencies, e.g., the City of Irwindale, County of Los Angeles GMED, RWQCB, AQMD, and LEA.

2 INTRODUCTION

Presented herein is Tetra Tech BAS GeoScience's (Tetra Tech) Geotechnical Engineering Report for the proposed redevelopment of the existing Irwindale Speedway site in the City of Irwindale, California into a commercial complex (the Project). The site, a backfilled sand and gravel quarry, is an approximately 63-acre rectangular-shaped parcel located at 500 Speedway Drive, south of Live Oak Avenue and west of interstate highway I-605 (see Plate 1).

The purpose of this study was to evaluate the subsurface conditions and to provide geotechnical recommendations for the design and construction of the proposed redevelopment. The key recommendations are based on evaluation of potential settlement manifestation at the finish grade upon implementation of suitable ground improvement. This report summarizes the data collected and presents the findings, analyses, conclusions, and recommendations.

This report includes geotechnical recommendations suitable for civil and structural design and for development of preliminary cost estimates. Therefore, this report is intended to be suitable for submittal to regulatory agencies, e.g., the City of Irwindale, County of Los Angeles GMED, RWQCB, AQMD, and LEA.

3 SCOPE OF WORK

Tetra Tech's scope of services for this project consisted of the following tasks:

- Review of available background data, including in-house and Client-provided geotechnical data from nearby projects, geotechnical literature, geologic maps, and seismic hazard maps relevant to the subject site.

- A site reconnaissance to observe the site surface conditions and to select boring locations.

- Procurement of drilling permits from the Los Angeles County Department of Public Health.

- Notification of Underground Service Alert (USA) prior to drilling for the clearance of buried on-site utilities.

- A subsurface investigation, including the excavating, logging, and sampling of 14 exploratory borings to depths ranging from about 52 to 206 feet below the existing grade. Soil samples obtained from the borings were transported to a geotechnical laboratory for visual classification and testing.

- A geophysical investigation consisting of multi-channel analysis of surface waves (MASW) survey for the upper 100 feet and spectral analysis of surface waves (SASW) survey to extend the investigation to 200 feet. A total of 5, 2-dimensional profiles were generated to complement the drilling investigation by mapping the variation of shear wave velocity across the site and delineating the extent of the fill materials.

- Laboratory testing of selected samples recovered from the borings to evaluate geotechnical properties of on-site soils.

- Engineering evaluation of the geotechnical data collected to develop geotechnical recommendations for the design and construction of the proposed redevelopment, including the following items:

    - A description of site mining and backfilling history.
    - An evaluation of general subsurface conditions and description of types, distribution, and engineering characteristics of subsurface materials.
    - An evaluation of the potential overall settlement due to earthquake ground shaking, hydrocollapse, and long term secondary settlement under self-weight.
    - An evaluation of the mitigation of the effects of the potential overall settlement at the finish grade by near-surface ground improvement based on results of numerical modeling with the computer code FLAC (version 8.0).
    - Recommendations for near-surface ground improvement by construction of an Improved Zone consisting of overexcavation and replacement, and deep dynamic compaction (DDC) of the existing fill materials.
    - Evaluation of slope stability in the eastern margin of the site adjacent to I-605.
    - Recommendation for structural setback zones.

- Determination of seismic design parameters in accordance with the 2016 California Building Code.
- Recommendations for design of conventional footing and mat foundations including allowable bearing capacity, lateral resistance, and settlement estimates.
- Recommendations for design of floor slab-on-grade.
- Recommendations for design of exterior concrete flatwork.
- Recommendations for flexible and rigid pavement sections.
- A discussion of corrosion potential of the on-site soils to buried concrete and steel.
- Recommendations for quality assurance and verification testing during construction.

- Preparation of this report, including the reference maps and illustrations, a summary of the collected data, conclusions, and geotechnical recommendations for the design and construction of the proposed Project.

4 PROJECT AND SITE DESCRIPTIONS

4.1 Current Site Condition

The project location is shown on Plate 1 – Project Location Map. The site is currently occupied by the Irwindale Event Center (the Speedway), which is composed of:

- NASCAR ½-mile and ⅓-mile asphalt-paved and banked racetracks with associated buildings and a grandstand;
- An 1/8-mile asphalt-paved dragstrip; and
- An asphalt- and stamped-concrete-paved area used for parking, swap meets and driver training.

The current site facilities layout is shown as the background of Plates 2A, 2B, and 3 and is best seen on Plate 3. The site is bordered by Live Oak Avenue to the north, Neovia Logistics trucking facility to the west, Hanson Pit aggregate quarry to the south, and interstate highway I-605 to the east.

4.2 Proposed Development

Two development concepts were provided to Tetra Tech at the time of preparation of this report. First, an outlet mall concept prepared by FCGA Architecture dated February 25, 2015 and secondly a warehouse, retail, and entertainment complex (referred to herein as a commercial complex) plan provided by JWL Associates (undated). The considered conceptual layouts are shown on Plates 2A and 2B for the outlet mall concept and the commercial complex concept, respectively.

The key characteristics of the two considered concepts are summarized below:

Outlet mall concept: 15 outlet shop buildings with covering approximately 40 percent of the site (quoted coverage includes also the plaza and walkway areas); the buildings are generally rectangular ranging typically between about 20,000 square feet up to about 70,000 square feet in footprint and associated pedestrian, parking, and driveway areas. The buildings will be located in the south-central portion of the parcel. The conceptual project layout is presented in Plate 2A.

Commercial complex concept: 19 warehouse, retail, hotel, and food court and entertainment buildings covering about 80 percent of the site (quoted coverage includes all driveways between buildings); the buildings are generally rectangular between about 13,000 square feet and about 100,000 square feet in footprint with associated parking and driveway areas. The conceptual project layout is presented in Plate 2B.

It should be understood that the proposed redevelopment concept has not yet been finalized but is expected to include structures similar in function, type, and size to the structures considered in the above-presented two concepts. Therefore, the analyses and recommendations presented in this report are applicable and valid for such similar structures.

4.3 Site History

Available records from the Client, City of Irwindale, published and unpublished literature sources, and historical aerial photographs and USGS topography were reviewed as a basis for the development of the site mining and reclamation history and for the design analyses. A compilation of sources considered directly pertinent to the Project site's history is presented in the "References" section of this report.

The Project site is a former Pacific Rock Quarry, which was operated since the early 1930's through the late 1960's for mining of sand and gravel (Shannon & Wilson, 2014). No records of mined out volumes, depths, or sequencing of the mining operations were located. After conclusion of the mining activities the quarry was backfilled from the early 1970's to May of 1993. No records of fill materials and sources, placement and compaction, or sequencing of the backfilling operations were located. Consequently, the mining and backfilling history of the site has been compiled mostly from aerial photographs. Excavation depths and extent were also evaluated based on the historical groundwater level records. A summary of reviewed aerial photography is provided in Appendix D and a plot of groundwater elevations from nearby wells is provided in Plate 10.

4.3.1 Site Mining History

Surface mining commenced in the Irwindale region in the middle to late 1920's. Aggregate mining began southwest of the Project site in approximately 1933 to 1935, progressing on to the westerly portion of the site by the early 1940's. The slack-line excavation methods used in the far-westerly portion of the site are interpreted to have extended slightly below the groundwater level, to an estimated bottom elevation of about 190 feet, i.e., about 190 feet below the original grade. By 1952, surface mining had progressed across the westerly third of the Project site, and into the easterly portion of the site sometime after 1952 and prior to 1960. A drop in local groundwater elevation between the late 1950's through 1965 allowed deeper surface excavation in the easterly approximately ¾ of the site, and the use of crane-supported dragline techniques during that period allowed for deeper below-water excavation generally in the approximate area of the existing Speedway oval track.

Between 1965 and 1970 the groundwater elevation rose over 80 feet, effectively ending the mining at the Project site. The mined out area formed a rectangular pit (Speedway Pit) that encompasses the majority of the site. The highest groundwater elevation recorded in the Speedway Pit's vicinity during this period is 307.1 feet on May 28, 1969 in State Well No. 3010D, located approximately ½ mile south of the Project site. The largest groundwater lake is observed in the historical aerial photograph from January 30, 1970 when the lake water elevation was estimated at approximately 270 feet.

The bottom of the mined out quarry is estimated to slope from an elevation of approximately 235 feet in the east to as low as 174 feet beneath the existing oval track to the west, and rising again toward the west to an estimated elevation of about 200 feet between the west edge of the existing oval track and the west property line. The east Pit wall was excavated in a series of benches that step down toward the west from an estimated native surface elevation of approximately 350 feet beneath the I-605 freeway to an estimated elevation of 230 feet at the toe. This longitudinal (east-west) bottom profile is depicted on Cross-Sections X-X', A-A', and D-D' (Plates 4, 5, and 8, respectively). Cross-Sections B-B', C-C', E-E' (Plates 6, 7, and 9, respectively) depict the interpreted transverse (north-south) bottom profile. This interpretation of the mined out surface is based primarily on the historical aerial photographic records and on the 1962 topographic survey included in the Shannon & Wilson report (2014), and on the data collected from our drilling and geophysical investigations.

4.3.2 Site Backfilling History

Although wash deposits, overburden and minor rubble fill are observed to have been placed in the far westerly portion of the site beginning as early as 1952, the reclamation of the Speedway Pit began intensely in the early 1970's and was completed in 1993 with up to approximately 200 vertical feet of fill composed mostly of inert demolition debris. The backfilling effort generally progressed from the west toward the east in a series of coalescing lobate truck-and-dozer fill platforms. These platforms were constructed by haul trucks dumping at the platform surface with dozers pushing the rubble off the leading edge of the fill lobe. The lake was observed in the aerial photographs through late 1976.

The Pit backfill material is estimated to consist primarily of soil and inert debris fill, with lesser amounts of tires and mixed solid waste (trash). Aerial photographs from 1975 and 1976 indicate scattered occurrences of stockpiled tires within the easterly portion of the pit bottom.

By 1980 the easterly-progressing fill lobes had moved across the deepest portion of the pit to just west of the existing Speedway grandstand. The pit area toward the east was somewhat lower, and was ostensibly still subject to flooding during periods of high groundwater. Windrows of black material, interpreted as tires, are observed on the surface of the fill lobes. By 1988 the truck-placed fill is observed to have extended to the eastern pit wall. In 1990 the working surface of the pit backfill is observed to contain larger proportion of soil. By 1994 the eastern half of the Project site had been paved and developed for a swap meet venue. By 1998 the Speedway facility and oval track are observed to be nearly completed.

5 PREVIOUS STUDIES

Shannon & Wilson, Inc. conducted a subsurface investigation in 2014 consisting of a single sonic core (B-1) located immediately northeast of the existing Speedway track (Plates 2A and 2B) (Shannon & Wilson, 2014). The sonic core extended to a depth of 200 feet and has encountered alluvium at a depth of about 170 feet. Log of the sonic core B-1 is included in Appendix A-3.

As a part of the Shannon & Wilson investigation, GeoVision, Inc. conducted a geophysical study at the site in July 2014 by using active surface wave measurements to develop shear wave velocity profiles and characterize the shear-wave velocity structure of the pit backfill (GeoVision, 2017). The study used both passive and active multi-channel array surface wave (MASW) methods at 8 arrays at the Project site. The study was further extended as a part of the investigation for this report (discussed in the ”Geophysical Investigation” section of this report). The locations of the 2014 arrays and their center positions are depicted on Figure 1 – Site Map in the GeoVision 2017 report included in Appendix E-1.

Law/Crandall conducted a subsurface investigation for the design of Irwindale Speedway in 1998, consisting of 10 bucket auger borings that were drilled to depths ranging from 15 to 20 feet and issued a subsequent geotechnical report (Law/Crandall, 1998). The borings are primarily concentrated toward the west-central portion of the site in the area of the existing track and grandstands. The boring locations, denoted L-1 through L-10, are shown on Plates 2A and 2B and the logs are included in Appendix A-3. Law/Crandall (1998) acknowledged the site’s long-term settlement potential, and provided recommendations for concrete mat foundations underlain by compacted fill with provisions for mitigating expected settlement. The report also discussed the potential for ongoing settlement and the need for continued maintenance.

Devco (1990) issued a letter report summarizing the surcharge data collected by Foundation Engineering Company during the period from February 1987 through September 1987 for the construction of a trucking facility in the parcel west of the Project site. Temporary surcharge fills 20 feet high were placed within the proposed structure footprints to mitigate long-term settlement potential. Settlements under these surcharge fills over a period of about 7 months in a range of 4.5 to 17.5 inches were recorded.

6 FIELD INVESTIGATION AND LABORATORY TESTING

The field investigation conducted for the scope of this report consisted of an initial site reconnaissance, mapping of surface distress features, field logging of the core samples from sonic boring B-1 by Shannon & Wilson (2014), advancement and logging of 7 Becker Hammer borings, and 2 additional sonic cores in the Fall 2015, and advancement and logging of an additional 5 sonic cores in June 2017. Approximate locations of all borings are presented in Plates 2A and 2B.

A limited geophysical study was conducted at the site in 2015 to evaluate the feasibility of passive surface wave techniques for broader and deeper characterization of the reclamation fill. As the results of the 2015 geophysical study indicated that the passive surface wave techniques cannot be effective for the deeper materials, an additional geophysical investigation was conducted in April and May 2017 consisting of multi-channel analysis of surface waves (MASW) and spectral analysis of surface waves (SASW) surveys. A total of 5, 2-dimensional profiles were generated to complement the drilling investigation by mapping the variation shear wave velocity across the site and delineating the extent of the fill materials.

6.1 Field Mapping of Surface Distress Features

Field mapping of surface distress features was conducted on August 5, 2015. The mapping effort was focused on documenting the distribution, patterns, and magnitudes of cracks/separations generally greater than 1 inch wide and localized depressions generally deeper than 2 inches within the pavement and flatwork areas. These observed distress features are recorded on Plate 3.

Observations were also made around and within several of the existing buildings, including the concession stands and restrooms north and west of the bleachers, the garage/shop and administrative buildings in the northwest corner of the property, and the ticket office on the east side of the speedway track. These masonry block structures were observed to have performed well with no apparent distress.

A brief check-up site inspection was carried out in April 2017 to confirm essentially unchanged conditions since the time of the initial inspection in August 2015.

6.2 Field Logging of Previous Sonic Core

The core boxes for the Shannon & Wilson (2014) sonic core B-1 were located on the Project site during the initial reconnaissance and the core was logged by a Tetra Tech's engineering geologist with respect to relative abundance of observed materials. This log is summarized graphically on Cross-Section X-X' (Plate 4), including sample blowcounts reported by Shannon & Wilson (2014).

6.3 Field Explorations

Advancement and logging of 7 Becker Hammer borings were conducted during the period from September 14 through September 29, 2015. The Becker Hammer drilling equipment included a diesel-actuated percussion hammer to advance a string of 6-5/8" outer diameter (O.D.) by 4-1/4" inner diameter (I.D.) open-ended casing while using a reverse-circulation stream of air to remove the cuttings. Cuttings were collected through a cyclone and logged at the surface. Features of the Becker Hammer method include the ability to penetrate zones of cobbles, boulders and the type of concrete-laden rubble that was anticipated within the pit backfill; as well as the ability to provide a continuous blowcount profile, providing an indication of relative driving resistance throughout the depth of exploration. Traditional geotechnical in-situ penetration sampling was accomplished with a 140-pound auto hammer through the inner string.

Although the Becker Hammer method was an effective method for drilling through the rubble, the effectiveness became problematic when tire-laden fill zone was encountered and the casing started to rebound rather than to penetrate the material. Refusal to Becker Hammer advancement on zones composed predominantly of tires and generally thicker than 8 to 10 feet was met at borings B-101, B-106, B-107 and B-109. In order to systematically deal with the zones of difficult Becker Hammer penetration, refusal criteria was engaged when blowcounts generally exceeding 1,000 blows/foot, advancement of less than 1 foot/hour, or uncontrollable bouncing of the drill rig, was encountered.

Another issue with the Becker Hammer method became evident upon encountering asbestos materials in the rubble fill in borings B-103 and B-107. Although not deemed a pervasive issue during the investigation, the decision was made to use only a sonic coring rig for the remaining planned holes since the sonic coring method inherently minimizes discharge of airborne particulates in the event that asbestos-containing material was encountered. Sonic core holes B-105 and B-102 were advanced on October 14 through October 16, 2015 and on November 9 through November 10, 2015, respectively. Both holes were advanced through the fill prism and into the underlying native alluvium. Several tire-laden fill zones were encountered in these holes, but those zones tended to be less than 5 feet thick and did not represent a significant impediment to advancement of the sonic core.

Additional sonic core holes B-201 through B-205 were advanced from June 5 through June 9, 2017. These holes were located near the perimeter of the site to assess the Pit's boundary conditions and provide data for assessment of the stability of the east-facing slope above I-605. All 5 of these core holes were advanced through the pit reclamation backfill into the underlying native alluvium.

Boring logs for borings B-101 through B-109 drilled in 2015 and for borings B-201 through B-205 drilled in 2017 are included in Appendices A-1 and A-2, respectively. These logs are also summarized graphically on the cross-sections (Plates 4 through 9). Boring log for B-1 performed by Shannon & Wilson (2014) is included in Appendix A-3. Table 1 provides a summary of Becker Hammer and Sonic Core borings performed at the Project site:

Table 1
Summary of Becker Hammer Borings and Sonic Core Holes

Boring No.	Approx. Elev. (ft)	Total Depth (ft)	Dates Drilled	Reason for Termination	Material Encountered at Terminal Depth
B-101	385.1	145	9/16/15 to 9/17/15	Refusal	Tires
B-102	375.5	206	11/9/15 to 11/10/15	Advanced through fill	Native Alluvium
B-103	372.8	150	9/28/15 to 9/29/15	Encountered fibrous pipe (asbestos)	Rubble Fill
B-104	383.2	161	9/14/15 to 9/15/15	Advanced through fill	Native Alluvium
B-105	387.5	171.5	10/14/15 to 10/16/15	Advanced through fill	Native Alluvium
B-106	387.7	172	9/17/15 to 9/18/15	Refusal	Tires
B-107	391.5	151	9/21/15 to 9/22/15	Refusal	Tire Fill
B-108	388.9	135	9/23/15 to 9/25/15	Advanced through fill	Native Alluvium
B-109	391.8	130.5	9/22/15 to 9/23/15	Refusal	Tire Fill
B-201	381.0	90.5	6/7/17 to 6/8/17	Advanced through fill	Native Alluvium
B-202	392.0	51.5	6/8/17 to 6/9/17	Advanced through fill	Native Alluvium
B-203	395.5	70.8	6/6/17	Advanced through fill	Native Alluvium
B-204	392.0	140.3	6/5/17 to 6/6/17	Advanced through fill	Native Alluvium
B-205	383.0	100.0	6/8/17 to 6/9/17	Advanced through fill	Native Alluvium

6.4 Geophysical Study of Passive Surface Wave Method Feasibility

A geophysical study was conducted at the site by GeoVision on September 10 and 11, 2015 to evaluate the feasibility of using passive surface wave survey for across-the-site characterization of the reclamation fill by shear wave velocity. This feasibility study was conducted to evaluate potentially significant economy of the passive surface wave technique as compared to the cost of the active wave methods previously employed at the site (GeoVision, 2014). Passive surface wave measurements were made at 4 of the 8 geophysical array locations (Arrays 4 through 7) from the 2014 investigation as shown on Figure 1 – Site Map with Proposed Surface Wave Testing Locations in Appendix E-3, and the resulting data were compared with the dispersion curves developed during the 2014 active Vibroseis study. However, only 2 of the 4 locations yielded generally acceptable results. Consequently, use of passive wave methods was not considered an effective means of imaging the shear wave velocity profile for the reclamation fill at the site. The results of the passive wave feasibility study are presented in Appendix E-2.

6.5 Active Surface Wave Geophysical Investigation

A geophysical investigation was conducted at the site by GeoVision from April 10 through April 25, 2017 and from May 8 through May 26, 2017 to expand on the investigation conducted in 2014 and to characterize the variation of the shear wave velocity within the Pit backfill and to aid with delineation of the Pit bottom and walls. Four 2-dimensional (2-D) profiles totaling 6,900 linear feet for the two east-west (A-A' and D-D') and the two north-south (B-B' and C-C') cross-sections were developed. Additionally, 5 1-dimensional (1-D) arrays were established in between the Arrays 2, 3, 7, and 8 from the 2014 investigation to supplement the 2014 data and develop an additional north-south 2-D profile for Cross Section E-E'. Fifteen additional 1-D arrays were conducted near the ends and orthogonal to the 2-D profiles to corroborate the 2-D profiles.

Two active surface wave geophysical techniques were employed during the investigation including spectral analysis of surface waves (SASW) and multi-channel analysis of surface waves (MASW). The MASW technique was used to characterize shear wave velocity distribution in the upper 75 to 100 feet and the SASW technique used a specialized Vibroseis energy source to extend the depth of investigation up to a depth of 300 feet.

The results of the MASW geophysical investigation are included in this report in Appendix E-1, and the interpreted contoured shear wave velocity profiles are superimposed on cross-sections A-A' through E-E' (Plates 5 through 9).

The key notable observations from the interpreted shear wave profiles is the generally gradual increase, i.e., stiffening, of the shear wave velocity with depth and lack of notable softer zones at depth. This is considered a favorable observation as it indicates a generally uniform mass without broader weak zones that would require special mitigation. On Cross-Sections B-B', D-D', and most notably on Cross-Section E-E', zones of higher shear wave velocity, which is indicative of stiffer material, project into shallower depths, which is considered generally favorable, although any variation in uniformity may increase the potential for differential settlement.

6.6 Laboratory Testing

Limited laboratory tests were performed on selected samples recovered from the borings to aid in the classification of soils and to evaluate pertinent engineering properties of backfill materials. The following tests were performed:

- In-situ Moisture Content and Dry Density, ASTM D2937; and
- Consolidation ASTM D2435;

Testing was performed in general accordance with applicable ASTM Standards. Results of laboratory tests are presented in Appendix B. For ease of referral to the soil profile, selected laboratory results, including moisture and density determinations, have also been included on the boring logs in Appendix A-1.

7 SUBSURFACE CONDITIONS

7.1 Regional Geology

The Project site is located near the north-central portion of the San Gabriel Valley, an east-trending structural depression located at the northeast extent of the Los Angeles basin. The San Gabriel Valley is bounded to the north by the San Gabriel Mountains which have been uplifted along the reverse faults that comprise the Sierra Madre Fault System. The northern portion of the San Gabriel Valley, in the vicinity of the site, has been infilled with sediments eroded from the San Gabriel Mountains and deposited on alluvial fans associated with the San Gabriel River located about ¼ mile to the east, and the Sawpit Canyon drainage located about ¾ mile to the northwest of the site.

Based on mapping by the CDMG (1998), the native alluvial fan deposits are late-Pleistocene to early-Holocene age and are composed primarily of sand and gravel that are moderately-well consolidated as indicated by the conditions exposed in local quarry pit walls. In general, the presence of fine-grained horizons (i.e., silt and clay) is typically rare.

Geologic structure within the alluvial outwash fan complex is generally flat with a very gentle gradient to the south. No evidence of significant local folding or fault deformation was interpreted from the available aerial photographs or literature.

7.2 Subsurface Conditions

Previous mining operations cut into the alluvial soils to an estimated minimum elevation of about 174 feet at the deepest point of mining, as interpreted by the elevation of the alluvium contact encountered in B-102 and shown in Cross-Section X-X’ on Plate 4, and by the geometry of the groundwater lake observed in the 1964 aerial photograph. Based upon available regional geology literature the depth to bedrock is likely several hundred feet below the bottom of the pit. The excavated alluvium was replaced with reclamation fill deposits within the entire footprint of the Pit. The limits of the Pit, i.e., the interface between the native alluvium (Qal) and the reclamation fills (Qaf) is illustrated on the Cross-Sections X-X’, A-A’, B-B’, C-C’, D-D’, and E-E’ (Plates 4 through 9).

7.2.1 Alluvium

The entire site is underlain by Quaternary-aged coarse-grained native alluvium deposited by the San Gabriel River, generally consisting of well graded gravel with sand. Native alluvial soils were encountered below the fill materials in Borings B-102, B-104, B-105, B-108; and in B-201 through B-205, as well as in B-1 of the previous investigation by Shannon and Wilson (2014).

7.2.2 Reclamation Backfill

Reclamation backfill was encountered in all 15 borings advanced for this study to bottom depths ranging from 127 to 202 feet. The reclamation backfill units consisted of variable amounts and intervals of soil, rubble, trash and tires. These units are depicted in the “stick-log” plots on

Cross-Sections X-X', A-A', B-B', C-C', D-D', and E-E' (Plates 4 through 9), and are classified into 4 generalized fill units based on the prevailing material as soil fill (≥50% soil), rubble fill (≥50% rubble), tires (≥50% tires), and trash (≥50% mixed solid waste). The estimated percentages of each of the generalized fill units in each of the borings are summarized in Table 2:

Table 2
Summary of Reclamation Fill Units

Boring No.	Fill Thickness (ft)	Approximate Percentage of Generalized Fill Units			
		> 50% Soil	≥50% Rubble	≥50% Tires	Trash
B-1	188	74	13	13	0
B-101	>145*	24	61	10	5
B-102	202	49	46	5	0
B-103	>150*	40	58	2	0
B-104	149	70	24	6	0
B-105	165	59	29	12	0
B-106	>172*	54	26	18	2
B-107	>151*	64	32	4	0
B-108	127	47	50	3	0
B-109	>130.5*	46	47	7	0
B-201	83	60	40	0	0
B-202	42	88	12	0	0
B-203	63	74	26	0	0
B-204	135	67	31	1	0
B-205	92.5	88	12	0	0
Weighted Average %		**57**	**35**	**7**	**1**

* Indicates that the boring did not penetrate the entire fill prism.

Based on the weighted average of the reclamation fill units listed in Table 2, the reclamation fill is composed primarily by soil-based fill complemented by rubble-based fill, with a minor component of approximately 7 percent tires and 1 percent trash. It is suspected that the volume of tires indicated in this table is overestimated, because the aerial photographs indicate tire placement generally only in the central portion of the pit and tires were usually mixed with soil. Fill units composed primarily of soil were generally loose to very dense silty sand and clayey sand with gravel, dense to very dense gravel and sand, with lesser amounts of firm to very stiff sandy clay and silt. Rubble fill was observed to predominantly consist of concrete and brick demolition debris with traces of other constituents as identified in Table 3 for all borings. The observed vertical distribution and estimated relative abundance of these constituents are included in the boring logs in Appendices A-1 and A-2.

Table 3
Observed Occurrence of Reclamation Fill Constituents

Fill Constituent	Boring (B-###)														
	1	101	102	103	104	105	106	107	108	109	201	202	203	204	205
Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Construction Debris / Rubble															
Asphalt / asphalt grindings	X	X		X	X	X	X	X	X	X	X		X	X	X
Bricks / brick fragments	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Concrete	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Concrete (powdered)	X						X						X		
Drywall								X							
Fibers / fibrous pipe (asbestos)[1]		X		X			X	X					X		
Trash															
Car battery									X						
Carpet		X													
Glass		X		X			X	X	X	X			X		
Metal (wire, nails, rebar, etc.)		X	X	X	X	X	X	X		X	X		X	X	X
Oil		X					X	X	X	X	X				
Paper	X	X		X			X		X			X			
Plastic		X		X	X		X		X						
Wood, roots, yard debris or other organic trash	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Tires	X	X	X	X	X	X	X	X	X	X				X	

Note: [1] Asbestos was observed in B-101 at depths from 75 to 78 feet, in B-103 from 140 to 150 feet, in B-106 at scattered occurrences between 22 and 78 feet, in B-107 at 30 feet and in B-203 at 39 feet.

7.2.3 Groundwater

Groundwater was not encountered at the time of our field investigation, as the local groundwater table is currently at/near its historically lowest levels below the bottom of the Pit. It should be noted that groundwater levels fluctuate due to seasonal and climate cycle variations, rainfall, irrigation, or other factors. Evaluation of such factors is beyond the scope of the current work.

Groundwater monitoring wells in the vicinity of the project: A plot of historical groundwater elevations from Los Angeles County wells no's 3010D and 3030F is provided on Plate 10. Well No. 3010D (State Well No. 1S11W12G01) is located at the Hanson Pit, approximately ½ mile south of the Project site with historical data beginning on August 14, 1968. Well No. 3030F (State Well No. 1S10W07R02) is located approximately 1½ miles to the southeast, near the intersection of Scott Place and Landis Avenue with historical data beginning on May 10, 1932. The data were obtained from the California Department of Water Resources (2016) and Los Angeles County Department of Public Works (2017), and are deemed to be representative of approximate groundwater conditions at the Project site.

The data indicates a generally "lowering" trend in water table elevation since the mid 1940's when the highest recorded water table elevation was at elevation 324.7 feet on July 26, 1944, i.e., about 60 feet below the ground surface. The historical low value of 171.2 feet for Well No. 3030F, was measured on September 30, 2016 and on October 7, 2016. The last measurement of water table elevation obtained at Well No. 3010D was 188.7 feet on April 18, 2014 before the well had gone dry.

A thumbnail plot of the groundwater elevation data for the Speedway Pit since 1970 when the backfilling operations had started is also provided on the cross-sections (Plates 4 through 9) to illustrate groundwater level fluctuations during the Speedway Pit's backfill history.

Historic high groundwater level per state mapping: Mapping by the State of California (California Department of Conservation, Division of Mines and Geology, 1998) for the Baldwin Park Quadrangle indicates that the historical high groundwater elevation at the site is estimated to be about 80 to 90 feet below the ground surface, i.e., approximate elevation of 300 feet.

Design groundwater levels per City of Irwindale: Based on Guidelines for Stability Analyses of Open Pit Mine Slopes (Irwindale Slope Stability Committee, 2003, referenced herein as *Slope Stability Guidelines*), historical high groundwater elevation, design groundwater elevation for static condition, and design groundwater elevation for seismic condition at the site is about 324, 280, and 225 feet, respectively.

The design groundwater elevation of 280 feet and 225 feet for static and seismic condition, respectively, will be used for settlement evaluation of reclamation backfills in subsequent sections of this report.

8 ENGINEERING SEISMOLOGY

8.1 General Seismic Setting

The Southern California region is known to be seismically active. Earthquakes occurring within approximately 60 miles of a site are generally capable of generating ground shaking of engineering significance to the proposed construction. The project area is located in the general proximity of several active and potentially active faults, as shown on Plate 11. Active faults are defined as those that have experienced surface displacement within Holocene period (approximately the last 11,000 years). The closest active faults to the site include:

- Raymond fault located approximately 5.5 km to the northwest,
- Whittier fault located approximately 14 km south of the site,
- Cucamonga fault located approximately 29 km to the northeast, and
- Chino fault located approximately 30 km southeast of the site.

In addition, the San Andreas Fault is located about 39 km to the northeast of the site.

A listing of historical earthquakes in Southern California (Southern California Earthquake Data Center) was reviewed to develop the following list of earthquake events of potential significance to the Project site:

- 2008 magnitude 5.4 Chino Hills earthquake near the Whittier and Chino faults [Epicenter location: 33.96°N, 117.76°W; approximately 26 km southeast of the site];

- 1994 magnitude 6.7 Northridge earthquake on blind thrust fault (low angle faults that are not expressed at the ground surface) [Epicenter location: 34.21°N, 118.54°W; approximately 59 km northwest of the site];

- 1992 magnitude 6.4 Big Bear earthquake on a potential conjugate fault to the 1992 Landers rupture [Epicenter location 31.175°N, 116.867°W; approximately 103 km east of the site];

- 1992 magnitude 7.3 Landers earthquake on the Johnson Valley fault (as well as several others) [Epicenter location 34.16°N, 116.4°W; approximately 147 km east of the site];

- 1991 magnitude 5.6 Sierra Madre earthquake on the Clamshell – Sawpit fault [Epicenter location 34.259°N, 118.001°W, approximately 16 km north of the site];

- 1988 magnitude 5.0 Pasadena earthquake on the Raymond fault [Epicenter location 34.14°N, 118.13°W, approximately 14 km northwest of the site];

- 1987 magnitude 5.9 Whittier Narrows earthquake on Puente Hills Blind Thrust Fault [Epicenter location: 34.06°N, 118.08°W; approximately 15 km southwest of the site];

- 1971 magnitude 6.4 San Fernando earthquake which occurred on the San Fernando Fault (the easternmost fault of the Sierra Madre system) [Epicenter location: 34.42°N, 118.37°W; approximately 65 km west-northwest of the site];

- 1933 magnitude 6.3 Long Beach earthquake on the Newport Inglewood Fault [Epicenter location: 33.63°N, 118.00°W; approximately 31 km south of the site];

- 1857 magnitude 7.9 Fort Tejon earthquake on the south central segment of the San Andreas Fault [Epicenter location: 35.43°N, 120.19°W; approximately 261 km northwest of the site].

8.2 Seismic Hazards

The engineering seismology study for the subject site included reviewing local and regional fault maps and the review of historical earthquake data. Specifically, the following engineering seismology issues are addressed:

8.2.1 Seismic Hazard Zones

Maps of seismic hazard zones are issued by the California Geological Survey (CGS, formerly California Department of Conservation, Division of Mines and Geology (CDMG)) in accordance with the Seismic Hazards Mapping Act enacted in April 1997. The intent of the Seismic Hazards Mapping Act is to provide for a statewide seismic hazard mapping and technical advisory program to assist cities and counties in developing compliance requirements to protect the public health and safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure and other seismic hazards caused by earthquakes.

Based on the review of the Baldwin Park Quadrangle Official Map of Seismic Hazard Zones issued March 25, 1999 (CDMG, 1999), the proposed development is not located within an area identified by the State of California as subject to the hazard of liquefaction. It is, however, noted that the City of Irwindale requires liquefaction potential evaluation of pit backfill based on the backfill properties and groundwater conditions regardless of the Seismic Hazard Zone mapping. Based on the results of geophysical survey, materials with shear wave velocity in excess of 1600 ft/sec indicative of very dense condition are found below the design groundwater elevation of 225 feet. Therefore the likelihood of liquefaction of these materials is considered low.

The slope that descends 23 to 35 feet from the easternmost portion of the site to the southbound on ramp for I-605 is located within a zone of required investigation for mitigation of seismically-induced permanent slope displacement (Plate 12). The evaluation of the stability of this slope and recommendations for mitigation measures are presented in the “Slope Stability” section of this report.

8.2.2 Surface Fault Rupture

Official Maps of Earthquake Fault Zones were reviewed to evaluate the location of the Project site relative to active fault zones. Earthquake Fault Zones (known prior to 1994as Special Studies

Zones) have been established in accordance with the Alquist-Priolo Special Studies Zones Act enacted in 1972. The Act directs the State Geologist to delineate the regulatory zones that encompass surface traces of active faults that have a potential for future surface fault rupture. The purpose of the Alquist-Priolo Act is to regulate development near active faults in order to mitigate the hazard of surface fault rupture.

The site is not located within a designated Earthquake Fault Zone for fault surface rupture hazard. The surface traces of any active or potentially active faults are not known to pass directly through or project towards the site. Neither our field exploration nor literature review disclosed an active fault trace projecting to the ground surface in the project area. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low.

8.2.3 Tsunamis and Seiches

Tsunamis are ocean waves triggered by earthquake ruptures along subduction zones (e.g., a tectonic fault rupture on the bottom of the ocean). Due to the site elevation and distance to the ocean, tsunamis are not a threat at the site.

A seiche is a periodic oscillation or “sloshing” of water in an enclosed basin (e.g., lake or reservoir) caused by an earthquake. The period of oscillation is dependent upon the size and configuration of the water body and may range from minutes to hours. Given the size and distance of water basins from the site, it is not necessary to consider the effects of a seiche during earthquake events on the proposed redevelopment.

9 SETTLEMENT OF RECLAMATION BACKFILL

9.1 General

Settlement potential of the reclamation backfill is the key consideration for the design of the Irwindale Speedway redevelopment. The settlement potential forms an input into engineering analyses described in the subsequent "Modeling of Settlement Manifestation at the Surface", section of this report, which is then used for the foundation design for the proposed redevelopment. The settlement potential evaluation is based on the fill characteristics interpreted from our field explorations and laboratory testing and the various published information. Three settlement mechanisms outlined in the Irwindale Technical Advisory Committee (ITAC) monography (2012) are herein considered:

- Seismically-induced settlement;
- Hydrocollapse due to potential rise of groundwater level; and
- Long-term time-dependent static secondary settlement under self-weight.

Settlement due to surcharge from the proposed grading and construction of the project is expected to occur fairly rapidly, given the prevailing granular and non-saturated nature of the materials, and be minimal, given the incremental surcharge produced by the proposed buildings equivalent only to about 2 feet of soil fill.

A reliable estimate of the settlement at the site is difficult to make due to intrinsic uncertainties related to fill composition and properties variations and lack of calibrated industry-accepted settlement prediction procedures for non-engineered, non-uniform, and heterogeneous reclamation fills. Typically, site-specific relationships based on extrapolation of collected data and observed performance provide the best predictions, although the intrinsic variability of non-engineered, non-uniform, and heterogeneous materials still may cause the predictions to be locally unreliable. Even though qualitative observations of the performance of the existing structures and pavement are available and show remarkably good condition of the structures and reasonably acceptable, albeit not perfect, condition of the pavements, no quntitative settlement data are available for the site. Consequently settlement estimates based on published information and relationship remain the only available reference. This section presents a best estimate of the potential upper-bound settlement range of the reclamation backfills based on research of available literature for fill materials.

9.2 Seismically-Induced Settlement

Potential for seismically-induced settlements of engineered fills compacted and certified in accordance with the Guidelines for Above-Water Backfilling of Open-Pit Mines (Irwindale Backfilling Committee, 2005 referenced herein as *Above-Water Backfilling Guidelines*) are likely to be minimal because of the high confidence in their compaction levels and controlled gradation. However, for the non-engineered, non-uniform, and heterogeneous backfill on-site materials the settlement potential during a design seismic events can be significant. The design peak ground acceleration at the Project site per 2016 California Building Code is estimated to be about 0.53g.

Conventional methods (e.g., Tokimatsu and Seed, 1987; Pradel, 1998; Cetin et al., 2009) typically used to estimate seismically-induced settlement of saturated and unsaturated materials were developed for loose sands and granular fills based on in-situ test results such as Cone Penetration Testing tip resistance (q_c) or Standard Penetration Testing blowcount (N_{60}) values. Because of the different material composition of reclamation fills, abundance of large particle sizes, and presence of voids, and the associated inability to obtain meaningful q_c or N_{60} values, as well as because of the significant variations in the reclamation backfill materials composition, these conventional analytical methods are not generally suitable for estimation of settlement of the such materials. However, in the absence of recognized estimation method the results yielded by these methods are considered herein in the context of all available information.

Literature research indicated three case histories of performance of compacted fills during seismic loading. One of the case histories is the performance of compacted fill at the Jensen Filtration Plant during the 1971 San Fernando, California earthquake (Pyke et al., 1975) which experienced estimated peak ground accelerations of about 0.5 to 0.6g comparable to the design ground motion at the site. The site was underlain by clayey sand fill up to about 56 feet thick overlying about 5 to 20 feet of alluvium. Groundwater table was located within the alluvium, which liquefied during the earthquake causing lateral spreading. Observed settlement along the survey baseline was about 5 inches, although some of the settlement could be attributed to lateral spreading. Pyke et al. (1975) estimated the settlement from seismic compression to be about 3.75 inches, which is about **0.55 percent** of the fill thickness.

Stewart et al. (2002) reported two sites with canyon fills in Santa Clarita, California shaken by the 1994 Northridge earthquake. At Site A, the sandy clay fill overlying shallow alluvium and bedrock was up to about 80 feet thick. The relative compaction of the fill was about 88 percent (ASTM D1557), and the fill was generally compacted dry of optimum. Peak ground accelerations were estimated to had been about 0.5 to 0.7g. Seismically-induced settlement as large as 8.7 inches were recorded, which is about **0.9 percent** of the fill thickness.

At the Site B the silty sand fill varying in thickness from 50 to 100 feet thick overlying bedrock was well compacted and placed at relative compaction (ASTM D1557) of about 92 percent near surface and at about 95 percent at depth. Peak ground accelerations were estimated to be about 0.8 to 1.2g. Field-observed settlements of the fill ranged from about 2 to 6 inches, which is about **0.2 to 0.5 percent** of the fill thickness.

None of the researched case histories apply directly to inert debris fill found the Project site. This lack of information is most certainly because of relatively newly developing need for this type of data. AES (2013) attempted to estimate seismically-induced settlements of 80 feet thick rubble fills underlying a proposed overexcavation/recompaction zone within the Nu Way Arrow Pit, which is immediately to the north of the Project site, using approach developed by Stewart et al. (2002) based on Site A and Site B case histories described above. Based on the design peak ground motion per 2010 California Building Code, and a ProShake (version 1.12) code utilized to evaluate the induced shear stress and shear strains within the fill, the seismically-induced settlement was estimated using Stewart et al. (2002) relationships between shear strain and volumetric strain, originally developed for compacted fills, to be up to about 12.5 inches, which is about **1.3 percent** of the fill thickness.

Based on the above information and considering the heterogeneity and potentially lesser compaction of the reclamation fills, we have conservatively elected to use for estimation of the upper-bound seismically-induced settlement of reclamation backfills a strain of **1.5 percent** of fill thickness. Seismically-induced settlement is anticipated to take place in the unimproved, non-engineered, non-uniform, and heterogeneous reclamation backfill materials above the design groundwater level. As the surficial Improved Zone will be engineered, negligible seismically-induced settlement is anticipated within this zone.

9.3 Hydrocollapse Settlement

Hydrocollapse, also known as wetting-induced settlement, can take place when water is introduced into a metastable soil/rubble structure usually due to rising groundwater, infiltration of irrigation or precipitation water, or leaks from the pipes. Upon wetting, the metastable matrix collapses into a smaller volume. The hydrocollapse settlement of inert debris fills has been investigated by ITAC (2012). The investigation consisted of obtaining bulk samples of inert debris fill material up to 12 inches maximum grain size, scalping the samples to 0.75-inch maximum size, testing them in the laboratory, correcting the results for actual gradation, and interpreting the results. A total of 7 test specimens were prepared, including three at 86 percent relative compaction, three at 91 percent relative compaction, and one at 94 percent relative compaction. The test specimens were loaded incrementally until reaching a vertical stress of either 10,000 psf or 20,000 psf, i.e., approximately equivalent to a depth of 80 and 160 feet, which represented the upper limit of the test apparatus. Upon reaching the maximum stress level and being allowed to compress to equilibrium, the specimens were inundated and the associated hydrocollapse settlement was measured. Based on the results of the laboratory testing, it was concluded that.

- There is potentially significant variability in the hydrocollapse behavior of inert debris fills.
- Hydrocollapse is dependent on the relative compaction of the fill where, predictably, poorly compacted fills have significantly greater collapse potential than well compacted fills.
- Hydrocollapse strain increases with overburden pressure (i.e., depth below the ground surface), and, consequently, most of the hydrocollapse settlement occurs in the deeper portions of the fills.
- There is a threshold stress below which hydrocollapse will not occur. This threshold stress increases with the relative compaction of the inert fills.

Hydrocollapse settlement is expected to take place in a zone below the design groundwater elevation at 280 feet and above the recent, post-backfilling, high groundwater experienced at the site at elevation 265 feet three times between 1993 and 2000. Below this elevation any potential hydrocollapse is anticipated to have already had taken place. Based on Figure 4 of the ITAC (2012) monography, the hydrocollapse settlement of inert debris fills in a zone between 100 and 115 feet below the ground surface (i.e., from elevation 280 to 265 feet) assumed to have been compacted to a relative compaction of 86 percent was estimated to be about 2 inches, which is about 1.2 percent of the fill thickness. For this study, the upper-bound hydrocollapse settlement was conservatively assumed to be **2.4 percent**, i.e., a multiple of 2 of the value provided in Figure 4 (ITAC, 2012), of the fill thickness.

9.4 Static Secondary Settlement under Self-Weight

The time-dependent static secondary settlement under self-weight can be estimated using the following equation (Sowers, 1973):

$$\Delta H = \alpha * H * \log\frac{t2}{t1}$$

Where:

ΔH ... long term secondary settlement
H … fill thickness
α ... coefficient of secondary settlement
t_1 ... starting time for settlement estimation since the start of secondary consolidation
t_2 ... ending time for settlement estimation since the start of secondary consolidation

There is no information regarding the specific values of the secondary settlement coefficient for inert debris fills. Sowers et al. (1965) reported that values of α for rockfill dams to be within the range 0.002 to 0.007 although there was a tendency for most results to lie at the extremes of this range and the high values appear to had been associated with dumped fill construction, whereas the low values were associated with rockfill placed in controlled manner. Settlement monitoring data from the adjacent Nu-Way Arrow Pit for a period of about 2.5 years from 2010 to 2013 indicated a coefficient of secondary settlement of 0.0005 to 0.0022 (AES, 2013).

Knowing that backfilling at the project site started in the mid-1970s and was completed in 1993 and assuming the start of secondary consolidation at the 2/3 of this interval, i.e., in 1985, the anticipated long term settlement of the landfill materials during the lifetime of the project of 50 years starting in 2020, i.e., $t_1 = 35$ years and $t_2 = 85$ years, for α taken conservatively as 0.006, and the prevailing fill thickness of 70 feet within a zone below the post-backfilling groundwater high and the bottom of the pit is estimated to be about 2 inches, which is about **0.2 percent** of the fill thickness. For this study, we have conservatively adopted **0.25 percent** of the fill thickness for estimation of the upper-bound secondary settlement potential of the fill.

9.5 Overall Settlement Estimate

When subject to seismic loading and/or saturation due to groundwater rise, the predominant mechanisms of settlement in the debris fill are considered to be filling of the cavities by fines migration and collapse of the metastable nested structure. Volumetric compression of the debris fill will also take place during seismic loading or hydrocollapse but this compression is significantly smaller than the two aforementioned dominant settlement mechanisms. Because the same mechanisms apply to both seismically-induced settlement and hydrocollapse, the potential hydrocollapse settlement and seismically-induced settlement for the debris fill are complementary rather than cumulative and, therefore, for the design, the larger compression of the two mechanisms, i.e., hydrocollapse, will govern.

The settlement estimates of the non-engineered, non-uniform, and heterogeneous reclamation backfill materials for each settlement mechanism within the respective zone were developed based on the conservatively assumed upper-bound strains discussed above. The summary of the assumed upper-bound strains and the calculation of the settlement for the considered Improved Zone thicknesses and assuming a typical pit bottom at elevation 190 feet is shown in Table 4 below.

Table 4
Upper Bound Settlements below the Improved Zone of Various Thickness

Zone	Zone Extent	Settlement Mechanism	**Assumed Strain (%)**	Zone Thickness (feet)	Upper-Bound Settlement (inches)
Improved Zone	Surface at el.380' to el.340' – 320'	Negligible settlement because the material is processed	**negligible**	40 50 60	negligible
Non-Engineered Backfill that will never be subject to inundation	From bottom of Improved Zone to el.280' (design gw level)	Seismically-induced unsaturated settlement only	**1.5**	60 50 40	10.8 9.0 7.2
Non-Engineered Backfill that could be subject to inundation	From design gw level at el.280' to post-backfilling gw high at el.265	Both seismically-induced settlement and hydrocollapse mechanisms possible; hydrocollapse mechanism deemed governing	**2.4**	15	4.4
Non-Engineered Backfill that has already been subject to inundation	From post-backfilling gw high at el.265' to the pit bottom typically at el.190'	Long term secondary settlement under self-weight	**0.25**	75	2.3
Native Alluvium	Below pit bottom typically at el.190'	Negligible settlement	**negligible**	n/a	negligible
				Upper-Bound Total Settlement	**17.5** **15.7** **13.9**

10 MODELING OF SETTLEMENT MANIFESTATION AT THE SURFACE

10.1 Introduction

The hydrocollapse, seismically-induced settlements, and time dependent static secondary settlements will occur in the non-engineered, non-uniform, and heterogeneous reclamation backfills. Because the Improved Zone is constructed of processed, engineered, and compacted materials, only negligible settlements are expected within the Improved Zone. As discussed in Section 9, the settlements of the non-engineered, non-uniform, and heterogeneous reclamation backfill materials below the Improved Zone within the prevailing pit depth are estimated to conservatively range between about 14 to 17.5 inches. These settlements then propagate through the Improved Zone to the surface where their magnitude and distribution directly impact the performance of at-grade improvements. The Improved Zone will redistribute and "even out" the differential settlement distribution and so mitigate the potential for excessive differential settlement at the finish grade.

The Improved Zone is proposed to be constructed by combination of overexcavation, processing, and recompaction (O&R) of the existing near-surface fill materials, and in-place deep dynamic compaction (DDC) of the underlying reclamation fill materials. Practically, the construction of the Improved Zone is anticipated to include a continuous overexcavation of a portion of the site, followed by the DDC at the overexcavation subgrade while the overexcavated material is being processed, and placement and recompaction of the processed material behind the advancing DDC operation.

The Improved Zone mitigates the magnitude of the total settlement only partially (up to about 35 percent reduction, see Tables 6a through 6c) but is expected to be effective in mitigating differential settlement, which is the primary consideration for design of at-grade improvement. The level of mitigation of the total and differential settlement at the grade level is a function of the thickness of the Improved Zone. The evaluation of the thickness and composition of the Improved Zone on the mitigation of the total and differential settlement at the grade level is subject to the numerical modeling presented in this section. The Improved Zone is modeled assuming 10, 20, and 30 feet of O&R and assuming a conservative improvement depth of DDC of 30 feet. Thus the total Improved Zone thicknesses of 40, 50, and 60 feet are considered in the modeling.

The surface settlement manifestation was evaluated using the code FLAC (Fast Lagrangian Analysis of Continua), version 8.0 (Itasca, 2015); a program that has been widely used for geotechnical engineering applications. FLAC is a two-dimensional that uses explicit finite difference numerical technique to simulate the non-linear stress – deformation behavior within soils.

10.2 Model Description

Cross-Sections A-A' and E-E' were selected as representative cross-sections for the modeling of the site. Location and profile of Cross-Sections A-A' and E-E' are shown on Plates 5 and 9, respectively. The schematic diagram of the Improved Zone configuration for use in the numerical modeling is shown in Figure C-1/1a in Appendix C-1 and Figure C-2/1 in Appendix C-2, for

Cross-Sections E-E' and A-A', respectively. The model grid size of 5x5 feet was selected to provide achieve a reasonable accuracy while maintaining computation efficiency. Global grids and local grids for FLAC modeling within the areas adjacent to the perimeter slope for the 50 feet thick Improved Zone are shown in Figures C-1/1b and C-1/1c in Appendix C-1.

Three scenarios were considered for evaluation of the effects of the Improved Zone on the surface settlements:

Scenario 1 … within the central portions of the site where the thickness of the reclamation backfill is essentially uniform without substantial variations;
Scenario 2 … along the pit north and south boundaries; and
Scenario 3 … near the slope along the eastern boundary of the site adjacent to I-605.

Section E-E' (Plate 9) is considered the typical design cross-section. A fixed boundary condition was applied along the pit bottom slope boundary at the right (north) side of the model to reflect that the settlement of the underlying alluvium is expected to be negligible. Along the left (south) side of the model the displacements were fixed in the horizontal direction and free to move in the vertical direction to reflect that the landfill continues to the south. To minimize the boundary effect, the model domain was extended 100 feet beyond the southern property line. This cross-section was utilized to evaluate the performance of the Improved Zone within the central portions of the site, and for the performance of the Improved Zone near the pit perimeter slopes, i.e., Scenarios 1 and 2.

The eastern end of Cross-Section A-A' (Plate 5) was analyzed to evaluate the performance of the Improved Zone near the slope along the eastern site boundary adjacent to I-605, i.e., Scenario 3. The left and right boundaries (west and east, respectively) of the model were fixed in the horizontal direction and free to move in the vertical direction. .

The 2-dimensional models were first initialized by turn-on gravity to establish in-situ geostatic stresses. For both models the bottom boundary was then assigned prescribed distribution of displacements to reflect the settlements of the underlying non-engineered, non-uniform, and heterogeneous reclamation backfill discussed in the "Settlement of Reclamation Backfill" section of this report. The distribution of the displacements along the bottom boundary was calculated based on the thickness of the underlying reclamation backfill utilizing the assumed upper-bound strains from Table 4. Table 4 also shows the calculation of the total settlement of the materials below the Improved Zone for a typical pit reclamation backfill depth. As expected, the table shows that increase in the thickness of the Improved Zone results in decrease of the total settlement because more of the compressible reclamation fill is replaced with relatively incompressible Improved Zone material.

For the numerical modeling two displacement distributions along the bottom boundary of the numerical models were evaluated:

- Realistic <u>design</u> displacement distribution was based on settlement distributed in a sinusoidal wave pattern ranging from 25 to 75 percent of the estimated upper-bound settlement over a horizontal distance of 70 feet; and

- Realistic conservative design displacement distribution was based on settlement distributed in a sinusoidal wave pattern ranging from 20 to 80 percent of the estimated upper-bound settlement over a horizontal distance of 50 feet.

Although these two settlement distributions were intended to represent a design and a conservative case, i.e., the results of the conservative case were expected to be "worse" than for the design case, the results actually indicated that these two cases are complementary, i.e., either case could be governing depending on the specific scenario, and the design recommendations were therefore based on results of both cases.

The calculation of the minimum and maximum settlements for all analyzed cases of Improved Zone thicknesses and settlement distributions is shown in Tables C-1/1 through 7 in Appendix C-1 and Tables C-2/1 through 7 in Appendix C-2, for Cross-Sections E-E' and A-A', respectively. These minimum and maximum settlements were connected by a sinusoidal half-wave. The sinusoidal wave pattern of settlement distribution was selected because a linear "zig-zag" distribution resulted in excessive concentration of stresses at the "zig-zag" extremes and local model instability. To further allow for a "natural" distribution of displacements and their propagation into the Improved Zone, a thin 3 feet thick relatively weak transition zone was included at the bottom of the model as shown in Figure C-1/1a in Appendix C-1 and Figure C-2/1 in Appendix C-2 for Cross-Sections E-E' and A-A', respectively.

10.3 Input Soil Parameters

The Improved Zone is composed of an overexcavation and recompaction (O&R) zone and a DDC zone. As discussed in the previous section, a 3 feet thick weak transition zone is included below the Improved Zone to reduce the stress concentrations under the applied base displacements. Both the O&R, DDC, and transition zones were modeled as elastic-plastic materials with Mohr-Coulomb yield criterion. Soil parameters adopted for numerical modeling are summarized in Table 5 below. Shear strength parameters were estimated based on expected material gradation, processing and compaction requirements of the Improved Zone components. Shear wave velocity for O&R zone was assumed based on the anticipated dense nature of the granular sandy/gravelly fill material, while the shear wave velocity of the DDC zone was estimated by slightly increasing (about 20 percent) shear wave velocity measured during the geophysical survey included in this report for the upper about 50 to 60 feet of the on-site fill. Input parameters for the 3 feet thick transition zone were selected to be relatively significantly weaker than the Improved Zone components.

Table 5
Summary of Input Soil Parameters

Constitutive Model	Mohr - Coulomb Plastic Model		
Parameter	O&R Zone (10 to 30 feet thick)	DDC Zone (30 feet thick)	Transition Zone (3 feet thick)
Unit weight (pcf)	135	135	135
Shear wave velocity (ft/s)	1,100	920	92
Bulk Modulus (psf)	1.10E+07	7.70E+06	7.70E+04
Shear Modulus (psf)	5.08E+06	3.55E+06	3.55E+04
Cohesion (psf)	0	0	0
Friction angle (deg)	38	35	10
Poisson’s ratio	0.3	0.3	0.3
Tensile strength (psf)	0	0	0
Dilation angle (deg)	10	7	0

10.4 Analyses Results

Surface settlement manifestation was evaluated in terms of maximum total settlement, maximum differential settlement within any 250 feet long segment (intended to model a footprint of a typical proposed building) of the model surface, and maximum angular distortion and maximum deflection ratio over any 30 feet long segment. Angular distortion is calculated as the difference in settlement between any two points along the model surface spaced 30 feet apart. The deflection ratio is defined as the difference between the calculated settlement at the midpoint of any 30-foot segment and the average of the calculated settlements at the two endpoints of that 30-foot segments.

The analyses for all 3 considered thicknesses of the Improved Zone (i.e., 40, 50, 60 feet) and for the realistic design and realistic conservative design displacement distributions for the typical design case (Cross-Section E-E’), conditions near the pit perimeter slopes (north/right end of Cross-Section E-E’), and for the conditions near the slope along the east property boundary (east/right end of Cross-Section A-A’) are provided in Tables 6a, 6b, and 6c below.

Table 6a below summarizes the results for the typical design case (Scenario 1) applicable for development on the interior of the site.

Table 6a
Summary of Modeling Results
Typical Design Case
Cross-Section E-E', Figure C-1/1a in Appendix C-1

Improved Zone Thickness (feet)	Maximum Total Settlement below Improved Zone (inches)	Maximum Total Surface Settlement (inches (%))[1]	Maximum Differential Settlement (within any 250'segment, except near pit perimeter) (inches)	Maximum Angular Distortion (inch/30 feet)	Maximum Deflection Ratio (inch/30 feet)	Figure No. in Appendix C-1
Realistic design displacement distribution 25 to 75 percent of the upper bound settlements over 70 feet						
10': 10' O&R[2]	17.0	17.0 (0%)	11.4	6.9	1.3	C-1/2
40': 10' O&R + 30' DDC	13.0	10.2 (-22%)	4.4	2.7	0.6	C-1/3
50': 20' O&R + 30' DDC	11.6	8.9 (-23%)	3.5	1.8	0.4	C-1/4
60': 30' O&R + 30' DDC	10.3	7.6 (-26%)	2.6	1.1	0.2	C-5
Realistic conservative design displacement distribution 20 to 80 percent of the upper bound settlements over 50 feet						
40': 10' O&R + 30' DDC	13.8	10.1 (-27%)	4.2	3.2	0.9	C-1/6
50': 20' O&R + 30' DDC	12.4	8.7 (-30%)	3.1	2.1	0.5	C-1/7
60': 30' O&R + 30' DDC	11.0	7.2 (-35%)	2.4	0.3	0.1	C-1/8

Notes: [1] Percentage in brackets indicates reduction of total settlement at the surface relative to the total settlement at the bottom of the Improved Zone.
[2] Results of modeling of Improved Zone with only 10-foot overexcavation, i.e., no DDC, are presented for comparison purposes only.

Table 6b below summarizes the results for the analyses of the surficial settlement manifestation along the north property line along Live Oak Avenue and south property line along Hanson America Pit, i.e., Scenario 2. This area is particularly prone to large differential settlement due to the abruptly varying thickness of the underlying compressible reclamation backfill. These analyses are intended to be used for development of setback requirements and for design of site entry and exit facilities including underground utilities, flatwork and pavements.

Table 6b
Summary of Modeling Results

Conditions near the Pit North and South Perimeter Slopes

north/right end of Cross-Section E-E', Figure C-1/1a in Appendix C-1

Improved Zone Thickness (feet)	Maximum: Total Settlement below Improved Zone (inches)	Maximum: Total Surface Settlement (inches (%))[1]	Maximum: Differential Settlement (within any 250'segment) (inches)	Maximum: Angular Distortion (inch/30 feet)	Maximum: Deflection Ratio (inch/30 feet)	Figure No. in Appendix C-1
Realistic design displacement distribution 25 to 75 percent of the upper bound settlements over 70 feet						
10': 10' O&R[2]	16.1	16.0 (0%)	16.1	7.2	1.5	C-1/2
40': 10' O&R + 30' DDC	12.0	9.3 (-22%)	9.4	3.1	0.7	C-1/3
50': 20' O&R + 30' DDC	10.7	8.2 (-23%)	8.2	2.6	0.5	C-1/4
60': 30' O&R + 30' DDC	9.3	6.8 (-26%)	6.8	1.9	0.3	C-1/5
Realistic conservative design displacement distribution 20 to 80 percent of the upper bound settlements over 50 feet						
40': 10' O&R + 30' DDC	12.6	9.1 (-29%)	9.0	3.0	0.8	C-1/6
50': 20' O&R + 30' DDC	11.2	7.8 (-30%)	7.7	2.2	0.5	C-1/7
60': 30' O&R + 30' DDC	9.8	6.8 (-35%)	6.6	1.6	0.4	C-1/8

Notes: [1] Percentage in brackets indicates reduction of total settlement at the surface relative to the total settlement at the bottom of the Improved Zone.
[2] Results of modeling of Improved Zone with only 10-foot overexcavation, i.e., no DDC, are presented for comparison purposes only.

Table 6c below summarizes the results for the analyses of the surficial settlement manifestation the along the east property line above I-605, i.e., Scenario 3. This area is prone to larger differential settlement due to the proximity of the free face and the varying thickness of the underlying compressible reclamation backfill. These analyses are intended to be used for development of setback requirements and for design of facilities in the close proximity of the east property line.

Table 6c
Summary of Modeling Results

Conditions near the Slope along the East Property Boundary

east/right end of Cross-Section A-A', Figure C-2/1 in Appendix C-2

Improved Zone Thickness (feet)	Maximum Total Settlement below Improved Zone (inches)	Maximum Total Surface Settlement (inches (%))[1]	Maximum Differential Settlement (within any 250'segment) (inches)	Maximum Angular Distortion (inch/30 feet)	Maximum Deflection Ratio (inch/30 feet)	Figure No. in Appendix C-2
Realistic design displacement distribution 25 to 75 percent of the upper bound settlements over 70 feet						
10': 10' O&R[2]	13.1	13.1 (0%)	14.3	3.1	1.0	C-2/2
40': 10' O&R + 30' DDC	9.8	9.0 (-8%)	8.4	2.7	1.0	C-2/3
50': 20' O&R + 30' DDC	8.8	8.0 (-9%)	8.1	1.7	0.1	C-2/4
60': 30' O&R + 30' DDC	7.9	7.1 (-10%)	7.5	1.3	0.1	C-2/5
Realistic conservative design displacement distribution 20 to 80 percent of the upper bound settlements over 50 feet						
40': 10' O&R + 30' DDC	13.8	10.0 (-27%)	9.5	3.6	0.9	C-2/6
50': 20' O&R + 30' DDC	12.3	8.6 (-30%)	8.4	2.8	0.7	C-2/7
60': 30' O&R + 30' DDC	10.9	7.6 (-30%)	7.8	2.3	0.5	C-2/8

Notes: [1] Percentage in brackets indicates reduction of total settlement at the surface relative to the total settlement at the bottom of the Improved Zone.
[2] Results of modeling of Improved Zone with only 10-foot overexcavation, i.e., no DDC, are presented for comparison purposes only.

The following conclusions should be utilized for the selection of the locations of the proposed buildings and improvements and for the selection of the thicknesses of the Improved Zone components:

- Improved Zone consisting of only 10-foot O&R, i.e., no DDC, has negligible beneficial effects on mitigation of surface settlements at the finish grade. This analysis indicates that significantly more substantial Improved Zone is needed to achieve effect of engineering significance.

- Comparison of the realistic design and realistic conservative design settlement distribution analyses indicate a very similar surface settlement deformation pattern. This is because the larger differential settlement distributed over a shorter distance for the realistic conservative design displacement distribution gets redistributed through the Improved Zone more efficiently than for the realistic design distribution. This observation is important as it suggests that within reasonable variation of the differential settlement of the materials below the Improved Zone, the surface settlement manifestation pattern will be similar and that the abrupt differential settlement will be efficiently mitigated by the Improved Zone.

- For the typical design case (Scenario 1) the maximum total settlement manifested at the finish grade varies from about 7 to 10 inches, decreasing as the thickness of the Improved Zone increases. Thus the settlement at the bottom of the Improved Zone is reduced by 22 to 35 percent at the surface. The reduction increases with increasing Improved Zone thickness. Similar improvements are realized for Scenarios 2 and 3 along the site boundaries.

- Maximum differential settlement within a distance of 250 feet manifested at the finish grade varies from about 2.4 to 4.4 inches for Scenario 1, decreasing as the thickness of the Improved Zone increases. However, for Scenarios 2 and 3 along the pit boundaries the maximum differential settlement within a distance of 250 feet manifested at the finish grade increases to about 6.6 to 9.5 inches. Structural setback zone should be therefore implemented in these regions as discussed in the “Structural Setback Zones” section of this report.

- Maximum angular distortion manifested at the finish grade varies from about 0.3 to 3.6 inches over a horizontal distance of 30 feet, decreasing as the thickness of the Improved Zone increases.

- Maximum deflection ratio manifested at the finish grade varies from about 0.1 to 1.0 inches in the middle of any 30-foot segment also decreasing as the thickness of the Improved Zone increases.

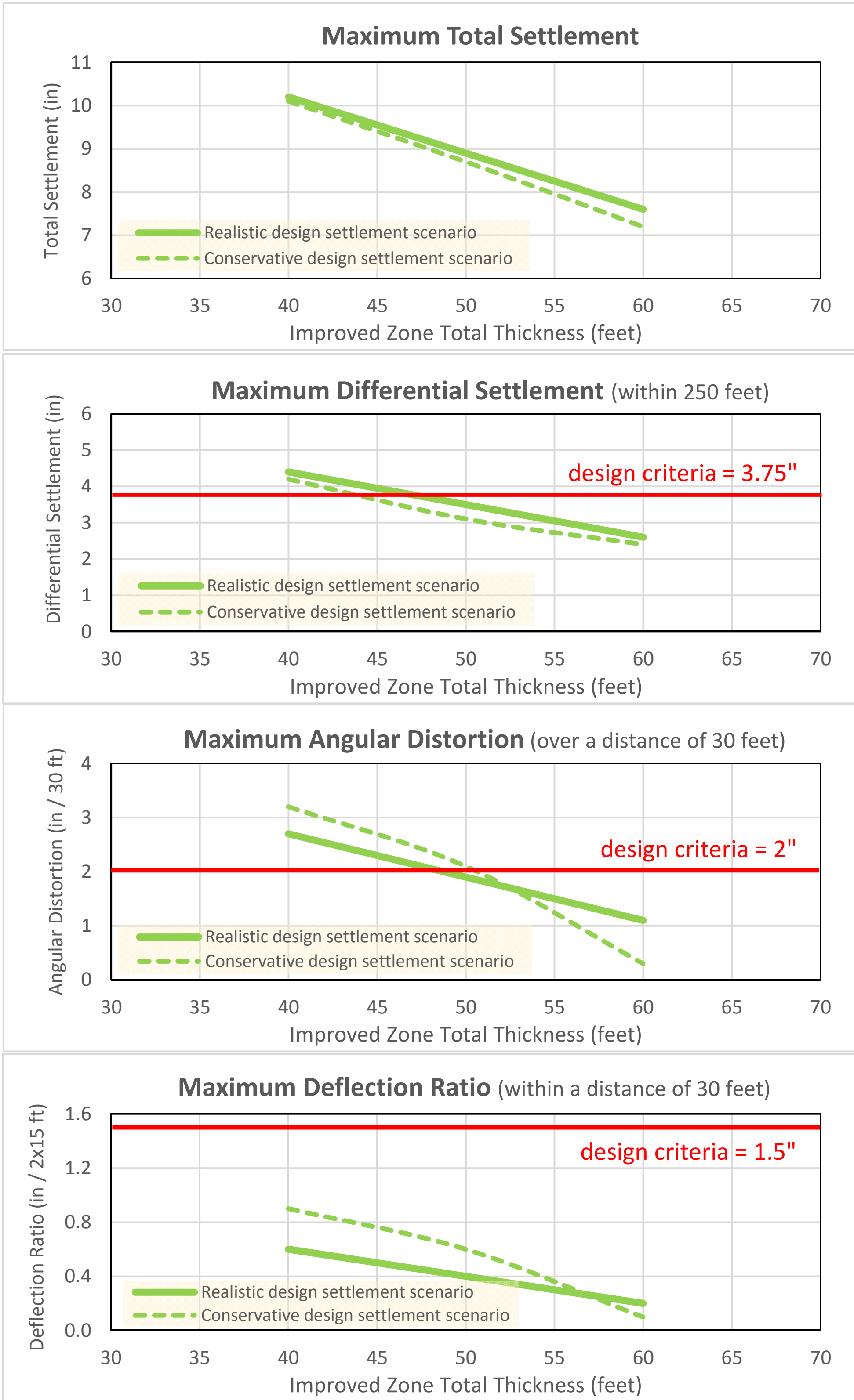


Figure 1. Design settlement parameters for Typical Design Case (Scenario 1)

10.5 Sensitivity Analyses

Sensitivity analyses were performed for the realistic design displacement distribution for the typical design case (Section E-E') for the 50 feet thick Improved Zone to evaluate the effects of selected input material parameters on the surface settlement manifestation. Results of sensitivity analyses are presented in Figures C-1/9 through C-1/11 in Appendix C-1. Specifically, the effect of the following parameters were evaluated:

- Strength parameters: friction angles of the Improved Zone materials were increased and decreased by 3 degrees;

- Strength parameters: dilation angles of the Improved Zone materials were increased and decreased by 3 degrees; and

- Stiffness parameters (i.e., bulk modulus and shear modulus) of the Improved Zone materials were increased and decreased by one order of magnitude

Results of sensitivity analyses indicated that:

- Friction angle change of +/- 3 degrees has a negligible effect on the surface settlement manifestation;

- Dilation angle change of +/- 3 degrees has a negligible effect on the surface settlement manifestation

- Bulk modulus and shear modulus change by one order of magnitude has a negligible effect on the surface settlement manifestation.

The sensitivity analyses indicate that meaningful variations of input material parameters result in relatively minor differences in the resulting surface settlement manifestation. This is considered favorable as the numerical modeling appears to be relatively insensitive to the variations of the key design parameters that needed to be estimated, rather than measured, while yielding meaningful result variations based on the thickness of the Improved Zone. This robustness provides confidence that the thickness of the Improved Zone is the key factor to optimize the surface settlement manifestation.

11 SLOPE STABILITY

Slope stability analysis was performed to evaluate the static and seismic stability of the existing slope descending from the eastern margin of the site to the southbound I-605 on-ramp. The slope is apparently located within the site property and the toe terminates adjacent to the Caltrans right-of-way. This slope is located within a zone of required investigation for mitigation of seismically-induced permanent ground displacement (CDMG, 1999) as shown on Plate 12.

Based on the provided topographic plan made as shown on Plates 2A and 2B the slope is 23 to 35 feet high with a gradient of 2(H):1(V). The slope is formed by undocumented fill presumably placed to cover the landfill materials. The thickness of the cover is not known but because of its undocumented nature the slopes will need to be reconstructed.

Both static and pseudostatic analyses were performed in accordance with the City of Irwindale Slope Stability Guidelines, 2016 California Building Code, and Guidelines for Evaluation and Mitigation of Seismic Hazards in California: Special Publication 117A (CGS, 2008).

These analyses were utilized to delineate the extent of the necessary rebuilding of the slope and to determine the setback from the top of the slope for the proposed redevelopment structures.

11.1 Material Shear Strength

The shear strength parameters assumed for the materials are summarized in Table 7. Strength parameters for the native alluvium (Qal) were conservatively determined in accordance with the referenced City of Irwindale Slope Stability Guidelines. For other materials, shear strength parameters were assumed based on the anticipated soil classification, gradation, and recommended ground improvement technique.

Table 7
Summary of Material Shear Strength Parameters

Material	Unit Weight	Friction Angle	Cohesion
	(pcf)	(deg)	(psf)
Engineered Fill to rebuilt the slope (overexcavation and replacement)	135	38	0
Deep Dynamic Compaction Zone (DDC)	135	35	0
Alluvium	140	45	0
Existing Soil/Rubble Fill	125	32	0

11.2 Seismic Demand

Seismic demand for the seismic stability was performed in accordance with the City of Irwindale Slope Stability Guidelines. Based on this approach, the slope is required to perform adequately under the Maximum Considered Earthquake (MCE) design ground motions defined in

Section 1613 of the 2016 California Building Code. The design acceleration response spectrum is presented in Figure F-1 in Appendix F. The associated PGA for the design MCE event was estimated to be about 0.53g.

11.3 Slope Stability and Permanent Seismic Deformation Analyses

The analysis was performed using the computer program Slope/W (Geo-Slope Office, 2016) with Spencer's limit equilibrium method. Pseudo-static slope stability was performed to determine the yield acceleration of the slope. Simplified permanent seismic deformation analyses were performed using the method developed by Bray and Travasarou (2007) that considers the following:

- Earthquake magnitude;
- Yield acceleration of the slope;
- Fundamental period of the failure mass T_s; and
- Spectral acceleration corresponding to the degraded fundamental period at $1.5T_s$

Details of the slope stability and permanent deformation analyses are presented in Appendix F. Results of static slope stability and permanent seismic deformation analyses are summarized in Table 8.

Table 8
Results of Slope Stability and Seismic Deformation Analyses

Analysis	Global Stability
Static Stability	
Static Factor of Safety (acceptable if $FS_{static} \geq 1.5$)	1.8
Figures in Appendix F	F-2
Seismic Stability and Deformation Analysis	
Yield horizontal acceleration (k_y)	0.292g
Deformation during a design MCE event (acceptable if $\delta_{seismic} < 6$ inches)	6 inches
Figures in Appendix F	F-3/4

The analysis of the results provides the following observations and conclusions:

- Static Slope Stability: the proposed slope achieves a Factor of Safety greater than 1.5 and, therefore, is considered statically stable.

- The permanent seismic displacement for the design MCE per 2016 California Building Code is about 6 inches and is therefore considered acceptable for non-rigid improvements constructed adjacent to the slope, i.e., pavements, landscape areas.

- The undocumented fill composing the slope needs to be excavated to a minimum horizontal distance of 25 feet as measured from the face of the slope and the slope rebuilt at an inclination 2(H):1(V). Additionally, an 8 feet wide bench in the mid height of the slope is required by the County of Los Angeles Grading Guidelines Appendix J (2011) for slopes taller than 30 feet.

- Rigid improvements, i.e., structures, foundations, buried utilities, should be set back a minimum distance of 15 feet from the top of the slope.

12 DESIGN RECOMMENDATIONS

12.1 Design Considerations

This section is intended to provide geotechnical design and construction recommendations for the proposed redevelopment of the Irwindale Speedway. Based on the results of the subsurface explorations and engineering analyses, it is Tetra Tech's opinion that construction of the proposed development is feasible from the geotechnical standpoint, provided that the recommendations contained in this report are incorporated into the project design and construction.

The primary geotechnical consideration for the design of the proposed development is characterization and mitigation of the potential excessive total and differential settlements at the surface grade where the proposed improvements will be founded. Based on the herein presented analyses, unless mitigated, a total maximum settlement at the surface within the site up to about 17 inches can be anticipated. However, this parameter is not considered governing for the design because total settlement does not have a significant effect on the performance of the surface improvements. Instead, the key parameters for the performance of the surface improvements are the differential settlement across the structure/building footprint, angular distortion, and deflection ratio. These parameters cause bending and shearing of the foundation elements and can result in cracks, offsets, and separations. The herein presented numerical modeling shows that these parameters can be significantly improved by increasing the thickness of the Improved Zone.

Special considerations will be needed for the design of the utility connections entering the site. It is expected that most of the utilities will enter the site from Live Oak Avenue and will then cross the over the variable thickness fill zone to reach the destinations within the site. The entry of the utilities from outside of the site will require flexible connections capable of accommodating the anticipated total settlement.

Besides foundations, performance of a building is also affected by the building structural design which can be performed to accommodate increased foundation settlements by increasing reinforcement, by use of high strength materials, and by selection of structural framing systems that accommodate larger deformations. Therefore, in order to optimize the performance, efficiency, and also cost of the construction, the selection of the thickness of the Improved Zone should be performed in conjunction with the options provided by the structural design.

It is conceivable that Improved Zones with different characteristics, e.g., different thicknesses, only O&R, only DDC, could be implemented in different portions within the site. For instance, <u>only</u> DDC may be used under the parking areas whereas O&R <u>and</u> DDC would be used under the buildings and walkway and plaza areas.

The processing and recompaction of the reclamation fills and the use of DDC for the construction of the Improved Zone will result in significant shrinkage of materials. Lowering of the grade by DDC on the order 1 to 2 feet is typical. Processing and recompaction of the reclamation fill can result in volume shrinkage in excess of 10 percent. Additionally, the anticipated settlement of the site on the order of 10 inches, depending on the design of the Improved Zone, requires overbuilding of grades to ensure long term performance of drainage grades and gravity utilities, i.e., storm drains, sewer. As a result, a significant volume of import fill may be needed.

The proposed buildings may be supported on shallow foundation system reinforced and configured to accommodate anticipated settlement distribution depending on the selected parameters of the Improved Zone. In order to promote similar surface settlement response, the walkaway and plaza areas and areas between closely spaced buildings should be founded on the same Improved Zone as the buildings. The flatwork should be dowelled into the building mat foundations and across frequent control joints.

The proposed Improved Zone design is intended to minimize adverse effects of total and differential settlement and prevent catastrophic response to an extreme event such as excessive settlement due to earthquake or hydrocollapse, but higher than "regular/normal" site risk for increased maintenance and repairs still remains. The provided Improved Zone design recommendations are intended to significantly minimize such risk but do not eliminate it. Therefore, localized distress due to exceedance of the design criteria can conceivably occur within the development that will require localized maintenance and/or repair.

No corrosion potential evaluation was performed for the on-site soils that will be in contact with buried concrete and metals because of the currently unknown composition and processing of the near surface materials and their variability.

Given the prevailing granular nature of the on-site materials, potential for post-construction expansion-related effects of the subgrade soils on the proposed improvements is considered minimal.

The geotechnical design recommendations presented below are based on Tetra Tech's current understanding of the Project and are intended for grading and structural design and for submittal for issuance of grading and construction permits. These design recommendations should be reviewed once the project layout, configuration, performance criteria, and structural design are established. Tetra Tech should review finalized plans and specifications to evaluate if the geotechnical design recommendations have been incorporated as intended.

12.2 Settlement Design Criteria

The settlement design criteria recommended for this Project are presented in Table 9 below.

Table 9
Settlement Design Criteria

Items	Building Design Criteria
Differential Settlement across a building footprint	1.5 inches per 100 feet of building footprint dimension, i.e., 3 inches for 200 feet long building
Angular Distortion	2 inches / 30 feet
Deflection Ratio	0.75 inch / 30 feet

These criteria may be adjusted depending on the structural design of the buildings. Relaxation of this criteria will result in a more robust structural design, whereas strengthening of this criteria will result in increased Improved Zone thickness.

For the pavement areas the selection of the acceptance criteria should be strictly based on the assessment of acceptable risk of maintenance and repairs. The performance of the existing pavement constructed on nominally prepared subgrade provides a good empirical basis indicative that even with minimal subgrade preparation periodic maintenance of the pavements will be needed from aesthetic perspective but not necessarily for operational reasons. Consequently, a nominal subgrade preparation as discussed below is herein recommended.

Special considerations will be needed for the design of the utility connections entering and exiting the site. It is expected that most of the utilities will enter the site from Live Oak Avenue and will then cross the transition zone to reach the destinations within the site. Whereas total settlement within the site is not a significant design concern for the buildings and associated improvements, because of its anticipated uniformity, the entry of utilities from outside of the site will require flexible connections capable to accommodate the anticipated total settlement. In addition, storm drains and sewer lines exiting the site should be provided with enhanced gradients in order to accommodate expected settlement.

12.3 Improved Zone Design

Based on the numerical modeling discussed in Section 10, the results presented in Table 6a, and the settlement design settlement criteria in Table 9 and section 12.2, the dimensions of the Improved Zone may be selected as summarized in Table 10 below.

Table 10
Recommended Improved Zone Parameters

Items	Improved Zone Component Thickness (feet) within and nearby a building footprint	
	Buildings	Parking Lots
Overexcavation, Processing, and Recompaction (O&R)	20	10
Deep Dynamic Compaction (DDC)	30	None or lesser energy pass (ironing pass)
Total	50	10+

It is conceivable, that only DDC, or even DDC with lesser impact energy, i.e., lower drop height or lighter tamper, greater drop point spacing, with only nominal O&R, say 5 feet, would be acceptable in the parking areas. However, 10 feet of O&R is generally deemed a necessary minimum for accommodating of foundations and underground utilities,

The general sequence of activities for construction of the Improved Zone and preparation of the foundation subgrade is expected to consist of the following steps:

1. Excavate and stockpile the existing reclamation fill to the depth of the O&R zone within the initial improvement area of about 3 acres;

2. Commence processing of the stockpiled material to overexcavation backfill specification, i.e., crushing, some batching, and mixing of the processed material will likely be needed to achieve specified gradation;

3. Commence deep dynamic compaction while simultaneously advancing ahead of the DDC by excavating, stockpiling and processing the overexcavated material and placing the processed material behind the DDC operation onto the completed DDC area to achieve the finished grade;

4. Continue the cycle of excavating – DDC – processing – placement until the entire improvement area is completed.

12.4 Clearing and Grubbing

Prior to commencement of any earthwork the existing surface should be cleared of any pavement, structures, vegetation, trash and debris. Any subterranean installations not to be preserved, such as pipes, utility collectors, tanks, etc., should be abandoned in accordance with applicable regulations. It is conceivable that pavement and concrete construction debris could be processed into acceptable backfill material.

12.5 Overexcavation of the Existing Reclamation Fill

The on-site fill materials are not expected to pose unusual excavation difficulties, and therefore, conventional earth-moving equipment may be used. Localized sloughing/raveling of exposed soil intervals and larger concrete debris pieces should be anticipated. All overexcavations should be performed in accordance with CalOSHA regulations. Apparent asbestos-containing material was encountered in 2 of the borings during the field exploration typically at depths below 75 feet, although smaller quantities were encountered also in B-106 scattered in depth interval between 22 and 78 feet and in B-203 between 35 and 40 feet. Therefore appropriate measures should be taken to identify and control hazards associated with asbestos handling.

The sides of temporary, unsurcharged excavations less than 30 feet deep should be sloped back at an inclination of 1(H):1(V) or flatter. Stockpiled (excavated) materials should be placed at a distance no closer than depth of the excavation from the top of the excavation. A greater setback may be necessary when considering surcharge loads such as heavy vehicles, concrete trucks and cranes. Tetra Tech should be advised of such heavy vehicle loadings so that specific setback requirements can be established for the actual equipment.

12.6 Deep Dynamic Compaction

The deep dynamic compaction (DDC) is a ground improvement technique that is suited to densify a large range of soils, and is particularly suitable for compaction of unsaturated loose granular materials. The method includes repeatedly raising and dropping a heavy tamper from a predetermined height using a crane. The impact of the tamper on the ground generates a shockwave that results in compaction of the underlying soils by reduction of voids by changing of the ground structure, which, in turn, results in increase of density, stiffness, and strength of the material.

The number of drops, weight and size of the tamper, and the configuration of the grid of drop points is designed according to the material type and target depth of improvement. The DDC operation are typically conducted in multiple passes. In the primary and secondary passes the drop grids are offset to uniformly cover the improvement area and the tamper drops are intended to deliver the maximum target depth compaction energy. In the last pass, the ironing pass, the tamper is dropped from a lower height in an overlapping pattern and with a lesser energy to densify the near surface zone disturbed by the primary and secondary drop craters that are typically 2 to 4 feet deep. Following the ironing pass, the remaining craters are backfilled by trimming the surface with a bulldozer, and finally the surface is scarified and recompacted to form a subgrade for subsequent construction. Possible preliminary DDC design parameters intended for preliminary cost and schedule assessment are summarized in Table 11 below.

Table 11
Conceptual Deep Dynamic Compaction Parameters

Improvement Depth	Tamper Weight	Tamper Drop Height	Drop Point Grid Spacing	Number of primary + secondary drops (excluding the ironing pass)
30 feet	25 tons	80 feet	12 feet	4 + 4

Vibration levels produced by the tamper impact generally dampen quickly with distance. It is our expectation that existing structures/buildings at the site will be demolished prior to start of ground improvement, and the site will be essentially an open area. Consequently, no protection or monitoring of on-site structures is expected to be needed during the DDC activities.

There are buildings at a distance of over 200 feet from the property line at the adjacent properties at the Neovia Logistics trucking facility to the west and at the Hanson America Pit to the south. Additionally, other structures exist at the adjacent properties relatively nearby to the property line. Although not likely to be an issue given the distance and building and structure type, it should be noted that DDC generates ground vibrations that can be potentially damaging to adjacent structures in addition to being annoying to people. It is therefore important to identify any nearby structures, including underground utilities that need to be protected and establish a vibration monitoring program and threshold action vibration limits. The vibration effects are expressed in terms of peak particle velocity (PPV) and measured using seismometers strategically located between the vibration source, i.e., the DDC operation, and the protected structure. Typically, PPVs by the protected structures should be maintained below 0.5 inches per second (ips) to prevent damage to plaster walls and 0.75 ips for drywall construction. Depending on the input energy and the types of structures to be protected, the drop points need to be typically located at least 100 feet from the protected structures. If vibration levels are anticipated to cause problems, isolation trenches may be dug between the drop points and the area to be protected or the drop weight and/or height need to be reduced.

A pre-construction survey to document the conditions at the adjacent properties should be carried out to form a basis and reference in case any damage claims are raised during the DDC implementation.

From a geotechnical standpoint, the best method to evaluate the effectiveness of the DDC is to compare shear wave velocities of the subsurface materials before and after the DDC implementation. The ”before” shear wave velocities can be obtained either before or after the overexcavation, and, similarly, the “after” shear wave velocities can be obtained either before or after the completion of the fill replacement and recompaction activities while each timing has its advantages and disadvantages. A work plan for the shear wave velocity program should be prepared prior to the commencement of the DDC activities.

For illustration and order-of-magnitude estimates the following rules of thumb for planning of DDC operations may be considered:

- Complete DDC operation including the DDC mobilization, site preparation, DDC implementation with typically, and post-DDC grading could be about $200,000/acre;

- The production of a DDC rig could be about 9 days per acre.

12.7 Construction of Improved Zone

12.7.1 Processing of Overexcavated Material

The overexcavated fill should be processed and blended to the extent practicable to achieve a uniform backfill material with gradations compliant with the Above-Water Backfilling Guidelines (2005). It is recommended that the overexcavated reclamation fill be processed in a crusher to reduce the particle sizes to compliant dimensions as discussed below. Any steel fragments, organic materials, timber, trash objects, or any deleterious materials should be separated and disposed of off-site. Asphalt pieces may be incorporated in the processed fill provided they meet the gradation requirements stated below.

Upon appropriate processing the material may be placed within the Improved Zone as compacted engineered fill suitable for support of the proposed development.

The overexcavated fill must be processed into one of the two material categories as described below. Besides different processing operations, the two fill categories require significantly different level of placement effort and compaction testing. The grading contractor will have the discretion to decide the type of material (soil or blended rubble fill) to which the overexcavated existing reclamation fill will be processed. It is acceptable to blend the processed fill materials mutually or with materials derived from other sources. The processed reclamation fill must fall into one of the following categories:

Soil Fill material consists of soil or rubble fill, potentially crushed and/or blended with soil processed to a gradation and sizes as follows:

- Less than 30 percent is larger than ¾ inches;
- Maximum particle size does not exceed 12 inches or 18 inches for flat, elongated particles with aspect ratio (length/width) greater than 3.

All particles larger than 3 inches should be spread apart (i.e., not nested). This soil fill material is suitable for determination of maximum dry density per ASTM D1557 and thus may be tested with conventional compaction testing equipment (nuclear gauge, sand cone) with appropriate correction for oversized particles. Additionally or alternatively, if approved by the regulatory agency, the acceptance may be based, without the need of determination of the maximum dry density per ASTM D1557, on the load plate test calibrated as outlined in Section 13.2.3 of this report.

Blended Rubble Fill consists of soil or rubble fill crushed, potentially blended, and processed to a gradation and sizes as follows:

- More than 30 percent of particles are greater than ¾ inch;
- Maximum particle size cannot exceed 12 inches or 18 inches for flat elongated particles with aspect ratio (length/width) greater than 3.
- Gradation of the fill fraction smaller than 3 inches should have 30 to 100 percent of grain sizes by weight smaller than ¾ inch and be in sufficient quantity so that the voids are fully filled.

The blended rubble fill cannot be tested by conventional compaction testing methods and the compaction needs to be evaluated based on the ratio of the actual in-place bulk density and the maximum achievable bulk density. The in-place bulk density of fill with oversize particles is determined by large scale field water/sand replacement density testing. The maximum achievable bulk density is determined by a full scale field test pad. The details of this testing are provided in Section 13.2.2 of this report. Alternatively, if approved by the regulatory agency, the acceptance may be based, without the need of determination of the actual in-place bulk density and the maximum achievable bulk density, on the load plate test calibrated as outlined in Section 13.2.3 of this report.

Occasional oversized clasts, i.e., sizes greater than 12 or 18 inches as discussed above, that are not practical to be crushed or broken, may be buried in the engineered fill at least 10 feet below finished grade in accordance with the recommendations provided below in Section 12.7.5 of this report.

In order to accommodate foundation and utility excavations, the upper 10 feet of the compacted fill should consist of soil fill with maximum particle size of 3 inches in largest dimension or import material approved by the Geotechnical Engineer.

Any suspected environmentally hazardous materials encountered during processing of the existing reclamation fill should be handled in accordance with the Excavation Management Plan (EMP) typically approved by the California Water Quality Control Board.

12.7.2 Unsuitable Backfill Materials

Backfill materials may not include:

- Unprocessed on-site rubble fill;
- Hazardous, biodegradable, chemically impacted/contaminated materials as defined by appropriate environmental regulatory guidelines or the project Environmental Consultant including but not limited to paper, rubber, plastic, metals not encased in concrete, plaster, wallboard, liquid wastes, and trash;
- Materials with high organics content, e.g., peat, wood, vegetation;
- Any soil material deemed unsuitable by the Geotechnical Engineer.

12.7.3 Imported Backfill Materials

Because of the densification of the onsite materials by DDC and volume shrinkage by processing and recompaction of the processed reclamation fill and the need to overbuild the site to achieve reliable drainage gradients it is anticipated that imported backfill materials will be required to construct the design grades. Any soil materials (including backfill or base course materials) imported to the site should be sampled, tested, and approved by the Geotechnical Engineer prior to arrival on-site. In general, any soils imported to the site for use as fill should be predominantly granular and have an Expansion Index less than 30.

Any import soils should be screened for presence of undesirable materials, as specified in Section 12.7.2 of this report, and rejected or segregated as appropriate. The observations and the approval or rejection of the material should be recorded on the Daily Field Report including the identification of the source of the material.

12.7.4 Placement of Backfill Materials

Placement of the backfill materials should be carried out under continuous observation and testing by a representative of the Geotechnical Engineer.

In order to improve the performance of the Improved Zone all fill placed should be compacted to at least 93 percent of relative compaction as related to maximum dry density (ASTM D1557) or maximum achievable bulk density determined as described in Appendix A of the Above-Water Backfilling Guidelines (2005). The upper 1 foot of soils below pavements and any flatwork should be processed and compacted to at least 95 percent of the maximum dry density (ASTM D1557). The fill within 10 feet of the design rough grade should consist of soil material as described in Section 12.7.1.

Uncompacted lift thicknesses should not be greater than 1.5 times the maximum particle size but no more than 10 inches and need not be less than 6 inches.

Particle sizes for fills to be placed in lifts shall not exceed the following:

- 18 inches - for flat and elongated particles with aspect ratio (length/width) greater than 3;
- 12 inches - for all other particles.

Particles exceeding these limits will be treated as oversize particles per Section 12.7.5 of this report.

Any blending of soil fills should be performed so that the backfill is free of large discrete areas or zones with different characteristics. With the exception of windrows, discussed in Section 12.7.5 of this report, jetting or flooding are not recommended means for compaction.

All fills, including import materials, should be moisture-conditioned to above optimum moisture content. The objective of the moisture-conditioning is to compact the soils as wet as practical. The wet-of-optimum moisture-conditioning is necessary to produce a fill matrix with a uniform small void structure as opposed to large void/clumpy structure associated with material compacted dry of the optimum moisture content. The uniform small void structure is essential to mitigate potential for future softening, collapse, and/or expansion.

In the event of interruption of fill delivery or hiatus in fill placement the affected area should be scarified, moisture-conditioned to above optimum moisture content, and recompacted to achieve uniform fill conditions prior to the restart of fill placement.

The fill materials should be tested in accordance with the procedures and frequencies specified in the Above-Water Backfilling Guidelines (2005). Additionally, during the construction of the Improved Zone, plate load tests, as discussed in Section 13.2.2 and 13.2.3 of this report, should be performed at several locations to confirm the stiffness assumptions utilized in the numerical analyses in evaluation of the settlements and the design of the Improved Zone.

A representative of the Geotechnical Engineer should observe the overexcavation, processing, and fill recompaction progress so that appropriate modifications to the design may be recommended, if necessary, due to encountered conditions differing from the design assumptions and to produce a record of the grading activities and fill placement characteristics.

12.7.5 Placement of Oversized Materials

Occasional oversized material that cannot be reduced to the maximum sizes defined in Section 12.7.1 are not permitted to be placed in fill lifts as outlined in the Section 12.7.4 of this report, may be placed in the fill at depths more than 10 feet below finish grade in a trench to form windrows. Trenches must be able to accommodate the oversized material in a single layer; individual particles must not be stacked vertically in the trench. Granular material with a Sand Equivalent (ASTM D 2419) of at least 30 should be jetted/placed between the oversized grains to fill the voids. No particles greater than 3 inches should be placed within 10 feet of the finished grade.

12.7.6 Backfill Placement adjacent to Pit Walls

For backfill placed along the pit walls, specifically along the Project north boundary, benches about 5 feet high and where possible at least 3 feet wide should be cut into the pit walls to promote connection along the interface between the backfill and the firm, undisturbed native materials.

12.8 Structural Setback Zones

As shown on Cross-Sections B-B', C-C', and E-E', the sidewalls of the pit along the northern boundary were originally excavated at about 1.5(H):1(V) slope ratio, which results in variable thickness of the overlying existing reclamation fills.

Similarly, Cross-Section B-B', C-C', and E-E' show the pit bottom along the southern boundary also sloping at 1.5(H):1(V), albeit the slope does not extend to the surface and is buried by the variable thickness reclamation fill 50 to 200 feet thick which continues into the adjacent Hanson America Pit.

As shown on Cross-Sections X-X', A-A', and D-D', a reclamation fill slope 23 to 35 feet high composed of undocumented fill is descending from the landfill deck along the site eastern boundary toward the southbound on-ramp of interstate highway I-605. Evaluation of the slope stability and seismically induced permanent ground displacement was presented in the "Slope Stability" section of this report. However, the setback was eventually determined based on modeling of the surface settlement due to variable reclamation fill thickness in this area due to the pit perimeter slopes.

Cross-Sections X-X', A-A', and D-D' show only minor variations of fill thickness exist along the western property line, where the fill extends into the adjacent trucking facility

Regardless of the presence of the Improved Zone, reclamation fills placed over steeply inclined slopes and variable reclamation fill thicknesses are intrinsically subject to increased differential settlement and angular distortion. Also, the Project development may be subject to propagation of adverse effects from the unmitigated reclamation fill at the neighboring properties (Hanson America Pit and the trucking facility). Consequently, a setback zone where no permanent buildings or settlement sensitive structures should be located is established as follows:

- 150-foot setback from the north property boundary along Live Oak Avenue;
- 225-foot setback from the top of slope along the east property boundary along I-605;
- 100-foot setback from the south boundary with Hanson America Pit;
- 75-foot setback from the west property boundary with the trucking facility.

Driveway and parking pavement and landscape areas may be located within the setback zone.

12.9 Seismic Design Parameters

The seismic design coefficients provided below in Table 12 are based on Chapter 16 of the 2016 California Building Code.

Table 12
Site Categorization and 2016 California Building Code Site Coefficients
Site coordinates N34.1095° and W 117.9880°

Parameter	Design Value
Site Class (Table 20.3-1 ASCE 7)	C
Short Period Spectral Acceleration Parameter S_s	2.004*
1-sec. Period Spectral Acceleration Parameter S_1	0.696*
Short Period Design Spectral Acceleration Parameter S_{DS}	1.336*
1-sec. Period Design Spectral Acceleration Parameter S_{D1}	0.603*
* Values obtained based on the ASCE7-10 with July 2013 errata from USGS Earthquake Hazards Program website, http://earthquake.usgs.gov/hazards/designmaps/	

12.10 Foundations Design

The site improvements located on the Improved Zone can be founded on shallow foundation systems established in competent engineered fill materials. Founding buildings and appurtenant structures on piles or intermediate foundation systems, e.g., rammed aggregate piers, is not deemed effective because these systems would effectively reduce the key function of the Improved Zone, which is to mitigate and more evenly distribute surficial settlements. However founding minor appurtenant structures, e.g., light poles, billboard signs, etc., on short "stubby" piles within the Improved Zone may be appropriate depending on nature and location of the structure.

The shallow foundation systems may be either a mat foundation or a continuous and pad footings connected by grade beams. Bothe system are expected to be viable while, the mat foundation is expected to be more rigid and so more uniformly distribute the total and differential settlement effects, whereas the a continuous and pad footings system will provide a more flexible response to the differential settlement.

Recommendations for both foundation systems are provided herein and the selection should be made in conjunction with the selection of the building superstructure structural system. The foundation systems recommended for the anticipated structures are summarized in Table 13. The detailed recommendations are provided in following sections.

-Table 13
Recommendation Foundation Systems

Structure	Foundation System
All buildings	Mat foundation at least 24 inches thick with reinforcing ribs and thickened edge, or Continuous perimeter footings and interior pad column footings connected by grade beams and floor slabs with reinforcing ribs
Site walls, sheds, enclosures, at-grade signs	Conventional shallow spread or continuous footings
Light poles, elevated signs (billboards), fences	Conventional shallow spread or continuous footings or short "stubby" piers founded within the Improved Zone

12.10.1 Mat Foundations

A mat foundation consists of a thick, relatively rigid concrete element that distributes the building structural loads more evenly and over a larger area into the subgrade than continuous and pad footings. Conversely, differential settlement of the foundation subgrade is distributed more evenly into the building structural framing. Thus, the mat foundation along with the Improved Zone is integral to mitigating the adverse effects of total and differential settlement on the proposed building construction. Although the design of the mat thickness is strictly a structural task, based on our experience and judgement, it is our opinion that the mat foundation thickness should be at least 24 inches and also possibly include reinforcing ribs and thickened perimeter edge in order to develop sufficient stiffness to mitigate the anticipated differential settlement effects. The mat foundations should be placed monolithically, i.e., with no cold joints. Precautions should be taken to prevent curling of mat in this semi-arid region (refer to American Concrete Institute (ACI) guidelines).

12.10.1.1 Bearing Capacity

The mat design should be based on the design settlement parameters provided in Figure 1 depending on the selected thickness of the Improved Zone. However, to provide the Structural Engineer with conventional mat design parameters, the maximum allowable bearing value may be taken as 1,500 psf. However, for the anticipated relatively large mats, the average distributed load should not exceed 800 psf.

12.10.1.2 Settlement

Settlements from building static structural loads are anticipated to be negligible and completed during or shortly after construction. Therefore, mat foundation need to be designed for settlement effects caused by the performance of the underlying reclamation fills partially mitigated by the Improved Zone as presented and discussed in Section 10 describing the numerical analyses. The settlement design criteria recommended for the structural design are presented in Table 9 in Section 12.2. The actual design settlement parameters based on the selected thickness of the Improved Zone may be taken from Figure 1 in Section 10.4.

12.10.1.3 Modulus of Subgrade Reaction

For design of mat foundations, a modulus of subgrade reaction k_1 on a 1-foot by 1-foot square plate of 250 pci may be used. For the anticipated prevailing granular on-site soils, the modulus of subgrade reaction for a concrete element of a specific dimension can be calculated as

$$k = k_1\left(\frac{B+1}{2B}\right)^2 \times \frac{1+0.5\frac{B}{L}}{1.5}$$

Where *B* and *L* are the width and length of the mat in feet, respectively, while *B* is no more than 14 times the thickness of the mat, and k is the design modulus of subgrade reaction in pci. The mat should be sufficiently reinforced and thickened to distribute the imposed loads relatively uniformly across the mat in accordance with the Structural Engineer's recommendations.

12.10.2 Continuous and Pad Footing Foundations for Buildings and Appurtenant Structures

Conventional continuous perimeter footings and interior pad column footings connected by grade beams and floor slabs with reinforcing ribs may be adopted for support of the buildings. The system is likely to be more flexible than a mat foundation system and may be more prone to development of distress when increased localized settlement takes place. This disadvantage may be, however, compensated by strengthening of the building structural system.

Conventional continuous / spread footing foundations may be used for support of auxiliary and appurtenant structures and structures tolerant to differential settlement such as trash enclosures, site walls, ramps, signage, etc., founded on processed and recompacted reclamation fill.

General recommendations for design of conventional footing foundations are provided below, although specific recommendations should be provided for specific structures once their type, sizes, loading, and locations are known.

Shallow foundations should be designed using the geotechnical design parameters presented in Table 14. Footings should be designed and reinforced in accordance with the recommendations of the structural engineer and should conform to the 2016 California Building Code. In addition, the designer must locate the footings so that they will be spaced at a safe distance from each other to avoid overlapping of their zone of influence.

Table 14
Geotechnical Design Parameters
(Isolated and Continuous Footing Foundations)

Dimensions	• At least 2 feet wide
Depth of Embedment	• At least 2 feet below the lowest adjacent grade
Allowable Bearing Pressure	• 2,500 psf • The allowable bearing value may be increased by one-third for transient live loads from wind.
Estimated Settlement	• Settlements from static structural loads are anticipated to be negligible and completed during or shortly after construction. Therefore, foundations need to be designed for settlement effects caused by the performance of the underlying reclamation fills partially mitigated by the Improved Zone as presented and discussed in Section 10. Settlement design criteria presented in Table 9 in Section 12.2 should be utilized for the structural design.

12.10.3 Allowable Lateral Resistance

Lateral loads may be resisted by soil friction and passive resistance of the soils. An allowable coefficient of friction of 0.35 may be used to calculate resistance between the concrete against the supporting processed granular fill materials. If fine grained zone were present, such as from import materials, a coefficient of friction of 0.25 should be utilized. If a moisture intrusion control plastic barrier is placed beneath the concrete and the subgrade, the allowable coefficient of friction should be reduced to 0.2. The allowable passive resistance of properly compacted processed granular or fine-grained fill may be assumed to be 220 pcf or 150 pcf, respectively. For bare grade, the passive resistance derived from the upper 12 inches should be neglected. The passive resistance and the frictional resistance of the soils may be combined without reduction in determining the total lateral resistance. These provided lateral resistance parameters incorporate a Factor of Safety of 2.

The total allowable lateral resistance can be taken as the sum of the friction resistance and passive resistance. The passive resistance values may be increased by one-third when considering transient wind or seismic loading. In no case, the lateral resistance may exceed 50 percent of the dead load.

12.10.4 Foundation Re-leveling

As discussed elsewhere in this document, given the nature of the site, potential for localized excessive settlement and resulting tilt or distress to the site improvements does exist. It should be recognized that the mitigation of such effects would be releveling of the foundations and not stabilization of the subgrade. The key difference between these two concepts is that subgrade stabilization generally includes ground improvement at depth, e.g., by means of compaction or injection grouting, which is not anticipated to be needed given the engineered nature of the Improved Zone, whereas releveling takes place at or close to the foundation subgrade. Typical means of releveling include:

- Hydraulic jacking and grouting of the void created between the bottom of the mat and the subgrade with high viscosity non-shrink grout;
- Polymer injection jacking;
- Mud jacking.

In order to accommodate the releveling operations, the design of the foundations can incorporate grouting ports to facilitate access for compaction grouting or pockets for placement of hydraulic jacks.

For preliminary consideration, the grouting ports should be installed uniformly throughout the foundation footprint and along the perimeter of the foundation no closer than 2 feet to the corners and spaced no more than 10 feet apart. The grouting ports should consist of 2- to 4-inch diameter galvanized steel pipes extended about 1 to 3 inches into the foundation subgrade. Hydraulic jacking reaction points, i.e., jacking pockets, may be installed along the foundation perimeter and include a bearing plate and reinforcement to facilitate transfer of the jacking force into the foundation. Conceivably, hydraulic jack pockets along the foundation perimeter can complement grouting ports within the interior of the foundation. The details of these features can be corroborated during the final design phase based on the preferred relevelling system.

12.11 Floor Slabs On-Grade

For design of concrete slabs, a modulus of subgrade reaction k_1 on a 1-foot by 1-foot square plate of 250 pci may be used. For the on-site silty sands, the modulus of subgrade reaction for a concrete element of a given dimension can be calculated as

$$k = k_1 \left(\frac{B+1}{2B} \right)^2 \times \frac{1 + 0.5\frac{B}{L}}{1.5}$$

Where B and L are the width and length of the element in feet, respectively, while B is no more than 14 times the thickness of the element, i.e., floor slab, and k is the design modulus of subgrade reaction in pci.

Floor slabs should be designed and reinforced in accordance with the Structural Engineer's recommendations to accommodate the design settlement depending on the selection of the Improved Zone thickness and components and complement the performance of the reinforcing ribs. Reinforcing ribs should be considered to improve the resistance of the slab to differential settlements.

The recommendations provided below are intended to be minimal to help reduce the occurrence of cracks in concrete and associated horizontal separation and vertical offset. However, it should be understood that concrete slabs may still crack due to structural design or detailing, curing, or construction execution even when these recommendations are implemented. This is why the concrete slab design is ultimately the responsibility of the Structural Engineer and/or Concrete

Specialist who can account for all adverse factors and loading and provide reinforcement, concrete mix, and curing specifications to minimize their adverse effects.

In order to assist with initial cost estimate, the slab-on-grade should have a minimum thickness of 6 inches. The minimum reinforcement to reduce separation and offset of potential concrete cracks should consist of No. 4 reinforcing bars spaced at 16 inches on-center, each way, placed in the middle one-third of the section. The slab should be doweled in the perimeter grade beams. Reinforcement should be properly placed and supported on blocks or "chairs." Welded wire mesh reinforcement is not recommended.

Control joints should be constructed in accordance with recommendations from the Structural Engineer and the Architect. For preliminary design considerations, control joints should be provided in all concrete slabs-on-grade as recommended by ACI guidelines and at a maximum spacing (in feet) of 2 to 3 times of the slab thickness (in inches), but generally no more than 10 feet,. All joints should form approximately square patterns to reduce potential for randomly oriented shrinkage cracks. The control joints should be tooled at the time of the pour or sawcut to ¼ of slab depth within 6 to 8 hours of concrete placement. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs during curing in this semi-arid region (refer to ACI guidelines).

Lateral resistance of the slabs-on grade may be evaluated per Section 12.10.3 − Allowable Lateral Resistance.

12.12 Water Vapor Retarding Layer

Vapor intrusion through the floor slabs can negatively affect floor coverings and lead to increased moisture within a building. Vapor retarding layers are required by the Building Code for floor slabs on grade, which are typically less than 6 inches thick. For the anticipated much thicker mat foundation, vapor retarding layer may not be necessary. However, Tetra Tech does not practice in the field of moisture vapor transmission evaluation/mitigation and therefore the decision regarding the need for the vapor retarding layer for buildings with mat foundations should be based on architect's recommendation and/or Owner's preference. If moisture vapor transmission is considered a risk to use and operation of the proposed structure, we recommend that a qualified specialist professional be engaged to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction and to provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure.

For convenience, Table 15 below provides initial conceptual alternatives for control of vapor transmission through concrete mat foundations placed on a properly prepared subgrade. The provided alternatives are based on local experience and may be considered appropriate for standard applications.

Table 15
Alternatives for Control of Vapor Migration through Mat Foundations

Objective	Recommendation
"Best" protection against vapor intrusion	• Concrete mat foundations placed directly on a plastic membrane 10 mils in thickness[1] (ACI 302.1R-06). • The membrane should be placed on at least 2 inches of dry silty sand[2]. • The dry silty sand should be separated from the underlying capillary break layer by non-woven geotextile, Mirafi 140N or equivalent. • The geotextile should be placed on at least 4 inches of ¾-inch crushed rock[3] or clean gravel[4] to act as a capillary break.
"Better" protection against vapor intrusion	• Concrete mat foundations placed directly on a plastic membrane 10 mils in thickness[1] (ACI 302.1R-96). • The membrane should be placed on at least 2 inches of silty sand[2].
Standard protection against vapor intrusion	• 2 inches of dry silty sand[2]; • placed over plastic membrane 10 mils in thickness. • The membrane should be placed on at least 2 inches of silty sand[2].

Notes:
[1] If additional protection is desired, the plastic membrane may be replaced with a 10-mil thick moisture vapor retarder that meets the requirements of ASTM E 1745 Class C (for example, Stego Wrap or similar).
[2] The silty sand should have a gradation between approximately 15 and 35 percent passing the No.200 sieve and a plasticity index (PI) of less than 4.
[3] The ¾-inch crushed rock should conform to Section 200-1.2 of the latest edition of the Standard Specifications for Public Works Construction (Greenbook).
[4] The gravel should contain less than 10 percent of material passing the No. 4 sieve and less than 3 percent passing the No. 200 sieve.

All materials underlying mat foundations should be adequately compacted prior to the placement of concrete. The materials should be dry or moist and not be wetted or saturated prior to the placement of concrete. Care should be taken during placement of the concrete to prevent displacement of the underlying materials. The concrete mat foundations should be allowed to cure properly prior to placing vinyl or other moisture-sensitive floor covering.

12.13 Exterior Concrete Flatwork

Exterior flatwork of walkways and plazas between closely spaced buildings should be supported on the same Improved Zone as the buildings to reduce potential for differential movements between the buildings and the flatwork. Conversely, flatwork located away from the buildings, e.g., along the site perimeter may be placed on the same subgrade for the driveway and parking pavement. Based on the characteristics of the on-site reclamation fill that will be processed into the Improved Zone and provide support for the proposed improvements, the materials are expected to have a very low Expansion Index. The recommendations provided below are intended to provide a firm bearing subgrade to help reduce the occurrence of cracks in concrete and associated horizontal separation and vertical offset. However, it should be understood that concrete slabs may still crack due to structural design or detailing, curing, or construction execution even when these recommendations are implemented. This is why the concrete slab design is ultimately the responsibility of the Structural Engineer and/or Concrete Specialist who can account for all adverse factors and loading and provide reinforcement, concrete mix, and curing specifications to minimize their adverse effects.

The upper one foot of soils below concrete flatwork should be processed and compacted as outlined in Section 12.7.4 “Placement of the Backfill Materials” and Section 12.20 “General Site Grading” of this report.

For design of concrete flatwork, a modulus of subgrade reaction k_1 on a 1-foot by 1-foot square plate of 250 pounds per cubic inch may be used. For the on-site soils, the modulus of subgrade reaction for a concrete element of a dimension can be calculated as

$$k = k_1\left(\frac{B+1}{2B}\right)^2 \times \frac{1+0.5\frac{B}{L}}{1.5}$$

Where B and L are the width and length of the element in feet, respectively, while B is no more than 14 times the thickness of the element, i.e., floor slab, and k is the design modulus of subgrade reaction in pci.

As a minimum for exterior walkways, it is recommended that narrow strip concrete slabs, such as sidewalks, be reinforced with at least No. 4 reinforcing bars placed longitudinally at 24 inches on center. Wide exterior slabs should be reinforced with at least No. 4 reinforcing bars placed 24 inches on center, each way. Reinforcement should be properly placed and supported on blocks or “chairs.” Welded wire mesh reinforcement is not recommended. Reinforcement should extend through the control joints to reduce the potential for differential movement. Wherever practicable, the perimeter flatwork around the buildings should be doweled in the perimeter of building mat foundations to minimize the potential differential movement between the flatwork and the buildings.

Control joints should be constructed in accordance with recommendations from the structural engineer and architect. For preliminary design considerations, control joints should be provided in all concrete flatwork as recommended by American Concrete Institute (ACI) guidelines and at a maximum spacing (in feet) of 2 to 3 times of the slab thickness (in inches), but generally no more than 10 feet,. All joints should form approximately square patterns to reduce potential for randomly oriented shrinkage cracks. The control joints should be tooled at the time of the pour or sawcut to ¼ of slab depth within 6 to 8 hours of concrete placement. Precautions should be taken to prevent curling of slabs during curing in this semi-arid region (refer to ACI guidelines). Where adjacent to buildings the flatwork should be sloped 2 percent or more away from the building.

The flatwork may be placed directly on prepared subgrade or on a minimum of 2 inches of concrete sand or aggregate base to provide a level subgrade and assist with curing. All underslab materials should be adequately compacted prior to the placement of concrete. The materials should be dry or moist and not be wetted or saturated prior to the placement of concrete. Care should be taken during placement of the concrete to prevent displacement of the underslab materials.

12.14 Subterranean Levels

In case that subterranean levels are considered for the proposed buildings to accommodate parking or expand useable area, a specific excavation and subterranean wall design and construction sequencing will be necessary. The following considerations should be evaluated:

- The Improved Zone conceptually identical to the Improved Zone recommended for all other construction at the site will be necessary under the basement level. A configuration-specific analyses may be carried out to evaluate the effect of construction at depth but it is expected that the appropriate Improved Zone for a desired benefit will be essentially the same as that for construction at grade.

- A building protection system to control potential impact of landfill gas specifically designed for subterranean levels will be required.

- The excavation for the subterranean levels should be planned in conjunction with the planning of the overexcavation for the DDC. In other words, if, for example, an O&R zone of 20 feet is required under a building with a subterranean level, the O&R zone needs to be measured from the subterranean level foundation bottom and the DDC will need to be performed from a grade that is deeper than the DDC grade for a building without a subterranean level.

- It is expected that the construction of the subterranean levels will be best performed in excavations with sloping sides rather than by use of a shoring system that would require installation of soldier piles, sheet piles, or tiebacks.

12.15 Posts and Poles

Posts and poles founded within the Improved Zone extending no-deeper than 2/3 of the thickness of the Improved Zone may be used for support of signs, light poles, or minor elevated structures.

12.15.1 Non-Constrained Case

For the non-constrained case where the pole is not restricted to move at the ground level, the minimum depth of embedment required to resist lateral loads should be determined in accordance with the 2016 California Building Code, Section 1807.3.2.1. The allowable static lateral soil bearing pressure for reclamation fill processed into gravelly soil fill can be assumed to be equal to 250 pounds per cubic foot equivalent fluid density (pcf EFD). For import materials that are more of sandy or silty/clayey character this value will likely need to be reduced. Where bare ground (without concrete or asphalt cover) is present adjacent to the foundation, the lateral resistance should be ignored for the upper 12 inches below grade so that a trapezoidal pressure distribution is used starting at 12 inches below grade. The allowable passive earth pressure value incorporates a Factor of Safety of 2. For lateral sliding resistance a coefficient of friction of 0.35 can be used for mass concrete on soil. Vertical compressive loading can be resisted utilizing an allowable end bearing pressure of 2,500 psf.

12.15.2 Constrained Case

For the constrained case where the pole is restricted from movement at the ground level by encasement in surrounding concrete or similar, the minimum depth of embedment required to resist lateral loads should be determined in accordance with the 2016 California Building Code, Section 1807.3.2.2. The allowable static lateral soil bearing pressure can be assumed to be equal to 250 pounds per cubic foot equivalent fluid density (pcf EFD). For import materials this value will likely need to be reduced. The constrained earth pressure value incorporates a Factor of Safety of 2. For lateral sliding resistance a coefficient of friction of 0.35 can be used for mass concrete on soil. Vertical compressive loading can be resisted utilizing an allowable end bearing pressure of 2,500 psf.

12.16 Pavement Design

Preliminary recommendations are provided below for flexible and rigid pavement sections for the site parking and driveway areas.

12.16.1 Pavement Subgrade Preparation

The subgrade preparation and fill placement in paved areas should conform to the recommendations provided in Section 12.7 "Construction of Improved Zone" and Section 12.20"General Site Grading Recommendations" of this report. It is expected that the Improved Zone design will be different, less extensive, in the pavement areas than in the building and walkway/plaza areas. It is conceivable that only limited overexcavation or modified DDC program combined with 5 to 10 feet of overexcavation, processing, and recompaction could be implemented in the areas outside the building and walkway/plaza areas.

12.16.2 Asphalt Concrete Pavement Design

As the pavement areas will be subject to the effects of differential settlement, only flexible pavement systems with an as-needed periodic maintenance plan should be considered. To enhance the resistance to cracking and performance of the asphalt concrete pavement, fiberglass grid reinforcement may be considered for asphalt reinforcement, e.g., TenCate Mirafi MPG product line, Tensar GlassGrid product line.

For preliminary pavement evaluation design, we have assumed average daily truck traffic and traffic indices, and have calculated the corresponding pavement section designs for the proposed development. Flexible pavement sections have been evaluated in general accordance with the Caltrans Highway Design Manual method for flexible pavement design using a 20-year design life period. An R-value value of 30 was assumed for pavement design purposes. The recommended pavement sections for several assumed Traffic Indices are presented in Table 16. The pavement design should be verified and/or updated once the traffic loading is finalized.

Table 16
Flexible Pavement Sections

Location	R-Value	Assumed Traffic Index	Composite Section		Full Depth Asphalt Concrete Alternative (inches)
			Asphalt Concrete (inches)	Aggregate Base (inches)	
Parking / drive aisles	30	4	3.0	4.5	4.5
Light to moderate traffic		6	3.5	7.5	7.5
Moderate to heavy traffic		8	5.0	10.5	10.0

Asphalt concrete and aggregate base should conform to the Specifications for Public Works Construction (Green Book) Sections 203-6 and 200-2, respectively. The aggregate base course should be compacted to at least 95 percent of the maximum dry density (ASTM D1557).

12.16.3 PCC Pavement Design

Because of its relatively poor resistance to differential settlement, the use of Portland cement concrete (PCC) pavement at the site is generally discouraged but may be considered in specific areas of the site, such as for loading docks or for driveway entry aprons on the fill/native material transition along the site perimeter.

Generally, PCC pavement should be founded on the same Improved Zone design as the design used for the buildings and walkway/plaza areas, i.e., it is not recommended to place the PCC pavement on the less substantial Improved Zone expected to be utilized for the parking areas with asphalt pavement. PCC pavement sections for driveway and parking areas based on ACI design method (ACI 330R-08) are presented in Table 17. The base course should meet specifications as described in the previous section “Asphalt Concrete Pavement Design”.
It is expected that the PCC pavement be placed on at least 4 inches of aggregate base compacted to 95 percent or more of the maximum dry density (ASTM D 1557). The 4-inch aggregate base is not required from the pavement structural design perspective but may be preferred for concrete curing and constructability reasons. Contraction, construction, and isolation joints should be placed in accordance with ACI recommendations.

Table 17
PCC Pavement Structural Sections

Subgrade Soil	Sand and sand-gravel mixture with moderate amounts of silt or clay	
Modulus of Subgrade Reaction, k	150 pci	
Thickness of Aggregate Base Course	0 - 4 inches	
Modulus of Subgrade Reaction adjusted for Base Course k_r	150 - 175 pci	
PCC Pavement 28-day concrete compressive strength	4000 psi	3000 psi

Category	ADTT[1]	Pavement Traffic Description	PCC Thickness (inches)	
A	0	Car parking areas and access lanes Autos, pickups, and panel trucks only	3.5	4.0
A-1	10	Truck access lanes	5.5	6.0
B	25	Shopping center entrance and service lanes Bus parking areas and interior lanes Single-unit truck parking areas and interior lanes	5.5	6.5
C	300	Bus entrance and exterior lanes Single-unit truck entrance and exterior lanes Multiple-unit truck parking areas and interior lanes	6.5	7.5
D	700	Bus entrance and exterior lanes Multiple-unit truck entrance and exterior lanes Multiple-unit truck parking areas and interior lanes	7.5	7.5

Note: [1]Average Daily Truck Traffic

Optionally, the pavement sections may be reinforced with No.3 reinforcing bars spaced 24 inches on center, each way, to further reduce potential for shrinkage and settlement-induced cracking. Reinforcement steel and tie bar requirements should also meet ACI recommendations. Moreover, the PCC pavement design, which is based on dynamic loading and fatigue, could be also complemented by a design of the pavement as a concrete slab-on-grade per Section 12.13 − Exterior Concrete Flatwork.

12.17 Soil Corrosion Potential

No corrosion potential evaluation was performed for the on-site soils because of the currently unknown nature of the eventual near surface materials and their variability. However, based on the nature of the on-site reclamation fills that will be overexcavated, processed and recompacted, the resulting fill is expected to be primarily granular in nature and significant corrosion potential is not expected. However, the corrosivity should be evaluated and the concrete and buried metals design completed only after the processing of the on-site soils is known.

Per 2016 California Building Code, Section 1904.1, concrete subject to exposure to sulfates shall comply with the requirements set forth in ACI 318, Section 4.3. The exposure of buried concrete to sulfate attack is defined per ACI 318, Table 4.2.1.

Per 2016 California Building Code, Section 1904.1, concrete reinforcement should be protected from corrosion and exposure to chlorides in accordance with ACI 318, Section 4.3.

Whereas the exposure of concrete to soluble sulphates cannot be reliably estimated at this point, the on-site materials are likely to possess a “moderate to severe” corrosion potential to buried ferrous metals. As a consequence of these conditions, we recommend that consideration be given to using plastic piping instead of metal. Alternatively, a corrosion specialist should be consulted regarding suitable types of piping and necessary protection for underground metal conduits.

The corrosion potential of the on-site soils should be verified during construction for each encountered soil type. Imported fill materials should be tested to confirm that their corrosion potential is not more severe than assumed for the project.

12.18 Reconstruction of Slope above I-605

The 23 to 35 feet high slope descending towards the site eastern boundary is composed of undocumented fill and needs to be rebuilt to achieve adequate seismic stability and compliance with the Los Angeles Grading Guidelines Appendix J (2011). Specifically, at least the outer 25 feet of the slope fill prism as measured horizontally from the face of the slope needs to be excavated and rebuilt at a 2(H):1(V) inclination to form a stabilization buttress.

Following the removals to competent subgrade, a toe key should be excavated as indicated on Plate 13 – Typical Toe Key Configuration. The key should be at least 4 feet deep founded in competent subgrade, project at least 8 feet in front of the toe of the slope, and slope back towards the heel of the key at 3 percent or steeper gradient. The width of the toe key should be at least 20 feet. The exposed subgrade should be cleared of any oversize particles and scarified to receive the reconstruction fill. No backdrain system is deemed necessary.

Fill should be placed in horizontal lifts not more than 8 inches in loose uncompacted thickness. In order to adequately compact the face of the slope, it is strongly recommended to overbuild the slope face by 1 to 2 feet and trim the slope face back to a compacted core at the final configuration. If this method is not practical, the contractor must be prepared to skillfully compact the outer slope edge and face to meet the compaction requirements. The edge of the constructed slope should be placed slightly elevated and not be allowed to roll off. All fill should be moisture-conditioned to above optimum moisture content (typically about 110 percent of the optimum moisture content for granular soils with fine contents below 15 percent, and above 120 percent of the optimum moisture content for soils with larger fine contents), and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557. The moisture-condition of the placed fill should be checked frequently and maintained or re-established as necessary during all phases of fill placement.

12.19 Drainage Control

The intent of this section is to provide general information regarding the control of surface water. The control of surface water is essential to the satisfactory performance of the building construction and site improvements. Surface water should be controlled so that conditions of uniform moisture are maintained beneath and adjacent to the structure, even during periods of heavy rainfall. The following recommendations should be considered as minimal.

- Ponding and areas of low flow gradients should be avoided.

- <u>Considering that the site has a potential to experience larger than typical settlement the surface grades to control water flow should be accentuated to reduce potential for localized depressions and/or reversed drainage gradients.</u>

- Paved surfaces within 10 feet from the building foundation should be provided with a gradient of at least 2 percent sloping away from improvements.

- Bare soil, e.g., planters, within 10 feet of the structure should be sloped away from the improvement at a gradient of 5 percent.

- Positive drainage devices, such as graded swales, paved ditches, and/or catch basins should be employed to accumulate and convey water to appropriate discharge points.

- Concrete walks and flatwork should not obstruct the free flow of surface water.

- Area drains should be recessed below grade to allow free flow of water into the drain.

- Enclosed raised planters should be sealed at the bottom and provided with an ample flow gradient to a drainage device. Recessed planters and landscaped areas should be provided with area inlet and subsurface drain pipes.

- To the extent practicable, planters should not be located adjacent to the structure. If planters are to be located adjacent to the structure, the planters should be positively sealed, should incorporate a subdrain, and should be provided with free discharge capacity to a drainage device.

- Planting areas should be provided with positive drainage. Wherever possible, the grade of exposed soil areas should be established above adjacent paved grades. Drainage devices and curbing should be provided to prevent runoff from adjacent pavement or walks into planted areas.

- Gutter and downspout systems should be provided to capture discharge from roof areas. The accumulated roof water should be conveyed to an off-site disposal area by a pipe or concrete swale system.

- Landscape watering should be performed judiciously to preclude either soaking or desiccation of soils. The watering should be such that it just sustains plant growth without excessive infiltration. Sprinkler systems should be checked periodically to detect leakage and irrigation efforts should be reduced or halted during the rainy season.

12.20 General Site Grading Recommendations

Specific recommendations have been presented in the Design Recommendations section of this report for rough grading of the site, including overexcavation, dynamic compaction, and placement of engineered fill. The intent of this section is to provide general information regarding the grading of the site. Site grading operations should conform with applicable local building and safety codes and to the rules and regulations of those governmental agencies having jurisdiction over the subject construction.

The grading contractor is responsible for notifying governmental agencies, as required, and a representative of the Geotechnical Engineer at the start of site cleanup, at the initiation of grading, and any time that grading operations are resumed after an interruption. Each step of the grading should be accepted in a specific area by a representative of the Geotechnical Engineer, and where required, should be approved by the applicable governmental agencies prior to proceeding with subsequent work.

The following site grading recommendations should be regarded as minimal. The site grading recommendations should be incorporated into the project plans and specifications.

- Prior to grading, existing vegetation, trash, surface structures and debris should be removed and disposed off-site at a legal dumpsite. Any existing utility lines, or other subsurface structures which are not to be utilized, should be removed, destroyed, or abandoned in compliance with current governmental regulations.

- Subsequent to cleanup operations, and prior to initial grading, a reasonable search should be made for subsurface obstructions and/or possible loose fill or detrimental soil types. This search should be conducted by the contractor, with advice from and under the observation of a representative of Geotechnical Engineer.

- The exposed subgrade and/or excavation bottom should be observed and approved by a representative of Geotechnical Engineer for conformance with the intent of the recommendations presented in this report and prior to any further processing or fill placement. <u>It should be understood that the actual encountered conditions may warrant excavation and/or subgrade preparation beyond the extent recommended and/or anticipated in this report.</u>

- Any imported fill material required for backfill or grading should be tested and approved prior to delivery to the site.

- Visual observations and field tests should be performed during grading by a representative of Geotechnical Engineer. This is necessary to assist the contractor in obtaining the proper moisture content and required degree of compaction. Wherever, in the opinion of a representative of Geotechnical Engineer, an unsatisfactory condition is being created in any area, whether by cutting or filling, the work should not proceed in that area until the condition has been corrected.

13 DESIGN REVIEW AND CONSTRUCTION SERVICES

This section presents recommendations for design review and construction services.

13.1 Plans and Specifications

Upon completion, the civil and structural design plans and specifications should be reviewed and approved by Tetra Tech prior to submittal for grading and issuance of construction permit and prior to bidding of construction tasks as the geotechnical recommendations may need to be re-evaluated based on the actual design configuration and loads. This review is necessary to evaluate whether the recommendations contained in this report have been incorporated into the project plans and specifications as intended.

13.2 Construction Monitoring

The objective of the construction quality assurance (CQA) is to assist in the construction of a properly engineered Improved Zone suitable for the proposed development. Continuous observation of site overexcavation, processing and assessment of fill materials, fill placement, deep dynamic compaction, and other site grading operations by a representative of the Geotechnical Engineer should be implemented during construction to allow for evaluation of the geotechnical-related conditions as they are encountered. This process provides the Geotechnical Engineer with the opportunity to recommend appropriate revisions as needed.

Due to the complexity of the Project it is likely that some aspects of the backfilling operations and/or the level and method of the quality assurance testing will need to be modified during the construction process. Such modifications should be documented in detail during the reporting described in the following section.

13.2.1 Construction Quality Assurance Reporting

The following list is intended to provide basic minimum guidelines for the reporting during the excavation and backfilling operations:

- A Daily Field Report should be generated every time a representative of the Geotechnical Engineer performing QA work is at the site.

- The Daily Field Reports should contain, at a minimum, a detailed description of the field activities, utilized equipment, areas of work, date, time, weather, and locations and results of all performed tests.

- Provisions should be made for vertical and horizontal control for observations and test locations.

- It is strongly recommended to formally divide the Pit area into a grid and utilize the grid for referencing the areas of work, observations, and testing. The grid markers should be established along the perimeter of the site and updated as needed. This system will allow for accurate communication between the contactor, QA personnel, and the regulatory agencies.

- A complete set of Daily Field Reports with a summary cover letter should be submitted as a part of monthly in-grading reports.

13.2.2 Construction Quality Assurance Testing

Continuous observations should be provided to verify the extent of removals, DDC effort, DDC completion operations, proper gradation and composition of processed materials, lift thicknesses and densities during placement and compaction of the Improved Zone fill. Due to the complex nature of the grading, processing, and Improved Zone construction procedures, a specific CQA plan should be developed once the construction methods are finalized. The CQA plan should outline the responsibilities of involved parties, types and frequencies of tests, and reporting requirements for the non-standard activities, e.g., fill processing, deep dynamic compaction, plate load testing.

For initial consideration, the following recommendations are provided for establishment of CQA activities for the fill the placement of the processed reclamation fill. The requirements for CQA testing during placement of the processed reclamation fill are generally based on the Above-Water Backfilling Guidelines (2005). All activities, tests, and test locations should be documented in daily reports and an as-built compaction report should be generated upon completion of construction. The frequency of tests is summarized in the following Table 18.

As discussed in Section 12.6, a shear wave velocity testing program to evaluate the effectiveness of the DDC should be implemented by comparing the shear wave velocities of the subsurface materials before and after the DDC implementation. The ”before” shear wave velocities can be obtained either before or after the overexcavation, and, similarly, the “after” shear wave velocities can be obtained either before or after the completion of the fill replacement and recompaction activities while each timing has its advantages and disadvantages. A work plan for the shear wave velocity testing program should be prepared depending on the selected Improved Zone configuration, the layout of the redevelopment facilities, and the logistics of the grading operations prior to the commencement of the DDC activities.

Table 18
Schedule of Field Testing

Field Test or Observation	Test Method	Minimum Testing Frequency	
		Soil Fill Less than 30% particles larger than ¾-inch	**Blended Rubble Fill** More than 30% particles larger than ¾ inch
Uniformity of subgrade following DDC at the overexcavated bottom	Visual assessment of fill uniformity of materials and subgrades and probing with ½-inch diameter probe	Continuously during fill placement operations	
Fill Placement	Visual verification of use of proper materials and lift thickness during placement of controlled fill	Continuously during fill placement operations	Test Pits: greater of: - 1 per 5,000 cy, - 2 per lift, - 1 every 2 weeks
Gradation	Particle size analysis (ASTM D422)	<u>Import fill</u> - As necessary <u>Processed reclamation fill:</u> Greater of: - 1 per week of processing - 1 per 50,000 cy,	
	Field Bulk Gradation Method described in Appendix B of the Guidelines[2]		Greater of: - 1 per 100,000 cy - 1 per month
Field Compaction Field Density	Maximum dry density determined by ASTM D1557	Greater of: - 1 per material type/source - 1 per week of processing	
	Field Density determined by nuclear gauge (ASTM D2922) <u>and</u> every 10th test Sand cone (ASTM D1556)	Greater of: - 1 per 1,000 cy - 1 per every 2 lifts - 2 per full day of placement	
	Maximum Achievable Bulk Density determined from test pad per Appendix A of the Guidelines[2]		Initially every 60,000 cy; frequency may be decreased to 1 test pad every 100,000 cy pending results of testing
	Field Density[1] by large ring water or sand replacement tests per ASTM D4914, D5030 or per Appendix B of the Guidelines[2] <u>and</u> nuclear gauge (ASTM D2922)		Greater of: - 1 per 20,000 cy, - 1 every 2 weeks, - 1 every 2 lifts
Moisture Content	Shall be determined only on sizes smaller than ¾ inch	1 per field density test, and as needed to guide fill placement	
Organics Content	Organics Content per ASTM D2974	As deemed necessary	
Improved Zone Stiffness	Plate load test per Section 12.2.3 of this report	Minimum of 20 tests, actual frequency to be determined within the context of the CQA plan.	

Note: [1] May be reduced or omitted once nuclear gauge test results are confirmed to be reliable.
[2] Above-Water Backfilling Guidelines (2005).

It should be noted that the types of tests differ significantly for soils fill and blended rubble fill materials. Whereas soil fill compaction testing follows conventional grading testing methods, i.e., nuclear gauge and sand cone test, blended rubble fill requires much more involved field testing, including full scale field maximum achievable density (MAD) test pads and large volume sand/water replacement density tests. This is because when materials that contain more than 30 percent of particles retained on the ¾-inch sieve, the maximum dry density may not be determined in accordance with ASTM D1557 because the amount of materials removed for the 6 inch mold (Method C) is too great for the rock correction to be considered accurate. Consequently, field test pads to evaluate the MAD based on the procedure described in Appendix A of the Above-Water Backfilling Guidelines (2005) and large scale field sand/water replacement tests to determine the field density are needed. If the processed reclamation fills prove to be consistent over time and the large scale field tests are calibrated against the conventional soil compaction tests, the frequency of the large scale tests may be reduced, pending an approval by the regulatory agency, typically in lieu of increased conventional soil compaction testing.

Whenever using a nuclear gauge in processed reclamation fill materials or where potential for oversize rocks or void exists, the procedure of rotating the gauge and taking at least 3 successive tests for a representative average to account for a single large rock or for detecting a void should be performed.

13.2.3 Plate Load Testing

Plate load test should be used to directly verify the stiffness of the materials placed within the Improved Zone to confirm the stiffness assumptions used in the numerical analyses. The plate load test can also be beneficially used for verification of compaction of the potentially variable processed reclamation fill.

Plate load test protocol is generally outlined in AASHTO T-222-78, Standard Method of Test for Non-repetitive Static Plate Load Test of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements. The plate load test consists of pressing a steel plate, typically 12 inches in diameter, into the surface of the compacted fill using hydraulic jacks. The reaction for the hydraulic jacks is typically provided by the frame of grading equipment or a truck (Figure 2). The size of the plate governs the depth to which the compressibility of the material is evaluated. Approximately, the material is tested to a depth of about 2 times the plate diameter, i.e., for a 12-inch plate the soil is tested to a depth of about 2 feet. The surface deflection/plate penetration and contact pressure are measured and the deformation modulus (E) or modulus of subgrade reaction (k) can be interpreted. The interpretation of the test for the purposes of compaction testing is typically done by reviewing the measured magnitudes of the deformation modulus or the modulus of subgrade reaction, and/or by the ratio of the moduli measured during 2 subsequent loading stages in a load-unload-reload test. These methods and guidelines are commonly and often exclusively used in Europe for compaction testing (e.g., Czech state norm CSN 72 1006). Depending on the soil type the plate load method can be typically completed in about 1 to 3 hours.

Figure 2. Plate load test configuration.

The key benefit of this method is that it measures an actual engineering property of the fill that can be used directly in evaluation of the stiffness, compressibility, and thus settlement of the compacted fill.

For engineering assessment of the fill materials of the Improved Zone to verify the material characteristics used in the numerical modeling, the plate load tests should be performed at a frequency 1 test on top of DDC subgrade for every 3 acres, plus at frequency of greater of 1 for every 10 feet of fill thickness per 2 acres or 1 for every 2 weeks of fill placement.

It is also recommended that the plate load test be used for verification of compaction especially for blended rubble fill materials which otherwise requires the rather cumbersome and time-consuming construction of the maximum achievable density test pad and large scale sand/water replacement field density or even for the testing of the soil fill when the variability of the materials makes it difficult to determine the appropriate maximum dry density per ASMT D1557. It is recognized that the local practice does not utilize this method for compaction verification and the AASHTO T-222 does not provide guidelines for interpretation of the plate load test for the purpose of acceptance of the fill material. However, it is our opinion that this method provides more consistent results that better characterize the quality of the compacted fill than the conventional methods based on the relative compaction concept. This method may be suitably adopted for fills with oversize particles or to test deeper zones of fill simply by using larger diameter plates. Plates up to about 30 inches in diameter can be used to test soils to depth over 5 feet. Of course, heavier equipment to provide a larger reaction for larger hydraulic jacks would then be required. Plate load tests may be eventually performed instead of field compaction and field density testing referenced in Table 18 and at the same minimum testing frequency as field density determined by the sand cone or nuclear gauge method.

The acceptance and approval of this method for approval of field compaction is dependent upon performing a successful calibration of the test against conventional compaction testing methods as discussed below. Prior to regulatory approval of the plate load test, quality assurance testing should be performed in strict compliance with the Above-Water Backfilling Guidelines (2005) as outlined in the previous Section 13.2.2. It is contemplated that separate calibration testing program would be performed for soil fill and blended rubble fill materials.

For acceptance of the plate load test method for blended rubble fill at least 5 maximum achievable density test pads and 10 field large sand/water replacement density tests would be performed. The results of these tests would be compared with the results of the plate load tests performed on the same materials and at the same locations and a correlation relationship would be developed.

For acceptance of the plate load test method for testing of soil fills, it is contemplated to establish correlation between the field relative compaction tests and plate load tests, based on at least 10 compaction curves and 3 tests of field density using sand cone method, and 3 tests using nuclear gauge method for each of the compaction curves, i.e., a total of 10 x 3 + 10 x 3 = 60 field relative compaction tests compared with plate load test results at each field density test location, i.e., 30 plate load tests.

The specific work plan for such a calibration testing program will be developed upon request and submitted for the review to the regulatory agency based on a preliminary agreement that such a test could be considered a viable alternative to the conventional in-situ compaction testing. When the calibration testing is successfully completed and reviewed by the regulatory agency, we will prepare and submit for approval a compaction testing protocol to be used during the backfilling operations.

Following the completion of the calibration testing program, a comprehensive data report presenting the measured data, interpreted results and correlations will be prepared for submittal to the regulatory agency. Pending a satisfactory evaluation of the calibration testing program, the report will include a proposed compaction testing protocol based on the use of plate load test. The plate load test may then be incorporated into the compaction testing upon approval by the regulatory agency.

13.3 Post-Construction Monitoring

Based on discussions in Sections 9 and 10, the site is expected to experience some post-construction settlement. Therefore, settlement monuments should be established around the perimeter of the buildings and at selected location throughout the site. Additionally, a floor level survey of all site buildings should be performed 4 to 6 months after completion of the foundation mats to establish a reference baseline for evaluating the foundation performance and for comparison with re-surveying the floor slabs if and when distress is observed.

Periodic inspections of the buildings, initially on a quarterly and later on semi-annual and annual basis and after any significant earthquake event, are recommended so that appropriate repair measures may be anticipated, developed and executed as necessary.

14 LIMITATIONS

The recommendations and opinions expressed in this report are based on Tetra Tech BAS GeoScience's analyses based on review of background documents, and on information obtained from field explorations and associated laboratory testing. It should be noted that this study did not evaluate the possible presence of hazardous materials on any portion of the site although possible asbestos-containing material was encountered at some locations during our field exploration.

Due to the limited nature of the field explorations, conditions not observed and described in this report may be present on the site. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation and laboratory testing can be performed upon request. It should be understood that conditions different from those anticipated in this report may be encountered during grading operations, for example, the extent of unsuitable soil and the associated additional effort required to mitigate them.

Site conditions can change with time as a result of natural processes or the activities of man. Changes to the applicable laws, regulations, codes, and standards of practice may occur as a result of government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Tetra Tech BAS GeoScience has no control. Therefore, this report should be reviewed and recertified by Tetra Tech BAS GeoScience if it were to be used for a project design commencing more than one year after the date of issuance of this report.

Tetra Tech BAS GeoScience's recommendations for this site are dependent upon verification of the actual encountered field conditions, appropriate quality control of grading operations including ground improvement with overexcavation, processing, and replacement of the on-site materials, implementation of deep dynamic compaction, and foundation construction. Accordingly, the recommendations are made contingent upon the opportunity for Tetra Tech BAS GeoScience to observe all aspects of subgrade preparation for the proposed construction. If parties other than Tetra Tech BAS GeoScience are engaged to provide such services, such parties are assuming complete responsibility as the Geotechnical Engineer of Record for the geotechnical phase of the project and implicitly concur with the recommendations provided in this report or may provide alternative recommendations.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Tetra Tech BAS GeoScience should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. Reliance by others on the data presented herein or for purposes other than those stated in the text is authorized only if so permitted in writing by Tetra Tech BAS GeoScience. It should be understood that such an authorization may incur additional expenses and charges.

Tetra Tech BAS GeoScience has endeavored to perform its evaluation using the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical professionals with experience in this area in similar soil conditions. No other warranty, either expressed or implied, is made as to the conclusions and recommendations contained in this report.

15 REFERENCES

Advanced Earth Sciences, Inc., 2013 Geotechnical Evaluation and Remedial Recommendations for Nu-Way Arrow Pit, Irwindale, California, AES Project No. 12-101 (dated April 12, 2013)

California Building Standards Commission, 2016 California Building Code, California Code of Regulations Title 24, Based on the 2015 International Building Code, July 2016.

California Geological Survey, 2008, Guidelines for Evaluation and Mitigation of Seismic Hazards in California: Special Publication 117A.

California Department of Conservation, Division of Mines and Geology, 1998, State of California, Seismic Hazard Zone Report for Baldwin Park 7.5-Minute Quadrangle, Los Angeles County, California.

Cetin, K., Bilge, H., Wu, J., Kammerer, A., and Seed, R. (2009). "Probabilistic Model for the Assessment of Cyclically Induced Reconsolidation (Volumetric) Settlements." *J. Geotech. Geoenviron. Eng.*, 10.1061/(ASCE)1090-0241(2009)135:3(387), 387-398.

County of Los Angeles, 2016, Historical Groundwater Data - Well Nos. 419b, 4208A, 3010D, 4238, Department of Public Works http://dpw.lacounty.gov/general/wells/# (accessed January 27, 2016).

County of Los Angeles, 2011, Grading Guidelines: County of Los Angeles Department of Public Works, Building and Safety Division/Land Development Division, 29 p. (includes Appendix J – Grading).

Devco Engineering, Inc., 1990. Letter to Craig Monaghan, The Monagham Group Architects: Letter Prepared by Devco Engineering, Inc., Corvallis, Oregon, for Weston Freight Center Project, Irwindale, California (dated March 6, 1990).

Devco Engineering, Inc. and Foundation Engineering, 1990. Site Surcharge program for Superior Fast Freight, Office Building / Truck Terminal, Los Angeles, California (dated February 1990).

Foundation Engineering, 1987. Letter to Devco Engineering, Inc. regarding Construction and Monitoring of Test Fills, Superior Fast Freight Truck Terminal, Los Angeles, California (dated January 5, 1987).

GeoSlope, 2013. Stress and Deformation Modeling with SIGMA/W, An Engineering Methodology, July 2013 Edition.

GeoVision, 2014. Final Report of Surface Wave Measurements, Irwindale Speedway Redevelopment, Irwindale, California. Report Number 14183-01 (dated September 24, 2014).

GeoVision, 2015. Passive Surface Wave Feasibility Study, Irwindale Speedway, Irwindale, California. Project Number 15340 (dated August 27, 2015).

Irwindale Slope Stability Committee, 2003, Guidelines for Stability Analyses of Open Pit Mines, Irwindale, California (dated December 24, 2003).

Irwindale Backfilling Committee, 2005, Guidelines for Above-Water Backfilling of Open-Pit Mines, Irwindale, California: (dated November 23, 2005).

Irwindale Technical Advisory Committee, 2012, Wetting-Induced Settlement of Inert Debris Fills, prepared for Public Works department, City of Irwindale, California: (dated December 17, 2012).

Itasca Consulting Group, 2015, FLAC, Fast Lagrangian Analysis of Continua, Version 8.0, Minneapolis, Minnesota, USA.

Law/Crandall, 1998. Report of Geotechnical Investigation, Proposed Irwindale Speedway Facility, 13300 East Live Oak Avenue, Irwindale, California. Project Number 70131-8-0070 (dated March 10, 1998).

LSA Associates, Inc., 2015. Final Environmental Impact Report, Irwindale Regional Shopping Center, City of Irwindale, Los Angeles County, California. State Clearinghouse No. 2014071042 (dated March 6, 2015).

Parkin, A.K., 1977, The Compression of Rockfill, Australian Geomechanics Journal, Paper No. S1003, submitted January 11, 1977.

Pradel, D., 1998a, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils: Journal of Geotechnical and Geoenvironmental Engineering, dated April, pp. 364-368.

Pradel, D., 1998b, Erratum to Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils: Journal of Geotechnical and Geoenvironmental Engineering, dated October, p. 1048.

Seed, H. B., Tokimatsu, K., Harder, L. F., and Chung, R. M., 1985. ‘‘The influence of SPT procedures in soil liquefaction resistance evaluations.’’ *J. Geotech. Engrg.*, ASCE, 111(12), 1425–1445.

Seed, H.B., Wong, R.T., Idriss, I.M., and Tokimatsu, K., 1986, Modulus and damping factors for dynamic analysis of cohesionless soils, Journal of Geotechnical Engineering, ASCE, 112(11), pp. 1016-1032.

Shannon & Wilson, Inc., 2014. Preliminary Geotechnical Engineering Report, Subsurface Characterization and Preliminary Settlement, Proposed Irwindale Outlet Center, Irwindale, California. Project Number 51-1-10087-003 (dated May 20, 1998).

Somasundaram S., Khilnani K., and Shenthan T., 2013. Characterization and Settlement Modeling of Deep Inert Debris Fills. www.issmge.org

Southern California Earthquake Data Center, Historical Earthquakes and Significant Faults in Southern California, http://scedc.caltech.edu/significant

Sowers, G.F., 1973. Settlement of waste disposal fills. In: Proceedings of the 8th International Conference on Soil Mechanics and Foundation Engineering, Moscow, USSR 2.2, 207-210.

Stewart, J.P., Bray, J.D., McMahon, D.T., Smith, P.M., and Kropp, A.I., 2001, Seismic Performance of Hillside Fills, Journal of Geotechnical and Geoenvironmental Engineering, ASCE Vol 127, No. 11, pp. 905-919.

Stewart, J.P., and Whang, D.H., 2003, Simplified Procedure to Estimate Ground Settlement from Seismic Compression in Compacted Soils, Proceedings of the 2003 Pacific Conference on Earthquake Engineering, New Zealand Society for Earthquake Engineering, Paper No. 046.

Stewart, J.P., Smith, P.M., Whang, D.H., and Bray, J.D., 2004, Seismic Compression of Two Compacted Earthfills Shaken by the 1994 Northridge Earthquake, Journal of Geotechnical and Geoenvironmental Engineering, ASCE Vol 130, No. 5, pp. 461-476.

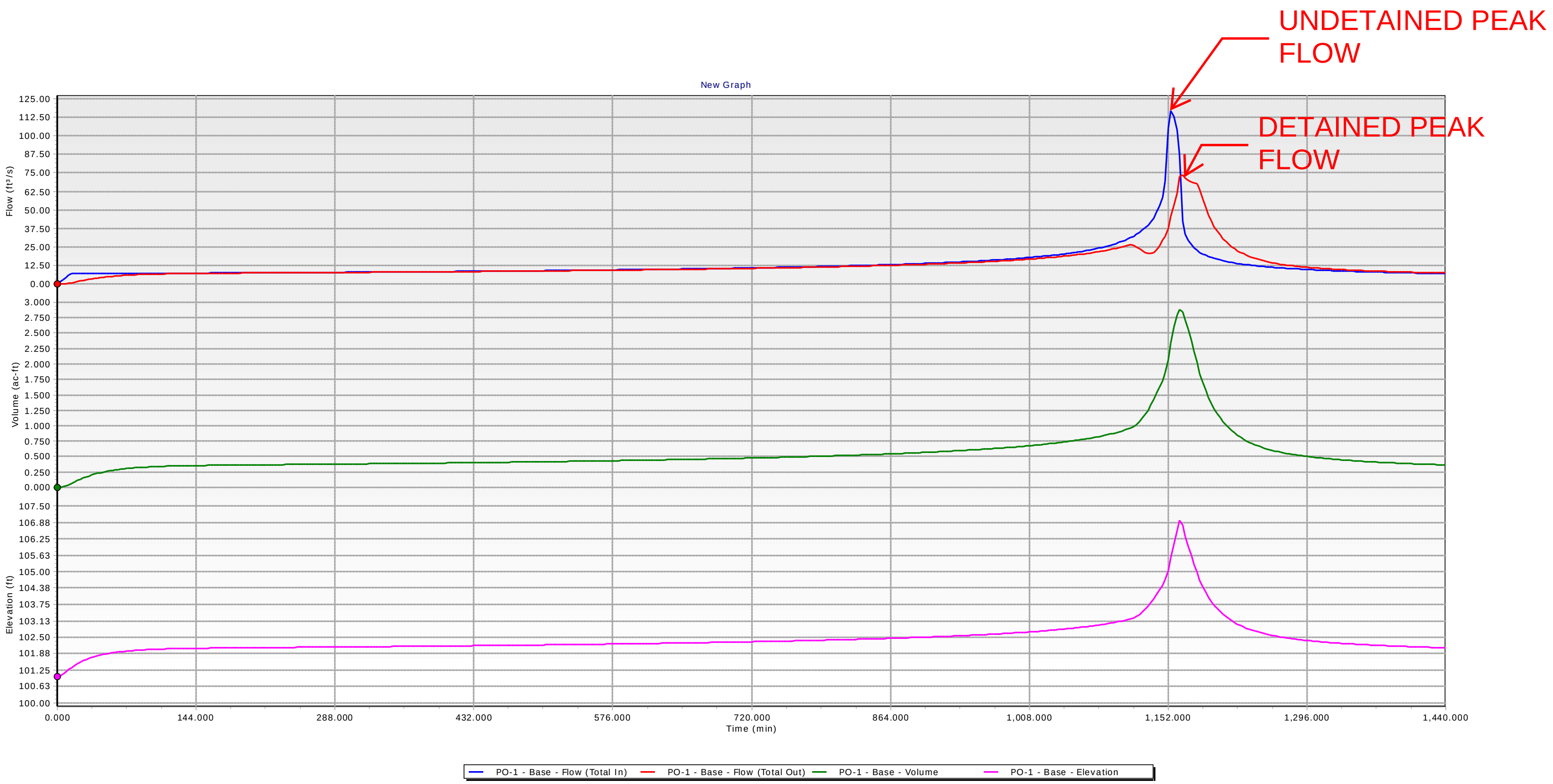
Stewart, J.P., Whang, D.H., Moyneur M., and Duku, P. (2004), Seismic Compression of As-Compacted Fill Soils with Variable Fines Content and Fines Plasticity, Earthquake Damage Assessment and Repair Project, Consortium of Universities for Research in Earthquake Engineering (CUREE), CUREE Publication No. EDA-05.

Tokimatsu, K. and Seed, H.B., 1987, Evaluation of settlement in sand due to earthquake shaking, Journal of Geotechnical Engineering, ASCE, 113(8), p. 861-878.

APPENDIX E

Hydrology Calculations

IRWINDALE SPEEDWAY COMMERCE CENTER 25 YEAR DETENTION ANALYSIS



Project Summary

Title	Irwindale Speedway
Engineer	Michael Lepore
Company	Kimley-Horn
Date	9/3/2020

Notes

Table of Contents

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
CM-1	Base	0	25.663	1,154.800	116.93

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
O-1	Base	0	25.227	1,167.000	73.51

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
PO-1 (IN)	Base	0	25.606	1,155.000	116.92	(N/A)	(N/A)
PO-1 (OUT)	Base	0	25.227	1,167.000	73.51	106.96	2.885

Subsection: Read Hydrograph
Label: CM-1

Peak Discharge	116.93 ft³/s
Time to Peak	1,154.800 min
Hydrograph Volume	25.663 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.10	0.20	0.29	0.39
1.000	0.49	0.59	0.69	0.78	0.88
2.000	0.98	1.08	1.18	1.27	1.37
3.000	1.47	1.57	1.67	1.76	1.86
4.000	1.96	2.06	2.16	2.26	2.35
5.000	2.45	2.55	2.65	2.75	2.84
6.000	2.94	3.04	3.14	3.24	3.33
7.000	3.43	3.53	3.63	3.73	3.82
8.000	3.92	4.02	4.12	4.22	4.31
9.000	4.41	4.51	4.61	4.71	4.80
10.000	4.90	5.00	5.10	5.20	5.29
11.000	5.39	5.49	5.59	5.69	5.78
12.000	5.88	5.98	6.08	6.18	6.27
13.000	6.37	6.47	6.57	6.67	6.77
14.000	6.86	6.86	6.86	6.86	6.87
15.000	6.87	6.87	6.87	6.87	6.87
16.000	6.87	6.87	6.87	6.87	6.87
17.000	6.87	6.87	6.87	6.87	6.87
18.000	6.87	6.88	6.88	6.88	6.88
19.000	6.88	6.88	6.88	6.88	6.88
20.000	6.88	6.88	6.88	6.88	6.88
21.000	6.88	6.88	6.88	6.88	6.89
22.000	6.89	6.89	6.89	6.89	6.89
23.000	6.89	6.89	6.89	6.89	6.89
24.000	6.89	6.89	6.89	6.89	6.89
25.000	6.89	6.90	6.90	6.90	6.90
26.000	6.90	6.90	6.90	6.90	6.90
27.000	6.90	6.90	6.90	6.90	6.90
28.000	6.90	6.90	6.90	6.90	6.91
29.000	6.91	6.91	6.91	6.91	6.91
30.000	6.91	6.91	6.91	6.91	6.91
31.000	6.91	6.91	6.91	6.91	6.91
32.000	6.91	6.92	6.92	6.92	6.92
33.000	6.92	6.92	6.92	6.92	6.92
34.000	6.92	6.92	6.92	6.92	6.92
35.000	6.92	6.92	6.92	6.92	6.93
36.000	6.93	6.93	6.93	6.93	6.93
37.000	6.93	6.93	6.93	6.93	6.93
38.000	6.93	6.93	6.93	6.93	6.93

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
39.000	6.93	6.94	6.94	6.94	6.94
40.000	6.94	6.94	6.94	6.94	6.94
41.000	6.94	6.94	6.94	6.94	6.94
42.000	6.94	6.94	6.94	6.95	6.95
43.000	6.95	6.95	6.95	6.95	6.95
44.000	6.95	6.95	6.95	6.95	6.95
45.000	6.95	6.95	6.95	6.95	6.95
46.000	6.96	6.96	6.96	6.96	6.96
47.000	6.96	6.96	6.96	6.96	6.96
48.000	6.96	6.96	6.96	6.96	6.96
49.000	6.96	6.96	6.97	6.97	6.97
50.000	6.97	6.97	6.97	6.97	6.97
51.000	6.97	6.97	6.97	6.97	6.97
52.000	6.97	6.97	6.97	6.97	6.98
53.000	6.98	6.98	6.98	6.98	6.98
54.000	6.98	6.98	6.98	6.98	6.98
55.000	6.98	6.98	6.98	6.98	6.98
56.000	6.98	6.99	6.99	6.99	6.99
57.000	6.99	6.99	6.99	6.99	6.99
58.000	6.99	6.99	6.99	6.99	6.99
59.000	6.99	6.99	7.00	7.00	7.00
60.000	7.00	7.00	7.00	7.00	7.00
61.000	7.00	7.00	7.00	7.00	7.00
62.000	7.00	7.00	7.00	7.00	7.01
63.000	7.01	7.01	7.01	7.01	7.01
64.000	7.01	7.01	7.01	7.01	7.01
65.000	7.01	7.01	7.01	7.01	7.01
66.000	7.01	7.02	7.02	7.02	7.02
67.000	7.02	7.02	7.02	7.02	7.02
68.000	7.02	7.02	7.02	7.02	7.02
69.000	7.02	7.02	7.03	7.03	7.03
70.000	7.03	7.03	7.03	7.03	7.03
71.000	7.03	7.03	7.03	7.03	7.03
72.000	7.03	7.03	7.03	7.03	7.04
73.000	7.04	7.04	7.04	7.04	7.04
74.000	7.04	7.04	7.04	7.04	7.04
75.000	7.04	7.04	7.04	7.04	7.04
76.000	7.05	7.05	7.05	7.05	7.05
77.000	7.05	7.05	7.05	7.05	7.05
78.000	7.05	7.05	7.05	7.05	7.05
79.000	7.05	7.06	7.06	7.06	7.06
80.000	7.06	7.06	7.06	7.06	7.06
81.000	7.06	7.06	7.06	7.06	7.06
82.000	7.06	7.06	7.06	7.07	7.07

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
83.000	7.07	7.07	7.07	7.07	7.07
84.000	7.07	7.07	7.07	7.07	7.07
85.000	7.07	7.07	7.07	7.07	7.08
86.000	7.08	7.08	7.08	7.08	7.08
87.000	7.08	7.08	7.08	7.08	7.08
88.000	7.08	7.08	7.08	7.08	7.08
89.000	7.09	7.09	7.09	7.09	7.09
90.000	7.09	7.09	7.09	7.09	7.09
91.000	7.09	7.09	7.09	7.09	7.09
92.000	7.09	7.10	7.10	7.10	7.10
93.000	7.10	7.10	7.10	7.10	7.10
94.000	7.10	7.10	7.10	7.10	7.10
95.000	7.10	7.10	7.11	7.11	7.11
96.000	7.11	7.11	7.11	7.11	7.11
97.000	7.11	7.11	7.11	7.11	7.11
98.000	7.11	7.11	7.11	7.12	7.12
99.000	7.12	7.12	7.12	7.12	7.12
100.000	7.12	7.12	7.12	7.12	7.12
101.000	7.12	7.12	7.12	7.12	7.13
102.000	7.13	7.13	7.13	7.13	7.13
103.000	7.13	7.13	7.13	7.13	7.13
104.000	7.13	7.13	7.13	7.13	7.14
105.000	7.14	7.14	7.14	7.14	7.14
106.000	7.14	7.14	7.14	7.14	7.14
107.000	7.14	7.14	7.14	7.14	7.14
108.000	7.15	7.15	7.15	7.15	7.15
109.000	7.15	7.15	7.15	7.15	7.15
110.000	7.15	7.15	7.15	7.15	7.15
111.000	7.15	7.16	7.16	7.16	7.16
112.000	7.16	7.16	7.16	7.16	7.16
113.000	7.16	7.16	7.16	7.16	7.16
114.000	7.16	7.17	7.17	7.17	7.17
115.000	7.17	7.17	7.17	7.17	7.17
116.000	7.17	7.17	7.17	7.17	7.17
117.000	7.17	7.17	7.18	7.18	7.18
118.000	7.18	7.18	7.18	7.18	7.18
119.000	7.18	7.18	7.18	7.18	7.18
120.000	7.18	7.18	7.19	7.19	7.19
121.000	7.19	7.19	7.19	7.19	7.19
122.000	7.19	7.19	7.19	7.19	7.19
123.000	7.19	7.19	7.19	7.20	7.20
124.000	7.20	7.20	7.20	7.20	7.20
125.000	7.20	7.20	7.20	7.20	7.20
126.000	7.20	7.20	7.20	7.21	7.21

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
127.000	7.21	7.21	7.21	7.21	7.21
128.000	7.21	7.21	7.21	7.21	7.21
129.000	7.21	7.21	7.21	7.22	7.22
130.000	7.22	7.22	7.22	7.22	7.22
131.000	7.22	7.22	7.22	7.22	7.22
132.000	7.22	7.22	7.22	7.23	7.23
133.000	7.23	7.23	7.23	7.23	7.23
134.000	7.23	7.23	7.23	7.23	7.23
135.000	7.23	7.23	7.23	7.24	7.24
136.000	7.24	7.24	7.24	7.24	7.24
137.000	7.24	7.24	7.24	7.24	7.24
138.000	7.24	7.24	7.24	7.25	7.25
139.000	7.25	7.25	7.25	7.25	7.25
140.000	7.25	7.25	7.25	7.25	7.25
141.000	7.25	7.25	7.25	7.26	7.26
142.000	7.26	7.26	7.26	7.26	7.26
143.000	7.26	7.26	7.26	7.26	7.26
144.000	7.26	7.26	7.26	7.27	7.27
145.000	7.27	7.27	7.27	7.27	7.27
146.000	7.27	7.27	7.27	7.27	7.27
147.000	7.27	7.27	7.27	7.28	7.28
148.000	7.28	7.28	7.28	7.28	7.28
149.000	7.28	7.28	7.28	7.28	7.28
150.000	7.28	7.28	7.28	7.29	7.29
151.000	7.29	7.29	7.29	7.29	7.29
152.000	7.29	7.29	7.29	7.29	7.29
153.000	7.29	7.29	7.30	7.30	7.30
154.000	7.30	7.30	7.30	7.30	7.30
155.000	7.30	7.30	7.30	7.30	7.30
156.000	7.30	7.30	7.31	7.31	7.31
157.000	7.31	7.31	7.31	7.31	7.31
158.000	7.31	7.31	7.31	7.31	7.31
159.000	7.31	7.31	7.32	7.32	7.32
160.000	7.32	7.32	7.32	7.32	7.32
161.000	7.32	7.32	7.32	7.32	7.32
162.000	7.32	7.33	7.33	7.33	7.33
163.000	7.33	7.33	7.33	7.33	7.33
164.000	7.33	7.33	7.33	7.33	7.33
165.000	7.33	7.34	7.34	7.34	7.34
166.000	7.34	7.34	7.34	7.34	7.34
167.000	7.34	7.34	7.34	7.34	7.34
168.000	7.35	7.35	7.35	7.35	7.35
169.000	7.35	7.35	7.35	7.35	7.35
170.000	7.35	7.35	7.35	7.35	7.36

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
171.000	7.36	7.36	7.36	7.36	7.36
172.000	7.36	7.36	7.36	7.36	7.36
173.000	7.36	7.36	7.36	7.37	7.37
174.000	7.37	7.37	7.37	7.37	7.37
175.000	7.37	7.37	7.37	7.37	7.37
176.000	7.37	7.37	7.37	7.38	7.38
177.000	7.38	7.38	7.38	7.38	7.38
178.000	7.38	7.38	7.38	7.38	7.38
179.000	7.38	7.38	7.39	7.39	7.39
180.000	7.39	7.39	7.39	7.39	7.39
181.000	7.39	7.39	7.39	7.39	7.39
182.000	7.39	7.40	7.40	7.40	7.40
183.000	7.40	7.40	7.40	7.40	7.40
184.000	7.40	7.40	7.40	7.40	7.40
185.000	7.41	7.41	7.41	7.41	7.41
186.000	7.41	7.41	7.41	7.41	7.41
187.000	7.41	7.41	7.41	7.41	7.42
188.000	7.42	7.42	7.42	7.42	7.42
189.000	7.42	7.42	7.42	7.42	7.42
190.000	7.42	7.42	7.42	7.43	7.43
191.000	7.43	7.43	7.43	7.43	7.43
192.000	7.43	7.43	7.43	7.43	7.43
193.000	7.43	7.43	7.44	7.44	7.44
194.000	7.44	7.44	7.44	7.44	7.44
195.000	7.44	7.44	7.44	7.44	7.44
196.000	7.45	7.45	7.45	7.45	7.45
197.000	7.45	7.45	7.45	7.45	7.45
198.000	7.45	7.45	7.45	7.45	7.46
199.000	7.46	7.46	7.46	7.46	7.46
200.000	7.46	7.46	7.46	7.46	7.46
201.000	7.46	7.46	7.46	7.47	7.47
202.000	7.47	7.47	7.47	7.47	7.47
203.000	7.47	7.47	7.47	7.47	7.47
204.000	7.47	7.48	7.48	7.48	7.48
205.000	7.48	7.48	7.48	7.48	7.48
206.000	7.48	7.48	7.48	7.48	7.48
207.000	7.49	7.49	7.49	7.49	7.49
208.000	7.49	7.49	7.49	7.49	7.49
209.000	7.49	7.49	7.49	7.49	7.50
210.000	7.50	7.50	7.50	7.50	7.50
211.000	7.50	7.50	7.50	7.50	7.50
212.000	7.50	7.50	7.51	7.51	7.51
213.000	7.51	7.51	7.51	7.51	7.51
214.000	7.51	7.51	7.51	7.51	7.51

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
215.000	7.52	7.52	7.52	7.52	7.52
216.000	7.52	7.52	7.52	7.52	7.52
217.000	7.52	7.52	7.52	7.52	7.53
218.000	7.53	7.53	7.53	7.53	7.53
219.000	7.53	7.53	7.53	7.53	7.53
220.000	7.53	7.53	7.54	7.54	7.54
221.000	7.54	7.54	7.54	7.54	7.54
222.000	7.54	7.54	7.54	7.54	7.54
223.000	7.55	7.55	7.55	7.55	7.55
224.000	7.55	7.55	7.55	7.55	7.55
225.000	7.55	7.55	7.55	7.56	7.56
226.000	7.56	7.56	7.56	7.56	7.56
227.000	7.56	7.56	7.56	7.56	7.56
228.000	7.56	7.56	7.57	7.57	7.57
229.000	7.57	7.57	7.57	7.57	7.57
230.000	7.57	7.57	7.57	7.57	7.57
231.000	7.58	7.58	7.58	7.58	7.58
232.000	7.58	7.58	7.58	7.58	7.58
233.000	7.58	7.58	7.58	7.59	7.59
234.000	7.59	7.59	7.59	7.59	7.59
235.000	7.59	7.59	7.59	7.59	7.59
236.000	7.59	7.60	7.60	7.60	7.60
237.000	7.60	7.60	7.60	7.60	7.60
238.000	7.60	7.60	7.60	7.61	7.61
239.000	7.61	7.61	7.61	7.61	7.61
240.000	7.61	7.61	7.61	7.61	7.61
241.000	7.61	7.62	7.62	7.62	7.62
242.000	7.62	7.62	7.62	7.62	7.62
243.000	7.62	7.62	7.62	7.62	7.63
244.000	7.63	7.63	7.63	7.63	7.63
245.000	7.63	7.63	7.63	7.63	7.63
246.000	7.63	7.63	7.64	7.64	7.64
247.000	7.64	7.64	7.64	7.64	7.64
248.000	7.64	7.64	7.64	7.64	7.64
249.000	7.65	7.65	7.65	7.65	7.65
250.000	7.65	7.65	7.65	7.65	7.65
251.000	7.65	7.65	7.66	7.66	7.66
252.000	7.66	7.66	7.66	7.66	7.66
253.000	7.66	7.66	7.66	7.66	7.66
254.000	7.67	7.67	7.67	7.67	7.67
255.000	7.67	7.67	7.67	7.67	7.67
256.000	7.67	7.67	7.68	7.68	7.68
257.000	7.68	7.68	7.68	7.68	7.68
258.000	7.68	7.68	7.68	7.68	7.68

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
259.000	7.69	7.69	7.69	7.69	7.69
260.000	7.69	7.69	7.69	7.69	7.69
261.000	7.69	7.69	7.70	7.70	7.70
262.000	7.70	7.70	7.70	7.70	7.70
263.000	7.70	7.70	7.70	7.70	7.70
264.000	7.71	7.71	7.71	7.71	7.71
265.000	7.71	7.71	7.71	7.71	7.71
266.000	7.71	7.71	7.72	7.72	7.72
267.000	7.72	7.72	7.72	7.72	7.72
268.000	7.72	7.72	7.72	7.72	7.73
269.000	7.73	7.73	7.73	7.73	7.73
270.000	7.73	7.73	7.73	7.73	7.73
271.000	7.73	7.74	7.74	7.74	7.74
272.000	7.74	7.74	7.74	7.74	7.74
273.000	7.74	7.74	7.74	7.74	7.75
274.000	7.75	7.75	7.75	7.75	7.75
275.000	7.75	7.75	7.75	7.75	7.75
276.000	7.75	7.76	7.76	7.76	7.76
277.000	7.76	7.76	7.76	7.76	7.76
278.000	7.76	7.76	7.76	7.77	7.77
279.000	7.77	7.77	7.77	7.77	7.77
280.000	7.77	7.77	7.77	7.77	7.77
281.000	7.78	7.78	7.78	7.78	7.78
282.000	7.78	7.78	7.78	7.78	7.78
283.000	7.78	7.78	7.79	7.79	7.79
284.000	7.79	7.79	7.79	7.79	7.79
285.000	7.79	7.79	7.79	7.79	7.80
286.000	7.80	7.80	7.80	7.80	7.80
287.000	7.80	7.80	7.80	7.80	7.80
288.000	7.80	7.81	7.81	7.81	7.81
289.000	7.81	7.81	7.81	7.81	7.81
290.000	7.81	7.81	7.81	7.82	7.82
291.000	7.82	7.82	7.82	7.82	7.82
292.000	7.82	7.82	7.82	7.82	7.83
293.000	7.83	7.83	7.83	7.83	7.83
294.000	7.83	7.83	7.83	7.83	7.83
295.000	7.83	7.84	7.84	7.84	7.84
296.000	7.84	7.84	7.84	7.84	7.84
297.000	7.84	7.84	7.84	7.85	7.85
298.000	7.85	7.85	7.85	7.85	7.85
299.000	7.85	7.85	7.85	7.85	7.86
300.000	7.86	7.86	7.86	7.86	7.86
301.000	7.86	7.86	7.86	7.86	7.86
302.000	7.86	7.87	7.87	7.87	7.87

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
303.000	7.87	7.87	7.87	7.87	7.87
304.000	7.87	7.87	7.87	7.88	7.88
305.000	7.88	7.88	7.88	7.88	7.88
306.000	7.88	7.88	7.88	7.88	7.89
307.000	7.89	7.89	7.89	7.89	7.89
308.000	7.89	7.89	7.89	7.89	7.89
309.000	7.89	7.90	7.90	7.90	7.90
310.000	7.90	7.90	7.90	7.90	7.90
311.000	7.90	7.90	7.91	7.91	7.91
312.000	7.91	7.91	7.91	7.91	7.91
313.000	7.91	7.91	7.91	7.92	7.92
314.000	7.92	7.92	7.92	7.92	7.92
315.000	7.92	7.92	7.92	7.92	7.92
316.000	7.93	7.93	7.93	7.93	7.93
317.000	7.93	7.93	7.93	7.93	7.93
318.000	7.93	7.94	7.94	7.94	7.94
319.000	7.94	7.94	7.94	7.94	7.94
320.000	7.94	7.94	7.95	7.95	7.95
321.000	7.95	7.95	7.95	7.95	7.95
322.000	7.95	7.95	7.95	7.95	7.96
323.000	7.96	7.96	7.96	7.96	7.96
324.000	7.96	7.96	7.96	7.96	7.96
325.000	7.97	7.97	7.97	7.97	7.97
326.000	7.97	7.97	7.97	7.97	7.97
327.000	7.97	7.98	7.98	7.98	7.98
328.000	7.98	7.98	7.98	7.98	7.98
329.000	7.98	7.98	7.99	7.99	7.99
330.000	7.99	7.99	7.99	7.99	7.99
331.000	7.99	7.99	7.99	8.00	8.00
332.000	8.00	8.00	8.00	8.00	8.00
333.000	8.00	8.00	8.00	8.00	8.01
334.000	8.01	8.01	8.01	8.01	8.01
335.000	8.01	8.01	8.01	8.01	8.01
336.000	8.02	8.02	8.02	8.02	8.02
337.000	8.02	8.02	8.02	8.02	8.02
338.000	8.02	8.03	8.03	8.03	8.03
339.000	8.03	8.03	8.03	8.03	8.03
340.000	8.03	8.03	8.04	8.04	8.04
341.000	8.04	8.04	8.04	8.04	8.04
342.000	8.04	8.04	8.05	8.05	8.05
343.000	8.05	8.05	8.05	8.05	8.05
344.000	8.05	8.05	8.05	8.06	8.06
345.000	8.06	8.06	8.06	8.06	8.06
346.000	8.06	8.06	8.06	8.06	8.07

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
347.000	8.07	8.07	8.07	8.07	8.07
348.000	8.07	8.07	8.07	8.07	8.07
349.000	8.08	8.08	8.08	8.08	8.08
350.000	8.08	8.08	8.08	8.08	8.08
351.000	8.09	8.09	8.09	8.09	8.09
352.000	8.09	8.09	8.09	8.09	8.09
353.000	8.09	8.10	8.10	8.10	8.10
354.000	8.10	8.10	8.10	8.10	8.10
355.000	8.10	8.10	8.11	8.11	8.11
356.000	8.11	8.11	8.11	8.11	8.11
357.000	8.11	8.11	8.12	8.12	8.12
358.000	8.12	8.12	8.12	8.12	8.12
359.000	8.12	8.12	8.12	8.13	8.13
360.000	8.13	8.13	8.13	8.13	8.13
361.000	8.13	8.13	8.13	8.14	8.14
362.000	8.14	8.14	8.14	8.14	8.14
363.000	8.14	8.14	8.14	8.15	8.15
364.000	8.15	8.15	8.15	8.15	8.15
365.000	8.15	8.15	8.15	8.15	8.16
366.000	8.16	8.16	8.16	8.16	8.16
367.000	8.16	8.16	8.16	8.16	8.17
368.000	8.17	8.17	8.17	8.17	8.17
369.000	8.17	8.17	8.17	8.17	8.18
370.000	8.18	8.18	8.18	8.18	8.18
371.000	8.18	8.18	8.18	8.18	8.18
372.000	8.19	8.19	8.19	8.19	8.19
373.000	8.19	8.19	8.19	8.19	8.19
374.000	8.20	8.20	8.20	8.20	8.20
375.000	8.20	8.20	8.20	8.20	8.20
376.000	8.21	8.21	8.21	8.21	8.21
377.000	8.21	8.21	8.21	8.21	8.21
378.000	8.22	8.22	8.22	8.22	8.22
379.000	8.22	8.22	8.22	8.22	8.22
380.000	8.23	8.23	8.23	8.23	8.23
381.000	8.23	8.23	8.23	8.23	8.23
382.000	8.24	8.24	8.24	8.24	8.24
383.000	8.24	8.24	8.24	8.24	8.24
384.000	8.25	8.25	8.25	8.25	8.25
385.000	8.25	8.25	8.25	8.25	8.25
386.000	8.26	8.26	8.26	8.26	8.26
387.000	8.26	8.26	8.26	8.26	8.26
388.000	8.27	8.27	8.27	8.27	8.27
389.000	8.27	8.27	8.27	8.27	8.27
390.000	8.28	8.28	8.28	8.28	8.28

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
391.000	8.28	8.28	8.28	8.28	8.28
392.000	8.29	8.29	8.29	8.29	8.29
393.000	8.29	8.29	8.29	8.29	8.29
394.000	8.30	8.30	8.30	8.30	8.30
395.000	8.30	8.30	8.30	8.30	8.30
396.000	8.31	8.31	8.31	8.31	8.31
397.000	8.31	8.31	8.31	8.31	8.32
398.000	8.32	8.32	8.32	8.32	8.32
399.000	8.32	8.32	8.32	8.32	8.33
400.000	8.33	8.33	8.33	8.33	8.33
401.000	8.33	8.33	8.33	8.33	8.34
402.000	8.34	8.34	8.34	8.34	8.34
403.000	8.34	8.34	8.34	8.35	8.35
404.000	8.35	8.35	8.35	8.35	8.35
405.000	8.35	8.35	8.35	8.36	8.36
406.000	8.36	8.36	8.36	8.36	8.36
407.000	8.36	8.36	8.36	8.37	8.37
408.000	8.37	8.37	8.37	8.37	8.37
409.000	8.37	8.37	8.38	8.38	8.38
410.000	8.38	8.38	8.38	8.38	8.38
411.000	8.38	8.38	8.39	8.39	8.39
412.000	8.39	8.39	8.39	8.39	8.39
413.000	8.39	8.40	8.40	8.40	8.40
414.000	8.40	8.40	8.40	8.40	8.40
415.000	8.40	8.41	8.41	8.41	8.41
416.000	8.41	8.41	8.41	8.41	8.41
417.000	8.42	8.42	8.42	8.42	8.42
418.000	8.42	8.42	8.42	8.42	8.43
419.000	8.43	8.43	8.43	8.43	8.43
420.000	8.43	8.43	8.43	8.43	8.44
421.000	8.44	8.44	8.44	8.44	8.44
422.000	8.44	8.44	8.44	8.45	8.45
423.000	8.45	8.45	8.45	8.45	8.45
424.000	8.45	8.45	8.46	8.46	8.46
425.000	8.46	8.46	8.46	8.46	8.46
426.000	8.46	8.47	8.47	8.47	8.47
427.000	8.47	8.47	8.47	8.47	8.47
428.000	8.47	8.48	8.48	8.48	8.48
429.000	8.48	8.48	8.48	8.48	8.48
430.000	8.49	8.49	8.49	8.49	8.49
431.000	8.49	8.49	8.49	8.49	8.50
432.000	8.50	8.50	8.50	8.50	8.50
433.000	8.50	8.50	8.50	8.51	8.51
434.000	8.51	8.51	8.51	8.51	8.51

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
435.000	8.51	8.51	8.52	8.52	8.52
436.000	8.52	8.52	8.52	8.52	8.52
437.000	8.52	8.53	8.53	8.53	8.53
438.000	8.53	8.53	8.53	8.53	8.53
439.000	8.54	8.54	8.54	8.54	8.54
440.000	8.54	8.54	8.54	8.54	8.55
441.000	8.55	8.55	8.55	8.55	8.55
442.000	8.55	8.55	8.55	8.56	8.56
443.000	8.56	8.56	8.56	8.56	8.56
444.000	8.56	8.56	8.57	8.57	8.57
445.000	8.57	8.57	8.57	8.57	8.57
446.000	8.57	8.58	8.58	8.58	8.58
447.000	8.58	8.58	8.58	8.58	8.58
448.000	8.59	8.59	8.59	8.59	8.59
449.000	8.59	8.59	8.59	8.60	8.60
450.000	8.60	8.60	8.60	8.60	8.60
451.000	8.60	8.60	8.61	8.61	8.61
452.000	8.61	8.61	8.61	8.61	8.61
453.000	8.61	8.62	8.62	8.62	8.62
454.000	8.62	8.62	8.62	8.62	8.62
455.000	8.63	8.63	8.63	8.63	8.63
456.000	8.63	8.63	8.63	8.64	8.64
457.000	8.64	8.64	8.64	8.64	8.64
458.000	8.64	8.64	8.65	8.65	8.65
459.000	8.65	8.65	8.65	8.65	8.65
460.000	8.66	8.66	8.66	8.66	8.66
461.000	8.66	8.66	8.66	8.66	8.67
462.000	8.67	8.67	8.67	8.67	8.67
463.000	8.67	8.67	8.67	8.68	8.68
464.000	8.68	8.68	8.68	8.68	8.68
465.000	8.68	8.69	8.69	8.69	8.69
466.000	8.69	8.69	8.69	8.69	8.69
467.000	8.70	8.70	8.70	8.70	8.70
468.000	8.70	8.70	8.70	8.71	8.71
469.000	8.71	8.71	8.71	8.71	8.71
470.000	8.71	8.72	8.72	8.72	8.72
471.000	8.72	8.72	8.72	8.72	8.72
472.000	8.73	8.73	8.73	8.73	8.73
473.000	8.73	8.73	8.73	8.74	8.74
474.000	8.74	8.74	8.74	8.74	8.74
475.000	8.74	8.74	8.75	8.75	8.75
476.000	8.75	8.75	8.75	8.75	8.75
477.000	8.76	8.76	8.76	8.76	8.76
478.000	8.76	8.76	8.76	8.77	8.77

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
479.000	8.77	8.77	8.77	8.77	8.77
480.000	8.77	8.78	8.78	8.78	8.78
481.000	8.78	8.78	8.78	8.78	8.78
482.000	8.79	8.79	8.79	8.79	8.79
483.000	8.79	8.79	8.79	8.80	8.80
484.000	8.80	8.80	8.80	8.80	8.80
485.000	8.80	8.81	8.81	8.81	8.81
486.000	8.81	8.81	8.81	8.81	8.82
487.000	8.82	8.82	8.82	8.82	8.82
488.000	8.82	8.82	8.83	8.83	8.83
489.000	8.83	8.83	8.83	8.83	8.83
490.000	8.84	8.84	8.84	8.84	8.84
491.000	8.84	8.84	8.84	8.85	8.85
492.000	8.85	8.85	8.85	8.85	8.85
493.000	8.85	8.86	8.86	8.86	8.86
494.000	8.86	8.86	8.86	8.86	8.87
495.000	8.87	8.87	8.87	8.87	8.87
496.000	8.87	8.87	8.88	8.88	8.88
497.000	8.88	8.88	8.88	8.88	8.88
498.000	8.89	8.89	8.89	8.89	8.89
499.000	8.89	8.89	8.89	8.90	8.90
500.000	8.90	8.90	8.90	8.90	8.90
501.000	8.90	8.91	8.91	8.91	8.91
502.000	8.91	8.91	8.91	8.91	8.92
503.000	8.92	8.92	8.92	8.92	8.92
504.000	8.92	8.92	8.93	8.93	8.93
505.000	8.93	8.93	8.93	8.93	8.94
506.000	8.94	8.94	8.94	8.94	8.94
507.000	8.94	8.94	8.95	8.95	8.95
508.000	8.95	8.95	8.95	8.95	8.95
509.000	8.96	8.96	8.96	8.96	8.96
510.000	8.96	8.96	8.96	8.97	8.97
511.000	8.97	8.97	8.97	8.97	8.97
512.000	8.98	8.98	8.98	8.98	8.98
513.000	8.98	8.98	8.98	8.99	8.99
514.000	8.99	8.99	8.99	8.99	8.99
515.000	8.99	9.00	9.00	9.00	9.00
516.000	9.00	9.00	9.00	9.01	9.01
517.000	9.01	9.01	9.01	9.01	9.01
518.000	9.01	9.02	9.02	9.02	9.02
519.000	9.02	9.02	9.02	9.03	9.03
520.000	9.03	9.03	9.03	9.03	9.03
521.000	9.03	9.04	9.04	9.04	9.04
522.000	9.04	9.04	9.04	9.05	9.05

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
523.000	9.05	9.05	9.05	9.05	9.05
524.000	9.05	9.06	9.06	9.06	9.06
525.000	9.06	9.06	9.06	9.07	9.07
526.000	9.07	9.07	9.07	9.07	9.07
527.000	9.07	9.08	9.08	9.08	9.08
528.000	9.08	9.08	9.08	9.09	9.09
529.000	9.09	9.09	9.09	9.09	9.09
530.000	9.10	9.10	9.10	9.10	9.10
531.000	9.10	9.10	9.10	9.11	9.11
532.000	9.11	9.11	9.11	9.11	9.11
533.000	9.12	9.12	9.12	9.12	9.12
534.000	9.12	9.12	9.13	9.13	9.13
535.000	9.13	9.13	9.13	9.13	9.13
536.000	9.14	9.14	9.14	9.14	9.14
537.000	9.14	9.14	9.15	9.15	9.15
538.000	9.15	9.15	9.15	9.15	9.16
539.000	9.16	9.16	9.16	9.16	9.16
540.000	9.16	9.17	9.17	9.17	9.17
541.000	9.17	9.17	9.17	9.18	9.18
542.000	9.18	9.18	9.18	9.18	9.18
543.000	9.18	9.19	9.19	9.19	9.19
544.000	9.19	9.19	9.19	9.20	9.20
545.000	9.20	9.20	9.20	9.20	9.20
546.000	9.21	9.21	9.21	9.21	9.21
547.000	9.21	9.21	9.22	9.22	9.22
548.000	9.22	9.22	9.22	9.22	9.23
549.000	9.23	9.23	9.23	9.23	9.23
550.000	9.23	9.24	9.24	9.24	9.24
551.000	9.24	9.24	9.24	9.25	9.25
552.000	9.25	9.25	9.25	9.25	9.25
553.000	9.26	9.26	9.26	9.26	9.26
554.000	9.26	9.26	9.27	9.27	9.27
555.000	9.27	9.27	9.27	9.27	9.28
556.000	9.28	9.28	9.28	9.28	9.28
557.000	9.28	9.29	9.29	9.29	9.29
558.000	9.29	9.29	9.29	9.30	9.30
559.000	9.30	9.30	9.30	9.30	9.30
560.000	9.31	9.31	9.31	9.31	9.31
561.000	9.31	9.32	9.32	9.32	9.32
562.000	9.32	9.32	9.32	9.33	9.33
563.000	9.33	9.33	9.33	9.33	9.33
564.000	9.34	9.34	9.34	9.34	9.34
565.000	9.34	9.34	9.35	9.35	9.35
566.000	9.35	9.35	9.35	9.36	9.36

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
567.000	9.36	9.36	9.36	9.36	9.36
568.000	9.37	9.37	9.37	9.37	9.37
569.000	9.37	9.37	9.38	9.38	9.38
570.000	9.38	9.38	9.38	9.38	9.39
571.000	9.39	9.39	9.39	9.39	9.39
572.000	9.40	9.40	9.40	9.40	9.40
573.000	9.40	9.40	9.41	9.41	9.41
574.000	9.41	9.41	9.41	9.42	9.42
575.000	9.42	9.42	9.42	9.42	9.42
576.000	9.43	9.43	9.43	9.43	9.43
577.000	9.43	9.43	9.44	9.44	9.44
578.000	9.44	9.44	9.44	9.45	9.45
579.000	9.45	9.45	9.45	9.45	9.45
580.000	9.46	9.46	9.46	9.46	9.46
581.000	9.46	9.47	9.47	9.47	9.47
582.000	9.47	9.47	9.47	9.48	9.48
583.000	9.48	9.48	9.48	9.48	9.49
584.000	9.49	9.49	9.49	9.49	9.49
585.000	9.49	9.50	9.50	9.50	9.50
586.000	9.50	9.50	9.51	9.51	9.51
587.000	9.51	9.51	9.51	9.52	9.52
588.000	9.52	9.52	9.52	9.52	9.52
589.000	9.53	9.53	9.53	9.53	9.53
590.000	9.53	9.54	9.54	9.54	9.54
591.000	9.54	9.54	9.55	9.55	9.55
592.000	9.55	9.55	9.55	9.55	9.56
593.000	9.56	9.56	9.56	9.56	9.56
594.000	9.57	9.57	9.57	9.57	9.57
595.000	9.57	9.58	9.58	9.58	9.58
596.000	9.58	9.58	9.58	9.59	9.59
597.000	9.59	9.59	9.59	9.59	9.60
598.000	9.60	9.60	9.60	9.60	9.60
599.000	9.61	9.61	9.61	9.61	9.61
600.000	9.61	9.62	9.62	9.62	9.62
601.000	9.62	9.62	9.63	9.63	9.63
602.000	9.63	9.63	9.63	9.63	9.64
603.000	9.64	9.64	9.64	9.64	9.64
604.000	9.65	9.65	9.65	9.65	9.65
605.000	9.65	9.66	9.66	9.66	9.66
606.000	9.66	9.66	9.67	9.67	9.67
607.000	9.67	9.67	9.67	9.68	9.68
608.000	9.68	9.68	9.68	9.68	9.69
609.000	9.69	9.69	9.69	9.69	9.69
610.000	9.70	9.70	9.70	9.70	9.70

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
611.000	9.70	9.71	9.71	9.71	9.71
612.000	9.71	9.71	9.72	9.72	9.72
613.000	9.72	9.72	9.72	9.73	9.73
614.000	9.73	9.73	9.73	9.73	9.74
615.000	9.74	9.74	9.74	9.74	9.74
616.000	9.75	9.75	9.75	9.75	9.75
617.000	9.75	9.76	9.76	9.76	9.76
618.000	9.76	9.76	9.77	9.77	9.77
619.000	9.77	9.77	9.77	9.78	9.78
620.000	9.78	9.78	9.78	9.78	9.79
621.000	9.79	9.79	9.79	9.79	9.80
622.000	9.80	9.80	9.80	9.80	9.80
623.000	9.81	9.81	9.81	9.81	9.81
624.000	9.81	9.82	9.82	9.82	9.82
625.000	9.82	9.82	9.83	9.83	9.83
626.000	9.83	9.83	9.83	9.84	9.84
627.000	9.84	9.84	9.84	9.85	9.85
628.000	9.85	9.85	9.85	9.85	9.86
629.000	9.86	9.86	9.86	9.86	9.86
630.000	9.87	9.87	9.87	9.87	9.87
631.000	9.88	9.88	9.88	9.88	9.88
632.000	9.88	9.89	9.89	9.89	9.89
633.000	9.89	9.89	9.90	9.90	9.90
634.000	9.90	9.90	9.91	9.91	9.91
635.000	9.91	9.91	9.91	9.92	9.92
636.000	9.92	9.92	9.92	9.92	9.93
637.000	9.93	9.93	9.93	9.93	9.94
638.000	9.94	9.94	9.94	9.94	9.94
639.000	9.95	9.95	9.95	9.95	9.95
640.000	9.96	9.96	9.96	9.96	9.96
641.000	9.96	9.97	9.97	9.97	9.97
642.000	9.97	9.98	9.98	9.98	9.98
643.000	9.98	9.98	9.99	9.99	9.99
644.000	9.99	9.99	10.00	10.00	10.00
645.000	10.00	10.00	10.00	10.01	10.01
646.000	10.01	10.01	10.01	10.02	10.02
647.000	10.02	10.02	10.02	10.02	10.03
648.000	10.03	10.03	10.03	10.03	10.04
649.000	10.04	10.04	10.04	10.04	10.04
650.000	10.05	10.05	10.05	10.05	10.05
651.000	10.06	10.06	10.06	10.06	10.06
652.000	10.07	10.07	10.07	10.07	10.07
653.000	10.07	10.08	10.08	10.08	10.08
654.000	10.08	10.09	10.09	10.09	10.09

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
655.000	10.09	10.10	10.10	10.10	10.10
656.000	10.10	10.10	10.11	10.11	10.11
657.000	10.11	10.11	10.12	10.12	10.12
658.000	10.12	10.12	10.13	10.13	10.13
659.000	10.13	10.13	10.14	10.14	10.14
660.000	10.14	10.14	10.14	10.15	10.15
661.000	10.15	10.15	10.15	10.16	10.16
662.000	10.16	10.16	10.16	10.17	10.17
663.000	10.17	10.17	10.17	10.18	10.18
664.000	10.18	10.18	10.18	10.19	10.19
665.000	10.19	10.19	10.19	10.19	10.20
666.000	10.20	10.20	10.20	10.20	10.21
667.000	10.21	10.21	10.21	10.21	10.22
668.000	10.22	10.22	10.22	10.22	10.23
669.000	10.23	10.23	10.23	10.23	10.24
670.000	10.24	10.24	10.24	10.24	10.25
671.000	10.25	10.25	10.25	10.25	10.26
672.000	10.26	10.26	10.26	10.26	10.27
673.000	10.27	10.27	10.27	10.27	10.28
674.000	10.28	10.28	10.28	10.28	10.29
675.000	10.29	10.29	10.29	10.29	10.30
676.000	10.30	10.30	10.30	10.30	10.31
677.000	10.31	10.31	10.31	10.31	10.32
678.000	10.32	10.32	10.32	10.32	10.33
679.000	10.33	10.33	10.33	10.33	10.34
680.000	10.34	10.34	10.34	10.34	10.35
681.000	10.35	10.35	10.35	10.35	10.36
682.000	10.36	10.36	10.36	10.36	10.37
683.000	10.37	10.37	10.37	10.37	10.38
684.000	10.38	10.38	10.38	10.38	10.39
685.000	10.39	10.39	10.39	10.39	10.40
686.000	10.40	10.40	10.40	10.41	10.41
687.000	10.41	10.41	10.41	10.42	10.42
688.000	10.42	10.42	10.42	10.43	10.43
689.000	10.43	10.43	10.43	10.44	10.44
690.000	10.44	10.44	10.44	10.45	10.45
691.000	10.45	10.45	10.46	10.46	10.46
692.000	10.46	10.46	10.47	10.47	10.47
693.000	10.47	10.47	10.48	10.48	10.48
694.000	10.48	10.48	10.49	10.49	10.49
695.000	10.49	10.50	10.50	10.50	10.50
696.000	10.50	10.51	10.51	10.51	10.51
697.000	10.51	10.52	10.52	10.52	10.52
698.000	10.53	10.53	10.53	10.53	10.53

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
699.000	10.54	10.54	10.54	10.54	10.54
700.000	10.55	10.55	10.55	10.55	10.56
701.000	10.56	10.56	10.56	10.56	10.57
702.000	10.57	10.57	10.57	10.58	10.58
703.000	10.58	10.58	10.58	10.59	10.59
704.000	10.59	10.59	10.59	10.60	10.60
705.000	10.60	10.60	10.61	10.61	10.61
706.000	10.61	10.61	10.62	10.62	10.62
707.000	10.62	10.63	10.63	10.63	10.63
708.000	10.63	10.64	10.64	10.64	10.64
709.000	10.65	10.65	10.65	10.65	10.65
710.000	10.66	10.66	10.66	10.66	10.67
711.000	10.67	10.67	10.67	10.67	10.68
712.000	10.68	10.68	10.68	10.69	10.69
713.000	10.69	10.69	10.69	10.70	10.70
714.000	10.70	10.70	10.71	10.71	10.71
715.000	10.71	10.72	10.72	10.72	10.72
716.000	10.72	10.73	10.73	10.73	10.73
717.000	10.74	10.74	10.74	10.74	10.74
718.000	10.75	10.75	10.75	10.75	10.76
719.000	10.76	10.76	10.76	10.77	10.77
720.000	10.77	10.77	10.77	10.78	10.78
721.000	10.78	10.78	10.79	10.79	10.79
722.000	10.79	10.80	10.80	10.80	10.80
723.000	10.80	10.81	10.81	10.81	10.81
724.000	10.82	10.82	10.82	10.82	10.83
725.000	10.83	10.83	10.83	10.84	10.84
726.000	10.84	10.84	10.84	10.85	10.85
727.000	10.85	10.85	10.86	10.86	10.86
728.000	10.86	10.87	10.87	10.87	10.87
729.000	10.88	10.88	10.88	10.88	10.89
730.000	10.89	10.89	10.89	10.89	10.90
731.000	10.90	10.90	10.90	10.91	10.91
732.000	10.91	10.91	10.92	10.92	10.92
733.000	10.92	10.93	10.93	10.93	10.93
734.000	10.94	10.94	10.94	10.94	10.95
735.000	10.95	10.95	10.95	10.95	10.96
736.000	10.96	10.96	10.96	10.97	10.97
737.000	10.97	10.97	10.98	10.98	10.98
738.000	10.98	10.99	10.99	10.99	10.99
739.000	11.00	11.00	11.00	11.00	11.01
740.000	11.01	11.01	11.01	11.02	11.02
741.000	11.02	11.02	11.03	11.03	11.03
742.000	11.03	11.04	11.04	11.04	11.04

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
743.000	11.05	11.05	11.05	11.05	11.06
744.000	11.06	11.06	11.06	11.07	11.07
745.000	11.07	11.07	11.08	11.08	11.08
746.000	11.08	11.09	11.09	11.09	11.09
747.000	11.10	11.10	11.10	11.10	11.11
748.000	11.11	11.11	11.11	11.12	11.12
749.000	11.12	11.12	11.13	11.13	11.13
750.000	11.13	11.14	11.14	11.14	11.14
751.000	11.15	11.15	11.15	11.16	11.16
752.000	11.16	11.16	11.17	11.17	11.17
753.000	11.17	11.18	11.18	11.18	11.18
754.000	11.19	11.19	11.19	11.19	11.20
755.000	11.20	11.20	11.20	11.21	11.21
756.000	11.21	11.21	11.22	11.22	11.22
757.000	11.23	11.23	11.23	11.23	11.24
758.000	11.24	11.24	11.24	11.25	11.25
759.000	11.25	11.25	11.26	11.26	11.26
760.000	11.26	11.27	11.27	11.27	11.28
761.000	11.28	11.28	11.28	11.29	11.29
762.000	11.29	11.29	11.30	11.30	11.30
763.000	11.30	11.31	11.31	11.31	11.32
764.000	11.32	11.32	11.32	11.33	11.33
765.000	11.33	11.33	11.34	11.34	11.34
766.000	11.35	11.35	11.35	11.35	11.36
767.000	11.36	11.36	11.36	11.37	11.37
768.000	11.37	11.38	11.38	11.38	11.38
769.000	11.39	11.39	11.39	11.39	11.40
770.000	11.40	11.40	11.41	11.41	11.41
771.000	11.41	11.42	11.42	11.42	11.42
772.000	11.43	11.43	11.43	11.44	11.44
773.000	11.44	11.44	11.45	11.45	11.45
774.000	11.46	11.46	11.46	11.46	11.47
775.000	11.47	11.47	11.48	11.48	11.48
776.000	11.48	11.49	11.49	11.49	11.49
777.000	11.50	11.50	11.50	11.51	11.51
778.000	11.51	11.51	11.52	11.52	11.52
779.000	11.53	11.53	11.53	11.53	11.54
780.000	11.54	11.54	11.55	11.55	11.55
781.000	11.55	11.56	11.56	11.56	11.57
782.000	11.57	11.57	11.58	11.58	11.58
783.000	11.58	11.59	11.59	11.59	11.60
784.000	11.60	11.60	11.60	11.61	11.61
785.000	11.61	11.62	11.62	11.62	11.62
786.000	11.63	11.63	11.63	11.64	11.64

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
787.000	11.64	11.65	11.65	11.65	11.65
788.000	11.66	11.66	11.66	11.67	11.67
789.000	11.67	11.67	11.68	11.68	11.68
790.000	11.69	11.69	11.69	11.70	11.70
791.000	11.70	11.70	11.71	11.71	11.71
792.000	11.72	11.72	11.72	11.73	11.73
793.000	11.73	11.73	11.74	11.74	11.74
794.000	11.75	11.75	11.75	11.76	11.76
795.000	11.76	11.76	11.77	11.77	11.77
796.000	11.78	11.78	11.78	11.79	11.79
797.000	11.79	11.80	11.80	11.80	11.80
798.000	11.81	11.81	11.81	11.82	11.82
799.000	11.82	11.83	11.83	11.83	11.84
800.000	11.84	11.84	11.84	11.85	11.85
801.000	11.85	11.86	11.86	11.86	11.87
802.000	11.87	11.87	11.88	11.88	11.88
803.000	11.89	11.89	11.89	11.89	11.90
804.000	11.90	11.90	11.91	11.91	11.91
805.000	11.92	11.92	11.92	11.93	11.93
806.000	11.93	11.94	11.94	11.94	11.95
807.000	11.95	11.95	11.95	11.96	11.96
808.000	11.96	11.97	11.97	11.97	11.98
809.000	11.98	11.98	11.99	11.99	11.99
810.000	12.00	12.00	12.00	12.01	12.01
811.000	12.01	12.02	12.02	12.02	12.03
812.000	12.03	12.03	12.04	12.04	12.04
813.000	12.05	12.05	12.05	12.06	12.06
814.000	12.06	12.07	12.07	12.07	12.08
815.000	12.08	12.08	12.08	12.09	12.09
816.000	12.09	12.10	12.10	12.10	12.11
817.000	12.11	12.11	12.12	12.12	12.12
818.000	12.13	12.13	12.13	12.14	12.14
819.000	12.14	12.15	12.15	12.16	12.16
820.000	12.16	12.17	12.17	12.17	12.18
821.000	12.18	12.18	12.19	12.19	12.19
822.000	12.20	12.20	12.20	12.21	12.21
823.000	12.21	12.22	12.22	12.22	12.23
824.000	12.23	12.23	12.24	12.24	12.24
825.000	12.25	12.25	12.25	12.26	12.26
826.000	12.26	12.27	12.27	12.27	12.28
827.000	12.28	12.29	12.29	12.29	12.30
828.000	12.30	12.30	12.31	12.31	12.31
829.000	12.32	12.32	12.32	12.33	12.33
830.000	12.33	12.34	12.34	12.34	12.35

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
831.000	12.35	12.36	12.36	12.36	12.37
832.000	12.37	12.37	12.38	12.38	12.38
833.000	12.39	12.39	12.39	12.40	12.40
834.000	12.41	12.41	12.41	12.42	12.42
835.000	12.42	12.43	12.43	12.43	12.44
836.000	12.44	12.44	12.45	12.45	12.46
837.000	12.46	12.46	12.47	12.47	12.47
838.000	12.48	12.48	12.49	12.49	12.49
839.000	12.50	12.50	12.50	12.51	12.51
840.000	12.51	12.52	12.52	12.53	12.53
841.000	12.53	12.54	12.54	12.54	12.55
842.000	12.55	12.56	12.56	12.56	12.57
843.000	12.57	12.57	12.58	12.58	12.59
844.000	12.59	12.59	12.60	12.60	12.60
845.000	12.61	12.61	12.62	12.62	12.62
846.000	12.63	12.63	12.63	12.64	12.64
847.000	12.65	12.65	12.65	12.66	12.66
848.000	12.66	12.67	12.67	12.68	12.68
849.000	12.68	12.69	12.69	12.70	12.70
850.000	12.70	12.71	12.71	12.71	12.72
851.000	12.72	12.73	12.73	12.73	12.74
852.000	12.74	12.75	12.75	12.75	12.76
853.000	12.76	12.77	12.77	12.77	12.78
854.000	12.78	12.79	12.79	12.79	12.80
855.000	12.80	12.80	12.81	12.81	12.82
856.000	12.82	12.82	12.83	12.83	12.84
857.000	12.84	12.84	12.85	12.85	12.86
858.000	12.86	12.86	12.87	12.87	12.88
859.000	12.88	12.89	12.89	12.89	12.90
860.000	12.90	12.91	12.91	12.91	12.92
861.000	12.92	12.93	12.93	12.93	12.94
862.000	12.94	12.95	12.95	12.95	12.96
863.000	12.96	12.97	12.97	12.97	12.98
864.000	12.98	12.99	12.99	13.00	13.00
865.000	13.00	13.01	13.01	13.02	13.02
866.000	13.02	13.03	13.03	13.04	13.04
867.000	13.05	13.05	13.05	13.06	13.06
868.000	13.07	13.07	13.08	13.08	13.08
869.000	13.09	13.09	13.10	13.10	13.10
870.000	13.11	13.11	13.12	13.12	13.13
871.000	13.13	13.13	13.14	13.14	13.15
872.000	13.15	13.16	13.16	13.16	13.17
873.000	13.17	13.18	13.18	13.19	13.19
874.000	13.20	13.20	13.20	13.21	13.21

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
875.000	13.22	13.22	13.23	13.23	13.23
876.000	13.24	13.24	13.25	13.25	13.26
877.000	13.26	13.27	13.27	13.27	13.28
878.000	13.28	13.29	13.29	13.30	13.30
879.000	13.31	13.31	13.31	13.32	13.32
880.000	13.33	13.33	13.34	13.34	13.35
881.000	13.35	13.36	13.36	13.36	13.37
882.000	13.37	13.38	13.38	13.39	13.39
883.000	13.40	13.40	13.41	13.41	13.41
884.000	13.42	13.42	13.43	13.43	13.44
885.000	13.44	13.45	13.45	13.46	13.46
886.000	13.46	13.47	13.47	13.48	13.48
887.000	13.49	13.49	13.50	13.50	13.51
888.000	13.51	13.52	13.52	13.53	13.53
889.000	13.54	13.54	13.54	13.55	13.55
890.000	13.56	13.56	13.57	13.57	13.58
891.000	13.58	13.59	13.59	13.60	13.60
892.000	13.61	13.61	13.62	13.62	13.63
893.000	13.63	13.64	13.64	13.64	13.65
894.000	13.65	13.66	13.66	13.67	13.67
895.000	13.68	13.68	13.69	13.69	13.70
896.000	13.70	13.71	13.71	13.72	13.72
897.000	13.73	13.73	13.74	13.74	13.75
898.000	13.75	13.76	13.76	13.77	13.77
899.000	13.78	13.78	13.79	13.79	13.80
900.000	13.80	13.81	13.81	13.82	13.82
901.000	13.83	13.83	13.84	13.84	13.85
902.000	13.85	13.86	13.86	13.87	13.87
903.000	13.88	13.88	13.89	13.89	13.90
904.000	13.90	13.91	13.91	13.92	13.92
905.000	13.93	13.93	13.94	13.94	13.95
906.000	13.96	13.96	13.97	13.97	13.98
907.000	13.98	13.99	13.99	14.00	14.00
908.000	14.01	14.01	14.02	14.02	14.03
909.000	14.03	14.04	14.04	14.05	14.05
910.000	14.06	14.07	14.07	14.08	14.08
911.000	14.09	14.09	14.10	14.10	14.11
912.000	14.11	14.12	14.12	14.13	14.14
913.000	14.14	14.15	14.15	14.16	14.16
914.000	14.17	14.17	14.18	14.18	14.19
915.000	14.20	14.20	14.21	14.21	14.22
916.000	14.22	14.23	14.23	14.24	14.24
917.000	14.25	14.26	14.26	14.27	14.27
918.000	14.28	14.28	14.29	14.29	14.30

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
919.000	14.31	14.31	14.32	14.32	14.33
920.000	14.33	14.34	14.35	14.35	14.36
921.000	14.36	14.37	14.37	14.38	14.38
922.000	14.39	14.40	14.40	14.41	14.41
923.000	14.42	14.43	14.43	14.44	14.44
924.000	14.45	14.45	14.46	14.47	14.47
925.000	14.48	14.48	14.49	14.49	14.50
926.000	14.51	14.51	14.52	14.52	14.53
927.000	14.54	14.54	14.55	14.55	14.56
928.000	14.57	14.57	14.58	14.58	14.59
929.000	14.59	14.60	14.61	14.61	14.62
930.000	14.62	14.63	14.64	14.64	14.65
931.000	14.66	14.66	14.67	14.67	14.68
932.000	14.69	14.69	14.70	14.70	14.71
933.000	14.72	14.72	14.73	14.73	14.74
934.000	14.75	14.75	14.76	14.77	14.77
935.000	14.78	14.78	14.79	14.80	14.80
936.000	14.81	14.81	14.82	14.83	14.83
937.000	14.84	14.85	14.85	14.86	14.87
938.000	14.87	14.88	14.88	14.89	14.90
939.000	14.90	14.91	14.92	14.92	14.93
940.000	14.94	14.94	14.95	14.95	14.96
941.000	14.97	14.97	14.98	14.99	14.99
942.000	15.00	15.01	15.01	15.02	15.03
943.000	15.03	15.04	15.05	15.05	15.06
944.000	15.07	15.07	15.08	15.09	15.09
945.000	15.10	15.10	15.11	15.12	15.12
946.000	15.13	15.14	15.14	15.15	15.16
947.000	15.17	15.17	15.18	15.19	15.19
948.000	15.20	15.21	15.21	15.22	15.23
949.000	15.23	15.24	15.25	15.25	15.26
950.000	15.27	15.27	15.28	15.29	15.29
951.000	15.30	15.31	15.32	15.32	15.33
952.000	15.34	15.34	15.35	15.36	15.36
953.000	15.37	15.38	15.39	15.39	15.40
954.000	15.41	15.41	15.42	15.43	15.43
955.000	15.44	15.45	15.46	15.46	15.47
956.000	15.48	15.48	15.49	15.50	15.51
957.000	15.51	15.52	15.53	15.54	15.54
958.000	15.55	15.56	15.56	15.57	15.58
959.000	15.59	15.59	15.60	15.61	15.62
960.000	15.62	15.63	15.64	15.65	15.65
961.000	15.66	15.67	15.68	15.68	15.69
962.000	15.70	15.71	15.71	15.72	15.73

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
963.000	15.74	15.74	15.75	15.76	15.77
964.000	15.77	15.78	15.79	15.80	15.80
965.000	15.81	15.82	15.83	15.83	15.84
966.000	15.85	15.86	15.87	15.87	15.88
967.000	15.89	15.90	15.90	15.91	15.92
968.000	15.93	15.94	15.94	15.95	15.96
969.000	15.97	15.97	15.98	15.99	16.00
970.000	16.01	16.01	16.02	16.03	16.04
971.000	16.05	16.05	16.06	16.07	16.08
972.000	16.09	16.10	16.10	16.11	16.12
973.000	16.13	16.14	16.14	16.15	16.16
974.000	16.17	16.18	16.18	16.19	16.20
975.000	16.21	16.22	16.23	16.23	16.24
976.000	16.25	16.26	16.27	16.28	16.28
977.000	16.29	16.30	16.31	16.32	16.33
978.000	16.34	16.34	16.35	16.36	16.37
979.000	16.38	16.39	16.40	16.40	16.41
980.000	16.42	16.43	16.44	16.45	16.46
981.000	16.46	16.47	16.48	16.49	16.50
982.000	16.51	16.52	16.53	16.53	16.54
983.000	16.55	16.56	16.57	16.58	16.59
984.000	16.60	16.61	16.61	16.62	16.63
985.000	16.64	16.65	16.66	16.67	16.68
986.000	16.69	16.70	16.70	16.71	16.72
987.000	16.73	16.74	16.75	16.76	16.77
988.000	16.78	16.79	16.80	16.81	16.82
989.000	16.82	16.83	16.84	16.85	16.86
990.000	16.87	16.88	16.89	16.90	16.91
991.000	16.92	16.93	16.94	16.95	16.96
992.000	16.97	16.98	16.99	16.99	17.00
993.000	17.01	17.02	17.03	17.04	17.05
994.000	17.06	17.07	17.08	17.09	17.10
995.000	17.11	17.12	17.13	17.14	17.15
996.000	17.16	17.17	17.18	17.19	17.20
997.000	17.21	17.22	17.23	17.24	17.25
998.000	17.26	17.27	17.28	17.29	17.30
999.000	17.31	17.32	17.33	17.34	17.35
1,000.000	17.36	17.37	17.38	17.39	17.40
1,001.000	17.41	17.42	17.43	17.45	17.46
1,002.000	17.47	17.48	17.49	17.50	17.51
1,003.000	17.52	17.53	17.54	17.55	17.56
1,004.000	17.57	17.58	17.59	17.60	17.61
1,005.000	17.63	17.64	17.65	17.66	17.67
1,006.000	17.68	17.69	17.70	17.71	17.72

Subsection: Read Hydrograph

Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,007.000	17.73	17.75	17.76	17.77	17.78
1,008.000	17.79	17.80	17.81	17.82	17.83
1,009.000	17.84	17.86	17.87	17.88	17.89
1,010.000	17.90	17.91	17.92	17.94	17.95
1,011.000	17.96	17.97	17.98	17.99	18.00
1,012.000	18.02	18.03	18.04	18.05	18.06
1,013.000	18.07	18.08	18.10	18.11	18.12
1,014.000	18.13	18.14	18.16	18.17	18.18
1,015.000	18.19	18.20	18.21	18.23	18.24
1,016.000	18.25	18.26	18.27	18.29	18.30
1,017.000	18.31	18.32	18.34	18.35	18.36
1,018.000	18.37	18.38	18.40	18.41	18.42
1,019.000	18.43	18.45	18.46	18.47	18.48
1,020.000	18.50	18.51	18.52	18.53	18.55
1,021.000	18.56	18.57	18.58	18.60	18.61
1,022.000	18.62	18.64	18.65	18.66	18.67
1,023.000	18.69	18.70	18.71	18.73	18.74
1,024.000	18.75	18.77	18.78	18.79	18.80
1,025.000	18.82	18.83	18.84	18.86	18.87
1,026.000	18.88	18.90	18.91	18.92	18.94
1,027.000	18.95	18.96	18.98	18.99	19.01
1,028.000	19.02	19.03	19.05	19.06	19.07
1,029.000	19.09	19.10	19.12	19.13	19.14
1,030.000	19.16	19.17	19.19	19.20	19.21
1,031.000	19.23	19.24	19.26	19.27	19.28
1,032.000	19.30	19.31	19.33	19.34	19.36
1,033.000	19.37	19.39	19.40	19.41	19.43
1,034.000	19.44	19.46	19.47	19.49	19.50
1,035.000	19.52	19.53	19.55	19.56	19.58
1,036.000	19.59	19.61	19.62	19.64	19.65
1,037.000	19.67	19.68	19.70	19.71	19.73
1,038.000	19.74	19.76	19.77	19.79	19.81
1,039.000	19.82	19.84	19.85	19.87	19.88
1,040.000	19.90	19.91	19.93	19.95	19.96
1,041.000	19.98	19.99	20.01	20.03	20.04
1,042.000	20.06	20.07	20.09	20.11	20.12
1,043.000	20.14	20.16	20.17	20.19	20.21
1,044.000	20.22	20.24	20.26	20.27	20.29
1,045.000	20.31	20.32	20.34	20.36	20.37
1,046.000	20.39	20.41	20.42	20.44	20.46
1,047.000	20.48	20.49	20.51	20.53	20.54
1,048.000	20.56	20.58	20.60	20.61	20.63
1,049.000	20.65	20.67	20.69	20.70	20.72
1,050.000	20.74	20.76	20.77	20.79	20.81

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,051.000	20.83	20.85	20.87	20.88	20.90
1,052.000	20.92	20.94	20.96	20.98	20.99
1,053.000	21.01	21.03	21.05	21.07	21.09
1,054.000	21.11	21.13	21.15	21.16	21.18
1,055.000	21.20	21.22	21.24	21.26	21.28
1,056.000	21.30	21.32	21.34	21.36	21.38
1,057.000	21.40	21.42	21.44	21.46	21.48
1,058.000	21.50	21.52	21.54	21.56	21.58
1,059.000	21.60	21.62	21.64	21.66	21.68
1,060.000	21.70	21.72	21.74	21.76	21.78
1,061.000	21.80	21.83	21.85	21.87	21.89
1,062.000	21.91	21.93	21.95	21.97	22.00
1,063.000	22.02	22.04	22.06	22.08	22.10
1,064.000	22.13	22.15	22.17	22.19	22.21
1,065.000	22.24	22.26	22.28	22.30	22.33
1,066.000	22.35	22.37	22.39	22.42	22.44
1,067.000	22.46	22.49	22.51	22.53	22.56
1,068.000	22.58	22.60	22.63	22.65	22.67
1,069.000	22.70	22.72	22.75	22.77	22.79
1,070.000	22.82	22.84	22.87	22.89	22.91
1,071.000	22.94	22.96	22.99	23.01	23.04
1,072.000	23.06	23.09	23.11	23.14	23.16
1,073.000	23.19	23.21	23.24	23.27	23.29
1,074.000	23.32	23.34	23.37	23.40	23.42
1,075.000	23.45	23.47	23.50	23.53	23.55
1,076.000	23.58	23.61	23.63	23.66	23.69
1,077.000	23.72	23.74	23.77	23.80	23.83
1,078.000	23.85	23.88	23.91	23.94	23.97
1,079.000	23.99	24.02	24.05	24.08	24.11
1,080.000	24.14	24.17	24.19	24.22	24.25
1,081.000	24.28	24.31	24.34	24.37	24.40
1,082.000	24.43	24.46	24.49	24.52	24.55
1,083.000	24.58	24.61	24.64	24.67	24.70
1,084.000	24.74	24.77	24.80	24.83	24.86
1,085.000	24.89	24.92	24.96	24.99	25.02
1,086.000	25.05	25.09	25.12	25.15	25.18
1,087.000	25.22	25.25	25.28	25.32	25.35
1,088.000	25.38	25.42	25.45	25.49	25.52
1,089.000	25.55	25.59	25.62	25.66	25.69
1,090.000	25.73	25.76	25.80	25.84	25.87
1,091.000	25.91	25.94	25.98	26.02	26.05
1,092.000	26.09	26.13	26.16	26.20	26.24
1,093.000	26.28	26.31	26.35	26.39	26.43
1,094.000	26.47	26.50	26.54	26.58	26.62

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,095.000	26.66	26.70	26.74	26.78	26.82
1,096.000	26.86	26.90	26.94	26.98	27.02
1,097.000	27.06	27.10	27.15	27.19	27.23
1,098.000	27.27	27.31	27.36	27.40	27.44
1,099.000	27.49	27.53	27.57	27.62	27.66
1,100.000	27.71	27.75	27.80	27.84	27.89
1,101.000	27.93	27.98	28.02	28.07	28.12
1,102.000	28.16	28.21	28.26	28.30	28.35
1,103.000	28.40	28.45	28.50	28.54	28.59
1,104.000	28.64	28.69	28.74	28.79	28.84
1,105.000	28.89	28.94	28.99	29.05	29.10
1,106.000	29.15	29.20	29.25	29.31	29.36
1,107.000	29.41	29.47	29.52	29.58	29.63
1,108.000	29.69	29.74	29.80	29.85	29.91
1,109.000	29.97	30.02	30.08	30.14	30.20
1,110.000	30.26	30.31	30.37	30.43	30.49
1,111.000	30.55	30.61	30.67	30.74	30.80
1,112.000	30.86	30.92	30.99	31.05	31.11
1,113.000	31.18	31.24	31.31	31.37	31.44
1,114.000	31.51	31.57	31.64	31.71	31.78
1,115.000	31.84	31.91	31.98	32.05	32.12
1,116.000	32.19	32.27	32.34	32.41	32.48
1,117.000	32.56	32.63	32.71	32.78	32.86
1,118.000	32.93	33.01	33.09	33.17	33.24
1,119.000	33.32	33.40	33.48	33.56	33.65
1,120.000	33.73	33.81	33.90	33.98	34.06
1,121.000	34.15	34.24	34.32	34.41	34.50
1,122.000	34.59	34.68	34.77	34.86	34.95
1,123.000	35.04	35.14	35.23	35.33	35.42
1,124.000	35.52	35.62	35.72	35.82	35.92
1,125.000	36.02	36.12	36.22	36.33	36.43
1,126.000	36.54	36.65	36.75	36.86	36.97
1,127.000	37.08	37.20	37.31	37.42	37.54
1,128.000	37.66	37.77	37.89	38.01	38.13
1,129.000	38.26	38.38	38.51	38.63	38.76
1,130.000	38.89	39.02	39.15	39.28	39.42
1,131.000	39.56	39.69	39.83	39.97	40.12
1,132.000	40.26	40.41	40.55	40.70	40.85
1,133.000	41.01	41.16	41.32	41.48	41.64
1,134.000	41.80	41.96	42.13	42.30	42.47
1,135.000	42.64	42.82	43.00	43.18	43.36
1,136.000	43.55	43.73	43.93	44.12	44.31
1,137.000	44.51	44.72	44.92	45.13	45.34
1,138.000	45.55	45.77	45.99	46.22	46.45

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,139.000	46.68	46.91	47.15	47.40	47.65
1,140.000	47.90	48.15	48.42	48.68	48.95
1,141.000	49.23	49.51	49.80	50.09	50.39
1,142.000	50.69	51.00	51.32	51.64	51.97
1,143.000	52.31	52.65	53.01	53.38	53.76
1,144.000	54.15	54.55	54.96	55.38	55.81
1,145.000	56.25	56.71	57.18	57.66	58.16
1,146.000	58.67	59.19	59.74	60.30	60.88
1,147.000	61.48	62.10	62.75	63.42	64.12
1,148.000	64.84	65.60	66.39	67.22	68.09
1,149.000	69.00	69.96	70.98	72.06	73.21
1,150.000	74.44	75.77	77.21	78.77	80.48
1,151.000	82.37	84.53	87.07	90.18	94.40
1,152.000	104.96	110.07	111.88	113.10	114.01
1,153.000	114.72	115.28	115.73	116.09	116.37
1,154.000	116.59	116.75	116.85	116.91	116.93
1,155.000	116.92	116.86	116.77	116.65	116.51
1,156.000	116.33	116.12	115.89	115.64	115.36
1,157.000	115.05	114.73	114.37	114.00	113.60
1,158.000	113.18	112.74	112.28	111.79	111.28
1,159.000	110.75	110.19	109.62	109.01	108.39
1,160.000	107.74	107.06	106.36	105.62	104.86
1,161.000	104.07	103.25	102.40	101.52	100.60
1,162.000	99.64	98.65	97.61	96.53	95.40
1,163.000	94.22	92.99	91.69	90.33	88.89
1,164.000	87.36	85.74	84.00	82.13	80.10
1,165.000	77.84	75.29	72.37	68.87	64.29
1,166.000	53.50	48.26	46.16	44.62	43.35
1,167.000	42.27	41.32	40.47	39.70	38.99
1,168.000	38.34	37.73	37.16	36.63	36.12
1,169.000	35.64	35.19	34.76	34.34	33.95
1,170.000	33.57	33.21	32.86	32.53	32.20
1,171.000	31.89	31.59	31.30	31.02	30.74
1,172.000	30.48	30.22	29.97	29.73	29.50
1,173.000	29.27	29.04	28.83	28.61	28.41
1,174.000	28.21	28.01	27.82	27.63	27.44
1,175.000	27.26	27.09	26.92	26.75	26.58
1,176.000	26.42	26.26	26.11	25.96	25.81
1,177.000	25.66	25.52	25.37	25.24	25.10
1,178.000	24.97	24.83	24.70	24.58	24.45
1,179.000	24.33	24.21	24.09	23.97	23.86
1,180.000	23.74	23.63	23.52	23.41	23.31
1,181.000	23.20	23.10	23.00	22.90	22.80
1,182.000	22.70	22.60	22.51	22.41	22.32

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,183.000	22.23	22.14	22.05	21.96	21.87
1,184.000	21.79	21.70	21.62	21.54	21.45
1,185.000	21.37	21.29	21.22	21.14	21.06
1,186.000	20.98	20.91	20.84	20.76	20.69
1,187.000	20.62	20.55	20.48	20.41	20.34
1,188.000	20.27	20.20	20.14	20.07	20.00
1,189.000	19.94	19.88	19.81	19.75	19.69
1,190.000	19.63	19.57	19.51	19.45	19.39
1,191.000	19.33	19.27	19.21	19.16	19.10
1,192.000	19.05	18.99	18.94	18.88	18.83
1,193.000	18.77	18.72	18.67	18.62	18.57
1,194.000	18.51	18.46	18.41	18.36	18.32
1,195.000	18.27	18.22	18.17	18.12	18.08
1,196.000	18.03	17.98	17.94	17.89	17.84
1,197.000	17.80	17.76	17.71	17.67	17.62
1,198.000	17.58	17.54	17.50	17.45	17.41
1,199.000	17.37	17.33	17.29	17.25	17.21
1,200.000	17.17	17.13	17.09	17.05	17.01
1,201.000	16.97	16.93	16.89	16.86	16.82
1,202.000	16.78	16.74	16.71	16.67	16.63
1,203.000	16.60	16.56	16.53	16.49	16.46
1,204.000	16.42	16.39	16.35	16.32	16.28
1,205.000	16.25	16.22	16.18	16.15	16.12
1,206.000	16.09	16.05	16.02	15.99	15.96
1,207.000	15.93	15.89	15.86	15.83	15.80
1,208.000	15.77	15.74	15.71	15.68	15.65
1,209.000	15.62	15.59	15.56	15.53	15.50
1,210.000	15.47	15.44	15.42	15.39	15.36
1,211.000	15.33	15.30	15.28	15.25	15.22
1,212.000	15.19	15.17	15.14	15.11	15.09
1,213.000	15.06	15.03	15.01	14.98	14.96
1,214.000	14.93	14.90	14.88	14.85	14.83
1,215.000	14.80	14.78	14.75	14.73	14.70
1,216.000	14.68	14.65	14.63	14.61	14.58
1,217.000	14.56	14.53	14.51	14.49	14.46
1,218.000	14.44	14.42	14.40	14.37	14.35
1,219.000	14.33	14.30	14.28	14.26	14.24
1,220.000	14.22	14.19	14.17	14.15	14.13
1,221.000	14.11	14.08	14.06	14.04	14.02
1,222.000	14.00	13.98	13.96	13.94	13.92
1,223.000	13.90	13.88	13.86	13.84	13.81
1,224.000	13.79	13.77	13.75	13.73	13.72
1,225.000	13.70	13.68	13.66	13.64	13.62
1,226.000	13.60	13.58	13.56	13.54	13.52

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,227.000	13.50	13.48	13.47	13.45	13.43
1,228.000	13.41	13.39	13.37	13.36	13.34
1,229.000	13.32	13.30	13.28	13.27	13.25
1,230.000	13.23	13.21	13.20	13.18	13.16
1,231.000	13.14	13.13	13.11	13.09	13.08
1,232.000	13.06	13.04	13.03	13.01	12.99
1,233.000	12.98	12.96	12.94	12.93	12.91
1,234.000	12.89	12.88	12.86	12.84	12.83
1,235.000	12.81	12.80	12.78	12.77	12.75
1,236.000	12.73	12.72	12.70	12.69	12.67
1,237.000	12.66	12.64	12.63	12.61	12.60
1,238.000	12.58	12.57	12.55	12.54	12.52
1,239.000	12.51	12.49	12.48	12.46	12.45
1,240.000	12.43	12.42	12.40	12.39	12.38
1,241.000	12.36	12.35	12.33	12.32	12.31
1,242.000	12.29	12.28	12.26	12.25	12.24
1,243.000	12.22	12.21	12.19	12.18	12.17
1,244.000	12.15	12.14	12.13	12.11	12.10
1,245.000	12.09	12.07	12.06	12.05	12.03
1,246.000	12.02	12.01	12.00	11.98	11.97
1,247.000	11.96	11.94	11.93	11.92	11.91
1,248.000	11.89	11.88	11.87	11.86	11.84
1,249.000	11.83	11.82	11.81	11.79	11.78
1,250.000	11.77	11.76	11.74	11.73	11.72
1,251.000	11.71	11.70	11.68	11.67	11.66
1,252.000	11.65	11.64	11.63	11.61	11.60
1,253.000	11.59	11.58	11.57	11.56	11.54
1,254.000	11.53	11.52	11.51	11.50	11.49
1,255.000	11.48	11.46	11.45	11.44	11.43
1,256.000	11.42	11.41	11.40	11.39	11.38
1,257.000	11.37	11.35	11.34	11.33	11.32
1,258.000	11.31	11.30	11.29	11.28	11.27
1,259.000	11.26	11.25	11.24	11.23	11.22
1,260.000	11.20	11.19	11.18	11.17	11.16
1,261.000	11.15	11.14	11.13	11.12	11.11
1,262.000	11.10	11.09	11.08	11.07	11.06
1,263.000	11.05	11.04	11.03	11.02	11.01
1,264.000	11.00	10.99	10.98	10.97	10.96
1,265.000	10.95	10.94	10.93	10.92	10.91
1,266.000	10.90	10.89	10.89	10.88	10.87
1,267.000	10.86	10.85	10.84	10.83	10.82
1,268.000	10.81	10.80	10.79	10.78	10.77
1,269.000	10.76	10.75	10.74	10.74	10.73
1,270.000	10.72	10.71	10.70	10.69	10.68

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,271.000	10.67	10.66	10.65	10.65	10.64
1,272.000	10.63	10.62	10.61	10.60	10.59
1,273.000	10.58	10.58	10.57	10.56	10.55
1,274.000	10.54	10.53	10.52	10.51	10.51
1,275.000	10.50	10.49	10.48	10.47	10.46
1,276.000	10.46	10.45	10.44	10.43	10.42
1,277.000	10.41	10.41	10.40	10.39	10.38
1,278.000	10.37	10.36	10.36	10.35	10.34
1,279.000	10.33	10.32	10.32	10.31	10.30
1,280.000	10.29	10.28	10.28	10.27	10.26
1,281.000	10.25	10.24	10.24	10.23	10.22
1,282.000	10.21	10.20	10.20	10.19	10.18
1,283.000	10.17	10.17	10.16	10.15	10.14
1,284.000	10.13	10.13	10.12	10.11	10.10
1,285.000	10.10	10.09	10.08	10.07	10.07
1,286.000	10.06	10.05	10.04	10.04	10.03
1,287.000	10.02	10.01	10.01	10.00	9.99
1,288.000	9.99	9.98	9.97	9.96	9.96
1,289.000	9.95	9.94	9.93	9.93	9.92
1,290.000	9.91	9.91	9.90	9.89	9.89
1,291.000	9.88	9.87	9.86	9.86	9.85
1,292.000	9.84	9.84	9.83	9.82	9.82
1,293.000	9.81	9.80	9.79	9.79	9.78
1,294.000	9.77	9.77	9.76	9.75	9.75
1,295.000	9.74	9.73	9.73	9.72	9.71
1,296.000	9.71	9.70	9.69	9.69	9.68
1,297.000	9.67	9.67	9.66	9.65	9.65
1,298.000	9.64	9.63	9.63	9.62	9.61
1,299.000	9.61	9.60	9.60	9.59	9.58
1,300.000	9.58	9.57	9.56	9.56	9.55
1,301.000	9.54	9.54	9.53	9.53	9.52
1,302.000	9.51	9.51	9.50	9.49	9.49
1,303.000	9.48	9.48	9.47	9.46	9.46
1,304.000	9.45	9.44	9.44	9.43	9.43
1,305.000	9.42	9.41	9.41	9.40	9.40
1,306.000	9.39	9.38	9.38	9.37	9.37
1,307.000	9.36	9.35	9.35	9.34	9.34
1,308.000	9.33	9.32	9.32	9.31	9.31
1,309.000	9.30	9.30	9.29	9.28	9.28
1,310.000	9.27	9.27	9.26	9.26	9.25
1,311.000	9.24	9.24	9.23	9.23	9.22
1,312.000	9.22	9.21	9.20	9.20	9.19
1,313.000	9.19	9.18	9.18	9.17	9.16
1,314.000	9.16	9.15	9.15	9.14	9.14

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,315.000	9.13	9.13	9.12	9.11	9.11
1,316.000	9.10	9.10	9.09	9.09	9.08
1,317.000	9.08	9.07	9.07	9.06	9.06
1,318.000	9.05	9.04	9.04	9.03	9.03
1,319.000	9.02	9.02	9.01	9.01	9.00
1,320.000	9.00	8.99	8.99	8.98	8.98
1,321.000	8.97	8.97	8.96	8.96	8.95
1,322.000	8.94	8.94	8.93	8.93	8.92
1,323.000	8.92	8.91	8.91	8.90	8.90
1,324.000	8.89	8.89	8.88	8.88	8.87
1,325.000	8.87	8.86	8.86	8.85	8.85
1,326.000	8.84	8.84	8.83	8.83	8.82
1,327.000	8.82	8.81	8.81	8.80	8.80
1,328.000	8.79	8.79	8.78	8.78	8.77
1,329.000	8.77	8.76	8.76	8.75	8.75
1,330.000	8.75	8.74	8.74	8.73	8.73
1,331.000	8.72	8.72	8.71	8.71	8.70
1,332.000	8.70	8.69	8.69	8.68	8.68
1,333.000	8.67	8.67	8.66	8.66	8.66
1,334.000	8.65	8.65	8.64	8.64	8.63
1,335.000	8.63	8.62	8.62	8.61	8.61
1,336.000	8.60	8.60	8.60	8.59	8.59
1,337.000	8.58	8.58	8.57	8.57	8.56
1,338.000	8.56	8.55	8.55	8.55	8.54
1,339.000	8.54	8.53	8.53	8.52	8.52
1,340.000	8.51	8.51	8.51	8.50	8.50
1,341.000	8.49	8.49	8.48	8.48	8.48
1,342.000	8.47	8.47	8.46	8.46	8.45
1,343.000	8.45	8.44	8.44	8.44	8.43
1,344.000	8.43	8.42	8.42	8.41	8.41
1,345.000	8.41	8.40	8.40	8.39	8.39
1,346.000	8.39	8.38	8.38	8.37	8.37
1,347.000	8.36	8.36	8.36	8.35	8.35
1,348.000	8.34	8.34	8.33	8.33	8.33
1,349.000	8.32	8.32	8.31	8.31	8.31
1,350.000	8.30	8.30	8.29	8.29	8.29
1,351.000	8.28	8.28	8.27	8.27	8.27
1,352.000	8.26	8.26	8.25	8.25	8.25
1,353.000	8.24	8.24	8.23	8.23	8.23
1,354.000	8.22	8.22	8.21	8.21	8.21
1,355.000	8.20	8.20	8.19	8.19	8.19
1,356.000	8.18	8.18	8.17	8.17	8.17
1,357.000	8.16	8.16	8.15	8.15	8.15
1,358.000	8.14	8.14	8.14	8.13	8.13

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,359.000	8.12	8.12	8.12	8.11	8.11
1,360.000	8.11	8.10	8.10	8.09	8.09
1,361.000	8.09	8.08	8.08	8.07	8.07
1,362.000	8.07	8.06	8.06	8.06	8.05
1,363.000	8.05	8.05	8.04	8.04	8.03
1,364.000	8.03	8.03	8.02	8.02	8.02
1,365.000	8.01	8.01	8.00	8.00	8.00
1,366.000	7.99	7.99	7.99	7.98	7.98
1,367.000	7.98	7.97	7.97	7.96	7.96
1,368.000	7.96	7.95	7.95	7.95	7.94
1,369.000	7.94	7.94	7.93	7.93	7.93
1,370.000	7.92	7.92	7.92	7.91	7.91
1,371.000	7.90	7.90	7.90	7.89	7.89
1,372.000	7.89	7.88	7.88	7.88	7.87
1,373.000	7.87	7.87	7.86	7.86	7.86
1,374.000	7.85	7.85	7.85	7.84	7.84
1,375.000	7.84	7.83	7.83	7.83	7.82
1,376.000	7.82	7.81	7.81	7.81	7.80
1,377.000	7.80	7.80	7.79	7.79	7.79
1,378.000	7.78	7.78	7.78	7.77	7.77
1,379.000	7.77	7.76	7.76	7.76	7.75
1,380.000	7.75	7.75	7.74	7.74	7.74
1,381.000	7.74	7.73	7.73	7.73	7.72
1,382.000	7.72	7.72	7.71	7.71	7.71
1,383.000	7.70	7.70	7.70	7.69	7.69
1,384.000	7.69	7.68	7.68	7.68	7.67
1,385.000	7.67	7.67	7.66	7.66	7.66
1,386.000	7.65	7.65	7.65	7.64	7.64
1,387.000	7.64	7.64	7.63	7.63	7.63
1,388.000	7.62	7.62	7.62	7.61	7.61
1,389.000	7.61	7.60	7.60	7.60	7.59
1,390.000	7.59	7.59	7.59	7.58	7.58
1,391.000	7.58	7.57	7.57	7.57	7.56
1,392.000	7.56	7.56	7.56	7.55	7.55
1,393.000	7.55	7.54	7.54	7.54	7.53
1,394.000	7.53	7.53	7.52	7.52	7.52
1,395.000	7.52	7.51	7.51	7.51	7.50
1,396.000	7.50	7.50	7.49	7.49	7.49
1,397.000	7.49	7.48	7.48	7.48	7.47
1,398.000	7.47	7.47	7.47	7.46	7.46
1,399.000	7.46	7.45	7.45	7.45	7.44
1,400.000	7.44	7.44	7.44	7.43	7.43
1,401.000	7.43	7.42	7.42	7.42	7.42
1,402.000	7.41	7.41	7.41	7.40	7.40

Subsection: Read Hydrograph
Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,403.000	7.40	7.40	7.39	7.39	7.39
1,404.000	7.38	7.38	7.38	7.38	7.37
1,405.000	7.37	7.37	7.36	7.36	7.36
1,406.000	7.36	7.35	7.35	7.35	7.35
1,407.000	7.34	7.34	7.34	7.33	7.33
1,408.000	7.33	7.33	7.32	7.32	7.32
1,409.000	7.31	7.31	7.31	7.31	7.30
1,410.000	7.30	7.30	7.30	7.29	7.29
1,411.000	7.29	7.28	7.28	7.28	7.28
1,412.000	7.27	7.27	7.27	7.27	7.26
1,413.000	7.26	7.26	7.26	7.25	7.25
1,414.000	7.25	7.24	7.24	7.24	7.24
1,415.000	7.23	7.23	7.23	7.23	7.22
1,416.000	7.22	7.22	7.22	7.21	7.21
1,417.000	7.21	7.20	7.20	7.20	7.20
1,418.000	7.19	7.19	7.19	7.19	7.18
1,419.000	7.18	7.18	7.18	7.17	7.17
1,420.000	7.17	7.17	7.16	7.16	7.16
1,421.000	7.16	7.15	7.15	7.15	7.15
1,422.000	7.14	7.14	7.14	7.13	7.13
1,423.000	7.13	7.13	7.12	7.12	7.12
1,424.000	7.12	7.11	7.11	7.11	7.11
1,425.000	7.10	7.10	7.10	7.10	7.09
1,426.000	7.09	7.09	7.09	7.08	7.08
1,427.000	7.08	7.08	7.07	7.07	7.07
1,428.000	7.07	7.06	7.06	7.06	7.06
1,429.000	7.05	7.05	7.05	7.05	7.05
1,430.000	7.04	7.04	7.04	7.04	7.03
1,431.000	7.03	7.03	7.03	7.02	7.02
1,432.000	7.02	7.02	7.01	7.01	7.01
1,433.000	7.01	7.00	7.00	7.00	7.00
1,434.000	6.99	6.99	6.99	6.99	6.98
1,435.000	6.98	6.98	6.98	6.98	6.97
1,436.000	6.97	6.97	6.97	6.96	6.96
1,437.000	6.96	6.96	6.95	6.95	6.95
1,438.000	6.95	6.94	6.94	6.94	6.94
1,439.000	6.94	6.93	6.93	6.93	6.93
1,440.000	6.92	6.82	6.72	6.62	6.52
1,441.000	6.42	6.32	6.22	6.12	6.02
1,442.000	5.92	5.82	5.73	5.63	5.53
1,443.000	5.43	5.33	5.23	5.13	5.03
1,444.000	4.93	4.83	4.73	4.63	4.53
1,445.000	4.43	4.33	4.23	4.13	4.04
1,446.000	3.94	3.84	3.74	3.64	3.54

Subsection: Read Hydrograph

Label: CM-1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.200 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
1,447.000	3.44	3.34	3.24	3.15	3.05
1,448.000	2.95	2.85	2.75	2.65	2.55
1,449.000	2.45	2.36	2.26	2.16	2.06
1,450.000	1.96	1.86	1.76	1.67	1.57
1,451.000	1.47	1.37	1.27	1.18	1.08
1,452.000	0.98	0.88	0.78	0.69	0.59
1,453.000	0.49	0.39	0.29	0.20	0.10
1,454.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Volume
Label: PO-1

Time vs. Volume (ac-ft)

Output Time increment = 3.000 min
Time on left represents time for first value in each row.

Time (min)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.003	0.012	0.026	0.045
15.000	0.068	0.092	0.114	0.134	0.153
30.000	0.171	0.187	0.202	0.215	0.228
45.000	0.239	0.250	0.259	0.268	0.276
60.000	0.283	0.290	0.296	0.301	0.306
75.000	0.311	0.315	0.319	0.322	0.325
90.000	0.328	0.331	0.333	0.336	0.338
105.000	0.339	0.341	0.343	0.344	0.346
120.000	0.347	0.348	0.349	0.350	0.351
135.000	0.352	0.353	0.354	0.355	0.355
150.000	0.356	0.357	0.357	0.358	0.359
165.000	0.359	0.360	0.360	0.361	0.361
180.000	0.362	0.363	0.363	0.363	0.364
195.000	0.364	0.365	0.365	0.366	0.366
210.000	0.367	0.367	0.368	0.368	0.368
225.000	0.369	0.369	0.370	0.370	0.370
240.000	0.371	0.371	0.372	0.372	0.373
255.000	0.373	0.373	0.374	0.374	0.375
270.000	0.375	0.376	0.376	0.376	0.377
285.000	0.377	0.378	0.378	0.379	0.379
300.000	0.379	0.380	0.380	0.381	0.381
315.000	0.382	0.382	0.383	0.383	0.384
330.000	0.384	0.385	0.385	0.385	0.386
345.000	0.386	0.387	0.387	0.388	0.388
360.000	0.389	0.389	0.390	0.390	0.391
375.000	0.391	0.392	0.392	0.393	0.393
390.000	0.394	0.394	0.395	0.396	0.396
405.000	0.397	0.397	0.398	0.398	0.399
420.000	0.399	0.400	0.400	0.401	0.402
435.000	0.402	0.403	0.403	0.404	0.405
450.000	0.405	0.406	0.406	0.407	0.408
465.000	0.408	0.409	0.409	0.410	0.411
480.000	0.411	0.412	0.412	0.413	0.414
495.000	0.414	0.415	0.416	0.416	0.417
510.000	0.418	0.418	0.419	0.420	0.420
525.000	0.421	0.422	0.422	0.423	0.424
540.000	0.424	0.425	0.426	0.426	0.427
555.000	0.428	0.429	0.429	0.430	0.431
570.000	0.431	0.432	0.433	0.434	0.435
585.000	0.435	0.436	0.437	0.438	0.438
600.000	0.439	0.440	0.441	0.442	0.442
615.000	0.443	0.444	0.445	0.446	0.447
630.000	0.448	0.448	0.449	0.450	0.451

Subsection: Time vs. Volume
Label: PO-1

Time vs. Volume (ac-ft)

Output Time increment = 3.000 min
Time on left represents time for first value in each row.

Time (min)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
645.000	0.452	0.453	0.454	0.455	0.456
660.000	0.457	0.458	0.459	0.460	0.461
675.000	0.462	0.462	0.463	0.464	0.465
690.000	0.466	0.467	0.468	0.469	0.471
705.000	0.472	0.473	0.474	0.475	0.476
720.000	0.477	0.478	0.479	0.480	0.481
735.000	0.482	0.483	0.485	0.486	0.487
750.000	0.488	0.489	0.490	0.492	0.493
765.000	0.494	0.495	0.497	0.498	0.499
780.000	0.501	0.502	0.503	0.505	0.506
795.000	0.507	0.509	0.510	0.512	0.513
810.000	0.515	0.516	0.518	0.519	0.521
825.000	0.522	0.524	0.525	0.527	0.529
840.000	0.530	0.532	0.533	0.535	0.537
855.000	0.539	0.540	0.542	0.544	0.546
870.000	0.548	0.550	0.552	0.554	0.556
885.000	0.558	0.560	0.562	0.564	0.566
900.000	0.568	0.570	0.573	0.575	0.577
915.000	0.579	0.582	0.584	0.586	0.589
930.000	0.591	0.594	0.596	0.599	0.602
945.000	0.604	0.607	0.610	0.613	0.616
960.000	0.619	0.622	0.625	0.628	0.631
975.000	0.634	0.638	0.641	0.645	0.648
990.000	0.652	0.656	0.659	0.663	0.667
1,005.000	0.671	0.676	0.680	0.684	0.689
1,020.000	0.694	0.698	0.703	0.708	0.713
1,035.000	0.719	0.724	0.730	0.736	0.742
1,050.000	0.748	0.754	0.761	0.768	0.775
1,065.000	0.782	0.790	0.798	0.806	0.815
1,080.000	0.824	0.833	0.843	0.854	0.864
1,095.000	0.876	0.888	0.901	0.915	0.929
1,110.000	0.945	0.962	0.985	1.018	1.060
1,125.000	1.113	1.177	1.251	1.334	1.425
1,140.000	1.523	1.626	1.732	1.863	2.067
1,155.000	2.337	2.592	2.788	2.885	2.849
1,170.000	2.711	2.552	2.382	2.205	2.023
1,185.000	1.850	1.699	1.569	1.456	1.356
1,200.000	1.269	1.192	1.124	1.063	1.009
1,215.000	0.961	0.918	0.879	0.844	0.812
1,230.000	0.783	0.757	0.733	0.712	0.692
1,245.000	0.673	0.657	0.641	0.627	0.613
1,260.000	0.601	0.589	0.579	0.569	0.559
1,275.000	0.550	0.542	0.534	0.527	0.520

Subsection: Time vs. Volume
Label: PO-1

Time vs. Volume (ac-ft)

Output Time increment = 3.000 min
Time on left represents time for first value in each row.

Time (min)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
1,290.000	0.513	0.507	0.501	0.495	0.490
1,305.000	0.484	0.480	0.475	0.470	0.466
1,320.000	0.462	0.458	0.454	0.450	0.446
1,335.000	0.443	0.440	0.436	0.433	0.430
1,350.000	0.427	0.424	0.421	0.418	0.416
1,365.000	0.413	0.411	0.408	0.406	0.403
1,380.000	0.401	0.399	0.397	0.394	0.392
1,395.000	0.390	0.388	0.386	0.384	0.382
1,410.000	0.381	0.379	0.377	0.375	0.373
1,425.000	0.372	0.370	0.369	0.367	0.365
1,440.000	0.364	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Pipe Volume
Label: PO-1

Volume Results (Pipe)	
Pipe Storage Upstream Invert	101.00 ft
Pipe Storage Downstream Invert	101.00 ft
Pipe Storage Length	4,450.00 ft
Pipe Storage Diameter	72.0 in
Pipe Storage Number of Barrels	1
Pipe Storage Slice Width	0.50 ft
Pipe Storage Vertical Increment	0.05 ft

Elevation (ft)	Perpendicular Downstream Depth (ft)	Perpendicular Downstream Area (ft²)	Wetted Length (ft)	Filled Length (ft)	Perpendicular Upstream Depth (ft)	Perpendicular Upstream Area (ft²)	Total Volume (ac-ft)
101.00	0.00	0.0	4,450.00	0.00	0.00	0.0	0.000
101.05	0.05	0.0	4,450.00	0.00	0.05	0.0	0.004
101.10	0.10	0.1	4,450.00	0.00	0.10	0.1	0.010
101.15	0.15	0.2	4,450.00	0.00	0.15	0.2	0.019
101.20	0.20	0.3	4,450.00	0.00	0.20	0.3	0.030
101.25	0.25	0.4	4,450.00	0.00	0.25	0.4	0.041
101.30	0.30	0.5	4,450.00	0.00	0.30	0.5	0.054
101.35	0.35	0.7	4,450.00	0.00	0.35	0.7	0.068
101.40	0.40	0.8	4,450.00	0.00	0.40	0.8	0.083
101.45	0.45	1.0	4,450.00	0.00	0.45	1.0	0.098
101.50	0.50	1.1	4,450.00	0.00	0.50	1.1	0.115
101.55	0.55	1.3	4,450.00	0.00	0.55	1.3	0.132
101.60	0.60	1.5	4,450.00	0.00	0.60	1.5	0.150
101.65	0.65	1.7	4,450.00	0.00	0.65	1.7	0.169
101.70	0.70	1.8	4,450.00	0.00	0.70	1.8	0.188
101.75	0.75	2.0	4,450.00	0.00	0.75	2.0	0.208
101.80	0.80	2.2	4,450.00	0.00	0.80	2.2	0.229
101.85	0.85	2.4	4,450.00	0.00	0.85	2.4	0.250
101.90	0.90	2.7	4,450.00	0.00	0.90	2.7	0.272
101.95	0.95	2.9	4,450.00	0.00	0.95	2.9	0.294
102.00	1.00	3.1	4,450.00	0.00	1.00	3.1	0.316
102.05	1.05	3.3	4,450.00	0.00	1.05	3.3	0.340
102.10	1.10	3.6	4,450.00	0.00	1.10	3.6	0.363
102.15	1.15	3.8	4,450.00	0.00	1.15	3.8	0.387
102.20	1.20	4.0	4,450.00	0.00	1.20	4.0	0.411
102.25	1.25	4.3	4,450.00	0.00	1.25	4.3	0.436
102.30	1.30	4.5	4,450.00	0.00	1.30	4.5	0.461
102.35	1.35	4.8	4,450.00	0.00	1.35	4.8	0.486
102.40	1.40	5.0	4,450.00	0.00	1.40	5.0	0.512
102.45	1.45	5.3	4,450.00	0.00	1.45	5.3	0.538
102.50	1.50	5.5	4,450.00	0.00	1.50	5.5	0.565
102.55	1.55	5.8	4,450.00	0.00	1.55	5.8	0.591

Subsection: Pipe Volume
Label: PO-1

Elevation (ft)	Perpendicular Downstream Depth (ft)	Perpendicular Downstream Area (ft²)	Wetted Length (ft)	Filled Length (ft)	Perpendicular Upstream Depth (ft)	Perpendicular Upstream Area (ft²)	Total Volume (ac-ft)
102.60	1.60	6.1	4,450.00	0.00	1.60	6.1	0.618
102.65	1.65	6.3	4,450.00	0.00	1.65	6.3	0.646
102.70	1.70	6.6	4,450.00	0.00	1.70	6.6	0.673
102.75	1.75	6.9	4,450.00	0.00	1.75	6.9	0.701
102.80	1.80	7.1	4,450.00	0.00	1.80	7.1	0.729
102.85	1.85	7.4	4,450.00	0.00	1.85	7.4	0.757
102.90	1.90	7.7	4,450.00	0.00	1.90	7.7	0.785
102.95	1.95	8.0	4,450.00	0.00	1.95	8.0	0.814
103.00	2.00	8.3	4,450.00	0.00	2.00	8.3	0.843
103.05	2.05	8.5	4,450.00	0.00	2.05	8.5	0.872
103.10	2.10	8.8	4,450.00	0.00	2.10	8.8	0.901
103.15	2.15	9.1	4,450.00	0.00	2.15	9.1	0.930
103.20	2.20	9.4	4,450.00	0.00	2.20	9.4	0.960
103.25	2.25	9.7	4,450.00	0.00	2.25	9.7	0.989
103.30	2.30	10.0	4,450.00	0.00	2.30	10.0	1.019
103.35	2.35	10.3	4,450.00	0.00	2.35	10.3	1.049
103.40	2.40	10.6	4,450.00	0.00	2.40	10.6	1.079
103.45	2.45	10.9	4,450.00	0.00	2.45	10.9	1.109
103.50	2.50	11.2	4,450.00	0.00	2.50	11.2	1.139
103.55	2.55	11.4	4,450.00	0.00	2.55	11.4	1.169
103.60	2.60	11.7	4,450.00	0.00	2.60	11.7	1.200
103.65	2.65	12.0	4,450.00	0.00	2.65	12.0	1.230
103.70	2.70	12.3	4,450.00	0.00	2.70	12.3	1.261
103.75	2.75	12.6	4,450.00	0.00	2.75	12.6	1.291
103.80	2.80	12.9	4,450.00	0.00	2.80	12.9	1.322
103.85	2.85	13.2	4,450.00	0.00	2.85	13.2	1.352
103.90	2.90	13.5	4,450.00	0.00	2.90	13.5	1.383
103.95	2.95	13.8	4,450.00	0.00	2.95	13.8	1.414
104.00	3.00	14.1	4,450.00	0.00	3.00	14.1	1.444
104.05	3.05	14.4	4,450.00	0.00	3.05	14.4	1.475
104.10	3.10	14.7	4,450.00	0.00	3.10	14.7	1.506
104.15	3.15	15.0	4,450.00	0.00	3.15	15.0	1.536
104.20	3.20	15.3	4,450.00	0.00	3.20	15.3	1.567
104.25	3.25	15.6	4,450.00	0.00	3.25	15.6	1.597
104.30	3.30	15.9	4,450.00	0.00	3.30	15.9	1.628
104.35	3.35	16.2	4,450.00	0.00	3.35	16.2	1.658
104.40	3.40	16.5	4,450.00	0.00	3.40	16.5	1.689
104.45	3.45	16.8	4,450.00	0.00	3.45	16.8	1.719
104.50	3.50	17.1	4,450.00	0.00	3.50	17.1	1.749
104.55	3.55	17.4	4,450.00	0.00	3.55	17.4	1.779
104.60	3.60	17.7	4,450.00	0.00	3.60	17.7	1.810
104.65	3.65	18.0	4,450.00	0.00	3.65	18.0	1.840
104.70	3.70	18.3	4,450.00	0.00	3.70	18.3	1.869
104.75	3.75	18.6	4,450.00	0.00	3.75	18.6	1.899
104.80	3.80	18.9	4,450.00	0.00	3.80	18.9	1.929

Subsection: Pipe Volume
Label: PO-1

Elevation (ft)	Perpendicular Downstream Depth (ft)	Perpendicular Downstream Area (ft²)	Wetted Length (ft)	Filled Length (ft)	Perpendicular Upstream Depth (ft)	Perpendicular Upstream Area (ft²)	Total Volume (ac-ft)
104.85	3.85	19.2	4,450.00	0.00	3.85	19.2	1.958
104.90	3.90	19.5	4,450.00	0.00	3.90	19.5	1.987
104.95	3.95	19.7	4,450.00	0.00	3.95	19.7	2.017
105.00	4.00	20.0	4,450.00	0.00	4.00	20.0	2.046
105.05	4.05	20.3	4,450.00	0.00	4.05	20.3	2.074
105.10	4.10	20.6	4,450.00	0.00	4.10	20.6	2.103
105.15	4.15	20.9	4,450.00	0.00	4.15	20.9	2.131
105.20	4.20	21.1	4,450.00	0.00	4.20	21.1	2.160
105.25	4.25	21.4	4,450.00	0.00	4.25	21.4	2.188
105.30	4.30	21.7	4,450.00	0.00	4.30	21.7	2.215
105.35	4.35	22.0	4,450.00	0.00	4.35	22.0	2.243
105.40	4.40	22.2	4,450.00	0.00	4.40	22.2	2.270
105.45	4.45	22.5	4,450.00	0.00	4.45	22.5	2.297
105.50	4.50	22.7	4,450.00	0.00	4.50	22.7	2.324
105.55	4.55	23.0	4,450.00	0.00	4.55	23.0	2.350
105.60	4.60	23.3	4,450.00	0.00	4.60	23.3	2.376
105.65	4.65	23.5	4,450.00	0.00	4.65	23.5	2.402
105.70	4.70	23.8	4,450.00	0.00	4.70	23.8	2.427
105.75	4.75	24.0	4,450.00	0.00	4.75	24.0	2.452
105.80	4.80	24.2	4,450.00	0.00	4.80	24.2	2.477
105.85	4.85	24.5	4,450.00	0.00	4.85	24.5	2.502
105.90	4.90	24.7	4,450.00	0.00	4.90	24.7	2.525
105.95	4.95	25.0	4,450.00	0.00	4.95	25.0	2.549
106.00	5.00	25.2	4,450.00	0.00	5.00	25.2	2.572
106.05	5.05	25.4	4,450.00	0.00	5.05	25.4	2.595
106.10	5.10	25.6	4,450.00	0.00	5.10	25.6	2.617
106.15	5.15	25.8	4,450.00	0.00	5.15	25.8	2.638
106.20	5.20	26.0	4,450.00	0.00	5.20	26.0	2.660
106.25	5.25	26.2	4,450.00	0.00	5.25	26.2	2.680
106.30	5.30	26.4	4,450.00	0.00	5.30	26.4	2.700
106.35	5.35	26.6	4,450.00	0.00	5.35	26.6	2.719
106.40	5.40	26.8	4,450.00	0.00	5.40	26.8	2.738
106.45	5.45	27.0	4,450.00	0.00	5.45	27.0	2.756
106.50	5.50	27.1	4,450.00	0.00	5.50	27.1	2.773
106.55	5.55	27.3	4,450.00	0.00	5.55	27.3	2.790
106.60	5.60	27.5	4,450.00	0.00	5.60	27.5	2.806
106.65	5.65	27.6	4,450.00	0.00	5.65	27.6	2.821
106.70	5.70	27.7	4,450.00	0.00	5.70	27.7	2.834
106.75	5.75	27.9	4,450.00	0.00	5.75	27.9	2.847
106.80	5.80	28.0	4,450.00	0.00	5.80	28.0	2.859
106.85	5.85	28.1	4,450.00	0.00	5.85	28.1	2.869
106.90	5.90	28.2	4,450.00	0.00	5.90	28.2	2.878
106.95	5.95	28.2	4,450.00	0.00	5.95	28.2	2.885
107.00	6.00	28.3	4,450.00	4,450.00	6.00	28.3	2.888

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	101.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	107.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward + Reverse	TW	101.00	107.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	101.00 ft
Orifice Diameter	42.0 in
Orifice Coefficient	0.600

Subsection: Interconnected Pond Routing Summary
Label: PO-1

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	101.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	3.000	min

	Maximum Storage	
Time to Peak (min)	Elevation (ft)	Volume (ac-ft)
1,164.000	106.96	2.885

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (min)	Flow (Peak) (ft³/s)	Time to Peak (min)	Flow (Peak) (ft³/s)
Pond Inflow....	1,155.000	116.92	0.000	0.00
Pond Outflow...	1,167.000	73.51	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	25.606	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	25.227	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	25.606 ac-ft
Volume (Total Out ICPM)	25.227 ac-ft
Volume (Ending)	0.364 ac-ft
Elevation (Ending)	102.10 ft
Difference	0.015 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

Index

Peak Flow Hydrologic Analysis

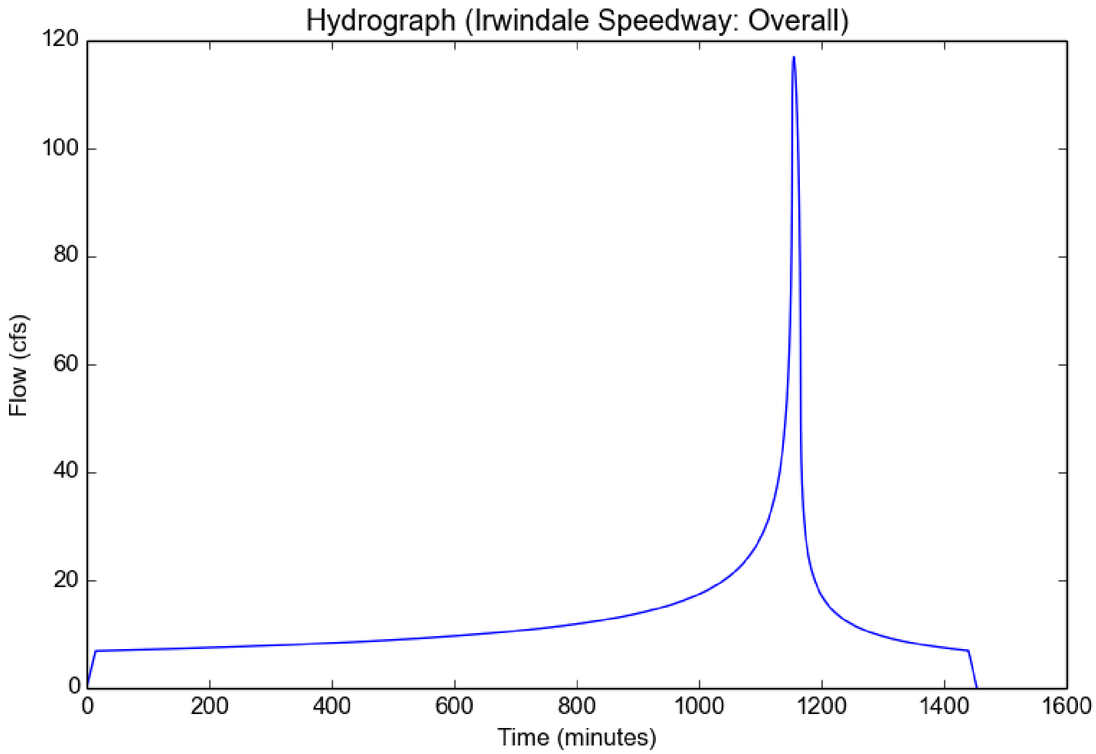
File location: K:/ORA_LDEV/194279001-Irwindale Speedway Commerce Center/Reports/PRELIM H&H/Appendix/Appendix F - Hydrology Calcs/Irwindale
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Irwindale Speedway
Subarea ID	Overall
Area (ac)	63.3
Flow Path Length (ft)	1400.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.8
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

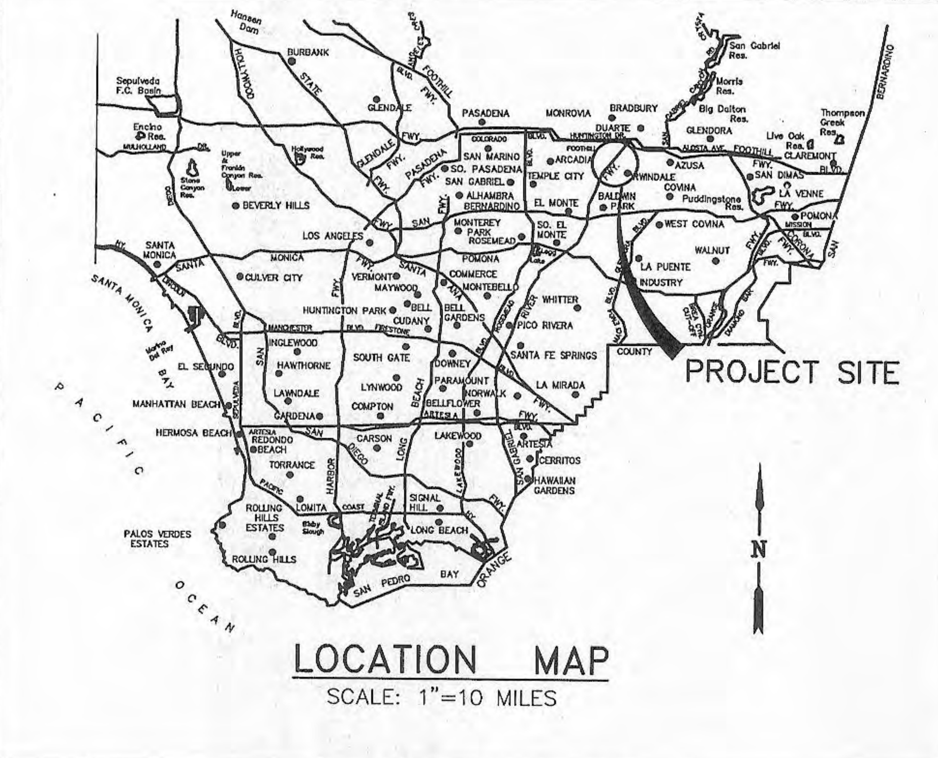
Output Results

Modeled (25-yr) Rainfall Depth (in)	5.9704
Peak Intensity (in/hr)	2.1955
Undeveloped Runoff Coefficient (Cu)	0.3139
Developed Runoff Coefficient (Cd)	0.8414
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	116.9344
Burned Peak Flow Rate (cfs)	116.9344
24-Hr Clear Runoff Volume (ac-ft)	25.6632
24-Hr Clear Runoff Volume (cu-ft)	1117887.2525



APPENDIX F

Live Oak Avenue Storm Drain As-Builts



LOCATION MAP

SCALE: 1"=10 MILES

THOMAS GUIDE 1999
PAGES: 597 & 598

CITY OF IRWINDALE & IRWINDALE REDEVELOPMENT AGENCY

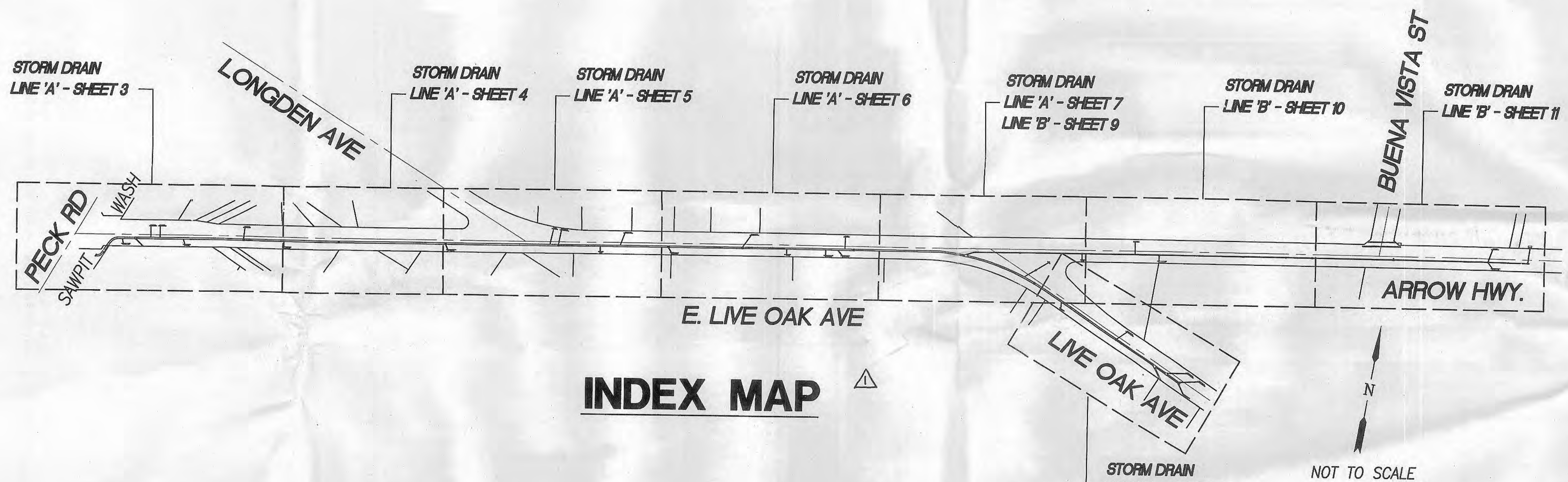
DEPARTMENT OF PUBLIC WORKS

PLANS FOR THE CONSTRUCTION OF

STORM DRAIN MTD #1595 IN E. LIVE OAK AVE. & ARROW HWY.

FROM PECK ROAD TO 650' E/O BUENA VISTA STREET

STORM DRAIN PLANS IN
CITY OF IRWINDALE M.T.D. No. 1595



INDEX MAP

STANDARD PLANS, 1997 EDITION, APWA

NUMBER	DESCRIPTION
120-1	CURB AND GUTTER-BARRIER
133-1	ASPHALT PAVEMENT REPLACEMENT
221-1	PIPE ANCHORS AND BACKFILL STABILIZERS
224-1	SUPPORTS FOR CONDUITS ACROSS TRENCHES
225-1	BLANKET PROTECTION FOR PIPES
300-2	CURB OPENING CATCH BASIN
307-2	CURB OPENING CATCH BASIN WITH MANHOLE IN STREET
308-1	MONOLITHIC CATCH BASIN CONNECTION
309-1	CATCH BASIN REINFORCEMENT
310-1	CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
312-2	CATCH BASIN MANHOLE FRAME AND COVER
313-1	LOCAL DEPRESSIONS AT CATCH BASINS
314-2	MODIFICATIONS FOR SIDE OPENING CATCH BASIN
320-1	MANHOLE PIPE TO PIPE MAIN LINE ID'S 36" OR LARGER
322-1	MANHOLE PIPE TO PIPE (LARGE SIDE INLET)
331-2	JUNCTION STRUCTURE - PIPE TO PIPE (INLET ID > 24" OR > 1/2 MAIN LINE ID)
332-1	JUNCTION STRUCTURE - PIPE TO PIPE (ID > 24")
340-1	TRANSITION STRUCTURE - PIPE TO PIPE
342-1	TRANSITION STRUCTURE RCB TO PIPE
380-2	CONCRETE COLLAR FOR PIPES 12 INCHES THROUGH 72 INCHES
600-1	CHAINK FENCE AND GATES
630-2	24" MANHOLE FRAME AND COVER
635-2	STEEL STEP

STANDARD PLANS, 1995 EDITION LOS ANGELES COUNTY, DEPT. OF PUBLIC WORKS

NUMBER	DESCRIPTION
1060-0	DRIVEWAY TEMPLATE
3053-0	REINFORCED CONCRETE BOX CULVERT
3060-0	SLOPED PROTECTION BARRIER
3080-0	PIPE BEDDING IN TRENCHES
3090-0	CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS
3091-0	SAMPLE SHEET FOR USE AS A GUIDE IN PREPARING CALCULATIONS FOR SHORING OF EXCAVATIONS

CALTRANS STANDARD PLANS

NUMBER	DESCRIPTION
D89	HEADWALL
D90	CUTOFF WALLS

UTILITY AGENCIES	PHONE NO
GENERAL TELEPHONE	(909) 469-6345
PACIFIC BELL	(818) 373-5966
SOUTHERN CALIFORNIA EDISON COMPANY	(626) 308-6652
SAN GABRIEL VALLEY WATER DISTRICT	(626) 448-6183
SOUTHERN CALIFORNIA WATER	(626) 446-5176
LOS ANGELES COUNTY PUBLIC WORKS	(626) 458-1700
SOUTHERN CALIFORNIA GAS COMPANY	(909) 335-7325
UNITED CABLE TELEVISION	(626) 855-3306

INDEX OF SHEETS

UNDERGROUND SERVICE ALERT

ATTENTION IS DIRECTED TO THE POSSIBLE EXISTENCE'S OF UNDERGROUND FACILITIES NOT SHOWN OR IN A LOCATION DIFFERENT FROM THAT WHICH IS SHOWN ON THE PLANS OR IN THE SPECIAL PROVISIONS. THE CONTRACTOR SHALL TAKE STEPS TO ASCERTAIN THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES PRIOR TO DOING WORK THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR SERVICE.

BEFORE EXCAVATING, THE CONTRACTOR SHALL VERIFY THE LOCATION OF UNDERGROUND UTILITIES BY CONTACTING UNDERGROUND UTILITIES SERVICE ALERT AT (800) 422-4133.

Underground Service Alert
Call: TOLL FREE
1-800
422-4133
TWO WORKING DAYS BEFORE YOU DIG

PF565074

CONSTRUCTION NOTES:

- 300 — CONST 6'x6' RCB SD PER DETAIL ON SHT 13
- 301 — CONST TRANS STRUCTURE RCB TO PIPE PER STD 342-1
- 302 — CONST MH PER STD 322-1 AND TABLE
- 303 — CONST JS PER STD 331-2 AND TABLE
- 304 — CONST 78" RCP SD (SEE PROFILE FOR D-LOAD)
- 305 — CONST 72" RCP SD (SEE PROFILE FOR D-LOAD)
- 306 — CONST 24" RCP SD (2000-D)
- 1 307 — CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_u MIN=2.5', B_{MIN}=3.67'
- 308 — CONST LD, CASE E, H=2" PER STD 313-1
- 309 — ABANDON & REMOVE INTERFERING PORTIONS OF EXST SD, CB & LD
- 310 — REMOVE EXST 24" SD
- 311 — PROTECT BRIDGE SUBSTRUCTURE
- 312 — CONST HEADWALL PER CALTRANS STD D89
- 1 313 — CONST ~~MODIFIED CB PER STD 314-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN NO. 314-2, V_u MIN=2.5', B_{MIN}=3.67'
- 314 — CONST CONCRETE INLET DETAIL ON SHT 2
- 315 — SEAL END WITH BRICK AND MORTAR
- 316 — CONST 30" RCP SD (1500-D)
- 317 — CONST CONCRETE COLLAR PER STD 380-2
- 318 — CONST 36" RCP SD (SEE PROFILE FOR D-LOAD)
- 319 — CONST 66" RCP SD (SEE PROFILE FOR D-LOAD)
- 320 — CONST MH PER STD 320-1
- 321 — CONST JS PER STD 332-1
- 322 — CONST RCB HEADWALL/CHNL WALL PER DETAIL ON SHT 12
- 1 323 — ~~CONST MODIFIED CB PER DETAIL ON SHT 12~~
- 324 — ABANDON EXST SD MH & ALL APPURTENANCES
- 325 — CONST CONCRETE BLANKET PROTECTION PER STD 225-1
- 326 — CONST LD, CASE A, H=2", M=2' PER STD 313-1
- 327 — CONST 48" RCP SD (SEE PROFILE FOR D-LOAD)
- 328 — CONST SLOPED PROTECTION BARRIER PER LACDPW STD 3060-0
- 329 — CONST 60" RCP SD (SEE PROFILE FOR D-LOAD)
- 3 337 — INCREASE CATCH BASIN A-8, 10, 12, 14 & 15 "V" DEPTH
- 3 338 — CONSTRUCT 4' X 6" OPENING IN REAR WALL OF CURB OPENING CATCH BASIN PER DETAIL ON SHEET 6
- 3 339 — REVISE CONNECTOR PIPE A-13 JUNCTION STRUCTURE SD STATION
- 2 333 — MOVED CATCH BASIN APWA No. 300-2 TO PROTECT EXISTING SCE POWER ANCHOR POLE AND REDUCED WIDTH FROM 28' TO 21'
- 2 334 — CONSTRUCT MODIFICATION FOR SIDE OPENING CATCH BASIN PER APWA STD. PLAN No. 314-2. V_u MIN. = 2.5', W = 28', V = 6.0', B_{MIN} = 3.67'
- 2 335 — PROTECT EXISTING 2" AND 8" GAS LINES IN PLACE
- 330 — REMOVE EXST HEADWALL, CONCRETE PAVEMENT & DRAINAGE STRUCTURES
- 331 — CONST 6' CHAIN LINK FENCE & GATE PER STD 600-1
- 332 — CONST TRANS STRUCTURE PIPE TO PIPE PER STD 340-1
- 1 323 — INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL
  - 3.5' CB: 1 DEBRIS GATE, 3 FILTERS
  - 10.0' CB: 2 DEBRIS GATES, 8 FILTERS
  - 14.0' CB: 3 DEBRIS GATES, 10 FILTERS
  - 21.0' CB: 5 DEBRIS GATES, 14 FILTERS
  - 28.0' CB: 6 DEBRIS GATES, 19 FILTERS

NO.	DATE	INIT.	REVISIONS CONTINUED	APPV'D
3	7-30-08	SAS	SPECIFY STD 331-2 FOR JS @ 41+70. INCREASE "V" DEPTH A-8, 10, 12, 14 & 15. REVISE CONNECTOR PIPE A-13 JUNCTION STRUCTURE SD STATION. PROVIDE CB A-10 REAR WALL OPENING. ADDED CONST. NOTES No. 337, 338 AND 339.	

PLANS UPDATED BY COORY ENGINERING
12631 E. IMPERIAL HWY. F-124
SANTA FE SPRINGS, CA. 90670
(562) 868-8266

SAMIR M. KHOURY R.C.E. 30567 DATE 12/21/07

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA

REVISIONS

NO.	DATE	INIT.		APPV'D
1	12-17-07	SAS	MODIFIED INDEX MAP AND CONSTRUCTION NOTES 307, 313 AND 323 WITH DEBRIS GATES AND FILTER INSERTS. ADDED SHEET No. 14 AND COORY ENGINEERING SIGNITURE BLOCK	
2	6-13-08	SAS	MOVED C.B. APWA No. 300-2 TO PROTECT SCE POLE AND REDUCED W FROM 28' TO 21'. ADDED CONST. NOTES No. 333, No. 334 AND No. 335	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF:		DATE
JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04		1/31/02
DRAWN BY	JKC	
CHECKED	VN	
RECOMMENDED	-	
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER		DATE: 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering - Planning - Surveying - Public Works
203 N. Golden Circle Dr., Ste. 300 - Santa Ana, CA 92705-4010 - (714) 664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS MTD #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
TITLE SHEET
IRWINDALE CALIFORNIA

SHT 1 OF ~~13~~ ~~14~~ 19

DDN 364-1107-F71.14

STORM DRAIN PLANS IN
CITY OF IRWINDALE M.T.D. No. 1595

GENERAL NOTES

1. PRIOR TO STARTING WORK UNDER THIS CONTRACT, A PERMIT SHALL BE OBTAINED AND ALL FEES AND DEPOSITS FOR CONSTRUCTION INSPECTION SHALL BE PAID TO THE COUNTY OF LOS ANGELES, DEPARTMENT OF PUBLIC WORKS AT THE PERMIT COUNTER, 900 SOUTH FREMONT AVENUE, 8TH FLOOR. ALL OTHER PERMITS, IF REQUIRED, SUCH AS ROAD EXCAVATION PERMITS, MUST BE OBTAINED PRIOR TO STARTING WORK.
2. THE CONTRACTOR SHALL CONTACT THE CITY OF IRWINDALE TO ARRANGE FOR AN ACCEPTABLE CONSTRUCTION START DATE.
3. APPROVAL OF THIS PLAN BY THE COUNTY OF LOS ANGELES DOES NOT CONSTITUTE A REPRESENTATION TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NONEXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE APWA'S "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION," (STANDARD SPECIFICATIONS) INCLUDING ALL SUPPLEMENTS AND ADDITIONS AND AMENDMENTS TO THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" LATEST EDITION BY THE COUNTY OF LOS ANGELES DEPT. OF PUBLIC WORKS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE DIRECTOR OF PUBLIC WORKS /CITY ENGINEER.
5. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 7–10.4.1 OF THE STANDARD SPECIFICATIONS IN REGARD TO SAFETY ORDERS.
6. ELEVATIONS ARE IN FEET APOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF NAD–83, UNLESS OTHERWISE INDICATED.
7. STATIONS SHOWN ON THE DRAWINGS ARE ALONG THE CENTER LINE OF CONDUIT OR ON A LINE NORMAL TO THE CENTER LINE OF CONDUIT
8. STATIONS AND INVERT ELEVATIONS OF PIPE INLETS SHOWN ON THE PROFILES ARE AT THE INSIDE FACE OF THE CONDUIT, UNLESS OTHERWISE SHOWN.
9. PIPE CONNECTIONS TO STORM DRAIN SHALL CONFORM TO APWA STANDARD PLAN NO. 322–1, UNLESS OTHERWISE SHOWN.
10. CONCRETE BACKFILL SHALL BE PROVIDED AROUND PIPE 21 INCHES IN DIAMETER OR LESS WHERE THE COVER IS EQUAL TO OR LESS THAN 2'–0", AROUND PIPE GREATER THAN 21 INCHES IN DIAMETER BUT LESS THAN 39 INCHES WHERE THE COVER IS LESS THAN 1'–3", AND FOR PIPE 39 INCHES OR GREATER WHERE THE COVER IS LESS THAN 1'–0". THE CONCRETE BACKFILL SHALL BE AS SPECIFIED ON COUNTY STANDARD PLAN NO. 3080, NOTE 7.
11. LOCATIONS OF CATCH BASIN CONNECTOR PIPE JUNCTIONS WITH CATCH BASINS AS SHOWN ON THE DRAWINGS ARE SCHEMATIC. IT IS INTENDED THAT SUCH JUNCTIONS BE LOCATED AT THE DOWNSTREAM ENDS OF THE CATCH BASINS, UNLESS SPECIFICALLY INDICATED OTHERWISE. IN ALL CASES, THE EXACT LOCATIONS WILL BE DETERMINED IN THE FIELD BY THE ENGINEER TO MEET FIELD CONDITIONS.
12. MONOLITHIC CATCH BASIN CONNECTIONS SHALL BE CONSTRUCTED, WHERE APPLICABLE, PER APWA STANDARD PLAN NO. 308
13. FOR LOCAL DEPRESSIONS, APWA STANDARD PLAN NO. 313 SHALL BE USED. "H" SHALL EQUAL 4 INCHES FOR CASES A, B, C, AND D AND 2 INCHES FOR CASES E, F, AND G, UNLESS OTHERWISE NOTED ON THE PROJECT DRAWINGS.
14. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR, OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN.
15. ALL RESURFACING, CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS, AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED SHALL BE CONSTRUCTED AT THE SAME ELEVATION AND LOCATION AS EXISTING IMPROVEMENTS, UNLESS OTHERWISE SHOWN.
16. REFER TO SHEET 2 FOR TYPICAL CATCH BASIN CONNECTOR PIPE PROFILE.
17. MANHOLES SHALL USE THE APWA STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION 630–2 FOR THE "FRAME AND COVER" AND 635–2 [OR] 636–1 FOR THE "STEP".
18. MANHOLE SHAFT SAFETY LEDGE SHALL USE APWA–AGC STANDARD PLAN NO. 320–1[OR] 322–1 AND THE MANHOLE SHAFT FRAME AND COVER SHALL BE PIER STANDARD PLAN NO. 325–1 AND 633–3.
19. THE WORK SHOWN ON THESE DRAWINGS REQUIRES THE PRIME CONTRACTOR TO HAVE A VALID CLASS "A' OR C42 LICENSE ISSUED BY THE STATE OF CALIFORNIA.
20. ALL FIELD BOOK REFERENCES ARE TO LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS FIELD BOOKS, UNLESS OTHERWISE NOTED.
21. FIELD DENSITY AFTER ROLLING OF ALL ASHPALTIC CONCRETE PLACED ON THIS PROJECT SHALL BE A MINIMUM OF 95 PERCENT RELATIVE COMPACTION, PER SUBSECTION 302–5.6.2 OF THE STANDARD SPECIFICATIONS.
22. ALL PIPES SHALL BE PLACED IN TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL. THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE THE TOP OF THE PIPE ELEVATION, OR FINISH SURFACE ELEVATION, WHICHEVER IS LESS
23. ALL BACKFILL AND FILLS WITHIN STREET RIGHT–OF–WAY SHALL BE COMPACTED IN ACCORDANCE WITH CITY REQUIREMENTS UNLESS OTHERWISE NOTED AND INSPECTED BY THE CITY. THE SOIL COMPACTION SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER.
24. PIPE BEDDING SHALL BE ACCORDING TO COUNTY STANDARD PLAN NO. 3080, CASE III, EXCEPT BELL AND SPIGOT PIPE WHICH SHALL BE CASE II BEDDING, UNLESS OTHERWISE SHOWN. "W" VALUES SHALL BE AS SPECIFIED ON STD. PLAN NO. 3080 FOR CASE III BEDDING, NOTES 3 (A), 3 (B), AND 3 (C). IF THE "W": VALUE AT THE TOP OF THE PIPE IS EXCEEDED, THE BEDDING SHALL BE MODIFIED, AND/OR PIPE OF ADDITIONAL STRENGTH SHALL BE PROVIDED. THE PROPOSED MODIFICATION SHALL BE APPROVED BY THE DEPARTMENT.
25. PIPE SHALL BE EMBEDDED 5 INCHES INTO ALL STRUCTURES INCLUDING INLET AND HEADWALLS, UNLESS OTHERWISE INDICATED.
26. "UNLESS OTHERWISE SPECIFIED IN THE PROFILE ON THESE PLANS, THE PIPE SHALL BE MANUFACTURED WITH A MINIMUM CONCRETE COVER OVER THE STEEL IN THE INVERT OF 0.75 INCHES OF RCP UP TO 96 INCHES IN DIAMETER AND 1.25 INCHES FOR PIPE GREATER THAN 96 INCHES IN DIAMETER".
27. ALL CATCH BASINS WITHIN THE DEDICATED STREET RIGHT–OF–WAY SHALL BE CONSTRUCTED PER STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
28. THE CONTRACTOR SHALL PROVIDE TO THE SATISFACTION OF THE CITY ENGINEER AND THE DIRECTOR OF PUBLIC WORKS A DRAINAGE SYSTEM FOR CONTRIBUTORY FLOWS TO BE OPERABLE AT ALL TIMES UNTIL THIS STORM DRAIN IS ACCEPTED FOR MAINTENANCE. THE DESIGN OF THE DRAINAGE SYSTEM MUST BE PREPARED UNDER THE DIRECTION OF A REGISTERED CIVIL ENGINEER.
29. ALL REFERENCES ON THIS PLAN TO THE COUNTY ENGINEER, ROAD DEPT., OR FLOOD CONTROL DISTRICT SHALL APPLY TO THE APPROPRIATE ELEMENTS OF THE DEPARTMENT OF PUBLIC WORKS.
30. WHERE THE UTILITIES ARE INDICATED ON THE DRAWINGS TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION NO. 224, UNLESS OTHERWISE INDICATED

GENERAL NOTES (CONT.)

31. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN. ALL PIPES ABANDONED SHALL BE PRESSURE FILLED WITH SAND OR GROUT AND THE ENDS PLUGGED AS ABOVE.
32. MANHOLES NO. 1, 2, 3, AND 4, SHALL USE THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION NO. 630 FOR THE "FRAME AND COVER" AND NO. 635 FOR THE "STANDARD DROP STEP".
33. A NPDES PERMIT FROM THE REGIONAL WATER QUALITY CONTROL BOARD IS REQUIRED BEFORE ANY DISCHARGE OF NON–STORM WATER INTO THE STORM DRAIN IS ALLOWED.
34. THE LATEST REVISED STANDARD PLAN OR DRAWING SHALL BE USED, UNLESS OTHERWISE SHOWN ON THE PLANS.
35. WHEN ELEVATIONS "R" & "S" ARE NOT SHOWN FOR MANHOLES, TRANSITION STRUCTURES AND JUNCTION STRUCTURES THE LATERAL SHALL JOIN THE MAIN LINE RADIALLY
36. CONTRACTOR SHALL USE TYPE V FOR ALL CONCRETE PIPE AND FOR ALL CONCRETE STRUCTURE AND CEMENT MORTAR WORK.
37. CONTRACTOR SHALL FIELD VERIFY THE EXISTING ELEVATIONS AT THE LOCATION OF THE CATCH BASINS AND SHALL MAKE SMOOTH TRANSITION FROM THE PROPOSED CURB TO THE EXISTING OF CURB.
38. ANY EXISTING TRAFFIC LOOP DETECTORS OR TRAFFIC STRIPING ON PAVEMENT THAT MAY BE DAMAGED DURING CONSTRUCTION, SHALL BE REPAIRED TO THE SATISFACTION OF THE CITY ENGINEER.
39. REMOVAL, ADJUSTMENT, AND/OR RELOCATION OF EXISTING TRAFFIC SIGNAL, SIGN, STRIPING ETC. SHALL BE DONE ONLY UPON APPROVAL OF THE CITY ENGINEER
40. ALL TRAFFIC SIGNALS AND SAFETY LIGHTING TO BE MAINTAINED OPERATIONAL TO MEET CITY OF IRWINDALE'S SPECIFICATIONS.
41. CONTRACTOR SHALL POT HOLE ALL THE UTILITY CROSSINGS AT LOCATIONS MARKED AS "▲" ON THE PLANS PRIOR TO THE BEGINNING OF CONSTRUCTION. CONTRACTOR SHALL THE BEGINNING OF CONSTRUCTION. CONTRACTOR SHALL VERIFY THE CLEARANCE OF THE UTILITIES AND THE PROPOSED STORM DRAIN AND SHALL NOTIFY THE CITY OR CITY'S REPRESENTATIVE IN THE EVENT OF ANY CONFLICTS.

GENERAL CONSTRUCTION NOTES

1. ALL TRENCH EXCAVATIONS SHALL CONFORM TO STATE OF CALIFORNIA CONSTRUCTION SAFETY ORDERS.
2. EXISTING UNDERGROUND STRUCTURES: THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES, CONDUITS, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO LOCATE AND PROTECT THE UTILITY LINES, STRUCTURES, AND SUBSTRUCTURES SHOWN ON THESE PLANS AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK. THE CONTRACTOR FURTHER ASSUMES ALL LIABILITY AND RESPONSIBILITY FOR LOCATING AND PROTECTING THE UNDERGROUND UTILITY PIPES, CONDUITS, SUBSTRUCTURES, AND SUPERSTRUCTURES SHOWN OR NOT SHOWN ON THESE PLANS.
3. CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUBCONTRACTORS COMPLIANCE WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR OR WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS".
4. BEFORE STARTING ANY WORK. THE CONTRACTOR IS REQUIRED TO MAKE A DATED–PHOTOGRAPH LOG AND VIDEO TO DOCUMENT THE PRE–EXISTING CONDITIONS IN AND AROUND THE PROPOSED LOCATION OF THE STORM DRAIN FACILITIES DOCUMENT SHOULD INCLUDE THE IMMEDIATE WORK AREA AS WELL AS ANY AREA BEYOND WHICH THE CONTRACTOR WILL USE, ALTER, OR TRAVEL UPON DURING THE COURSE OF CONSTRUCTION. THE PHOTOGRAPH LOG AND VIDEO SHALL BE THE PROPERTY OF THE CITY OF IRWINDALE THIS DOCUMENT WILL BE USED TO AVOID ANY POSSIBLE DAMAGE CLAIMS AGAINST WHICH ARE NOT A RESULT OF THE WORK PERFORMED ON THIS PROJECT.
5. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY FOR ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FOR ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

CONCRETE REMOVAL NOTES

A. WHERE SECTION OF ANY EXISTING STRUCTURE IS TO BE SEPARATED FROM A NEW STRUCTURE, AND THE REINFORCEMENT IS TO BE CUT AT THE POINT OF SEPARATION, THE CONTRACTOR SHALL SAWCUT THROUGH THE WALL WITH AN APPROVED CONCRETE SAW. ANY SAWCUT OR IRREGULARITIES IN THE SURFACE OF THE REMAINING WALL OR JOINT SHALL BE FILLED WITH ANY EPOXY GROUT MIXTURE TO OBTAIN A SMOOTH PLANE SURFACE. THE REINFORCING STEEL EXPOSED BY CONCRETE REMOVAL SHALL BE BURNED OFF ONE (1) INCH BELOW THE SURFACE OF THE REMAINING CONCRETE AND THE RESULTING VOIDS SHALL BE PATCHED WITH EPOXY ADHESIVE. EPOXY SHALL BE A COMMERCIAL QUALITY, TWO–COMPONENT MIXTURE, SPECIALLY MANUFACTURED FOR THE INTENDED PURPOSE, AND BE APPLIED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. ONE–HALF INCH THICK PREMOLDED EXPANSION JOINT MATERIAL SHALL BE USED TO SEPARATE THE FACES OF THE EXISTING AND NEW WALL.

B. WHERE REINFORCEMENT IS REQUIRED TO EXTEND THROUGH THE NEW JOINT, CONCRETE SHALL BE REMOVED IN THE FOLLOWING SEQUENCE.

1. A SAWCUT SHALL BE MADE ONE AND ONE–HALF INCHES DEEP AT THE REMOVAL LIMITS. CARE SHALL BE EXERCISED IN SAWING AT THE REMOVAL LIMITS SO AS NOT TO CUT THE REINFORCING STEEL IN THE REMAINING SLAB. THE EXISTING REINFORCING STEEL SHALL BE RETAINED AND EXTENDED INTO THE NEW CONSTRUCTION AS INDICATED ON PLAN.
2. USING HAND HELD EQUIPMENT, THE CONCRETE SHALL BE CAREFULLY REMOVED FOR THE FULL DEPTH OF THE WALL OR SLAB AND FOR A MINIMUM DISTANCE FROM THE SAWCUT EQUAL TO THE LONGEST EXTENSION OF THE EXISTING BARS TO BE EXTENDED INTO THE NEW CONSTRUCTION. THIS EXTENSION SHALL BE 30 BAR DIAMETERS, UNLESS OTHERWISE SHOWN.
3. EXISTING REINFORCEMENT SHALL BE CUT TO THE REQUIRED BAR EXTENSION
4. THE REMAINING CONCRETE MAY BE REMOVED BY ANY SUITABLE METHOD UPON APPROVAL OF THE ENGINEER, WHO SHALL BE THE SOLE JUDGE OF THE USE OF ANY CONCRETE REMOVAL EQUIPMENT. EXPLOSIVES, WRECKING BALL, OR OTHER SIMILAR DEVICES, WHICH ARE LIKELY TO DAMAGE THE CONCRETE TO BE LEFT IN PLACE, SHALL NOT BE USED.

STRUCTURAL NOTES

1. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACE INSPECTED AND APPROVED.
2. ALL STRUCTURAL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28–DAY COMPRESSIVE STRENGTH OF 3250 PSI, UNLESS OTHERWISE NOTED.
3. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO THE CONDUIT CENTERLINE EXCEPT AS OTHERWISE, SHOWN ON THE DRAWINGS.
4. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2–$\frac{1}{2}$ INCHES CLEARANCE, UNLESS OTHERWISE SPECIFIED.
5. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL, PER ASTM A–615 GRADE 60.
6. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE ADOPTED EDITION OF AMERICAN CONCRETE INSTITUTE (ACI) "MANUAL OF STANDARD PRACTICE".
7. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTERLINE OF STEEL, UNLESS OTHERWISE NOTED.
8. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUM LAP OF 30 BAR DIAMETERS, 18" OR ACI'S RECOMMENDATION, WHICHEVER IS GREATER.
9. ALL CONSTRUCTION JOINTS IN THE FOOTING OR SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
10. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
11. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTERLINE OF CONSTRUCTION.

STORM WATER POLLUTION REQUIREMENT

STORMWATER POLLUTION CONTROL REQUIREMENTS FOR STORM DRAIN CONSTRUCTION

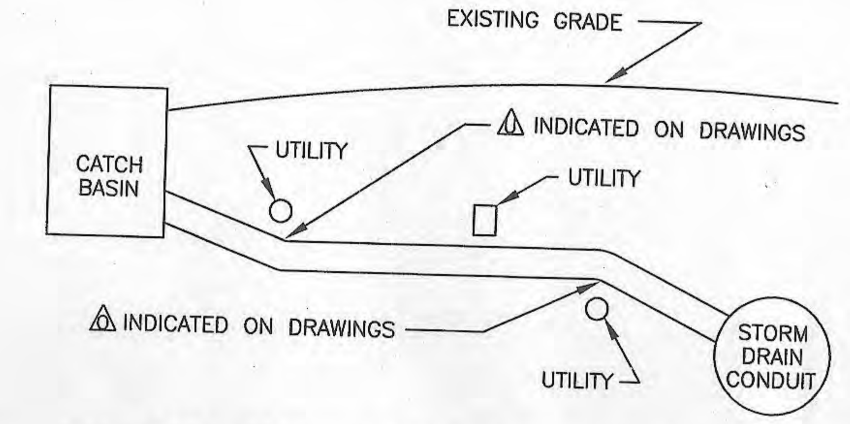
A. BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES*

THE FOLLOWING IS INTENDED AS AN ATTACHMENT FOR CONSTRUCTION AND GRADING PLANS AND REPRESENTS THE MINIMUM STANDARDS OF GOOD HOUSEKEEPING WHICH MUST BE IMPLEMENTED ON ALL CONSTRUCTION SITES, REGARDLESS OF SIZE.

1. ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON–SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEETFLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES OR WIND.
2. STOCKPILES OR EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER.
3. FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATEIRIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.
4. EXCESS OR WASTE CONCRETE MAY NOT WASHED INTO THE PUBLIC WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTES ON–SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.
5. TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND.
6. SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACKED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS MUST BE STABILIZED SO AS TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC WAY. ACCIDENTAL DEPOSITIONS MUST BE SWEPT UP IMMEDIATELY AND MAY NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.
7. ANY SLOPES WITH DISTURBED SOILS OR DENUDED OF VEGETATION MUST BE STABILIZED SO AS TO INHIBIT EROSION BY WIND AND WATER.

B. THE FOLLOWING BMPS AS OUTLINED IN, BUT NOT LIMITED TO, THE <u>BEST MANAGEMENT PRACTICES HANDBOOK, CALIFORNIA STORMWATER QUALITY TASK FORCE, SACRAMENTO, CALIFORNIA 1993</u>, OR THE LATEST REVISED EDITION, MAY APPLY DURING THE CONSTRUCTION OF THIS PROJECT (ADDITIONAL MEASURES MAY BE REQUIRED IF DEEMED APPROPRIATE BY COUNTY INSPECTORS):

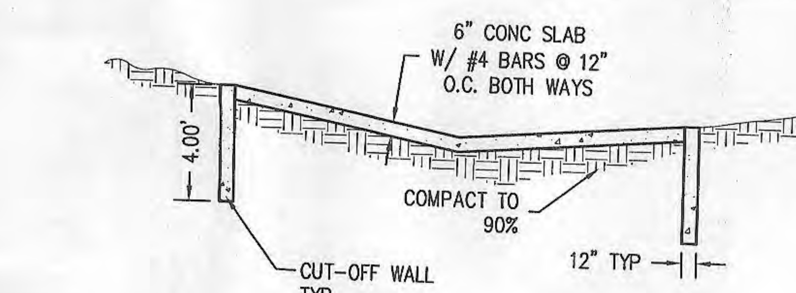
CA001 – DEWATERING OPERATIONS
CA002 – PAVING OPERATIONS
CA003 – STRUCTURE CONSTRUCTION AND PAINTING
CA010 – MATERIAL DELIVERY AND STORAGE
CA012 – SPILL PREVENTION AND CONTROL
CA020 – SOLID WASTE MANAGEMENT
CA021 – HAZARDOUS WASTE MANAGEMENT
CA023 – CONCRETE WASTE MANAGEMENT
CA030 – VEHICLE AND EQUIPMENT CLEANING
CA031 – VEHICLE AND EQUIPMENT FUELING
CA032 – VEHICLE AND EQUIPMENT MAINTENANCE
CA040 – EMPLOYEE/SUBCONTRACTOR TRAINING
ESC01 – SCHEDULING
ESC02 – PRESERVATION OF EXISTING VEGETATION
ESC10 – SEEDING AND PLANTING
ESC11 – MULCHING
ESC20 – GEOTEXTILES AND MATS
ESC21 – DUST CONTROLS
ESC22 – TEMPORARY STREAM CROSSING
ESC23 – CONSTRUCTION ROAD STABILIZATION
ESC24 – STABLIZED CONSTRUCTION ENTRANCE
ESC30 – EARTH DIKE
ESC31 – TEMPORARY DRAINS AND SWALES
ESC32 – SLOPE DRAIN
ESC40 – OUTLET PROTECTION
ESC41 – CHECK DAMS
ESC50 – SILT FENCE
ESC51 – STRAW BALE BARRIERS
ESC52 – SAND BAG BARRIER
ESC53 – BRUSH OR ROCK FILTER
ESC54 – STORM DRAIN INLET PROTECTION



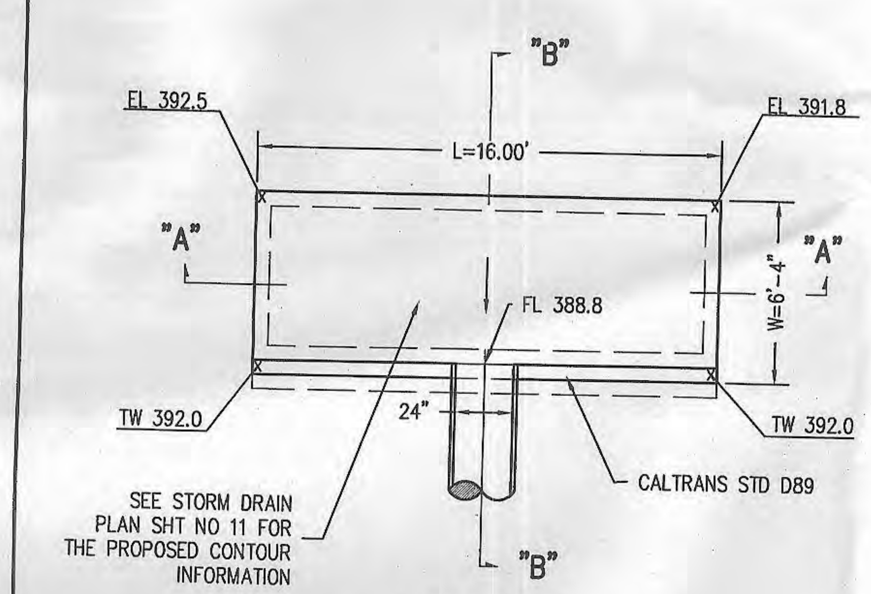
TYPICAL CONNECTOR PIPE PROFILE

N.T.S.

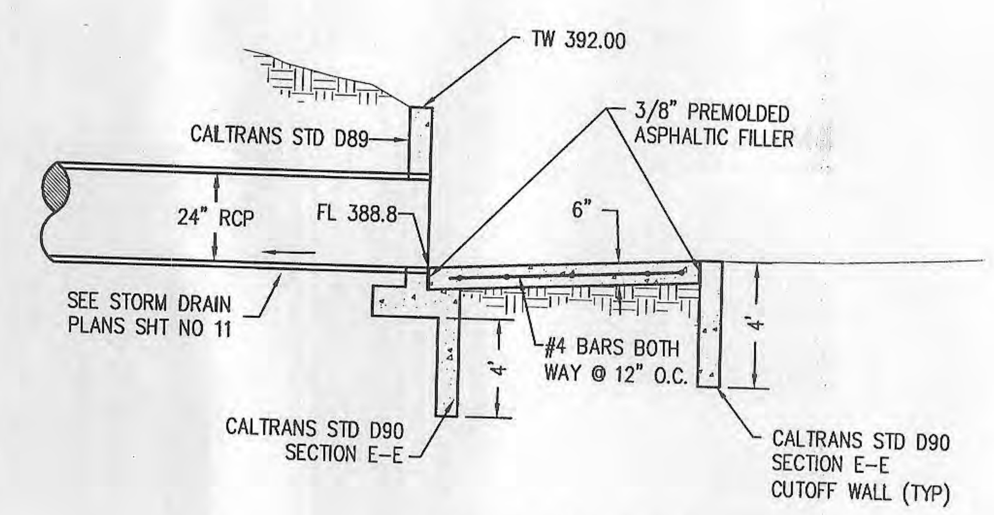
1. THE CHANGE IN GRADE OF THE CONNECTOR PIPE MAY OCCUR EITHER OVER OR UNDER AN EXISTING UTILITY. THE PARTICULAR UTILITY AT WHICH THE CHANGE IN GRADE OCCURS, IS NOTED ON THE PROJECT DRAWINGS. AT LOCATIONS WHERE UTILITY CROSSINGS ARE MARKED ⚠, THE CONNECTOR PIPE GRADE WILL BREAK OVER THE UTILITY. AT LOCATIONS WHERE UTILITY CROSSINGS ARE MARKED ⚠ THE CONNECTOR PIPE WILL BREAK UNDER THE UTILITY.
2. ON THOSE CONNECTOR PIPES WHERE CHANGE IN GRADE IS NOT INDICATED, IT IS ASSUMED THAT THE CONNECTOR PIPE CAN BE LAID ON A STRAIGHT GRADE FROM THE CATCH BASIN TO THE STORM DRAIN WITHOUT INTERFERENCE WITH UTILITIES.
3. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS TO DETERMINE THE EXACT LOCATION AND DEPTH OF UTILITIES, EXCEPT SANITARY SEWER, WHICH ARE MARKED ⚠ OR ⚠. AFTER THE EXACT LOCATION OF THE UTILITY HAS BEEN DETERMINED, THE GRADE AND ALIGNMENT OF THE CONNECTOR PIPE WILL BE STAKED SO AS TO CLEAR THE UTILITY.
4. WHERE CONNECTOR PIPE HAS A GRADE CHANGE EXCEEDING 0.10 FT. OR DIFFERS IN DIAMETER FROM THAT OF EXISTING PIPE, USE CONCRETE COLLAR PER APWA STANDARD PLAN NO. 380–2.



SECTION "A"–"A"
N.T.S.



PLAN VIEW
N.T.S.



SECTION "B"–"B"
N.T.S.

SEE SHEET 11

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA

⚠ 12/21/07

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

REVISIONS

NO.	DATE	INIT.		APPV'D
⚠	12-17-07	SAS	ADDED SHEET NO. 14 AND STAMP AND SIGN	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL OF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67–76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF:		DATE
JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04		1/31/02
DRAWN BY	JKC	
CHECKED	VN	
RECOMMENDED	–	
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER		2/19/2002 DATE:

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705–4010 · (714)664–0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN IMPROVEMENT PLANS MTD #1595

ARROW HIGHWAY & E. LIVE OAK AVENUE

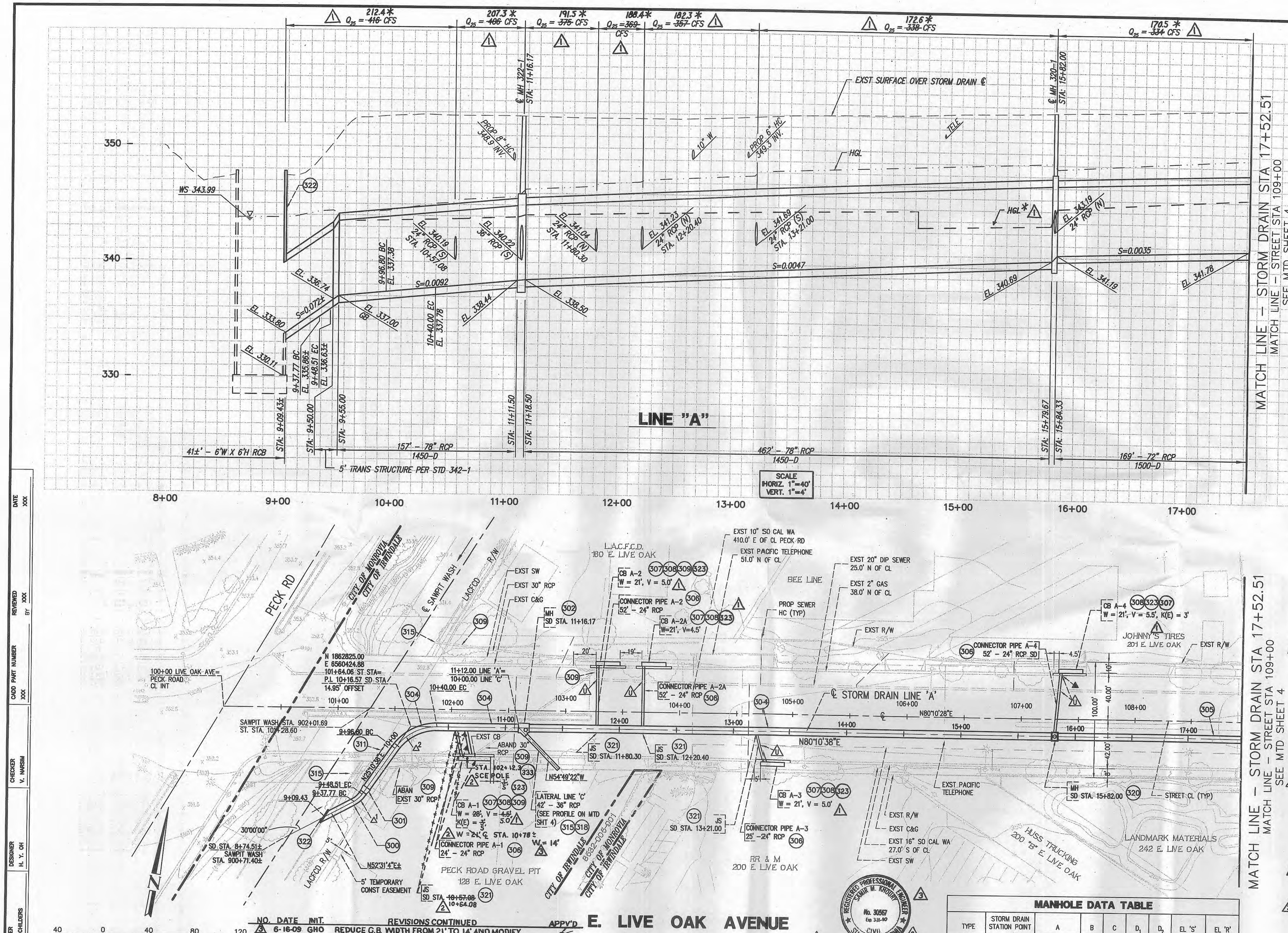
GENERAL NOTES

IRWINDALE CALIFORNIA

SHT 2 OF ~~13~~ ~~14~~ 19

DDN 364-1107-F71-14

R: \99167\Sd\9167C002.dwg 12-11-00 10:50:21 am EST



⚠ * PER REVISED L.A. COUNTY HYDROLOGY MANUAL

NO. DATE INIT. REVISIONS CONTINUED APPV'D
⚠3 6-16-09 GHO REDUCE C.B. WIDTH FROM 21' TO 14' AND MODIFY CONSTRUCTION NOTE 333

CONSTRUCTION NOTES:

- (300) — CONST 6'x6' RCB SD PER DETAIL ON MTD SHT 13
- (301) — CONST TRANS STRUCTURE RCB TO PIPE PER STD 342-1
- (302) — CONST MH PER STD 322-1 AND TABLE HEREON
- (304) — CONST 78" RCP SD (SEE PROFILE FOR D-LOAD)
- (305) — CONST 72" RCP SD (SEE PROFILE FOR D-LOAD)
- (306) — CONST 24" RCP SD (2000-D)
- ⚠1 (307) — CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_U MIN = 2.5', B_{MIN} = 3.67'
- (308) — CONST LD, CASE E, H=2" PER STD 313-1
- (309) — ABANDON & REMOVE INTERFERING PORTIONS OF EXST SD, CB & LD
- (311) — PROTECT BRIDGE SUBSTRUCTURE
- (315) — SEAL END WITH BRICK AND MORTAR
- (318) — CONST 36" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) — CONST MH PER STD 320-1
- (321) — CONST JS PER STD 332-1
- (322) — CONST RCB HEADWALL/CHNL WALL PER DETAIL ON MTD SHT 12
- ⚠1 (323) — ~~CONST MODIFIED CB PER DETAIL ON MTD SHT 12~~

CURVE DATA TABLE

	Δ	RADIUS	LENGTH	TANGENT
Δ1	27°20'26"	22.50'	10.74'	5.47'
Δ2	55°00'00"	45.00'	43.20'	23.43'

⚠1 (323) — INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL
21.0' CB: 5 DEBRIS GATE, 14 FILTERS
28.0' CB: 6 DEBRIS GATE, 19 FILTERS

⚠2 (333) — MOVED CATCH BASIN APWA No. 300-2 TO PROTECT EXISTING SCE POWER ANCHOR POLE, ~~AND REDUCED WIDTH FROM 28' TO 21'~~
⚠3 INCREASE CLEARANCE TO ADJACENT DRIVEWAY, AND REDUCE WIDTH FROM 21' TO 14'

MANHOLE DATA TABLE

TYPE	STORM DRAIN STATION POINT	A	B	C	D_1	D_2	EL 'S'	EL 'R'
322-1	11+12.00	45°00'00"	36"	3.50'	78"	78"	340.22	340.40

REVISIONS

NO.	DATE	INIT.		APPV'D
⚠1	12-17-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS. REVISED MAIN LINE Q'S AND HGL. ADDED SHEET No. 14 AND STAMP AND SIGN	
⚠2	6-13-08	SAS	MOVED C.B. APWA No. 300-2 TO PROTECT SCE POLE AND REDUCED W FROM 28' TO 21'. ADDED CONST. NOTE No. 333	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY: JKC
CHECKED: VN
RECOMMENDED: -
APPROVED: KWOK TAM, P.E. PUBLIC WORKS/DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY: Hall & Foreman, Inc. Civil Engineering · Planning · Surveying · Public Works, 203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-10 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595

ARROW HIGHWAY & E. LIVE OAK AVENUE

STORM DRAIN STA 9+09.09± TO 17+52.51

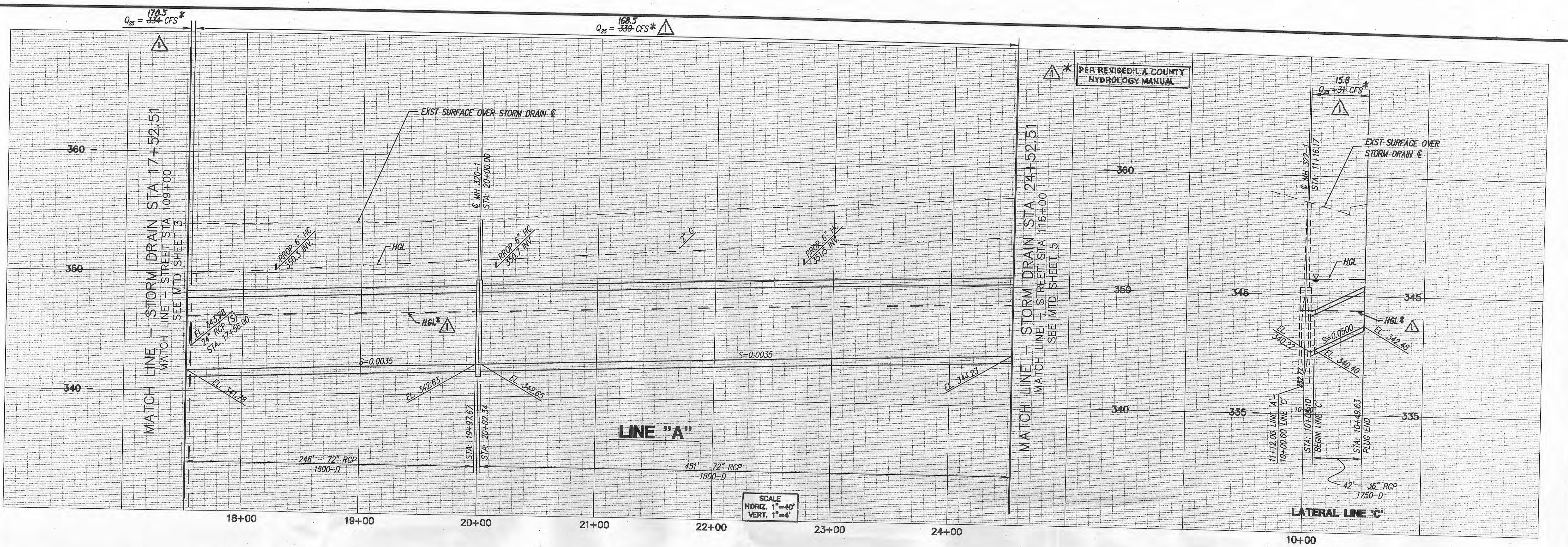
IRWINDALE CALIFORNIA

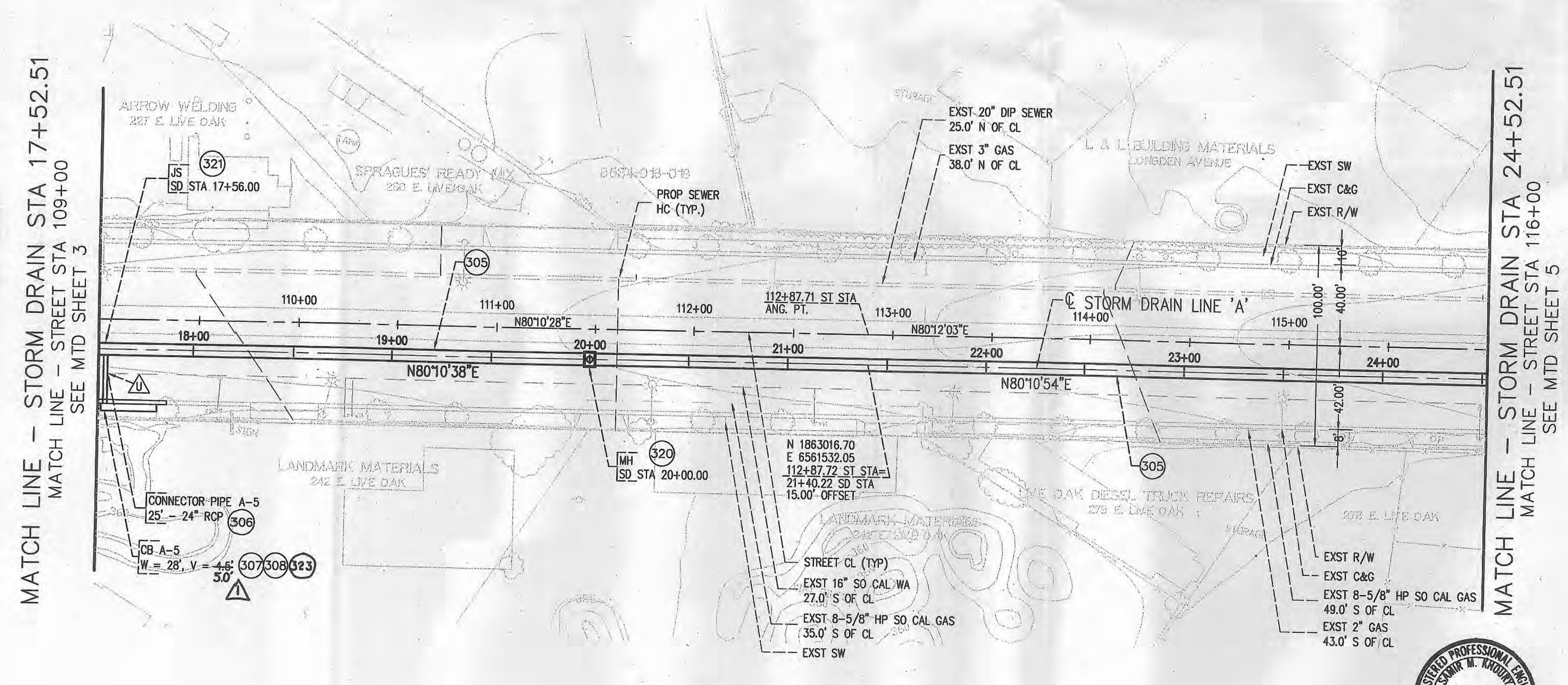
SHT 3 OF ~~13~~ ~~14~~ 19

DDN 364-1107-F 7.1-.14

R:\99167\Sd\99167d01.DWG 12-13-00 3:11:01 pm EST

DESIGNER H. Y. OH · CHECKER V. NARSIM · DRAFTER J. K. CHILDERS





E. LIVE OAK AVENUE

CONSTRUCTION NOTES:

- (305) CONST 72" RCP SD (SEE PROFILE FOR D-LOAD)
- (306) CONST 24" RCP SD (2000-D)
- △1 (307) CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_u MIN = 2.5', B_{MIN} = 3.67'
- (308) CONST LD, CASE E, H=2" PER STD 313-1
- (320) CONST MH PER STD 320-1
- (321) CONST JS PER STD 332-1
- △1 (323) INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL 28.0' CB: 6 DEBRIS GATE, 19 FILTERS

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARASIM	XXX	BY XXX	XXX

REVISIONS

NO.	DATE	INIT.		APP'V'D
△1	12-17-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS.	
			REVISED MAIN LINE Q'S AND HGL	
			ADDED SHEET No. 14 AND STAMP AND SIGN	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870

FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02

DRAWN BY: JKC

CHECKED: VN

RECOMMENDED: -

APPROVED: KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY: Hall & Foreman, Inc. Civil Engineering · Planning · Surveying · Public Works 203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA 12/21/07

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595

ARROW HIGHWAY & E. LIVE OAK AVENUE

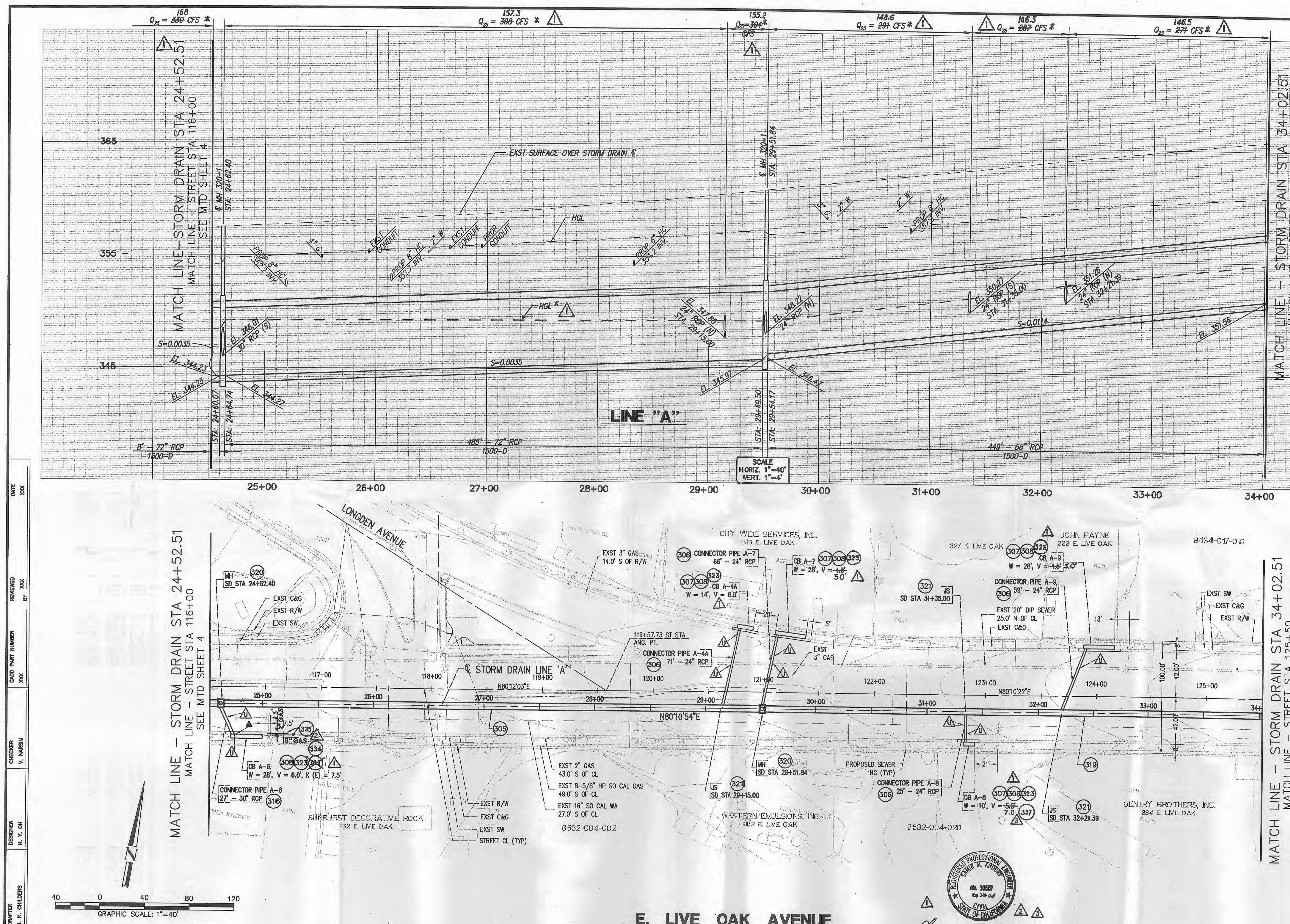
STORM DRAIN STA 17+52.51 TO 24+52.51

IRWINDALE CALIFORNIA

SHT 4 OF ~~13~~ 14 19

DDN 364-1107-F7.1.14

R:\9916\SA\9916702.dwg 12-11-00 10:52:15 am EST



CONSTRUCTION NOTES:

- (305) CONST 72" RCP SD (SEE PROFILE FOR D-LOAD)
- (306) CONST 24" RCP SD (2000-D)
- (307) CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_U MIN = 2.5', B_{MIN} = 3.67'
- (308) CONST LD, CASE E, H=2" PER STD 313-1
- (316) CONST 30" RCP SD (1500-D)
- (319) CONST 66" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) CONST MH PER STD 320-1
- (321) CONST JS PER STD 332-1
- (323) ~~CONST MODIFIED CB PER DETAIL ON MTD SHT 12~~ INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL.
  10.0' CB: 2 DEBRIS GATE, 8 FILTERS
  14.0' CB: 3 DEBRIS GATE, 10 FILTERS
  28.0' CB: 6 DEBRIS GATE, 19 FILTERS
- (334) CONSTRUCT MODIFICATION FOR SIDE OPENING CATCH BASIN PER APWA STD. PLAN No. 314-2, CASE 2 V_U MIN. = 2.5', W = 28' V = 6.0', B_{MIN} = 3.67'
- (335) PROTECT EXISTING 2" AND 8" GAS LINES IN PLACE (VERIFY IN FIELD)
- (337) INCREASE CATCH BASIN A-8, 10, 12, 14 & 15 "V" DEPTH

DDN 364-1107-F7.1-.14

DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED XXX BY XXX | DATE XXX

REVISIONS

NO.	DATE	INIT.		APP'V'D
1	12-17-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS.	
			REVISED MAIN LINE Q'S AND HGL	
			ADDED SHEET No. 14 AND STAMP AND SIGN	
2	6-13-08	SAS	ADDED CONST. NOTES No. 334 AND No. 335	
3	7-30-08	SAS	INCREASE A-8 "V" DEPTH. ADDED CONST. NOTE NO. 337	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY JKC
CHECKED VN
RECOMMENDED -
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY: Hall & Foreman, Inc. Civil Engineering · Planning · Surveying · Public Works 203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

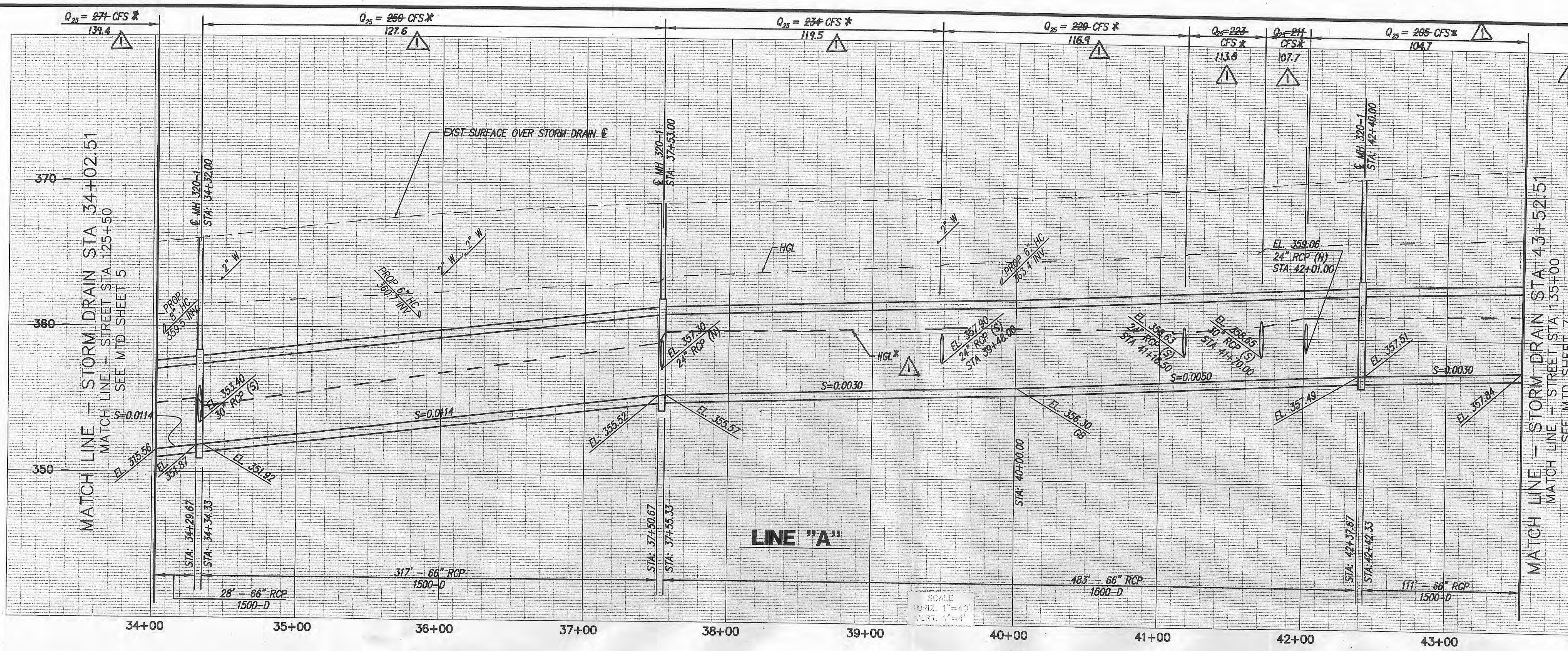
REGISTERED PROFESSIONAL ENGINEER No. 30567 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA 12/21/07

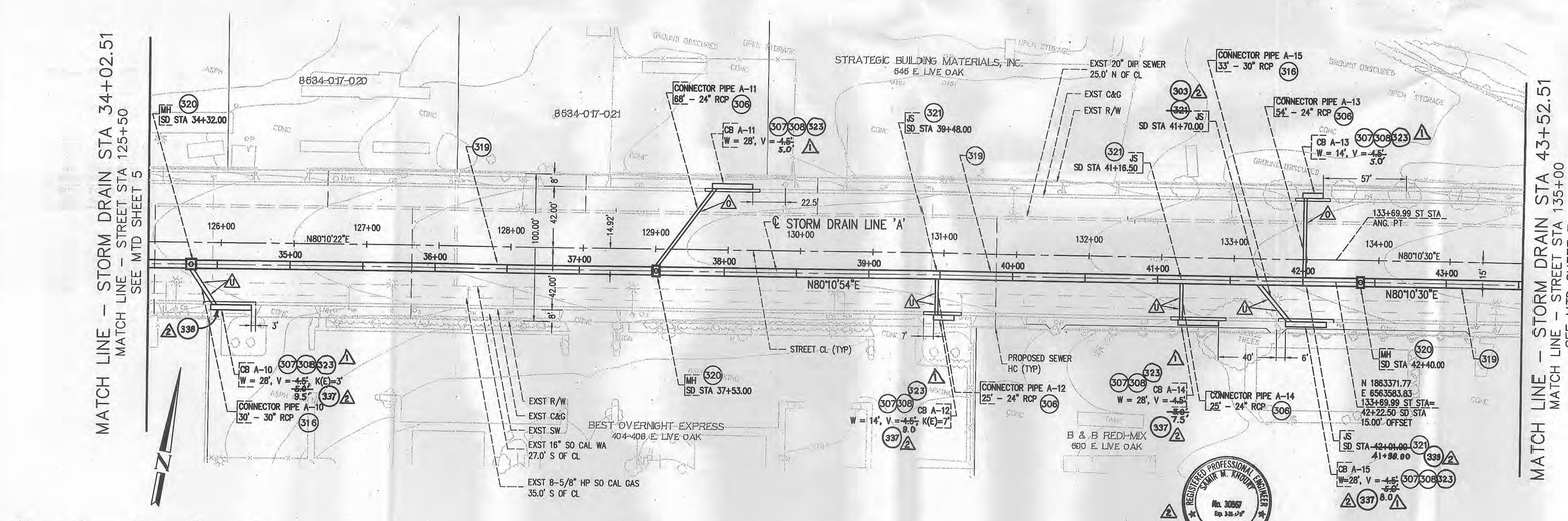
CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
STORM DRAIN STA 24+52.51 TO 34+02.51
IRWINDALE CALIFORNIA

SHT 5 OF ~~13~~ ~~14~~ 19

R:\99167\Sd\99167d03.dwg 12-11-00 10:53:19 am EST



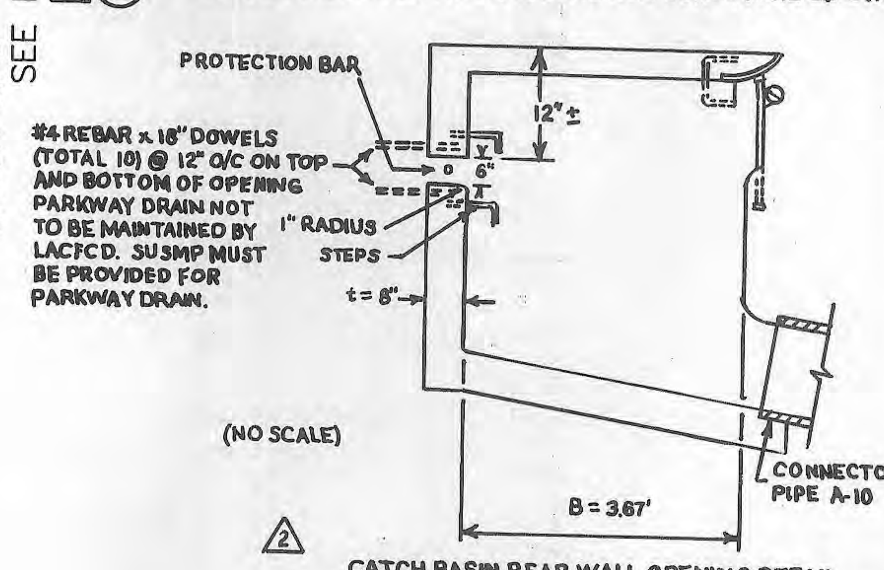


40 0 40 80 120
GRAPHIC SCALE: 1"=40'

E. LIVE OAK AVENUE

CONSTRUCTION NOTES:

- (306) — CONST 24" RCP SD (2000-D)
- ⚠1 (307) — CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_u MIN = 2.5', B_{MIN} = 3.67'
- (308) — CONST LD, CASE E, H=2" PER STD 313-1
- (316) — CONST 30" RCP SD (1500-D)
- (319) — CONST 66" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) — CONST MH PER STD 320-1
- (321) — CONST JS PER STD 332-1
- ⚠1 (323) — INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL
  14.0' CB: 3 DEBRIS GATE, 10 FILTERS
  28.0' CB: 6 DEBRIS GATE, 19 FILTERS
- ⚠2 (303) — CONSTRUCT JUNCTION STRUCTURE PER STD 331-2
- ⚠2 (337) — INCREASE CATCH BASIN A-8, 10, 12, 14 & 15 "V" DEPTH
- ⚠2 (338) — CONSTRUCT 4' X 6" OPENING IN REAR WALL OF CURB OPENING CATCH BASIN PER DETAIL ON SHEET 6
- ⚠2 (339) — REVISE CONNECTOR PIPE A-13 JUNCTION STRUCTURE SD STA.



CATCH BASIN REAR WALL OPENING DETAIL

REVISIONS

NO.	DATE	INIT.		APPV'D
⚠1	12-17-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS. REVISED MAIN LINE Q'S AND HGL. ADDED SHEET No. 14 AND STAMP AND SIGN	[signature]
⚠2	7-30-08	SAS	SPECIFY STD 331-2 FOR JS @ 41+70. INCREASE "V" DEPTH A-10, 12, 14 & 15. PROVIDE CB A-10 REAR WALL OPENING. ADDED CONST. NOTES No. 303, 337, 338 AND 339. REVISE CONNECTOR PIPE A-13 JUNCTION STRUCTURE SD STATION.	[signature]

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY: JKC
CHECKED: VN
RECOMMENDED: –
APPROVED: KWOK TAM, P.E., PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY: Hall & Foreman, Inc. Civil Engineering · Planning · Surveying · Public Works, 203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30867 CIVIL STATE OF CALIFORNIA 12/21/07

DESIGNER H. Y. OH · CHECKER V. NARSIM · DRAFTER J. K. CHILDERS · CADD PART NUMBER XXX · REVIEWED BY XXX · DATE XXX

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595

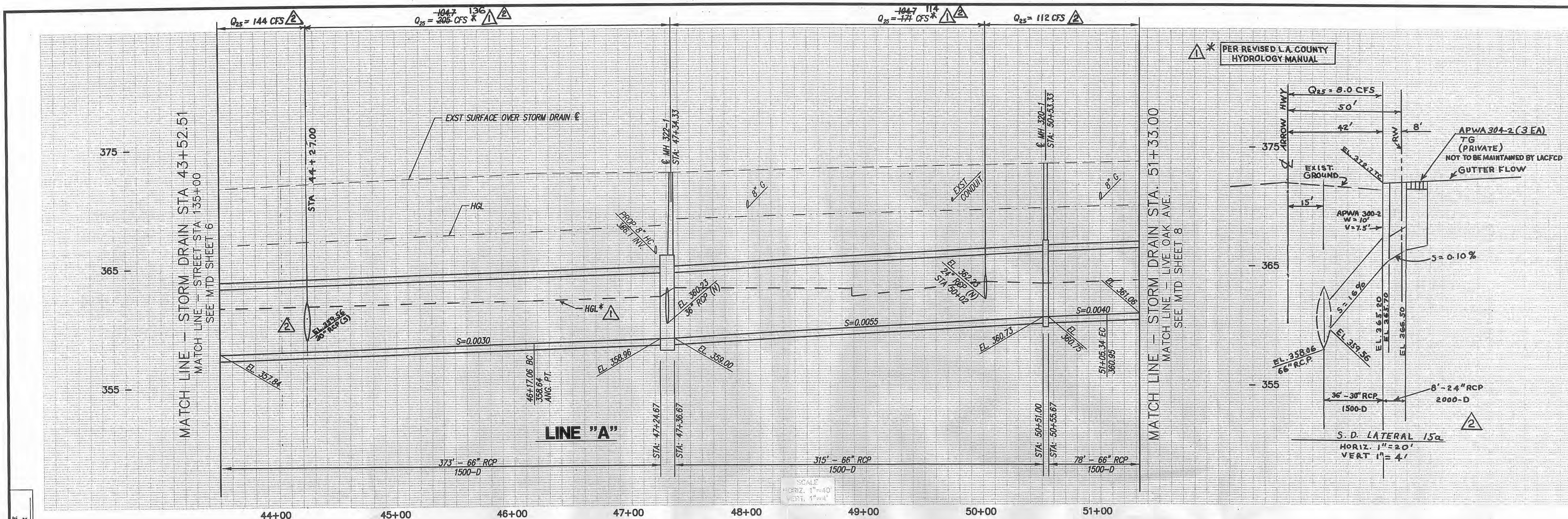
ARROW HIGHWAY & E. LIVE OAK AVENUE

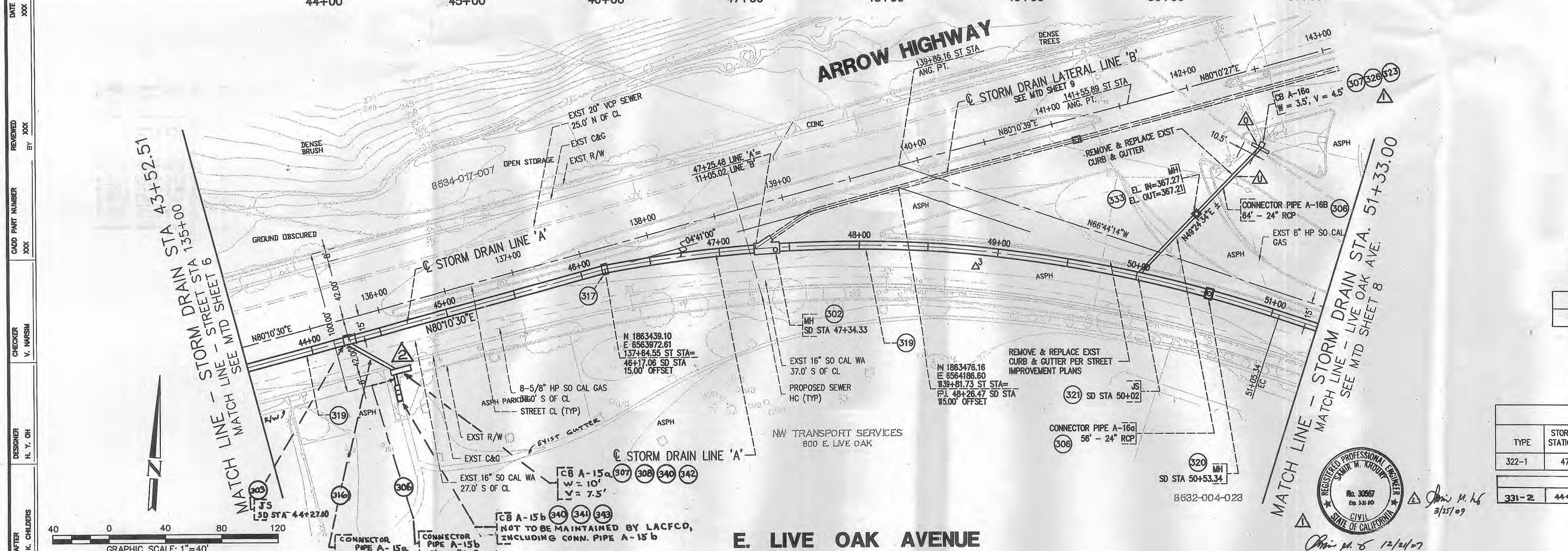
STORM DRAIN STA 34+02.51 TO 43+52.51

IRWINDALE CALIFORNIA

SHT 6 OF ~~13~~ 14 19

DDN 364-1107-F7.1-14





CONSTRUCTION NOTES:

- (302) — CONST MH PER STD 322-1 AND TABLE HEREON
- (306) — CONST 24" RCP SD (2000-D)
- △1 (307) — CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_u MIN = 2.5', B_{MIN} = 3.67'
- (317) — CONST CONCRETE COLLAR PER STD 380-2
- (319) — CONST 66" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) — CONST MH PER STD 320-1
- (321) — CONST JS PER STD 332-1
- (326) — CONST LD, CASE A, H=2", M=2' PER STD 313-1
- (333) — CONST MH PER STD 321-1
- △1 (323) — INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL - 3.5' CB: 1 DEBRIS GATE, 3 FILTERS
- △2 (303) — CONSTR JS PER STD 331-2 AND TABLE
- △2 (308) — CONSTR LD, CASE E, H= 2", PER STD 313-1

CURVE DATA TABLE

	Δ	RADIUS	LENGTH	TANGENT
△3	28°24'06"	985.04'	488.28'	249.47'

- △2 (316) — CONSTR 30" RCP SD (1500-D)
- △2 (340) — REMOVE INTERFERING PORTIONS OF EXISTING PARKWAY CULVERT
- △2 (341) — CONSTR GRATING CATCH BASIN, 3 GRATES, V= 6' PER STD 304-2
- △2 (342) — INSTALL AUTOMATIC RETRACTING SCREENS (ARS) AS MFR. BY AMERICAN STORMWATER OR APPROVED EQUAL

MANHOLE DATA TABLE

TYPE	STORM DRAIN STATION POINT	A	B	C	D_1	D_2	EL 'S'	EL 'R'
322-1	47+25.48	30°00'00"	36"	6.50'	66"	66"	360.23	360.95

JUNCTION STRUCTURE DATA TABLE

331-2	44+27.00	45°00'00"	30"	5.50'	66"	66"	RADIAL	RADIAL

- △2 (343) — INSTALL FOSSIL FILTER INSERT SYSTEM BY KRISTAR ENTERPRISES OR APPROVED EQUAL

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-10 CIVIL STATE OF CALIFORNIA

△2 Samir M. Kh 3/25/09

△1 Samir M. K 12/21/07

REVISIONS

NO.	DATE	INIT.		APP'D
△1	12-17-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS. REVISED MAIN LINE Q'S AND HGL. ADDED SHEET No. 14 AND STAMP AND SIGN	
2	3-24-09	gho	ADDED CATCH BASINS A-15a & A-15b, & NOTES	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870

FC BR CAP IN S END W WINGWALL OF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF:		DATE
JON E. BOURGEOIS	RCE No. 30242 EXP. 3/31/04	1/31/02
DRAWN BY	JKC	
CHECKED	VN	
RECOMMENDED	-	
APPROVED	KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER	2/19/2002 DATE:

PLANS PREPARED BY: Hall & Foreman, Inc. Civil Engineering · Planning · Surveying · Public Works 203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)665-0576

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595

ARROW HIGHWAY & E. LIVE OAK AVENUE

STORM DRAIN STA 43+52.51 TO 51+33

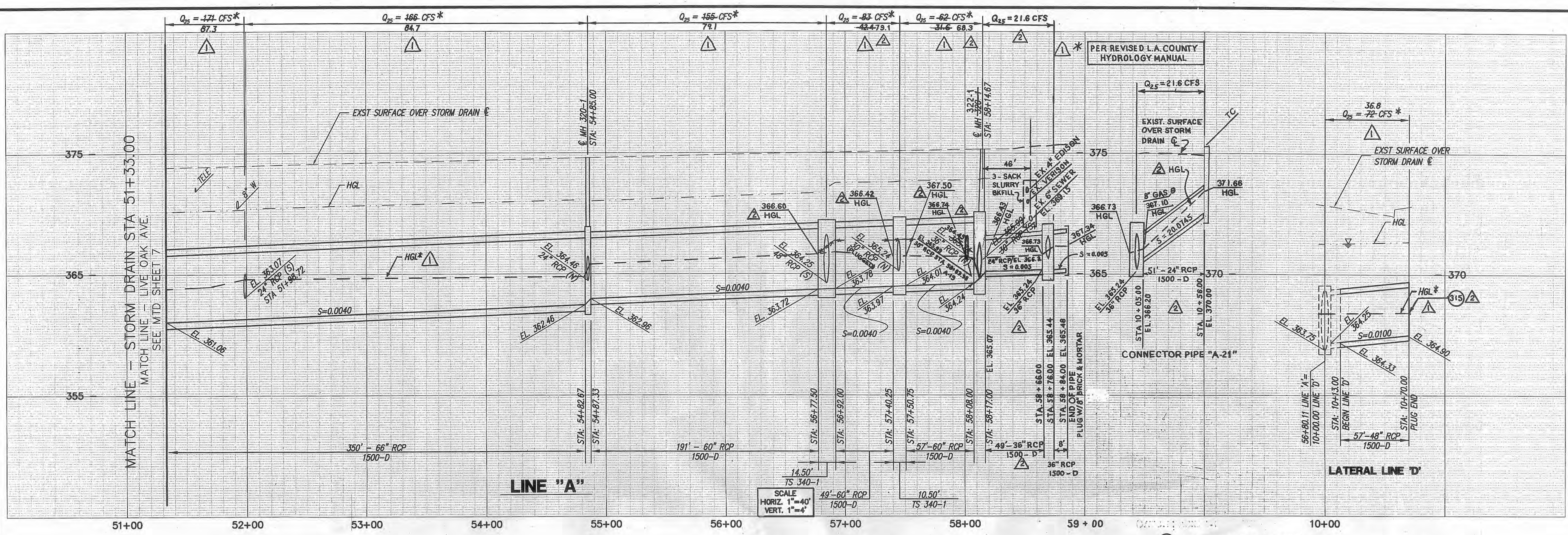
IRWINDALE CALIFORNIA

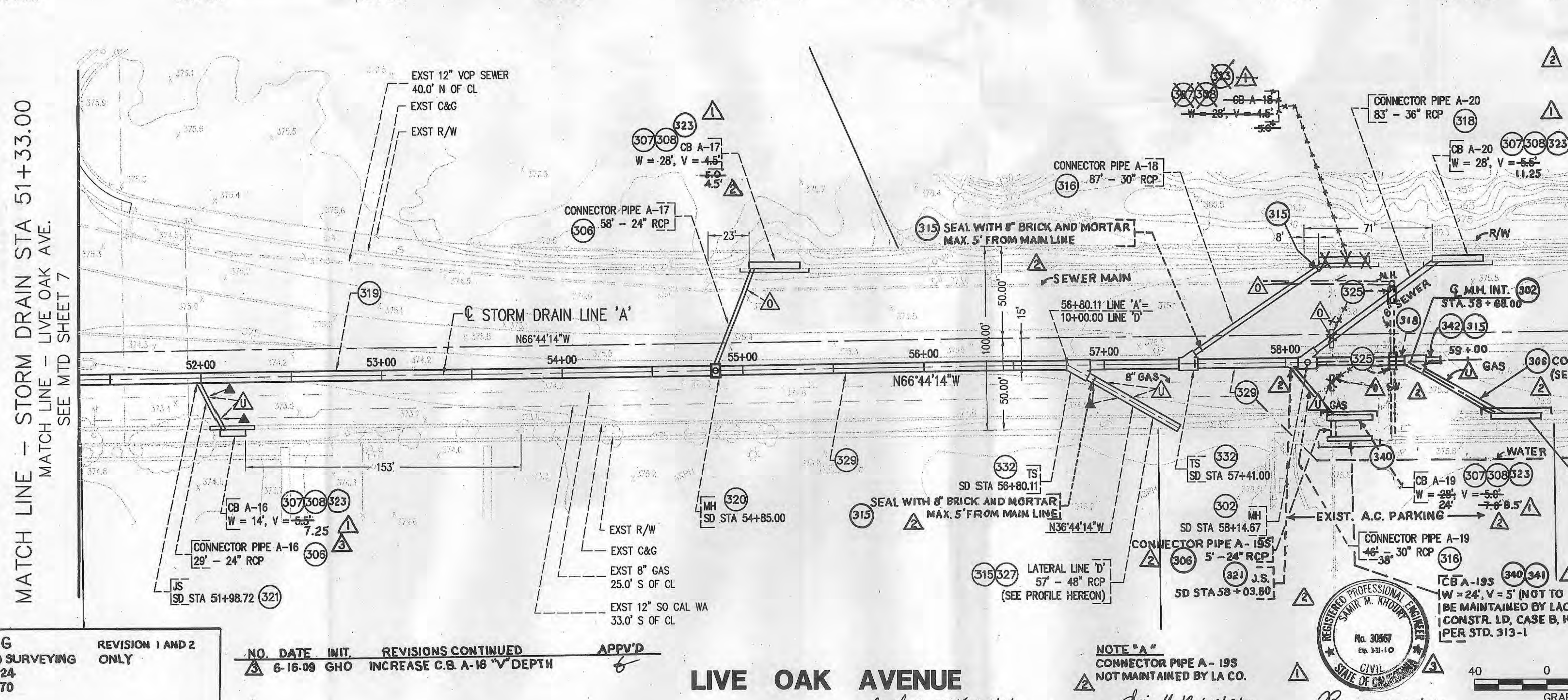
SHT 7 OF ~~13~~ ~~14~~ 19

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

DDN 364-1107-F7.1-.14

R:\99167\Sd\99167d05.dwg 12-11-00 10:54:26 am EST





(340) REMOVE EXISTING INTERFERING PORTION OF 24' X 6" PCC PARKWAY CULVERT FROM PARKING LOT.

(341) CONSTRUCT CURB OPENINGS C.B. PER APWA STD. 300-2, B = 2-6". PER DETAIL HEREON, AND INSTALL TRASH AND DEBRIS GUARD SYSTEM WITH POUCH AT THE OPENINGS BY KRISTAR FLO-GUARD MODEL FG-TDG 24 OR APPROVED EQUAL. (NOT TO BE MAINTAINED BY LACFCD).

(342) CONSTRUCT 36" STORM DRAIN STUB (1500-D)

CONSTRUCTION NOTES:

- (302) CONST MH PER STD 322-1 AND TABLE HEREON
- (306) CONST 24" RCP SD (2000-D)
- (307) CONST ~~CB PER STD 300-2~~ MODIFIED CURB OPENING CATCH BASIN PER APWA STD PLAN No. 300-2, V_U MIN = 2.5', B_{MIN} = 3.67'
- (308) CONST LD, CASE E, H=2" PER STD 313-1
- (315) SEAL END WITH BRICK AND MORTAR
- (316) CONST 30" RCP SD (1500-D)
- (318) CONST 36" RCP SD (2000-D)
- (319) CONST 66" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) CONST MH PER STD 320-1
- (321) CONST JS PER STD 332-1
- (325) CONST CONCRETE BLANKET PROTECTION PER STD 225-1
- (327) CONST 48" RCP SD (SEE PROFILE FOR D-LOAD)
- (329) CONST 60" RCP SD (SEE PROFILE FOR D-LOAD)
- (332) CONST TRANS STRUCTURE PIPE TO PIPE PER STD 340-1

TRANSITION STRUCTURE DATA TABLE

TYPE	STORM DRAIN STATION POINT	A	B	C	D1	D2	EL 'S'	EL 'R'
340-1	56+80.11	30°00'00"	48"	8.00'	60"	60"	364.25	364.33
340-1	57+41.00	33°27'21"	30"	5.00'	60"	60"	365.24	365.59

MANHOLE DATA TABLE

TYPE	STORM DRAIN STATION POINT	A	B	C	D1	D2	EL 'S'	EL 'R'
322-1	58+14.67 ~~58+07.54~~	35°34'59"	36"	5.50'	36" ~~60"~~	60"	~~364.45~~ ~~365.74~~	~~364.47~~ ~~367.97~~
~~322-1~~	~~58+07.54~~	~~31°17'41"~~	~~30"~~	~~5.50'~~	~~60"~~		~~365.99~~	~~367.50~~
322-1	58+68.00	31°00'00"	24"	4.50	36"	36"	366.20	366.54

(323) INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL.
14.0' CB: 3 DEBRIS GATES, 10 FILTERS
24.0' CB: 6 DEBRIS GATES, 17 FILTERS
28.0' CB: 6 DEBRIS GATES, 19 FILTERS

NOTE "A"
CONNECTOR PIPE A-19S NOT MAINTAINED BY LA CO.

COORY ENGINEERING
CIVIL ENGINEERING & LAND SURVEYING
12631 E. IMPERIAL HWY. F-124
SANTA FE SPRINGS, CA 90670

REVISION 1 AND 2 ONLY

NO.	DATE	INIT.	REVISIONS CONTINUED	APPV'D
3	6-16-09	GHO	INCREASE C.B. A-16 "V" DEPTH	

REVISIONS

NO.	DATE	INIT.		APPV'D
1	12-11-07	SAS	MODIFIED CONSTRUCTION NOTES 307 AND 323 WITH DEBRIS GATES AND FILTER INSERTS. REVISED MAIN LINE Q'S AND HGL. ADDED SHEET No. 14 AND STAMP AND SIGN	
2	11-19-08	GHO	MODIFIED CBA-19. ADDED CB A-21 & CONNECTOR A-21. EXTEND LINE "A", DELETE CB A-18, REVISE V DEPTHS.	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/12
DRAWN BY: JKC
CHECKED: VN
RECOMMENDED:
APPROVED: KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714) 664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LINE 'A' M.T.D. #1595

ARROW HIGHWAY & E. LIVE OAK AVENUE

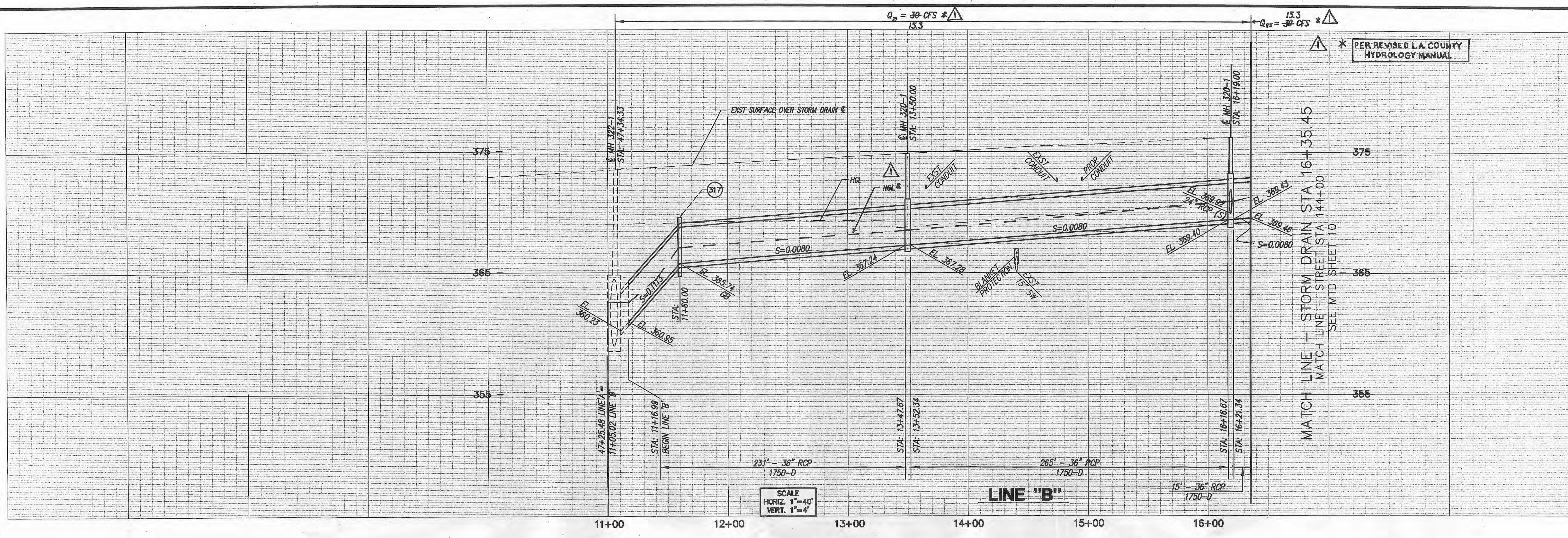
STORM DRAIN STA 51+33 TO 58+21

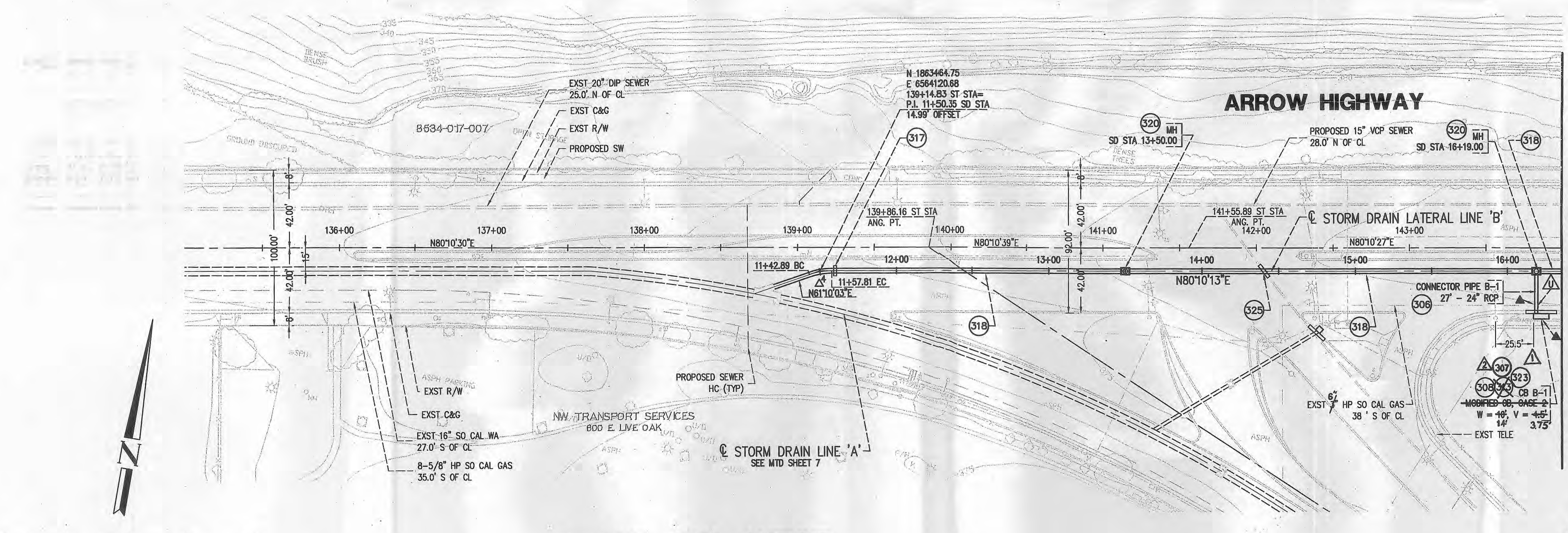
IRWINDALE CALIFORNIA

SHT 8 OF ~~14~~ ~~18~~ 19

DDN 364-1107-F71-.14

R:\99167\Sd\99167d06.dwg 12-11-00 10:56:45 am EST





40 0 40 80 120
GRAPHIC SCALE: 1"=40'

E. LIVE OAK AVENUE

CONSTRUCTION NOTES:

- (306) CONST 24" RCP SD (2000–D)
- (308) CONST LD, CASE E, H=2" PER STD 313–1
- △1 (313) CONST MODIFIED ~~CB PER STD 314–2~~ CURB OPENING CATCH BASIN PER APWA STD PLAN No. 314-2, Y_U MIN = 2.5', B_{MIN} = 3.67'
- (317) CONST CONCRETE COLLAR PER STD 380–2
- (318) CONST 36" RCP SD (SEE PROFILE FOR D–LOAD)
- (320) CONST MH PER STD 320–1
- (325) CONST CONCRETE BLANKET PROTECTION PER STD 225–1
- △1 (323) INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL 10.0' CB: 2 DEBRIS GATE, 8 FILTERS
- △2 (307) CONSTRUCT CB PER STD 300-2

CURVE DATA TABLE

	Δ	RADIUS	LENGTH	TANGENT
△4	19°00'10"	45.00'	14.92'	7.53'

△2 Samir M. K. 1/14/09

DDN 364-1107-F71-14

△1 Samir M. K. 12/21/07

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

REVISIONS

NO.	DATE	INIT.		APPV'D
△1	12-17-07	SAS	MODIFIED NOTE 313 AND 323 WITH DEBRIS GATES AND FILTER INSERT AND REVISED MAIN LINE Q'S AND HGL ADDED SHEET No. 14 AND STAMP AND SIGN	
△2	11-26-08	GHO	MODIFY CB B-1. ADD CONSTRUCTION NOTE 307	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67–76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF:		DATE
JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04		1/31/02
DRAWN BY	JKC	
CHECKED	VN	
RECOMMENDED		
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER		2/19/2002 DATE:

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-10 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LATERAL LINE 'B' M.T.D. #1595

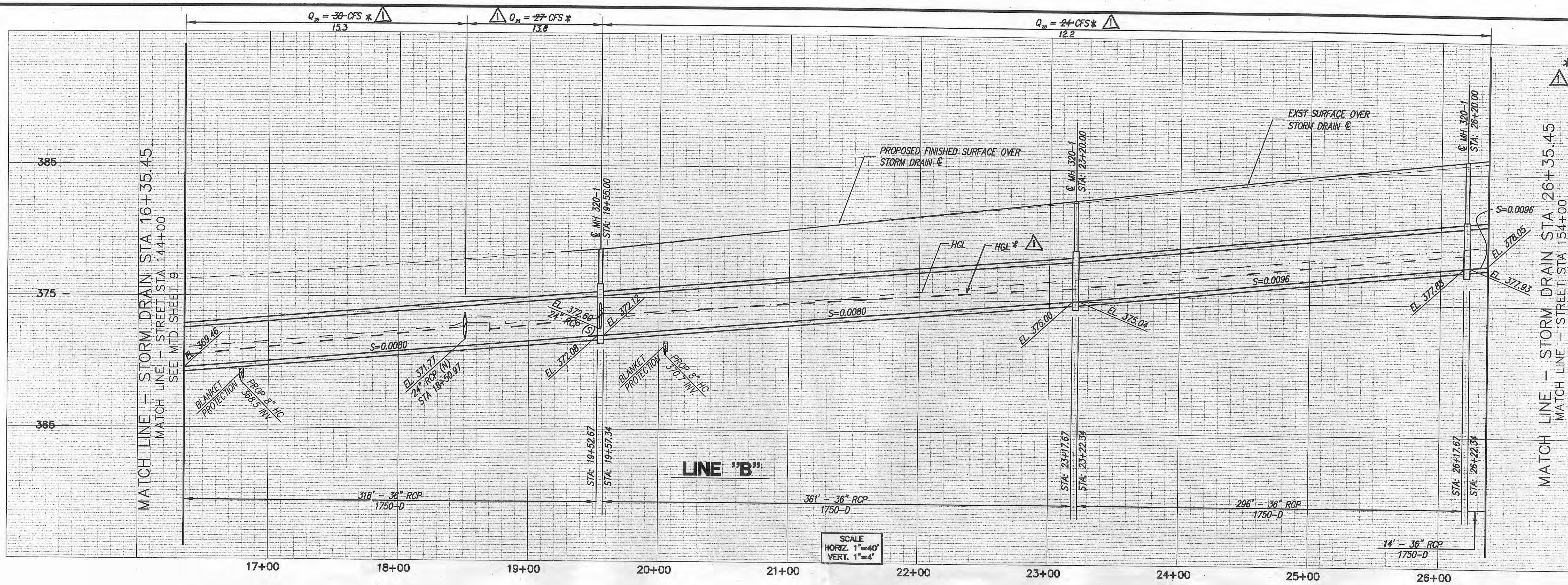
ARROW HIGHWAY & E. LIVE OAK AVENUE

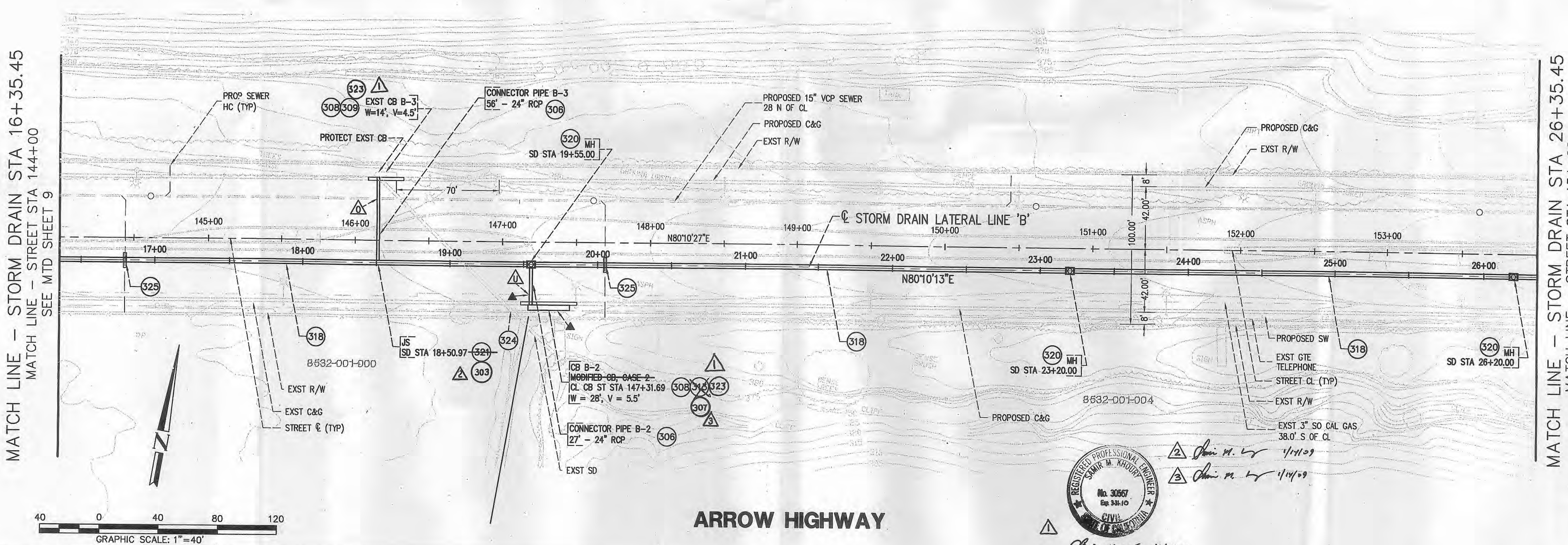
STORM DRAIN STA 11+16.99 TO 16+35.45

IRWINDALE CALIFORNIA

SHT 9 OF ~~14~~ ~~13~~ 19

R:\99167\Sd\99167d07.dwg 12-11-00 10:57:21 am EST





ARROW HIGHWAY

GRAPHIC SCALE: 1"=40'

CONSTRUCTION NOTES:

- 306 — CONST 24" RCP SD (2000-D)
- 308 — CONST LD, CASE E, H=2" PER STD 313-1
- 309 — ABANDON & REMOVE INTERFERING PORTIONS OF EXST SD & LD
- 313 — CONST MODIFIED ~~CB PER STD 314-2~~ CURB OPENING CATCH BASIN PER APWA STD PLAN No. 314-2, V_u MIN = 2.5', B_{MIN} = 3.67'
- 318 — CONST 36" RCP SD (SEE PROFILE FOR D-LOAD)
- 320 — CONST MH PER STD 320-1
- 321 — CONST JS PER STD 332-1
- 324 — ABANDON EXST SD MH & ALL APPURTENANCES
- 325 — CONST CONCRETE BLANKET PROTECTION PER STD 225-1
- 323 — INSTALL FILTER BASKET AND DEBRIS GATE MANUFACTURED BY OCEAN-PRO OR APPROVED EQUAL
  14.0' CB: 3 DEBRIS GATE, 10 FILTERS
  28.0' CB: 6 DEBRIS GATE, 19 FILTERS
- 303 — CONST JS PER STD 331-2 AND TABLE
- 307 — CONSTRUCT CB PER STD 300-2

DDN 364-1107-F7.1-.14

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED BY	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	XXX	XXX

REVISIONS

NO.	DATE	INIT.		APPV'D
1	12-17-07	SAS	MODIFIED NOTE 313 AND 323 WITH DEBRIS GATES AND FILTER INSERT AND REVISED MAIN LINE Q'S AND HGL	
			ADDED SHEET No. 14 AND STAMP AND SIGN	
2	8-14-08	SAS	ADDED CONSTRUCTION NOTE 303	
3	11-26-08	GHO	MODIFY CB B-2 CONSTRUCTION NOTE	
			ADDED CONSTRUCTION NOTE 307	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY JKC
CHECKED VN
RECOMMENDED -
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-10 CIVIL STATE OF CALIFORNIA

12/21/07
2 1/14/09
3 1/14/09

CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LATERAL LINE 'B' M.T.D. #1595

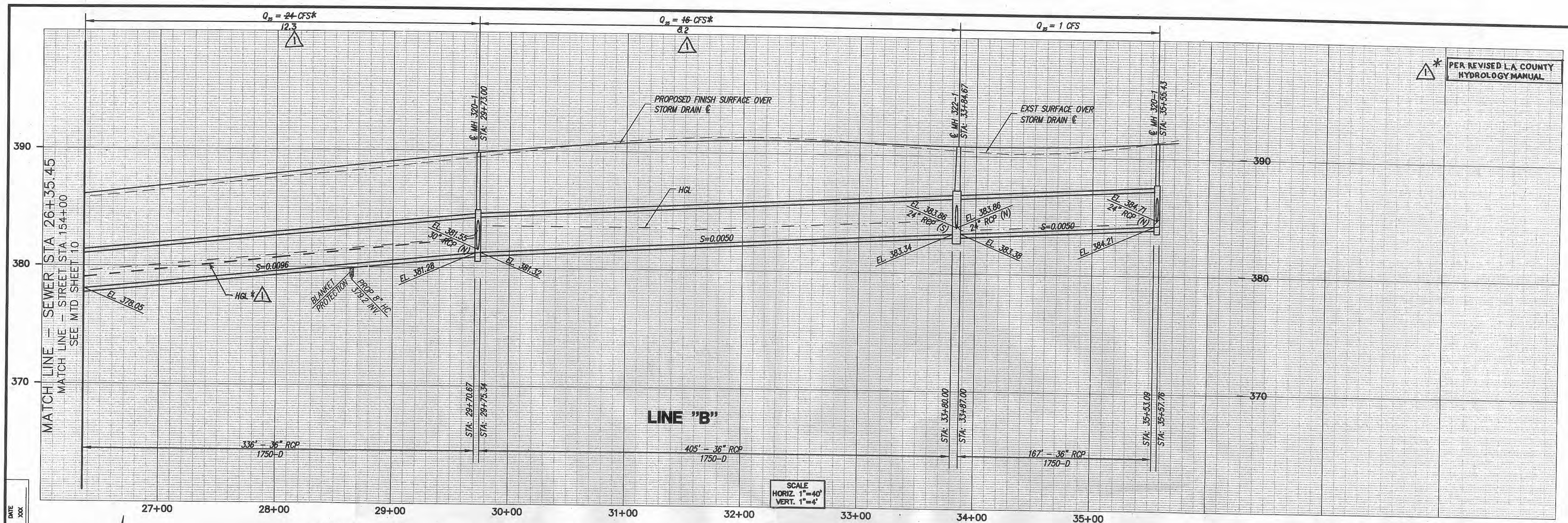
ARROW HIGHWAY & E. LIVE OAK AVENUE

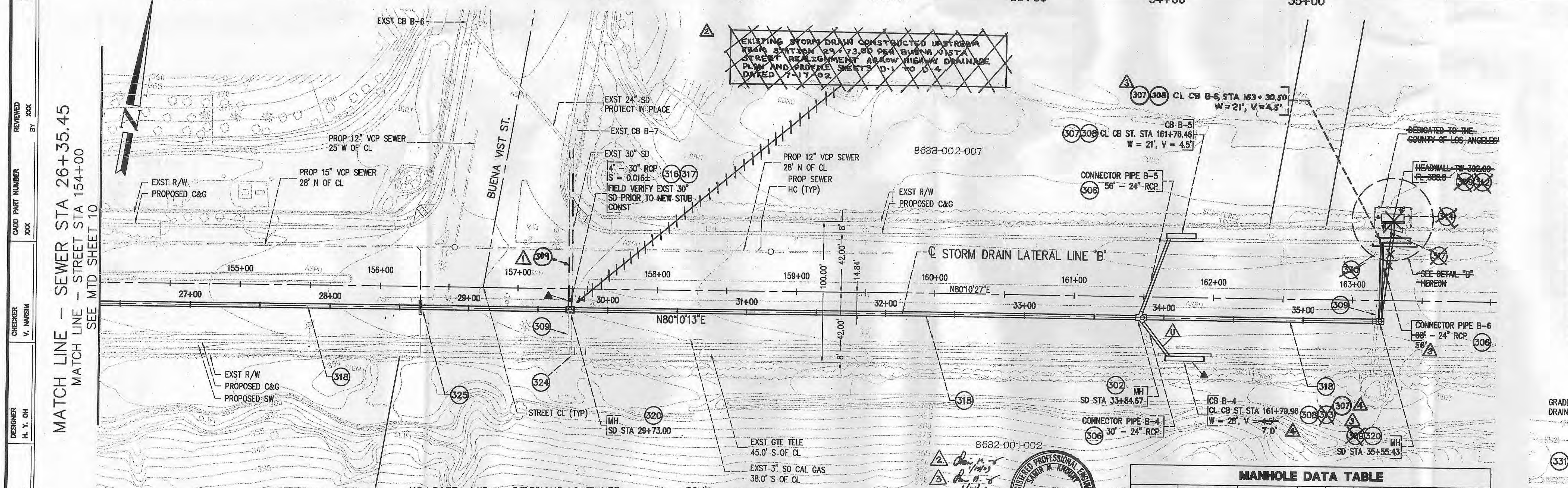
STORM DRAIN STA 16+35.45 TO 26+35.45

IRWINDALE CALIFORNIA

SHT 10 OF ~~14~~ ~~13~~ 19

R:\99167\Sd\99167d08.dwg 12-11-00 11:23:50 am EST





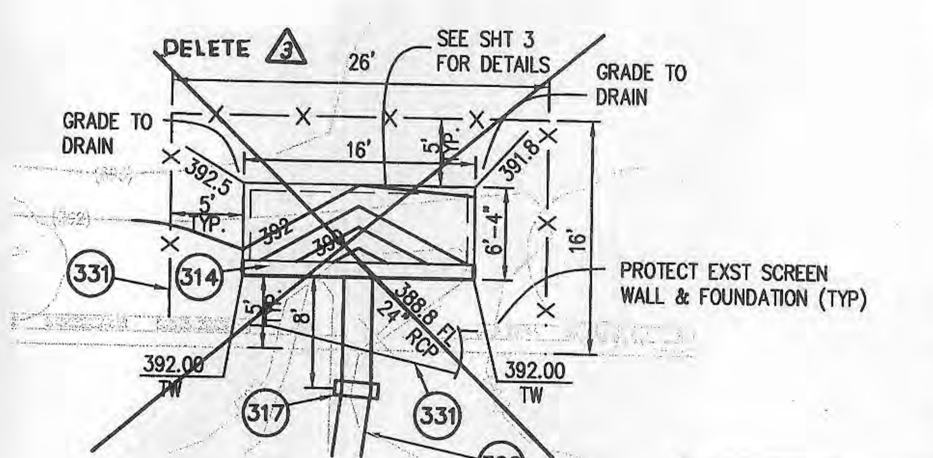
GRAPHIC SCALE: 1"=40'

NO.	DATE	INIT.	REVISIONS CONTINUED	APPV'D
4	6-16-09	GHO	INCREASE C.B. B-4 "V" DEPTH AND MODIFY CONSTRUCTION NOTES	

ARROW HIGHWAY

CONSTRUCTION NOTES:

- (302) CONST MH PER STD 322-1 AND TABLE HEREON
- (306) CONST 24" RCP SD (2000-D)
- (307) CONST CB PER STD 300-2
- (308) CONST LD, CASE E, H=2" PER STD 313-1
- (309) ABANDON & REMOVE INTERFERING PORTIONS OF EXST SD, CB & LD
- ~~(312) CONST HEADWALL PER CALTRANS STD D80~~
- (313) CONST MODIFIED CB PER STD 314-2
- ~~(314) CONST CONCRETE APRON PER DETAIL ON SHT 3~~
- (316) CONST 30" RCP SD (1500-D)
- (317) CONST CONCRETE COLLAR PER STD 380-2
- (318) CONST 36" RCP SD (SEE PROFILE FOR D-LOAD)
- (320) CONST MH PER STD 320-1
- (324) ABANDON EXST MH & ALL APPURTENANCES
- (325) CONST CONCRETE BLANKET PROTECTION PER STD 225-1
- (330) REMOVE EXST HEADWALL, CONCRETE PAVEMENT & DRAINAGE STRUCTURES
- (331) CONST 6' CHAIN LINK FENCE & GATE PER STD 600-1



DETAIL "B"
N.T.S.

MANHOLE DATA TABLE

TYPE	STORM DRAIN STATION POINT	A	B	C	D_1	D_2	EL 'S'	EL 'R'
322-1	33+82.43	51°43'55"	24"	3.00'	36"	36"	383.86	384.08
322-1	33+82.43	69°54'36"	24"	3.00'	36"	36"	383.86	383.98

REVISIONS

NO.	DATE	INIT.		APPV'D
1	12-17-07	SAS	ADDED CONSTRUCT NOTE 309 AND REVISED MAIN LINE Q'S AND HGL. REVISED STORM DRAIN PLAN TO EXISTING FROM STA. 29+73.00 TO 35+55.43 ADDED SHEET No. 14 AND STAMP AND SIGN	
2	8-14-08	SAS	REMOVED NOTE REGARDING EXISTING SYSTEM	
3	11-26-08	GHO	DELETE DETAIL "B", ADD CB B-6 & CONNECTOR PIPE	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF:
JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY: JKC
CHECKED: VN
RECOMMENDED: -
APPROVED: KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

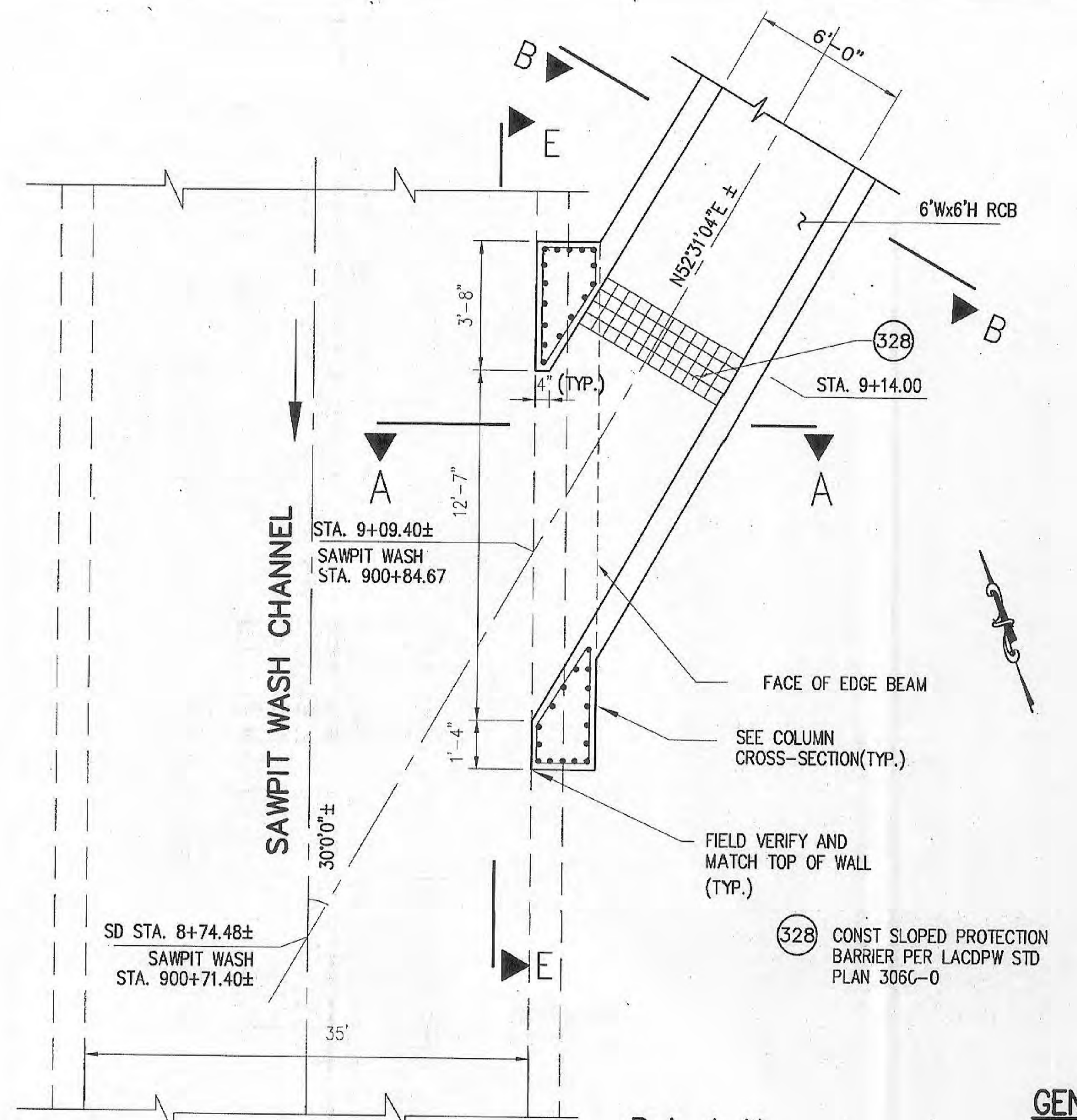
CITY OF IRWINDALE

STORM DRAIN PLAN & PROFILE LATERAL LINE 'B' M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
STORM DRAIN STA 26+35.45 TO 35+61.76
IRWINDALE CALIFORNIA

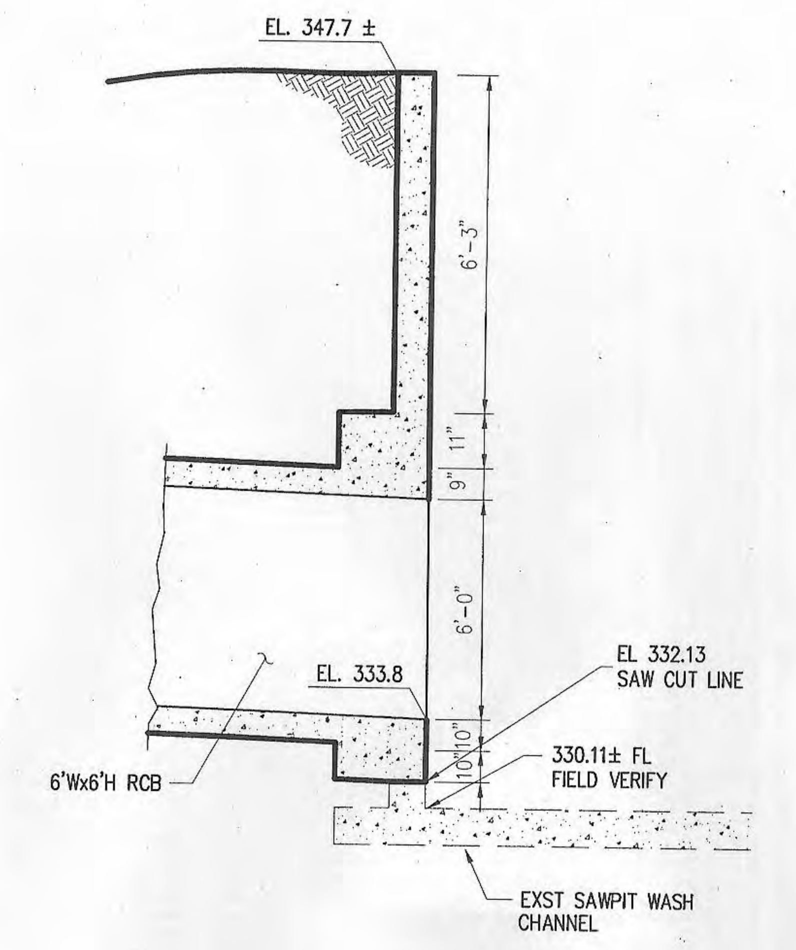
SHT 11 OF ~~14~~ 13 19

DDN 364-1107-F7.1-.14

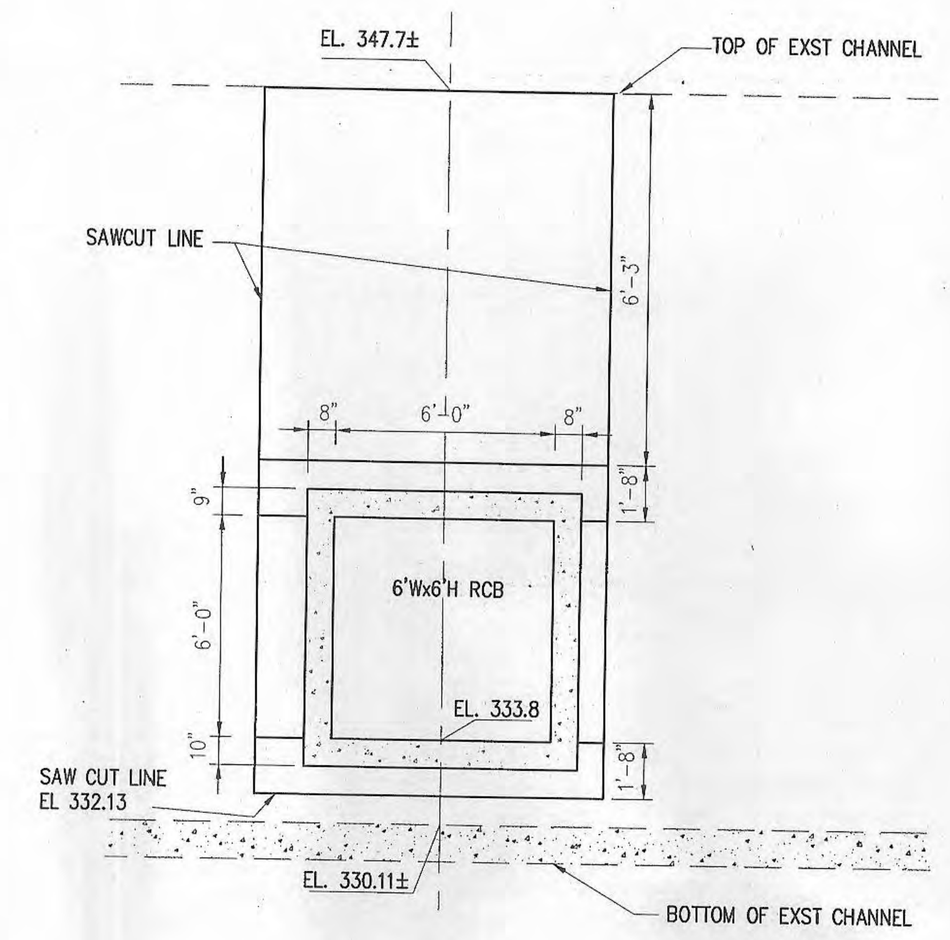
R:\99167\Sd\99167d09.dwg 12-11-00 11:24:59 am EST



PLAN
N.T.S.



CROSS SECTION A–A
N.T.S.



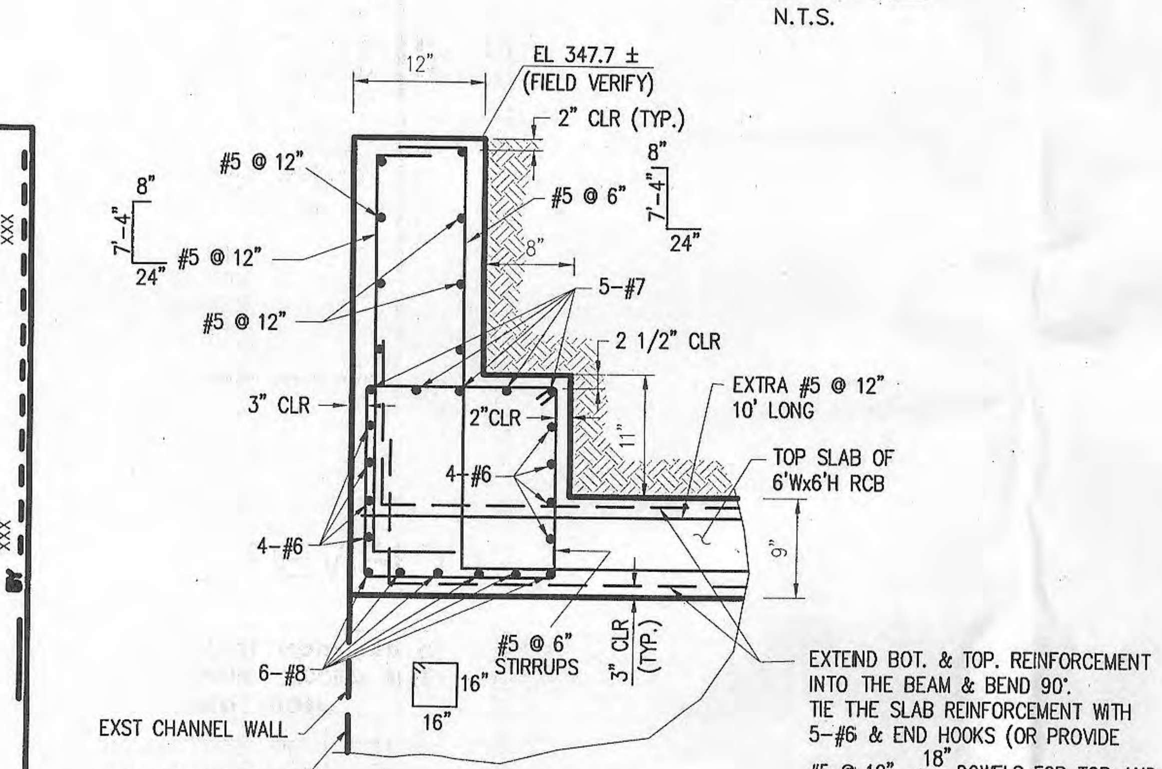
SECTION B–B
N.T.S.

STRUCTURAL NOTES:

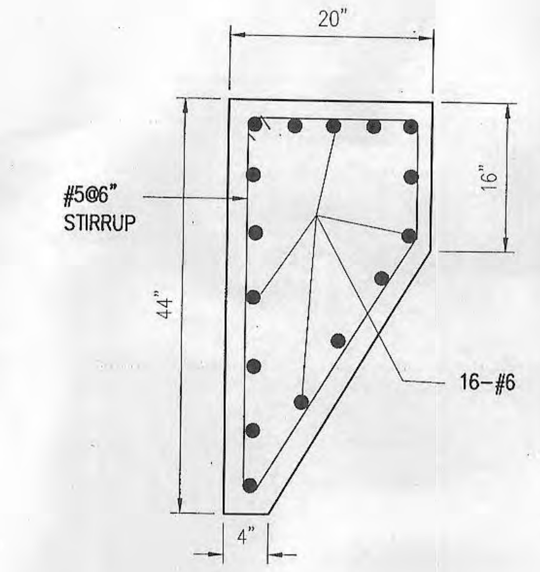
1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE CENTER OF BAR AND SHALL NOT BE LESS THAN THREE INCHES UNLESS OTHERWISE SHOWN.
2. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318–95), SECTION 7.3
3. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318–95), SECTION 7.3
4. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF INLETS
5. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION
6. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE TWO AND ONE–HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN
7. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BELEVED
8. NO SPLICES IN TRANSVERSE STEEL REINFORMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGTUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED
9. LONGTUDINAL STEEL SHALL TERMINATE TWO AN ONE–HALF INCHES FROM TRANSVERSE CONSTRUCTION JOINTS, UNLESS OTHERWISE SHOWN
10. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAS BEEN PLACED, INSPECTED AND APPROVED
11. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL AS PER A.S.T.M. A–615 GRADE 60 fy=60,000 PSI
12. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE LATEST AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE"
13. ALL BACKFILLS AND FILLS TO BE USED AS SUBGRADE SHALL BE COMPACTED TO A RELATIVE DENSITY OF 90% UNLESS OTHERWISE SPECIFIED
14. THE MAXIMUM WATER–CEMENT RATIO FOR THE CONCRETE MIX SHALL BE 0.45 FOR ALL STRUCTURES
15. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND PARALELL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTERLINE OF CONSTRUCTION
16. A SOILS ENGINEER SHALL CERTIFY THAT ALL FILLS AND BACKFILLS OVER UNDERGROUND STORM DRAINS OUTSIDE OF STREET RIGHT OF WAY HAVE BEEN COMPACTED OR CONSOLIDATED TO A 90% DENSITY. THIS CERTIFICATION SHALL BE SUBMITTED TO THE COUNTY ENGINEER PRIOR TO ACCEPTANCE OF THE WORK BY THE COUNTY
17. COMPACTION SHALL BE TO 90% EXCEPT FOR THE 6" SECTION BELOW ALL CONCRETE STRUCTURES WHICH SHALL BE AT 95%
18. COMPRESSIVE STRENGTH OF CONCRETE f'c=4000 PSI. SEE ACI 318–95 FOR OTHER STRENGTH DETAILS
19. IF THE CONTRACTOR ELECTS TO USE A MEMBRANE–FORMING CURING COMPOUND FOR CURING EXPOSED CONCRETE SURFACES, THE COMPOUND SHALL BE CLEAR TYPE CONTAINING A FUGITIVE DYE AND CONFORMS TO ASTM C 309, TYPE 2
20. BACKFILL WILL BE SIMILAR TO EXISTING MATERIAL AND WILL NOT CONTAIN BROKEN CONCRETE, ORGANIC MATERIAL OR OTHER MATERIALS UNSUITABLE FOR COMPACTION
21. THE WEIGHT OF ANY PIECE OF EQUIPMENT USED TO PLACE AND COMPACT BACKFILL BEHIND CHANNEL WALLS WILL NOT EXCEED 35,000 lbs INCLUDING DYNAMIC FORCES PRODUCED BY VIBRATOR EQUIPMENT. CONSTRUCTION EQUIPMENT WILL NOT BE PERMITTED WITHIN ONE–FOOT OF THE WALL

GENERAL NOTES:

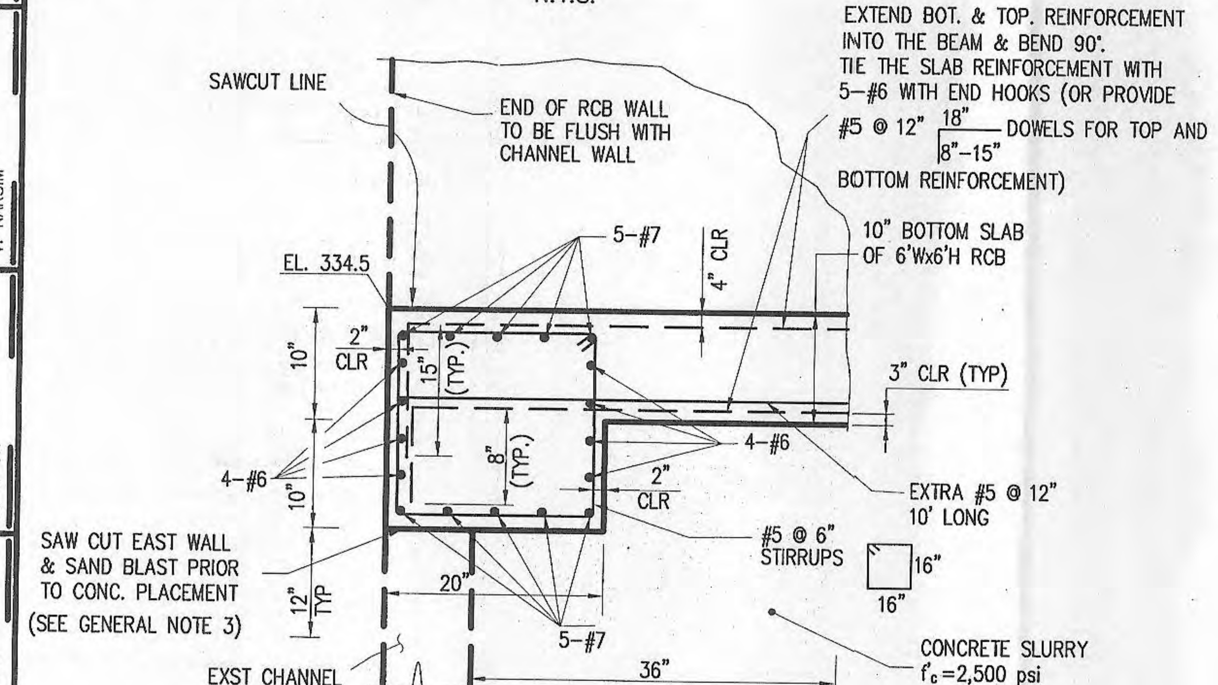
1. REINFORCEMENT DETAILS FOR 6'Wx6'H RCB IS NOT SHOWN FOR CLARITY
2. SEE "CONCRETE REMOVAL NOTES" ON SHEET 2
3. REMOVE ALL CHANNEL REINFORCEMENT EXCEPT LONGITUDINAL STEEL SHALL BE CUT AND BEND WITH MIN. SPLICE LENGTH INTO THE NEW CONSTRUCTION.



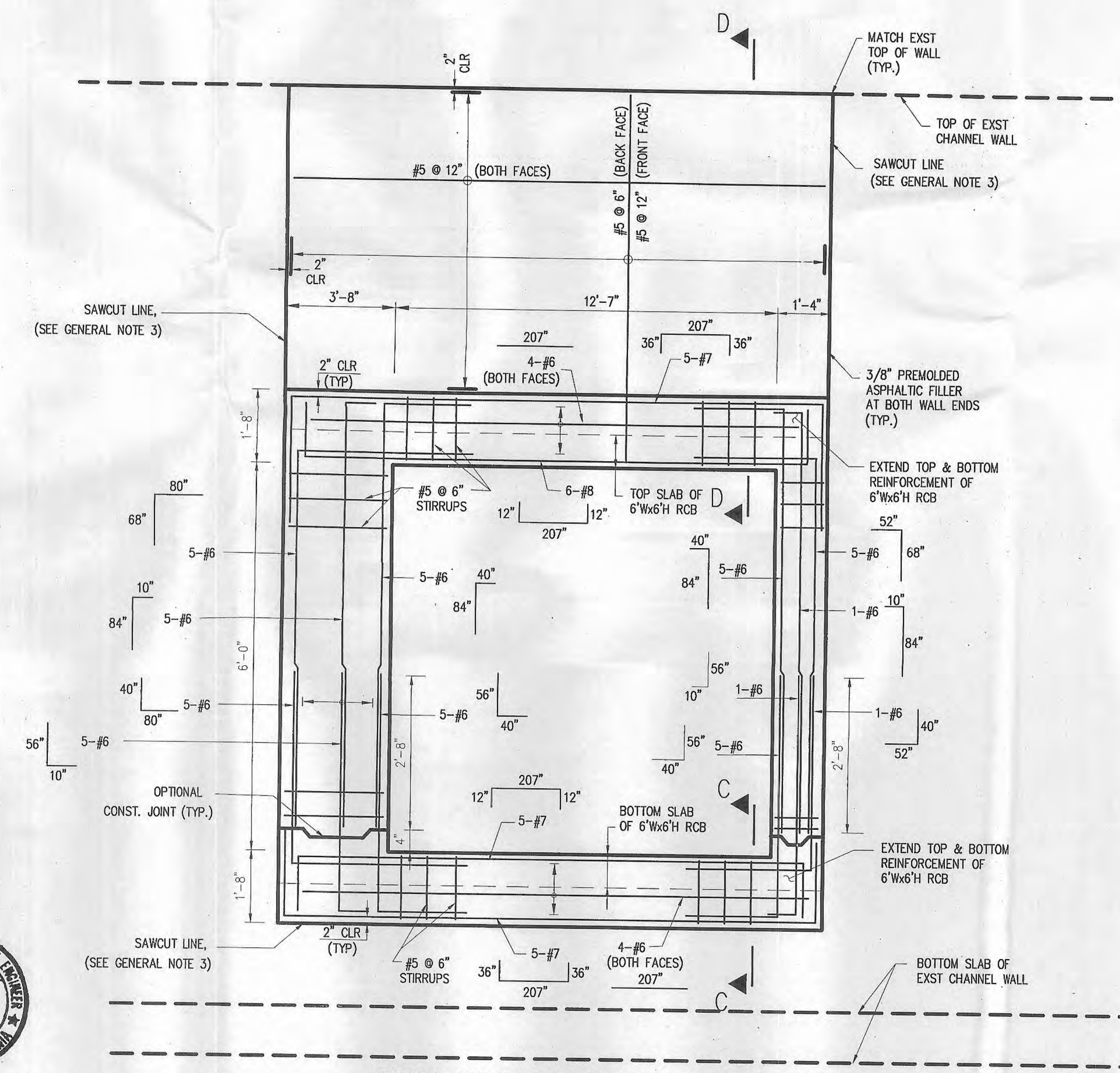
SECTION D–D
N.T.S.



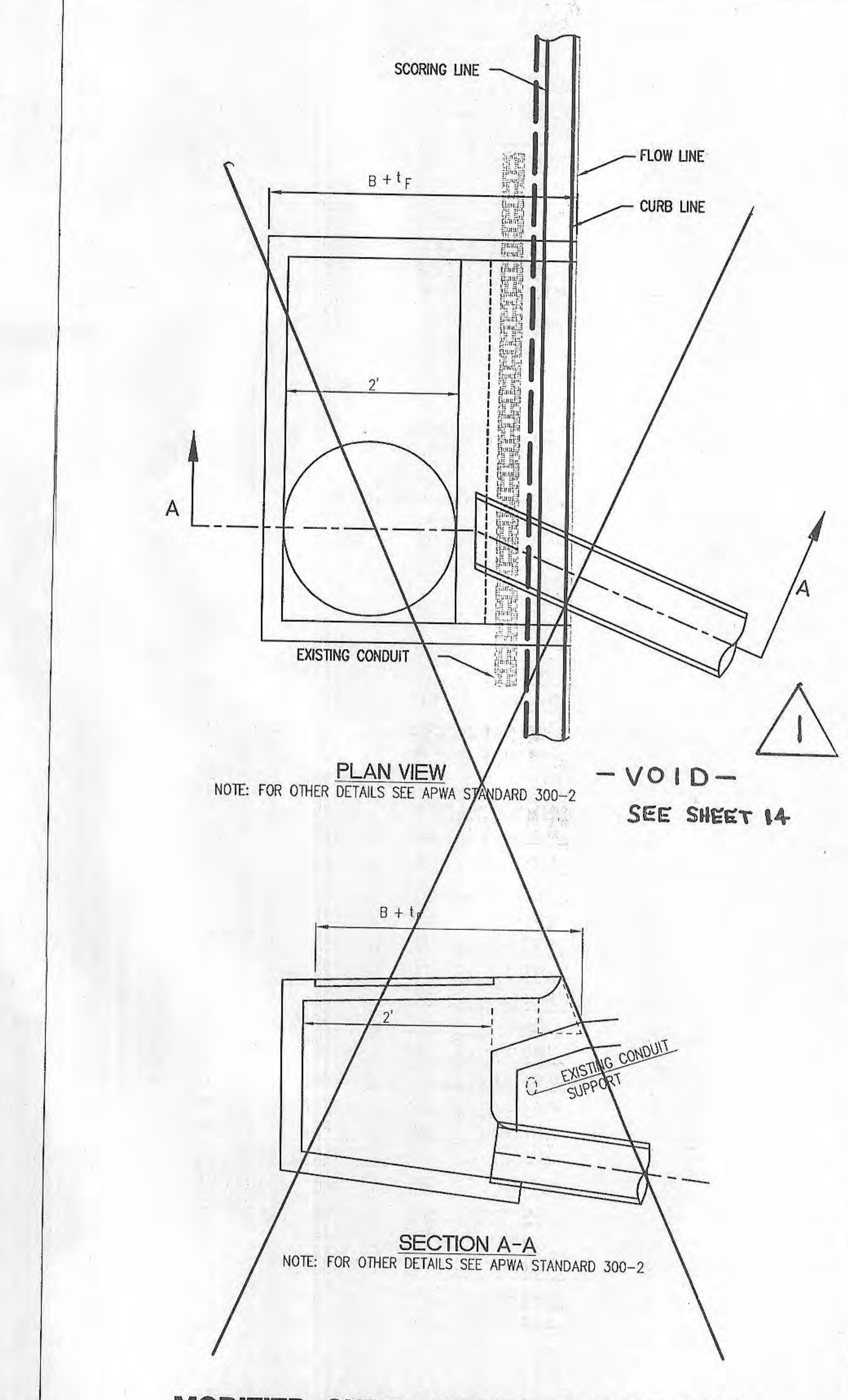
COLUMN CROSS SECTION
N.T.S.



SECTION C–C
N.T.S.



CROSS SECTIONAL ELEVATION E–E
N.T.S.



–VOID–
SEE SHEET 14

MODIFIED CURB OPENING CATCH BASIN
N.T.S.

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30957 Exp. 3-31-09 CIVIL STATE OF CALIFORNIA

12/21/07

DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

REVISIONS

NO.	DATE	INIT.		APP'D
1	12-17-07	SAS	DELETE MODIFIED CURB OPENING CATCH BASIN. ADDED SHEET 14 AND STAMP AND SIGN.	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 DATE 1/31/02
DRAWN BY JKC
CHECKED VN
RECOMMENDED
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER DATE: 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering • Planning • Surveying • Public Works
203 N. Golden Circle Dr., Ste. 300 • Santa Ana, CA 92705-4010 • (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595

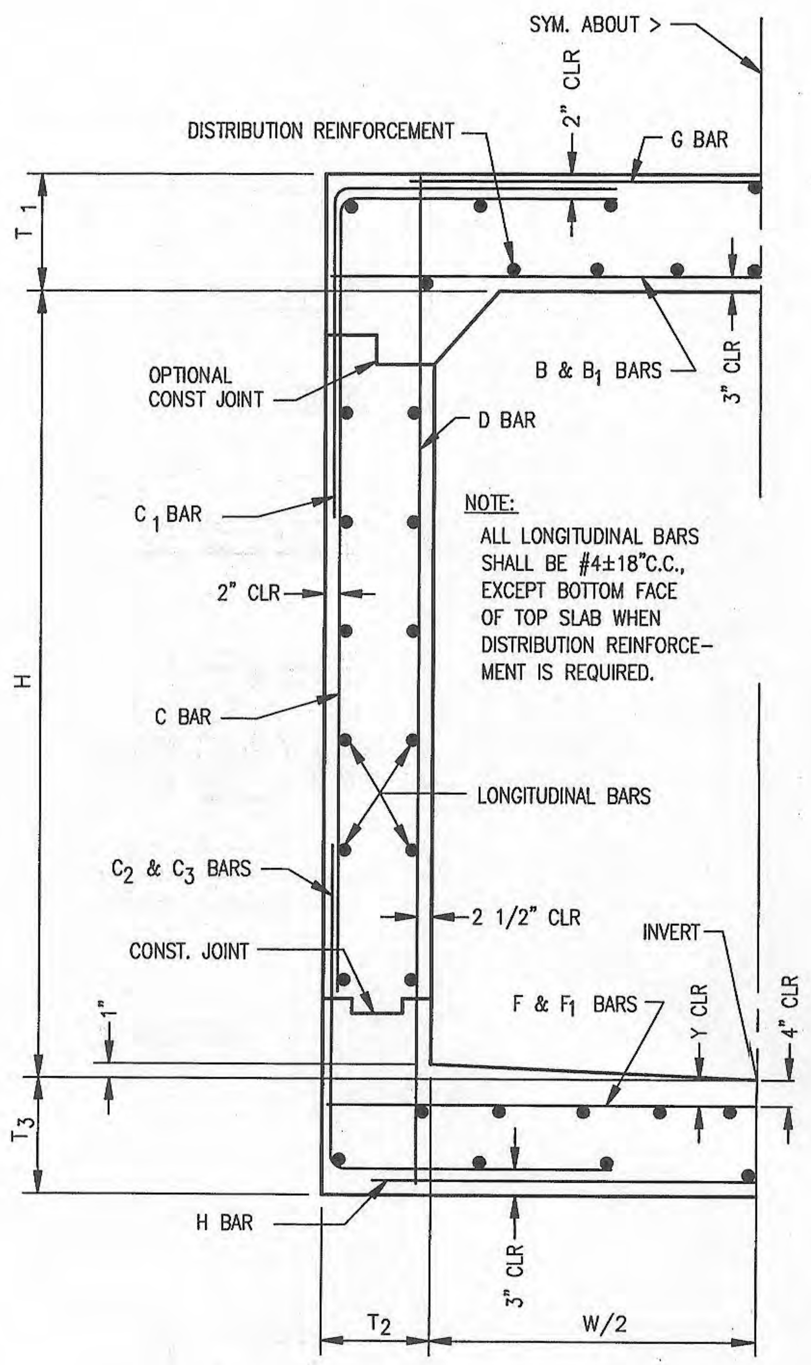
ARROW HIGHWAY & E. LIVE OAK AVENUE

DETAILS

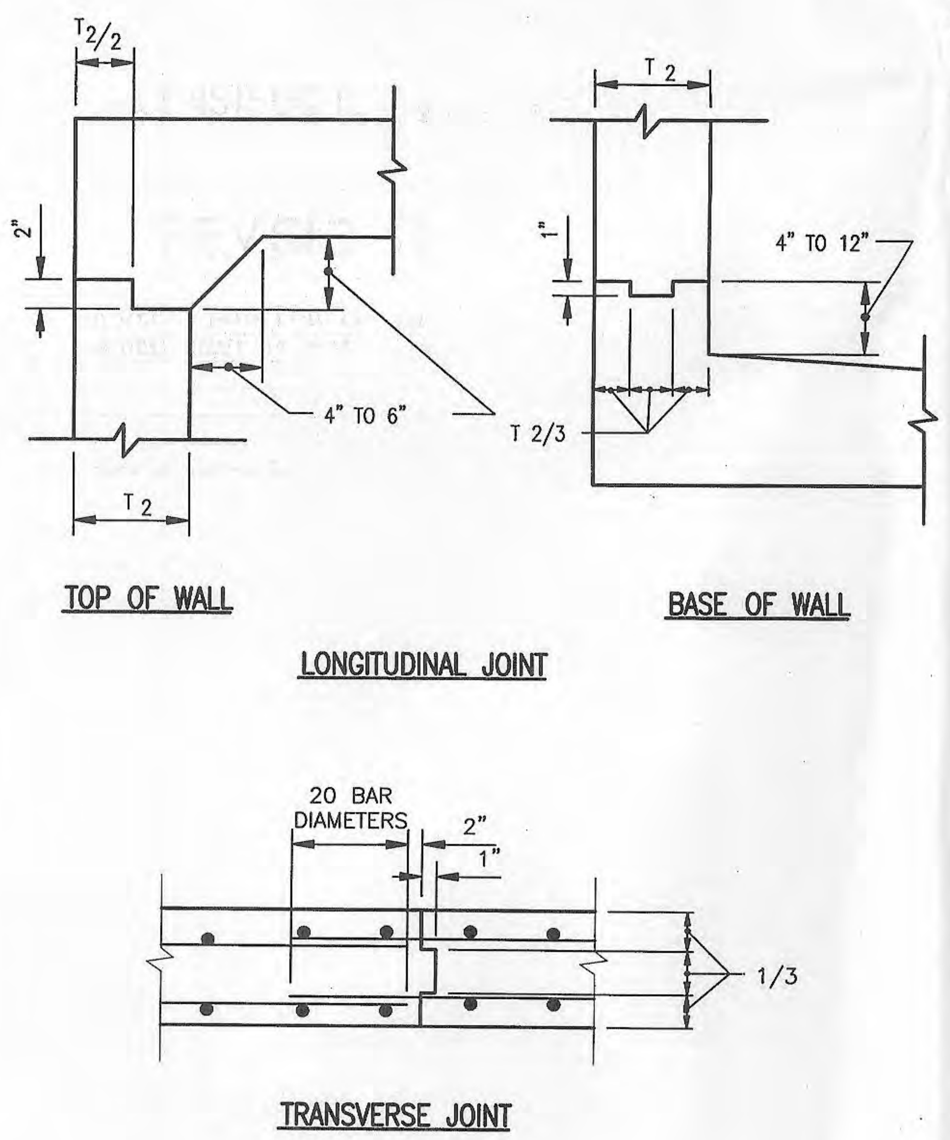
IRWINDALE CALIFORNIA

SHT 12 OF ~~13~~ 14 19

DDN 364-1107-F 7.1-.14



TYPICAL RC BOX SECTION
N.T.S.



CONSTRUCTION JOINT DETAILS
N.T.S.

STRUCTURAL NOTES

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR, UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENT FOR REINFORCED CONCRETE", LATEST EDITION, SECTION 7.2.
4. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
5. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
6. THE TRANSVERSE REINFORCING BARS SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
7. EXPOSED SURFACES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELED.
8. NO SPLICES IN TRANSVERSE BARS REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
9. LONGITUDINAL BARS SHALL BE LAPPED 20 BAR DIAMETERS AT SPLICES. TRANSVERSE BARS SHALL BE LAPPED 30 BAR DIAMETERS AT SPLICES.
10. LONGITUDINAL BARS SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
11. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE CONSTRUCTION JOINTS (IN BOTH SLABS AND WALLS), SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET NOR BE LESS THAN 10 FEET.
12. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. THE SPACING OF STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE MEASURED AT THE CENTERLINE OF CONSTRUCTION. THE SPACING OF STRAIGHT BARS AND L-BARS IN WALLS SHALL BE MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
13. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
14. D BARS MAY BE SPLICED 20 BAR DIAMETERS AT THE LOWER LONGITUDINAL CONSTRUCTION JOINT, AT CONTRACTOR'S OPTION.
15. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 HAS BEEN CALCULATED FOR A FOUR-INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
16. CONCRETE QUANTITIES ARE BASED ON A SIX-BY-SIX INCH FILLET AND STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
17. IF WALL THICKNESS IS SIX INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.

BOX SECTION			1	2
DESIGN COVER			10'	10'
WIDTH		W	6'	6.5'
HEIGHT		H	6'	6.5'
TOP SLAB THICKNESS		T1	9 1/2"	9 1/2"
SIDE WALL THICKNESS		T2	9 1/2"	9 1/2"
BOTTOM SLAB THICKNESS		T3	11 1/2"	11 1/2"
CONCRETE COVER (3" MIN. CLR)		Y	3"	3"
B BARS	BAR NO. & SPACING		#5 @ 13"	#6 @ 17"
	LENGTH		7'-1.5"	7'-7.5" (MAX) VARIES
B_1 BARS	BAR NO. & SPACING		#4 @ 13"	#5 @ 17"
	LENGTH		5'-2"	5'-6.5" (MAX) VARIES
C BARS	BAR NO. & SPACING		#4 @ 12"	#4 @ 11"
	HOR. LENGTH		3'-2"	3'-3.5" (MAX) VARIES
	VERT. LENGTH		6'-2"	6'-8" (MAX) VARIES
C_1 BARS	BAR NO. & SPACING		–	–
	HOR. LENGTH		–	–
	VERT. LENGTH		–	–
C_2 BARS	BAR NO. & SPACING		#4 @ 12"	#4 @ 11"
	HOR. LENGTH		2'-7.5"	2'-10.5"(MAX) VARIES
	VERT. LENGTH		2'-3"	2'-3"
C_3 BARS	BAR NO. & SPACING		–	–
	HOR. LENGTH		–	–
	VERT. LENGTH		–	–
D BARS	BAR NO. & SPACING		#4 @ 18"	#4 @ 18"
	LENGTH		7'-4"	7'-10" (MAX) VARIES
F BARS	BAR NO. & SPACING		#7 @ 19"	#6 @ 13"
	LENGTH		7'-1.5"	7'-7.5" (MAX) VARIES
F_1 BARS	BAR NO. & SPACING		#4 @ 19"	#4 @ 13"
	LENGTH		4'-10.5"	5'-4.5" (MAX) VARIES
G BARS	BAR NO. & SPACING		#4 @ 12"	#4 @ 11"
	LENGTH		3'-0"	3'-3" (MAX) VARIES
H BARS	BAR NO. & SPACING		–	–
	LENGTH		–	–
NUMBER OF LONGITUDINAL REINFORCEMENT # 5 BARS				
TOP SLAB (INCLUDES DISTRIBUTION REINFORCEMENT)			12	12
BOTTOM SLAB			16	16
SIDE WALLS			16	16
TOTAL			44	44
QUANTITIES				
CONCRETE CU. YDS./LIN. FT.			0.85	0.91 (MAX)
STEEL LBS./LIN. FT.			95.4	104.0 (MAX)

R C BOX LOCATION SCHEDULE

BOX SECT.	STATION FROM	STATION TO	BOX SECT.	STATION FROM	STATION TO
1	9+09	9+50	–	–	–
2	9+50	9+55	–	–	–

STRUCTURAL DESIGN CRITERIA
L.A.C.F.C.D. STRUCTURAL DESIGN MANUAL
DATED APRIL 1982

LIVE LOAD

HS 20-44 UNLESS OTHERWISE NOTED

DEAD LOAD

EARTH LOAD PER MARSTON'S FORMULA: W=120 PCF
Ku=Ku'=0.150
Bd=OUTSIDE WIDTH OF BOX PLUS 3 FEET
SIDE EARTH PSF PER FOOT OF DEPTH
INTERNAL WATER PRESSURE: 62.4 PSF PER FOOT OF DEPTH
WEIGHT OF CONCRETE: 150 PCF

ALLOWABLE STRESSES

F'c=4000 PSI AT 28 DAYS
Fc=1800 PSI
Fy=60,000 PSI
Fs=24,000 PSI
N=8
SHEAR AND BOND STRESSES PER A.C.I. 318-95

HYDRAULIC ELEMENT TABLE ⚠1

LINE	STATIONS	SECTION (IN)	Q * (CFS)	S_f	V (FPS)	D (FT)	S_f *	V * (FPS)	D * (ft)
'A'	99+07 TO 9+50	6'Wx6'H	~~416~~ 212.4	~~0.0061~~	~~11.64~~	~~2.25~~	0.0008	6.5	1.7
	9+55 TO 10+55.08	78	~~416~~ 212.4	~~0.0063~~	~~12.54~~	~~4.51~~	0.0025	8.9	4.4
	10+59.08 TO 11+11.50	78	~~406~~ 207.3	~~0.0060~~	~~12.24~~	~~4.44~~	0.0024	9.4	4.3
	11+18.50 TO 11+78.30	78	~~375~~ 191.5	~~0.0051~~	~~11.30~~	~~5.64~~	0.0021	8.4	4.0
	11+82.30 TO 12+18.40	78	~~365~~ 186.4	~~0.0049~~	~~11.00~~	~~5.42~~	0.0021	8.3	4.0
	12+22.40 TO 13+19.00	78	~~357~~ 182.3	~~0.0046~~	~~10.76~~	~~5.32~~	0.0020	8.3	3.9
	13+23.00 TO 15+79.67	78	~~338~~ 172.6	~~0.0042~~	~~10.19~~	~~4.97~~	0.0080	14.4	3.7
	15+84.33 TO 17+54.00	72	~~334~~ 170.5	~~0.0062~~	~~11.82~~	~~6.00~~	0.0040	10.3	4.3
	17+58.00 TO 24+60.07	72	~~330~~ 168.5	~~0.0061~~	~~11.68~~	~~6.00~~	0.0034	9.9	4.3
	24+64.74 TO 29+13.00	72	~~308~~ 157.3	~~0.0053~~	~~10.90~~	~~6.00~~	0.0077	13.7	4.1
	29+17.00 TO 29+49.50	72	~~304~~ 155.2	~~0.0052~~	~~10.76~~	~~6.00~~	0.0106	14.7	3.9
	29+54.17 TO 31+33.00	66	~~291~~ 148.6	~~0.0075~~	~~12.25~~	~~3.76~~	0.0088	14.3	2.9
	31+37.00 TO 32+19.39	66	~~287~~ 146.5	~~0.0073~~	~~12.08~~	~~3.72~~	0.0088	13.8	2.8
	32+23.39 TO 34+29.67	66	~~271~~ 138.4	~~0.0065~~	~~11.41~~	~~3.59~~	0.0081	13.5	2.8
	34+34.33 TO 37+50.67	66	~~250~~ 127.6	~~0.0055~~	~~10.53~~	~~3.39~~	0.0060	12.8	2.6
	37+55.33 TO 39+46.00	66	~~234~~ 119.5	~~0.0049~~	~~9.85~~	~~5.50~~	0.0024	8.0	3.7
	39+50.00 TO 40+00.00	66	~~229~~ 116.9	~~0.0047~~	~~9.64~~	~~5.50~~	0.0023	7.7	4.0
	40+00.00 TO 41+14.50	66	~~229~~ 116.9	~~0.0047~~	~~9.64~~	~~4.35~~	0.0042	9.7	3.1
	41+18.50 TO 41+68.00	66	~~223~~ 113.4	~~0.0044~~	~~9.39~~	~~4.14~~	0.0028	8.5	3.2
	41+72.00 TO 41+99.00	66	~~211~~ 107.7	~~0.0040~~	~~8.89~~	~~3.98~~	0.0022	7.4	3.2
	42+03.00 TO 42+37.67	66	~~205~~ 104.7	~~0.0037~~	~~8.63~~	~~4.08~~	0.0021	7.3	3.0
	42+42.33 TO 47+24.67	66	~~205~~ 104.7	~~0.0037~~	~~8.63~~	~~5.50~~	0.0028	8.3	3.5
	47+36.67 TO 50+51.00	66	~~171~~ 89.3	~~0.0026~~	~~7.20~~	~~3.35~~	0.0047	9.7	2.6
	50+55.67 TO 51+96.72	66	~~171~~ 87.3	~~0.0026~~	~~7.20~~	~~3.75~~	0.0029	9.1	2.8
	52+00.72 TO 54+82.67	66	~~166~~ 84.8	~~0.0024~~	~~6.99~~	~~3.60~~	0.0064	10.5	2.8
	54+87.33 TO 56+77.50	60	~~155~~ 79.1	~~0.0035~~	~~7.89~~	~~3.86~~	0.0040	8.8	2.8
	56+92.00 TO 57+40.25	60	~~83~~ 42.4	~~0.0010~~	~~4.23~~	~~2.52~~	0.0005	3.3	2.0
	57+50.75 TO 58+07.50	60	~~62~~ 31.7	~~0.0006~~	~~3.16~~	~~2.12~~	0.0003	2.6	2.0
	58+17.00 TO 58+21.00	48	~~1~~ -	~~0.0000~~	~~0.08~~	~~0.25~~	0.0026	2.1	2.0
'B'	11+16.99 TO 11+60.00	36	~~30~~ 15.3	~~0.0020~~	~~4.26~~	~~0.75~~	0.0400	15.0	0.6
	11+60.00 TO 12+21.81	36	~~30~~ 15.3	~~0.0020~~	~~4.26~~	~~1.51~~	0.0080	7.8	1.2
	12+21.81 TO 12+83.67	36	~~30~~ 15.3	~~0.0018~~	~~4.58~~	~~1.51~~	0.0080	7.8	1.2
	12+83.67 TO 13+13.77	36	~~30~~ 15.3	~~0.0020~~	~~4.91~~	~~1.51~~	0.0080	7.8	1.2
	13+13.77 TO 13+37.02	36	~~30~~ 15.3	~~0.0027~~	~~5.49~~	~~1.51~~	0.0080	7.8	1.2
	13+37.02 TO 15+10.24	36	~~30~~ 15.3	~~0.0080~~	~~8.47~~	~~1.51~~	0.0080	7.8	1.2
	15+10.24 TO 18+24.48	36	~~30~~ 15.3	~~0.0078~~	~~8.30~~	~~1.50~~	0.0060	7.0	1.2
	18+24.48 TO 18+68.65	36	~~30~~ 15.3	~~0.0057~~	~~7.41~~	~~1.50~~	0.0040	4.3	1.1
	18+72.65 TO 19+04.18	36	~~27~~ 13.8	~~0.0025~~	~~5.22~~	~~1.42~~	0.0070	4.8	1.1
	19+04.18 TO 19+52.67	36	~~27~~ 13.8	~~0.0059~~	~~7.32~~	~~1.42~~	0.0060	6.5	1.1
	19+57.34 TO 19+74.68	36	~~24~~ 12.3	~~0.0021~~	~~4.77~~	~~1.28~~	0.0020	4.0	1.0
	19+74.68 TO 29+08.68	36	~~24~~ 12.3	~~0.0089~~	~~8.25~~	~~1.28~~	0.0090	7.5	1.0
	29+08.68 TO 29+66.19	36	~~24~~ 12.3	~~0.0069~~	~~7.54~~	~~1.28~~	0.0070	7.2	1.0
	29+66.19 TO 29+70.67	36	~~24~~ 12.3	0.0050	6.68	1.28			
	29+75.34 TO 30+63.53	36	~~16~~ 8.2	0.0009	3.17	1.20			
	30+63.53 TO 31+13.73	36	~~16~~ 8.2	0.0016	3.92	1.20			
	31+13.73 TO 33+80.00	36	~~16~~ 8.2	0.0035	5.25	1.20			
	33+87.00 TO 35+53.09	36	1	0.0102	3.40	0.30			
	35+57.76 TO 35+61.76	30	1	0.0056	2.32	0.22			
'C'	10+08.10 TO 10+49.63	36	~~31~~ 15.3	~~0.0022~~	~~4.39~~	~~0.93~~	0.0009	10.0	0.7
'D'	10+13.50 TO 10+70.00	48	~~72~~ 36.8	~~0.0025~~	~~5.73~~	~~1.99~~	0.0007	6.5	1.5

⚠ * PER REVISED L.A. COUNTY HYDROLOGY MANUAL

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA

⚠1

12/21/07

NO.	DATE	INIT.	REVISIONS	APPR'VD
⚠1	12-17-07	SAS	REVISED MAIN LINE Q'S AND HGL ADDED SHEET 14 AND STAMP AND SIGN	

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: JON E. BOURGEOIS RCE No. 30242 EXP. 3/31/04 — DATE 1/31/02
DRAWN BY: JKC
CHECKED: VN
RECOMMENDED: –
APPROVED: KWOK TAM, P.E., PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 2/19/2002

PLANS PREPARED BY:
Hall & Foreman, Inc.
Civil Engineering · Planning · Surveying · Public Works
203 N. Golden Circle Dr., Ste. 300 · Santa Ana, CA 92705-4010 · (714)664-0570

REGISTERED PROFESSIONAL ENGINEER JON E. BOURGEOIS No. 30242 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE

STORM DRAIN IMPROVEMENT PLANS MTD #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
SINGLE RC BOX (STRUCTURAL SCHEDULE, NOTES & DETAILS)
HYDRAULIC ELEMENT TABLES
IRWINDALE **CALIFORNIA**

SHT 13 OF ~~13~~ ~~14~~ 19

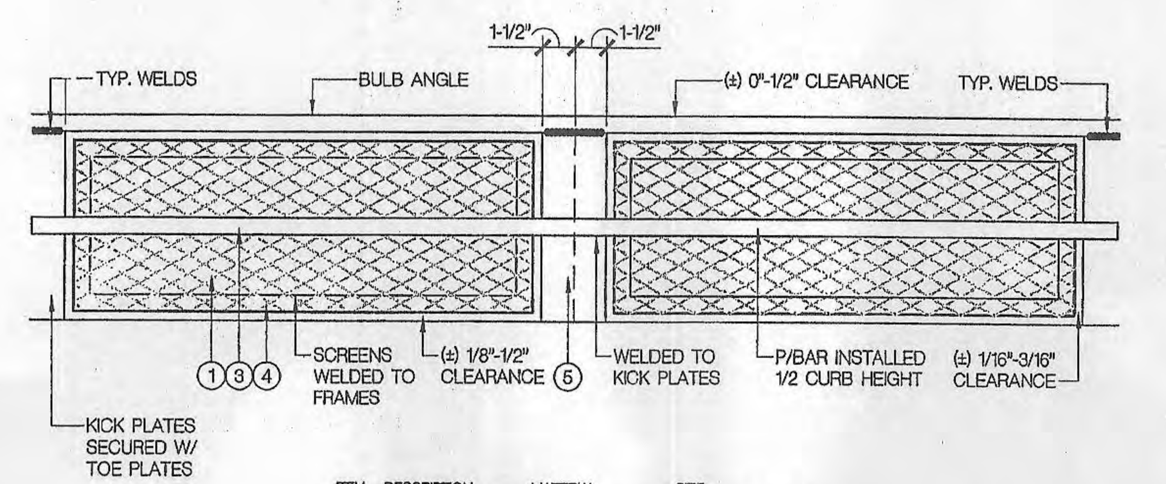
DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

DDN 364-1107-F7I.14

R:\99167\Sd\99167d11.dwg 12-8-00 3:14:44 pm EST

U.S. Enviro-Net Services, Inc.
OCEAN-Pro Debris Gate™
Patent# 6,217,756

2 UNIT INSTALLATION*

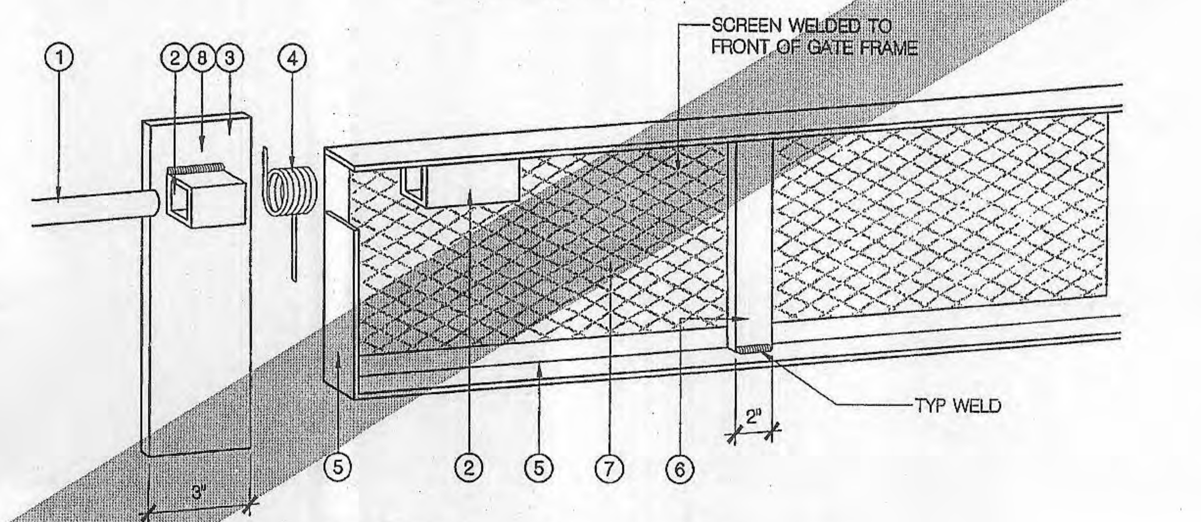


ITEM	DESCRIPTION	MATERIAL	SIZE
1	EXPANDED METAL	STAINLESS STEEL	3/4" X 3/4" X #9
2	FLAT BAR	STAINLESS STEEL	3" X 3/16" X H
3	SOLID ROUND	RE-USE EXISTING	3/4" ROUND SOLID
4	ANGLE	STAINLESS STEEL	3/4" X 3/4" X 1/8"
5	FLAT BAR	STAINLESS STEEL	3" X 3/16" X H

* NOTE: INDEPENDENT DEBRIS GATE INSTALLED BETWEEN EACH VERTICAL SUPPORT BOLT.

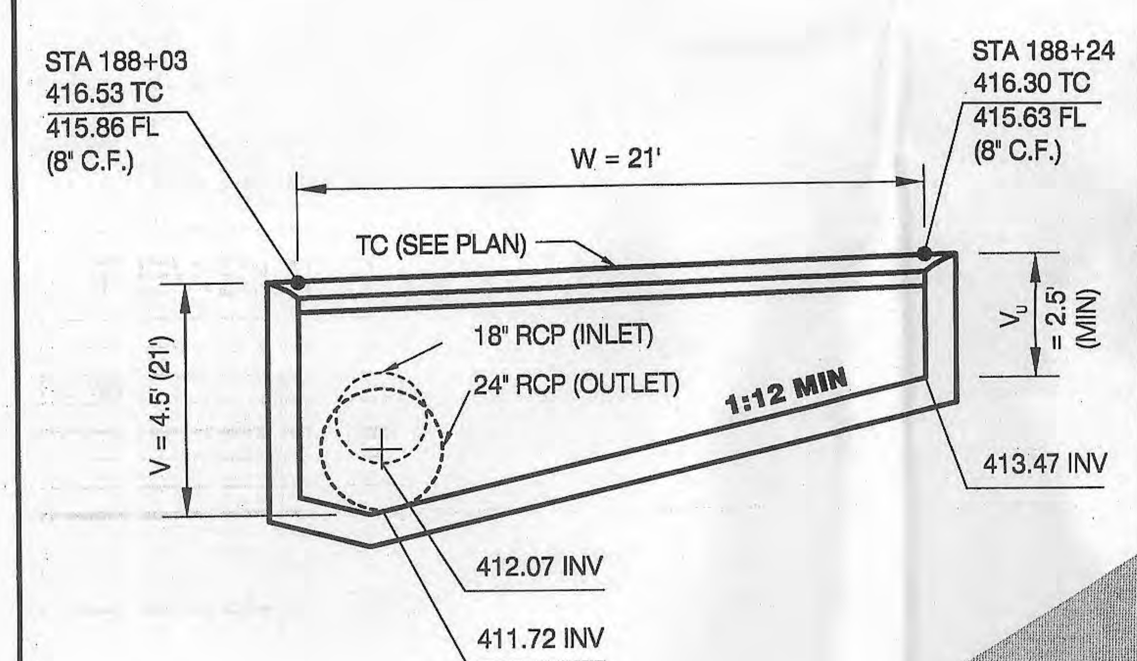
U.S. Enviro-Net Services, Inc.
OCEAN-Pro Debris Gate™
Patent# 6,217,756

REAR ASSEMBLY VIEW



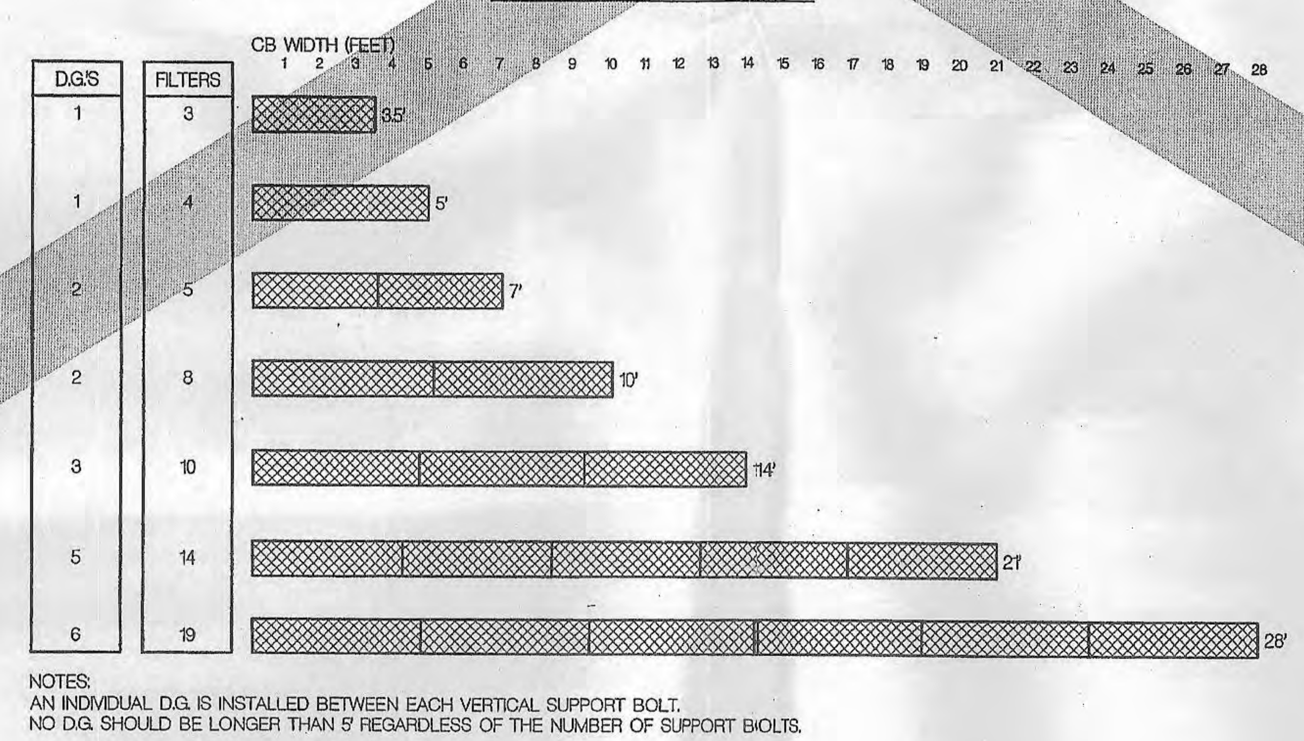
ITEM	DESCRIPTION	MATERIAL	SIZE
1	SOLID ROUND	STAINLESS STEEL	7/16" ROUND SOLID
2	SQUARE TUBE	STAINLESS STEEL	3/4" X 3/4" X .065
3	FLAT BAR	STAINLESS STEEL	3" X 3/16" X H
4	TORSION SPRING	STAINLESS STEEL	3/16" DIA.
5	ANGLE	STAINLESS STEEL	3/4" X 3/4" X 1/8"
6	FLAT BAR	STAINLESS STEEL	2" X 1/8" X H
7	EXPANDED METAL	STAINLESS STEEL	3/4" X 3/4" X H #9
8	WELD	STAINLESS STEEL	3/32" DIA.

1



U.S. Enviro-Net Services, Inc.
OCEAN-Pro Debris Gate™
Patent# 6,217,756

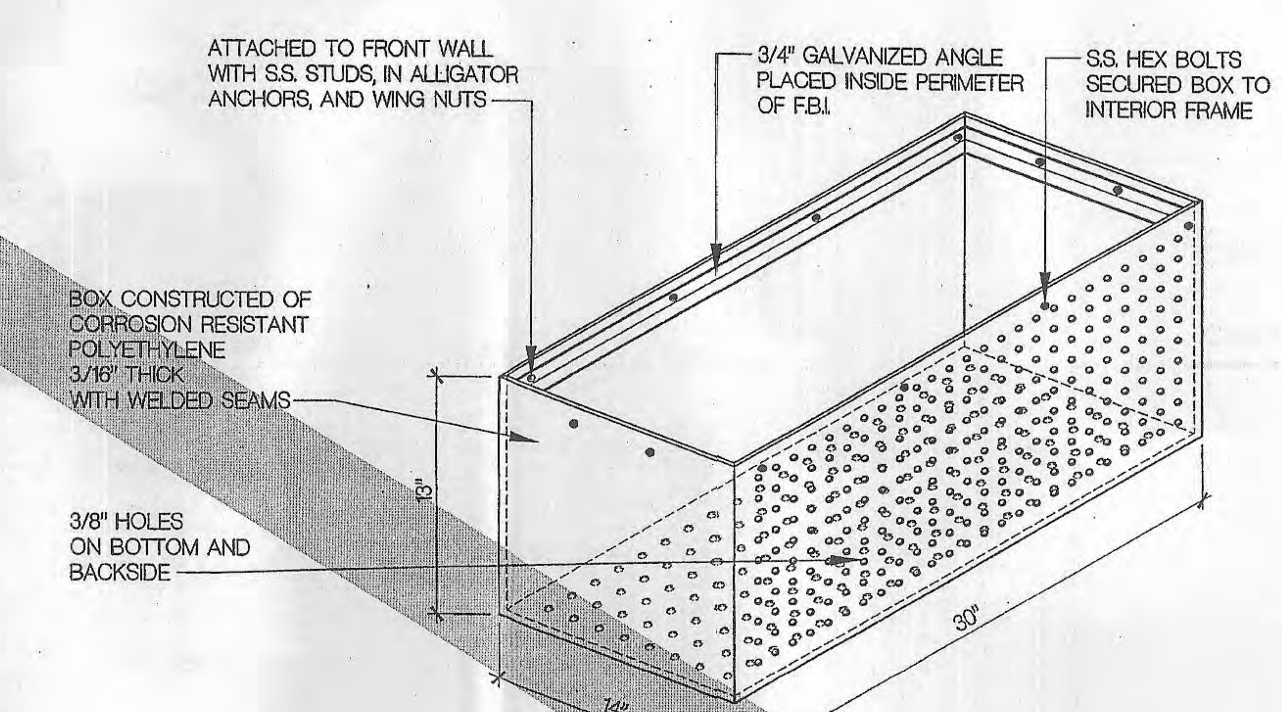
STANDARD APWA CURB OPENING CATCH BASIN
DEBRIS GATE™ COUNTS



NOTES:
AN INDIVIDUAL D.G. IS INSTALLED BETWEEN EACH VERTICAL SUPPORT BOLT.
NO D.G. SHOULD BE LONGER THAN 5' REGARDLESS OF THE NUMBER OF SUPPORT BOLTS.

G2 Construction
STATE CONTRACTORS LICENSE # 801253 - A, C-8
13331 Unit "I-F"
Garden Grove Blvd. Garden Grove, CA 92843

FILTER BASKET INSERT - MODEL # EDC13
Patent Pending



C.B. SECTION
NOT TO SCALE

DEBRIS GATE AND FILTER DETAILS
NOT TO SCALE

THIS SHEET VOID

PHASE 1
PHASE 1 - PECK ROAD TO THE INTERSECTION LIVE OAK AVE AND ARROW HWY
PHASE 2 - INTERSECTION OF LIVE OAK AVE AND ARROW HWY TO EAST LIVE OAK

DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

MTD
SHT 14 OF 19

REVISIONS				
NO.	DATE	INIT.		APPV'D
1	4/16/09	gho	SHEET VOIDED	

BENCHMARK
BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL OF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: | DATE
DRAWN BY SAS
CHECKED - GHO
RECOMMENDED -
APPROVED KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER 4/28/09 DATE

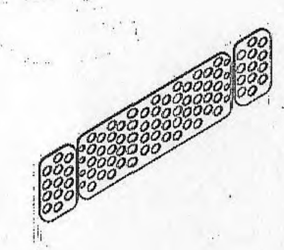
PLANS PREPARED BY:
COORY ENGINEERING:
12631 E. IMPERIAL HWY, SUITE F-124 SANTA FE SPRINGS, CA 90670 (562) 868-8266
SAMIR M. KHOURY R.C.E. 30567 EXP. 3-31-2008 4/28/09 DATE
REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 EXP. 3-31-2008 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
DETAILS
IRWINDALE CALIFORNIA

SHT 35-A OF 74

DDN 364-1107-F7.1-.14

DEPARTMENT OF PUBLIC WORKS



GENERAL NOTES:

1. All catch basin opening screen cover parts shall be of 304 stainless steel.
2. The vertical distance between the surf gate and the upper underside of the curb shall not exceed one and one half inch (1-1/2") inch.
3. The distance between the vertical perforated metal satellite, the side wall and the upper and lower curb shall not exceed three quarter (3/4") inch.
4. The gate shall be placed at a minimum angle of ninety (90°) degrees, to the catchment area.
5. Concrete wedge anchor depth, embedment, shall be a minimum of three (3") inches.
6. The gate and its components vary in size and are based on the length and width of the curb opening.
7. Height and width of the screen cover varies, depends on field conditions.
8. The perforations of the screen cover shall be three quarter inch (3/4") diameter through out.
9. C.B. screen cover shall have a smooth & straight perimeter with no jagged edges.
10. Surf-gate shall not be installed in culverts and low flows.
11. Surf-gate shall only be installed in combination curb opening / grate
12. Surf-gate will be supplied to the city in lengths from 25" to 78".
13. Multi-gate assembles may require satellite components that may vary in length from (2") two inch to (6") six inch, to accommodate standard surf-gate sizes.

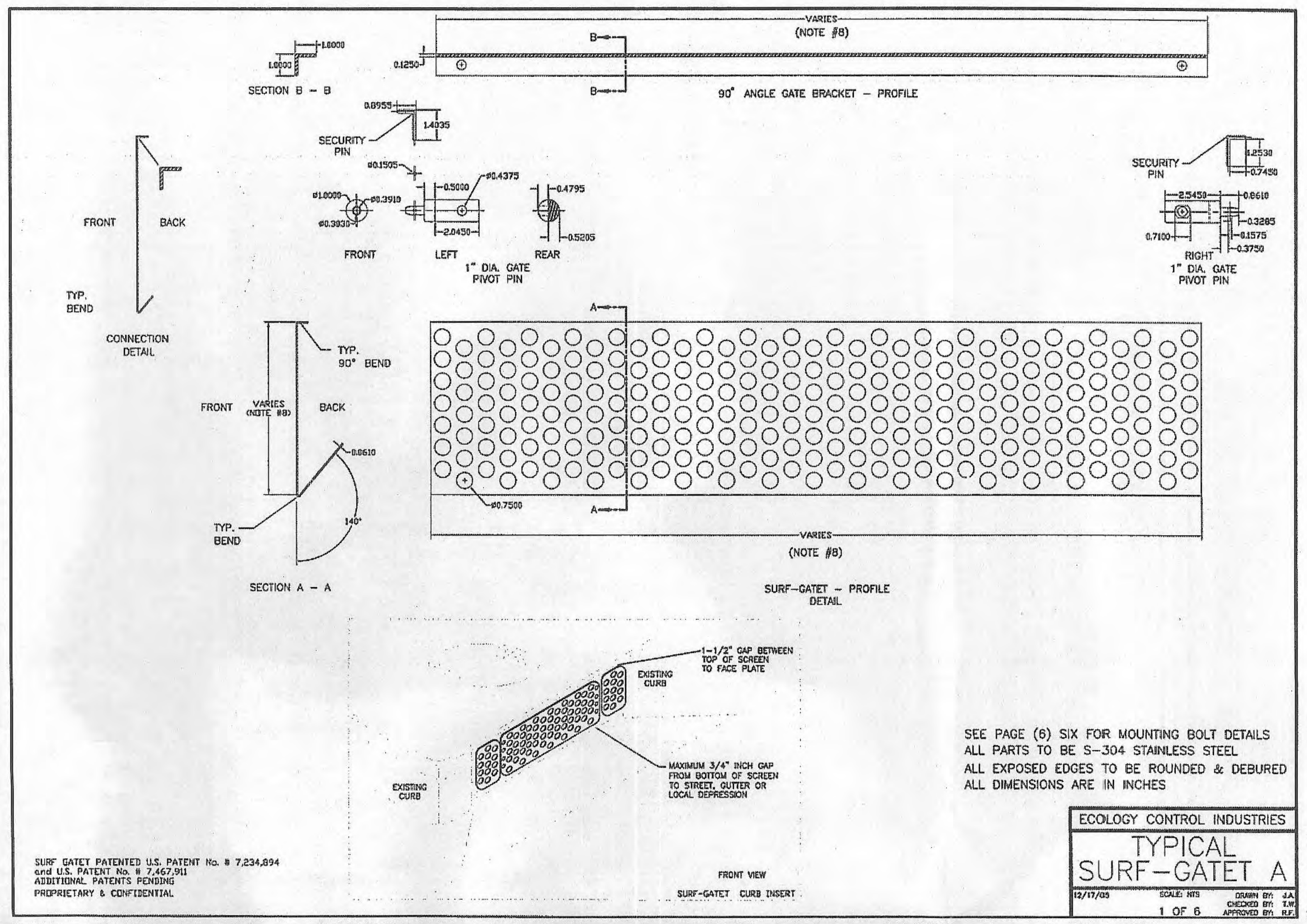
Catch Basin Opening Screen Cover

Table of Contents

SURF GATET PATENTED U.S. PATENT No. # 7,234,894 and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

Submitted By:
ECOLOGY CONTROL INDUSTRIES
AMERICAN STORM WATER DIVISION
20846 NORMANDIE AVENUE
TORRANCE, CA 90502
Phone: 310-354-9999
Fax: 310-354-6673

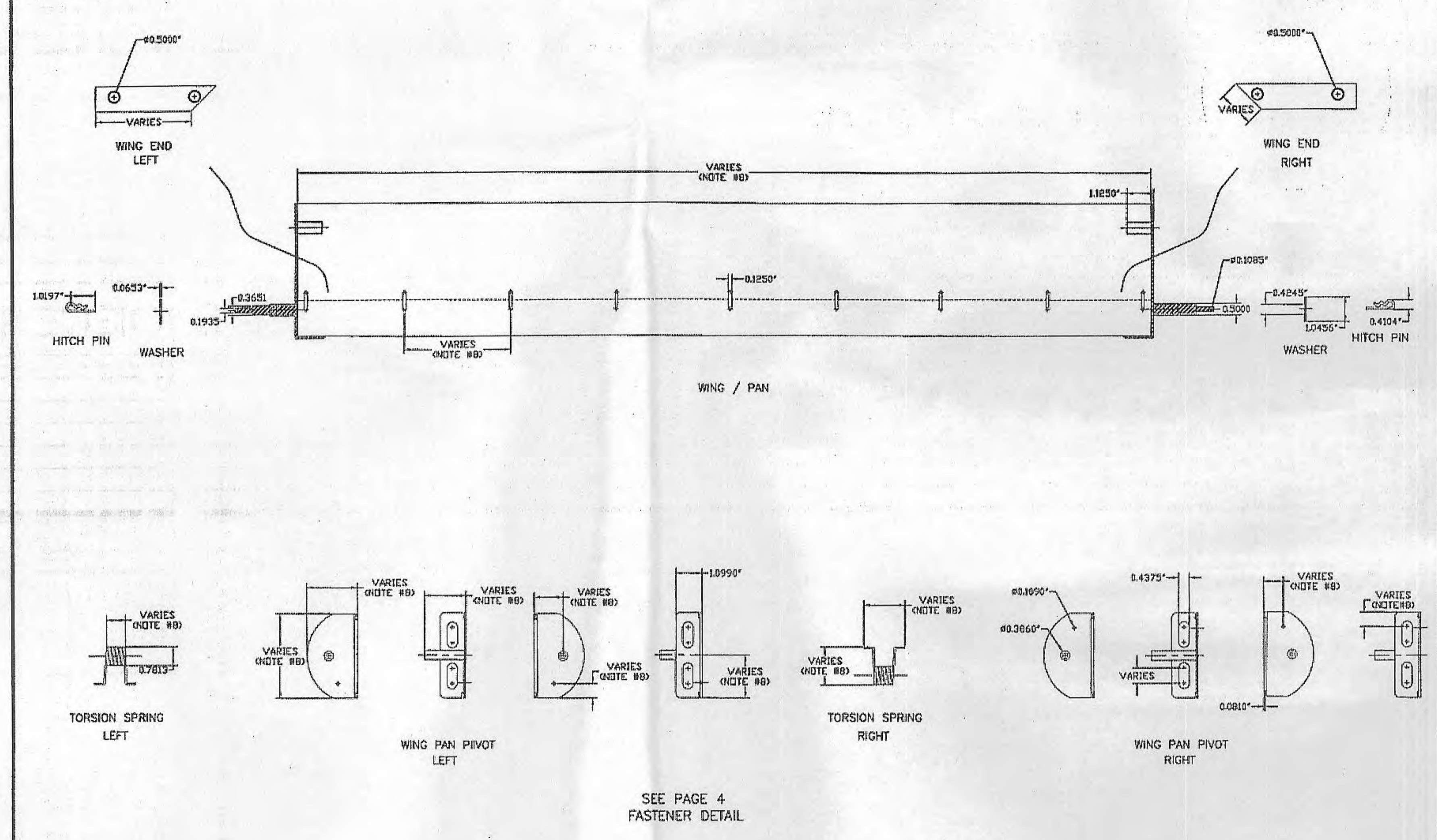
12/22/2008 1



SEE PAGE (6) SIX FOR MOUNTING BOLT DETAILS
ALL PARTS TO BE S-304 STAINLESS STEEL
ALL EXPOSED EDGES TO BE ROUNDED & DEBURED
ALL DIMENSIONS ARE IN INCHES

SURF GATET PATENTED U.S. PATENT No. # 7,234,894 and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

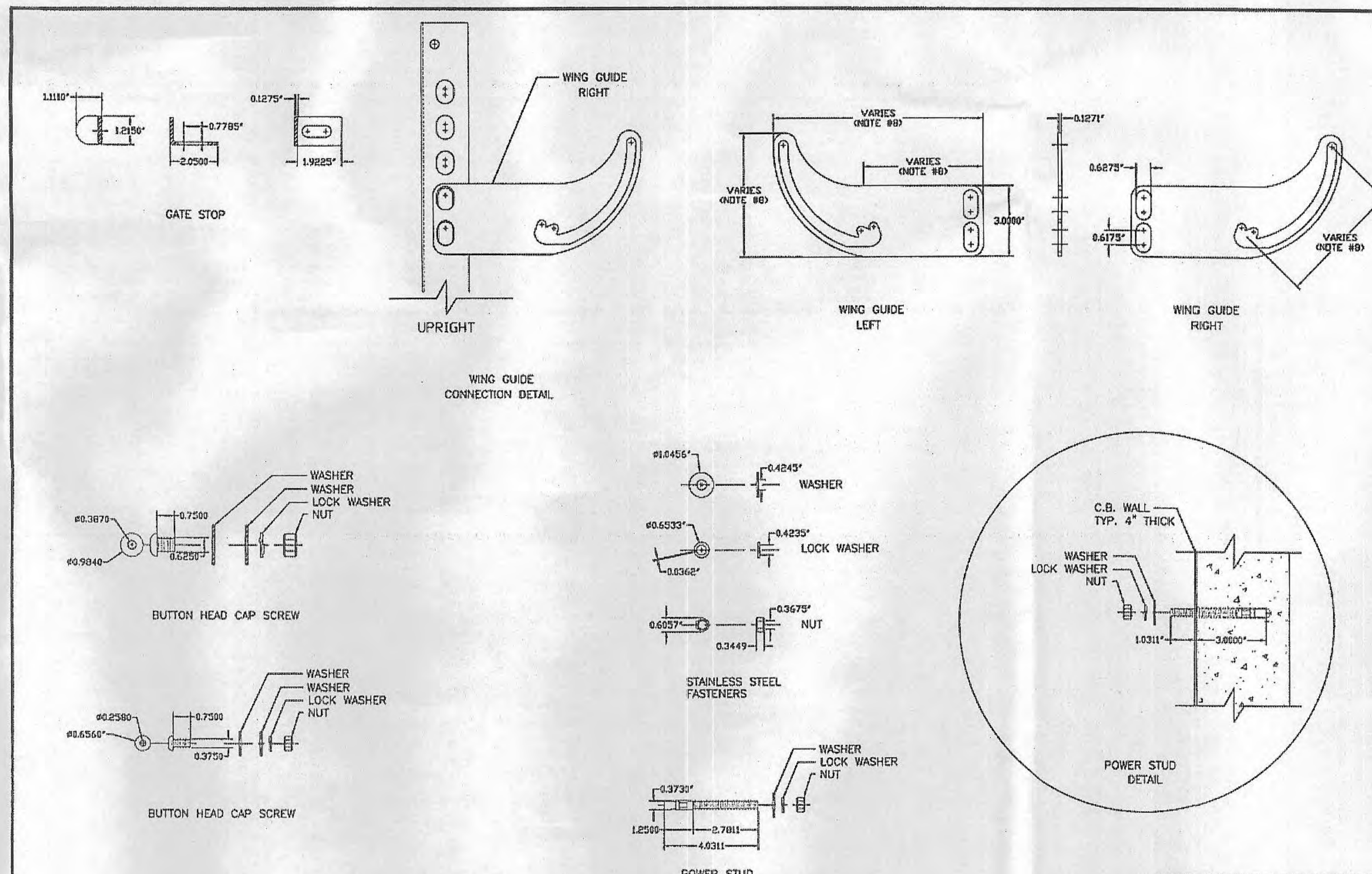
ECOLOGY CONTROL INDUSTRIES
TYPICAL SURF-GATET A
12/17/05 1 OF 6 2



SEE PAGE (6) SIX FOR MOUNTING BOLT DETAILS
ALL PARTS TO BE S-304 STAINLESS STEEL
ALL EXPOSED EDGES TO BE ROUNDED & DEBURED
ALL DIMENSIONS ARE IN INCHES

SURF GATET PATENTED U.S. PATENT No. # 7,234,894 and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ECOLOGY CONTROL INDUSTRIES
SURF-GATET WING DETAILS
12/17/05 2 OF 6 3



SEE PAGE (6) SIX FOR MOUNTING BOLT DETAILS
ALL PARTS TO BE S-304 STAINLESS STEEL
ALL EXPOSED EDGES TO BE ROUNDED & DEBURED

SURF GATET PATENTED U.S. PATENT No. # 7,234,894 and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ECOLOGY CONTROL INDUSTRIES
SURF-GATET WING CONNECTION DETAIL
12/17/05 3 OF 6 4

DEBRIS GATE AND FILTER DETAILS

NOT TO SCALE

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

REVISIONS				
NO.	DATE	INIT.		APPV'D

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL OF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: DATE

DRAWN BY	SAS
CHECKED	- GHO
RECOMMENDED	-
APPROVED	KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER — DATE: 4/28/09

PLANS PREPARED BY:
COORY ENGINEERING:
12631 E. IMPERIAL HWY, SUITE F-124 SANTA FE SPRINGS, CA 90670 (562) 868-8266

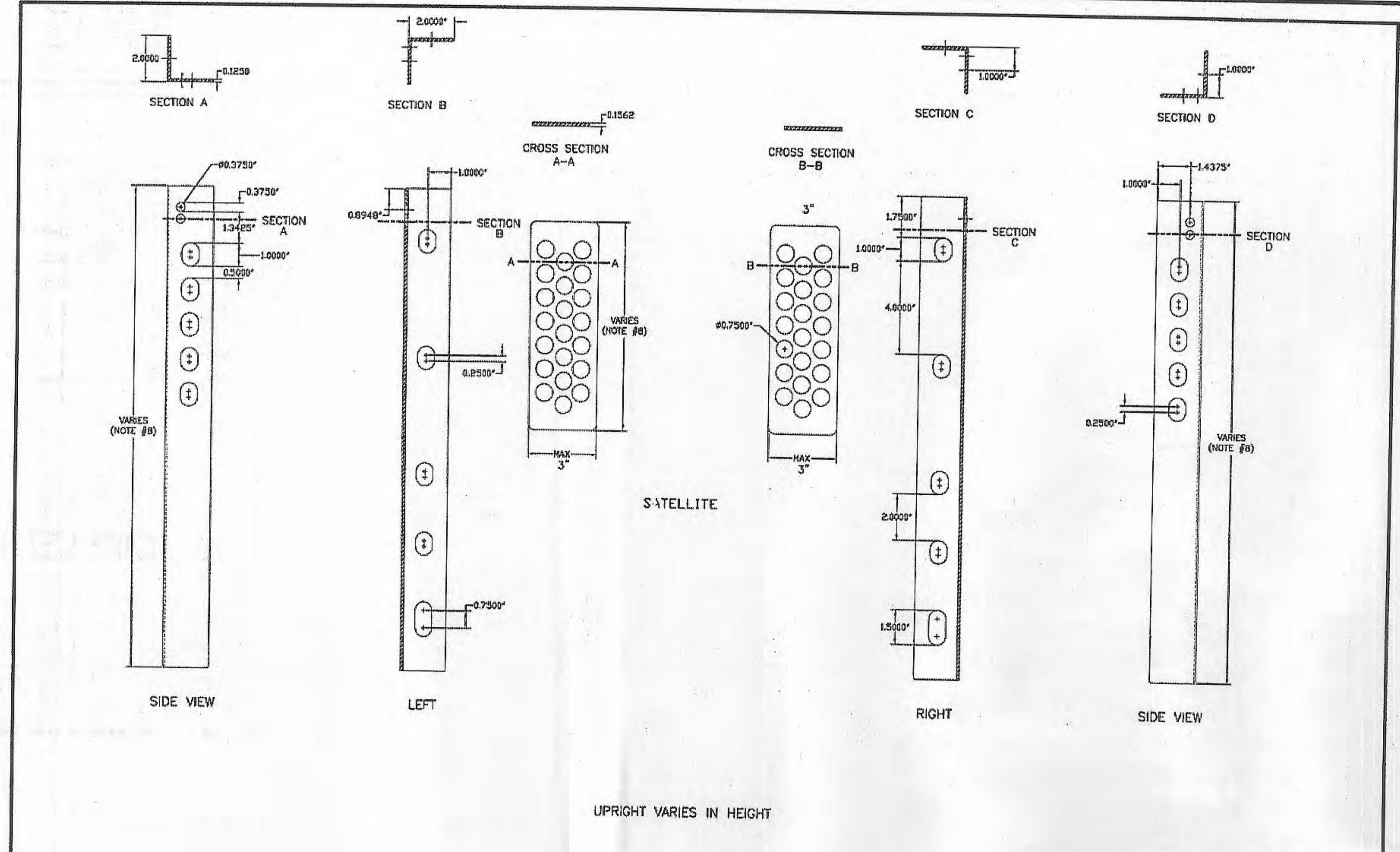
SAMIR M. KHOURY R.C.E. 30567 DATE 4/28/09
EXP. 3-31-2010

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 EXP. 3-31-2010 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
DETAILS
IRWINDALE CALIFORNIA

MTD
SHT 15 OF 19
- - -
SHT 35-B OF 74

DDN 364-1107-F7.1-14



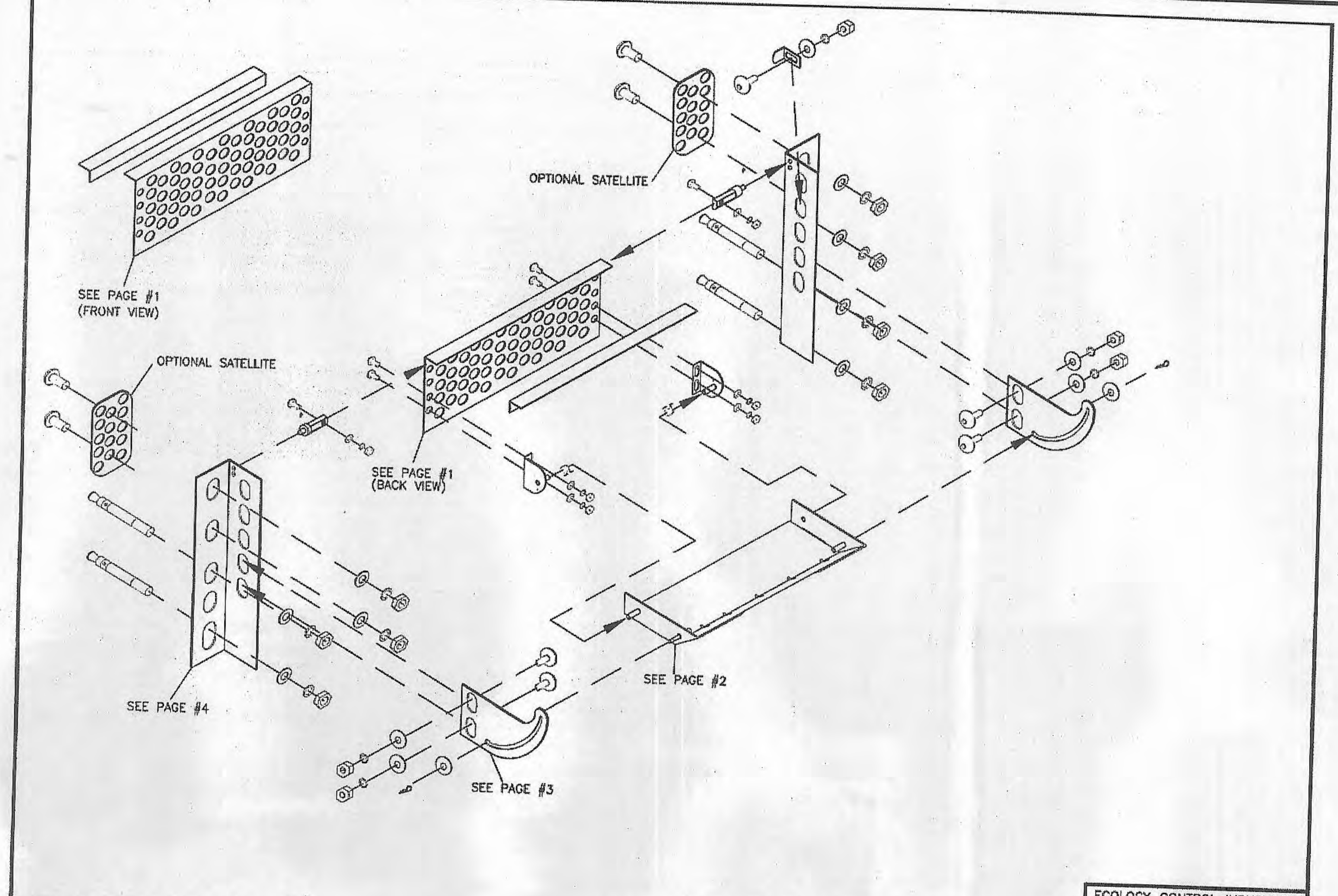
UPRIGHT VARIES IN HEIGHT

SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

VERTICAL 90 DEGREE ANGLE S–304 STAINLESS STEEL
SEE PAGE (6) SIX FOR MOUNTING BOLT DETAILS
ALL DIMENSIONS ARE IN INCHES

ECOLOGY CONTROL INDUSTRIES
SURF–GATET UPRIGHTS
12/17/05 SCALE: NTS 4 OF 6 DRAWN BY: J.A. CHECKED BY: T.W. APPROVED BY: R.F.

5



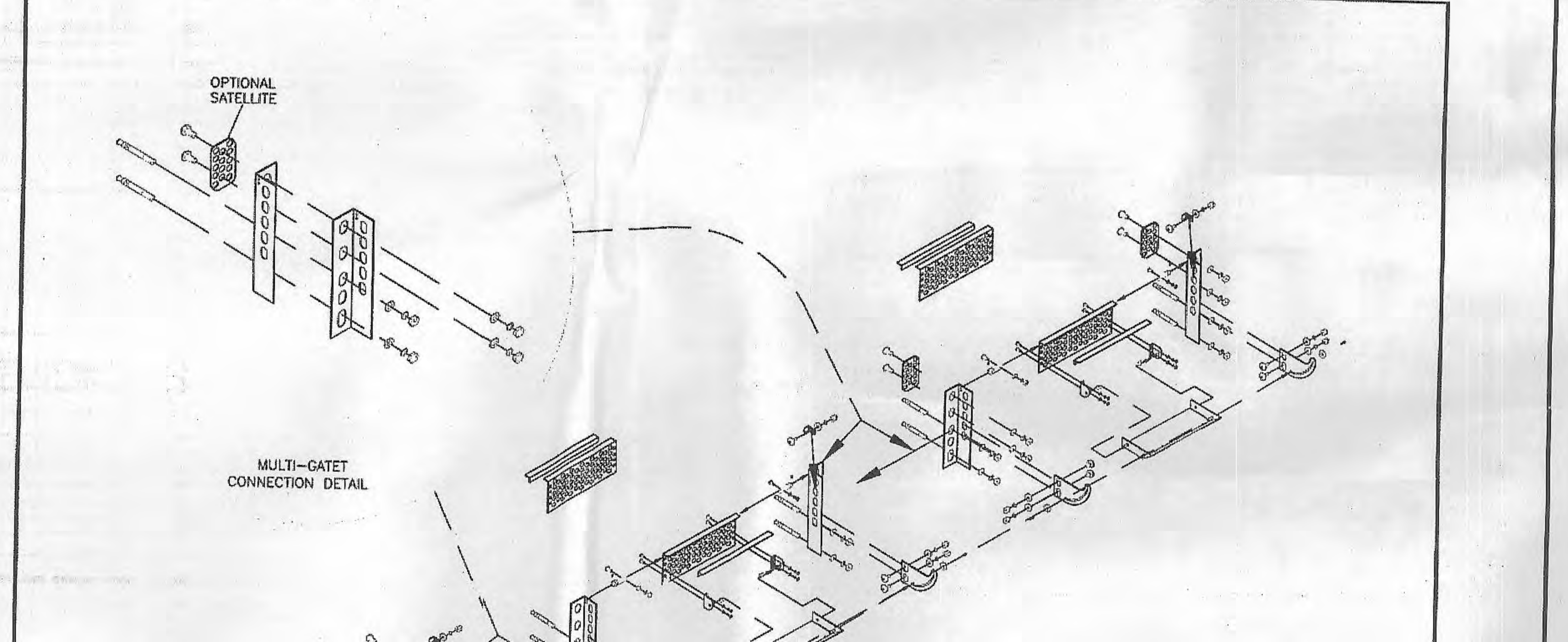
SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ALL PARTS, BOLTS & FASTENERS ARE 304 STAINLESS STEEL
BOLTS & FASTENERS DETAIL PAGE #3

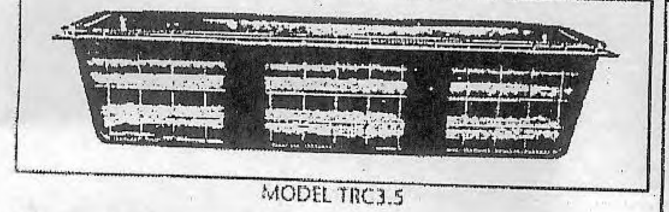
ECOLOGY CONTROL INDUSTRIES
SURF–GATET ASSEMBLY
12/17/05 SCALE: NTS 5 OF 6 DRAWN BY: J.A. CHECKED BY: T.W. APPROVED BY: R.F.

6

CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

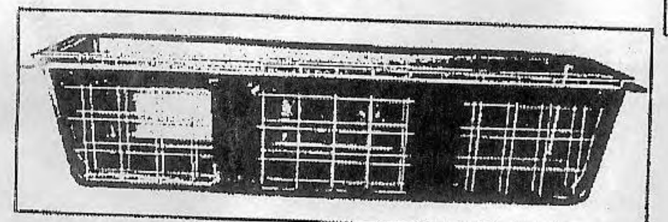


TRITON FILTER™ CURB INLET INSERT

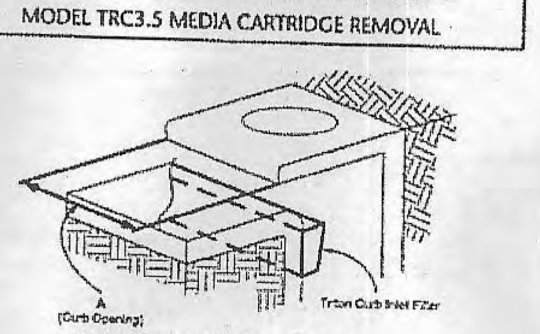


MODEL TRC3.5

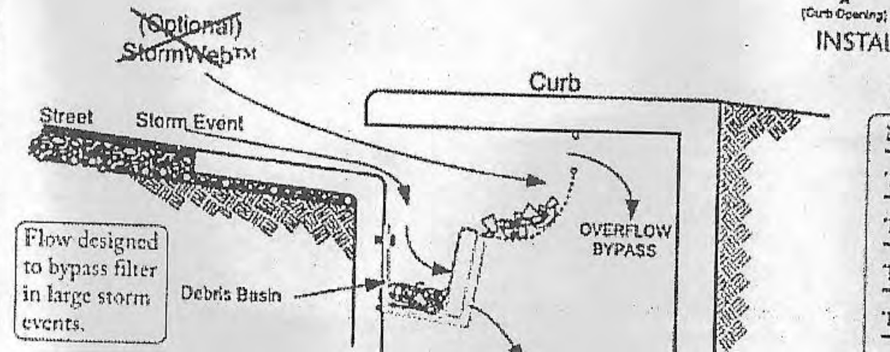
MODEL TRC3.5 MEDIA CARTRIDGE REMOVAL



MODEL TRC3.5 - LITTER ONLY



INSTALLED ISOMETRIC VIEW



STANDARD DIMENSIONS

MODEL	A (CURB OPENING)
TRC2	2.00
TRC2.5	2.50
TRC3	3.00
TRC3.5	3.50

REM
www.remfilters.com

Revel Environmental Manufacturing Inc.
sales@remfilters.com (888) 526-4736 Lic. No. 857410

Northern California
960-B Detroit Avenue
Concord, California 94518
P: (925) 676-4736
F: (925) 676-8676

Southern California
215 E. Orangethorpe Ave., #282
Fullerton, California 92832
P: (714) 720-4604
F: (714) 557-2679

TOOLS REQUIRED:
1) Hammer Drill, with 1/4" masonry drill bit.
2) Hammer.
3) Measuring Tape.
4) 1/4" X 2.25" Concrete Anchors. i.e. (Red Head)

For the Installation of the TRITON Curb Inlet

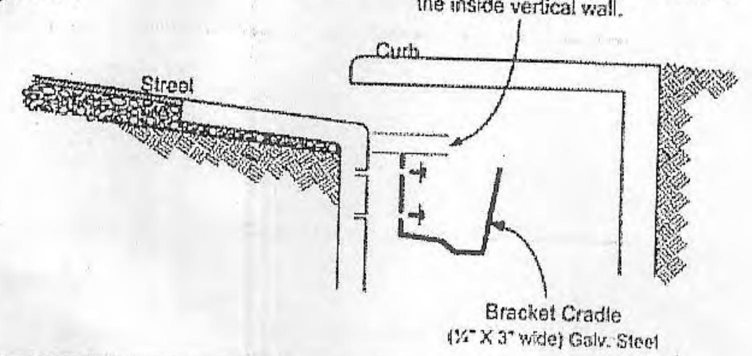
PATENT PENDING

Step #1)
Starting from the left wall to right when inside of catch basin (facing the street), Place curb inlet 2" to 3" below the start of the inside vertical wall. Mark the height on the wall.

Note: Each section should come with two Cradle Brackets.

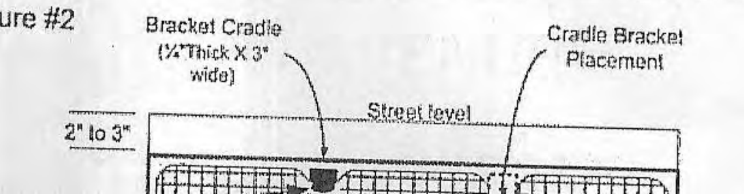
For curb inlets larger than 3.5', Joint Cplg's will also be supplied. (See Figure #3)

Figure #1



Step #2)
Determine where the Cradle bracket is to be placed horizontally along inside wall. The bracket should be placed in between the windows of the curb inlet filter. For a 2' Curb Inlet section with one window, the brackets will go on the two ends.
Mark the location on the wall. Having the

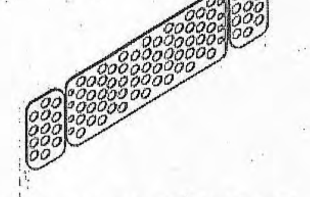
Figure #2



Catch Basin Opening Screen Cover

CITY OF IRWINDALE &
IRWINDALE REDEVELOPMENT AGENCY
DEPARTMENT OF PUBLIC WORKS

STORM DRAIN MTD #1595
IN E. LIVE OAK AVE. & ARROW HWY.



OPTIONAL "CEILING LOCK" SYSTEM

GENERAL NOTES:

1. All catch basin opening screen cover parts shall be of 304 stainless steel.
2. The vertical distance between the surf gate and the upper underside of the curb shall not exceed one and one half inch (1-1/2") inch.
3. The distance between the vertical perforated metal satellite, the side wall and the upper and lower curb shall not exceed three quarter (3/4") inch.
4. The gate shall be placed at a minimum angle of ninety (90°) degrees, to the catchment area.
5. Concrete wedge anchor depth, embedment, shall be a minimum of three (3") inches.
6. The gate and its components vary in size and are based on the length and width of the curb opening.
7. Height and width of the screen cover varies, depends on field conditions.
8. The perforations of the screen cover shall be three quarter inch (3/4") diameter through out.
9. C.B. screen cover shall have a smooth & straight perimeter with no jagged edges.
10. Surf gatet shall not be installed in culverts and low flows.
11. Surf gatet shall only be installed in combination curb opening / grate basins at the direction of the engineer.
12. Surf gatet will be supplied to the city in lengths from 35" to 78" inch.
13. Multi gatet assembles may require satellite components that may vary in length from (2") two inch to (6") six inch, to accommodate standard surf gatet sizes.

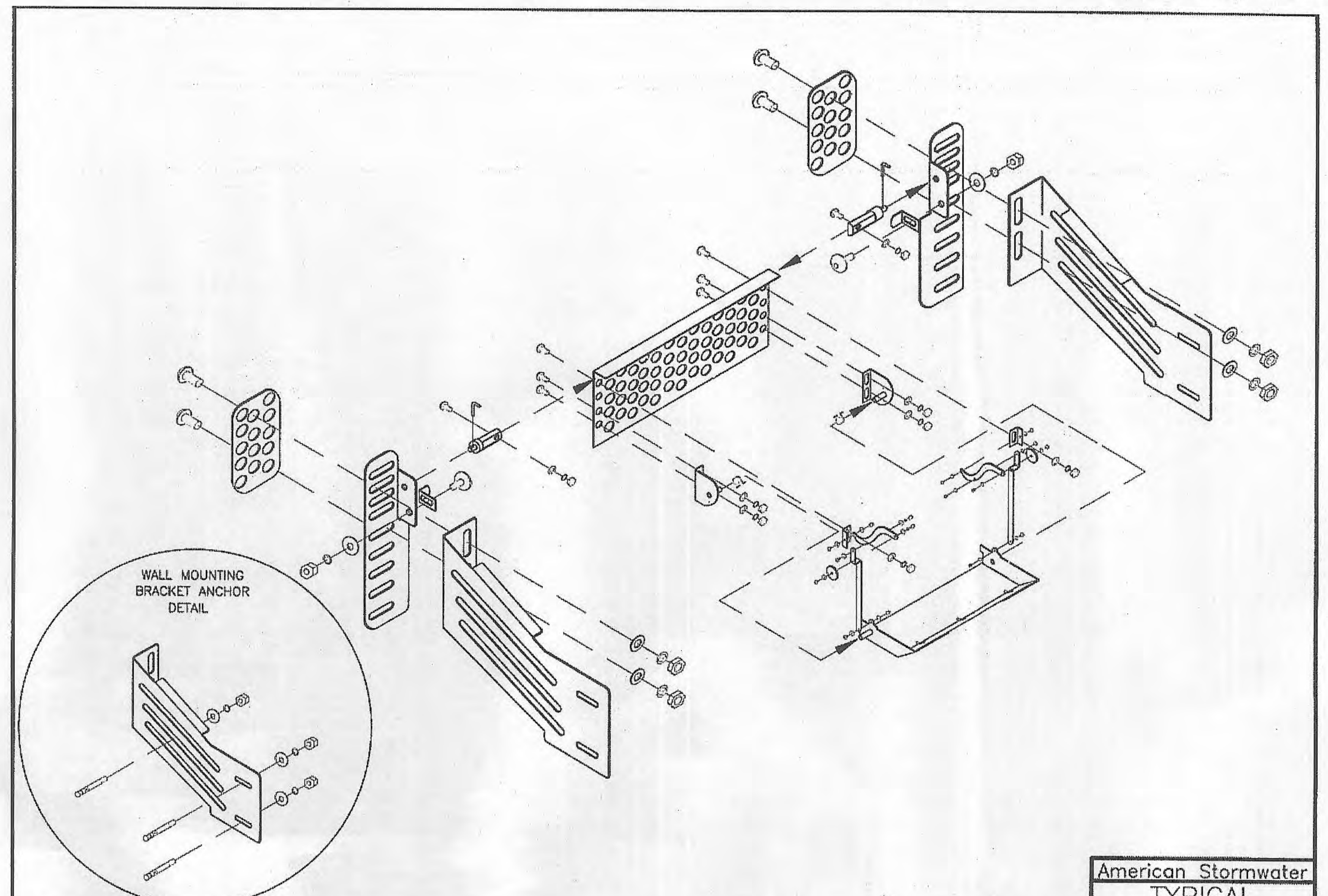
Table of Contents

SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

Submitted By:

ECOLOGY CONTROL INDUSTRIES
AMERICAN STORM WATER DIVISION
20846 NORMANDIE AVENUE
TORRANCE, CA 90502
Phone: 310-354-9999
Fax: 310-354-6673

12/22/2008 8

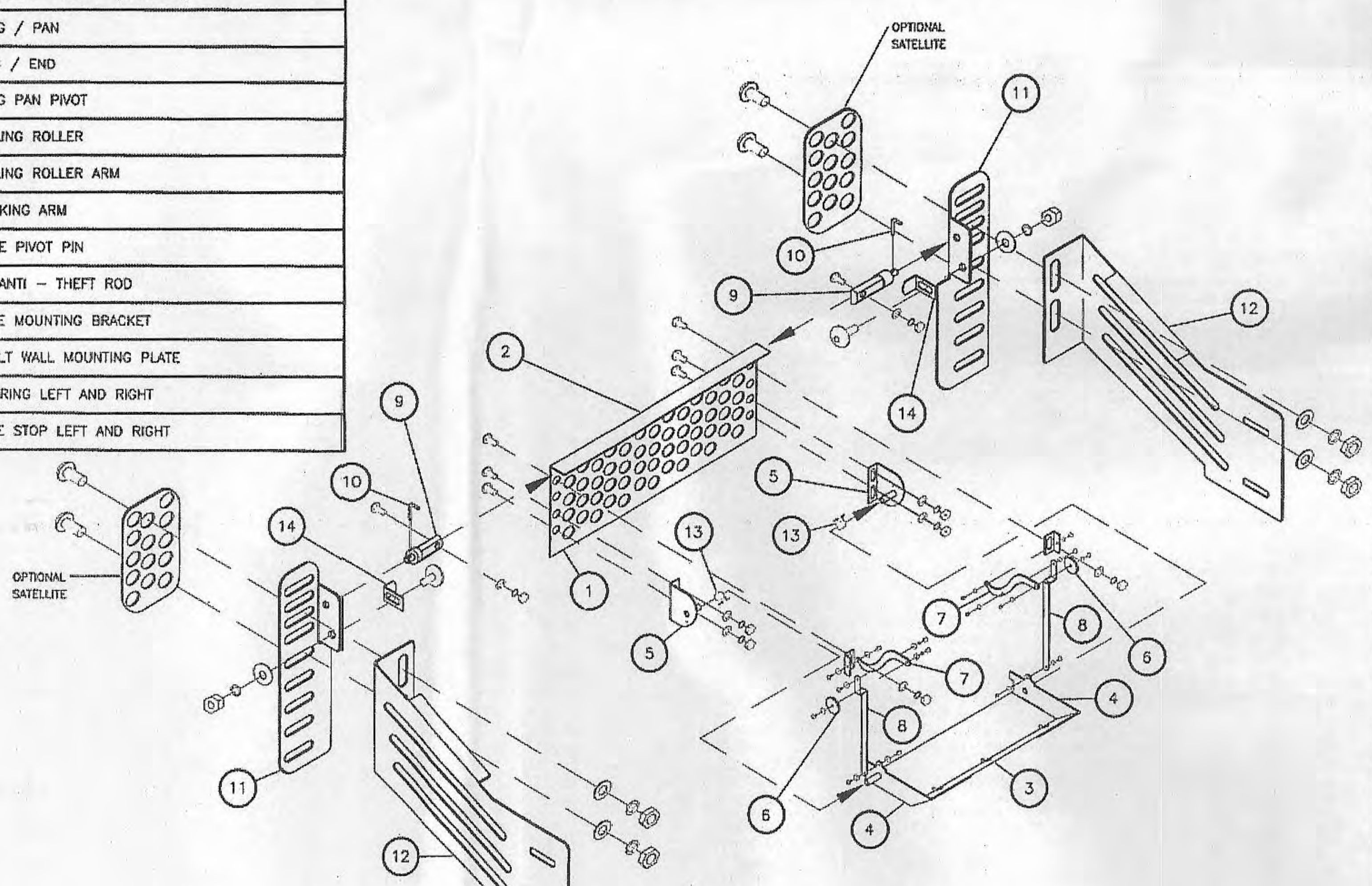


SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ALL PARTS, BOLTS & FASTENERS ARE 304 STAINLESS STEEL
PARTS VARY IN SIZE BASED ON CATCH BASIN DIMENSIONS

American Stormwater
TYPICAL SURF GATET ASSEMBLY
12/18/07 SCALE: NTS DRAWN BY: J.A. CHECKED BY: T.W. APPROVED BY: R.F.
1 OF 3
9

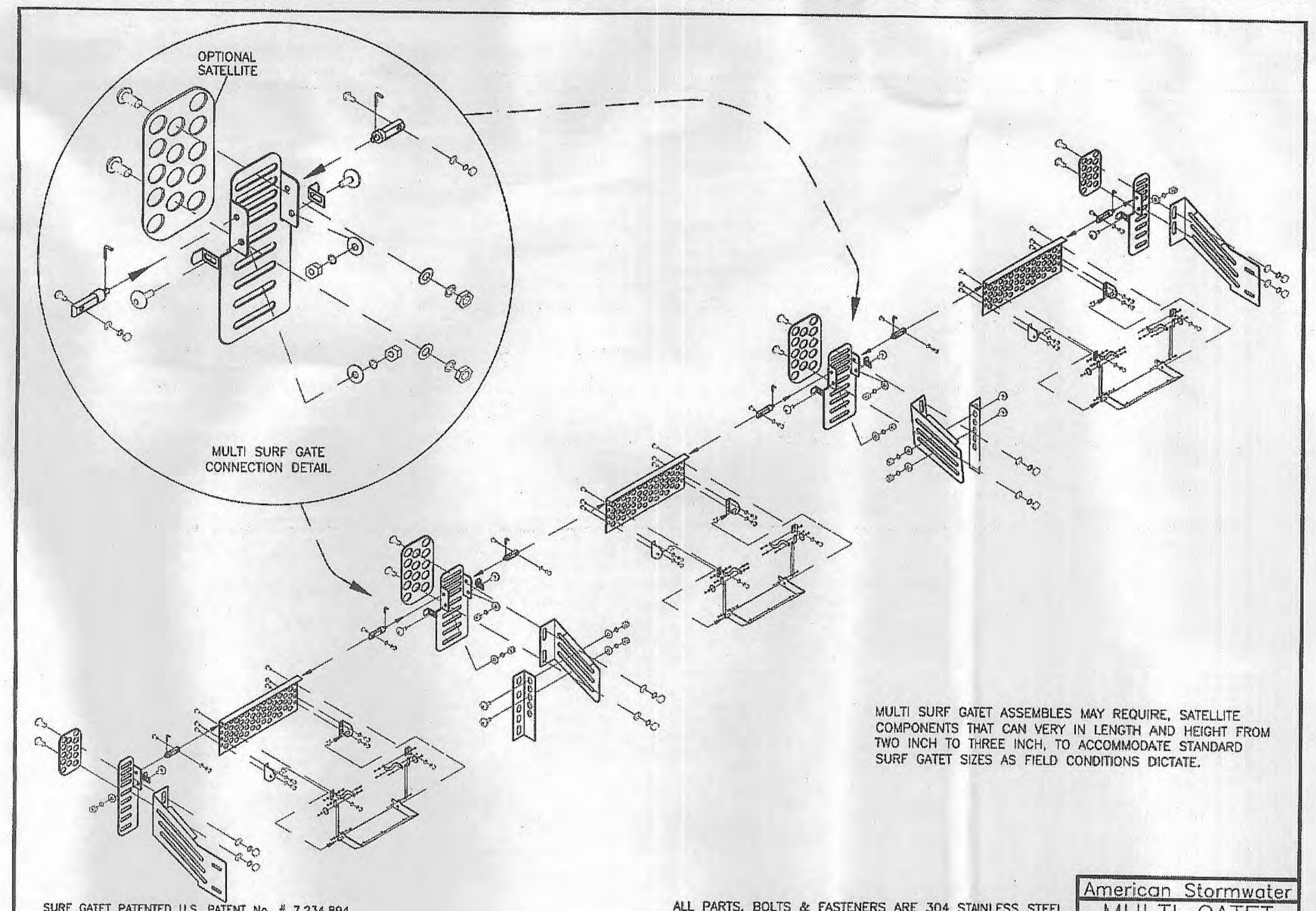
NO.	QTY	MATERIALS
1	1	12 ga. PERFORATED SCREEN W/ 0.75 HOLE STG. CENTER
2	1	1" X 1" X 0.125" ANGLE (OPTIONAL)
3	1	18 ga. WING / PAN
4	2	14 ga WING / END
5	2	14 ga. WING PAN PIVOT
6	2	10 ga. CEILING ROLLER
7	2	10 ga. CEILING ROLLER ARM
8	2	10 ga. LOCKING ARM
9	2	1" DIA. GATE PIVOT PIN
10	2	0.156 DIA. ANTI - THEFT ROD
11	2	10 ga. GATE MOUNTING BRACKET
12	2	10 ga. VAULT WALL MOUNTING PLATE
13	2	TORSION SPRING LEFT AND RIGHT
14	2	14 ga. GATE STOP LEFT AND RIGHT



SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ALL PARTS, BOLTS & FASTENERS ARE 304 STAINLESS STEEL
PARTS VARY IN SIZE BASED ON CATCH BASIN DIMENSIONS

American Stormwater
SURF GATET PARTS BREAKDOWN
12/18/07 SCALE: NTS DRAWN BY: J.A. CHECKED BY: T.W. APPROVED BY: R.F.
2 OF 3
10



MULTI SURF GATET ASSEMBLES MAY REQUIRE, SATELLITE COMPONENTS THAT CAN VERY IN LENGTH AND HEIGHT FROM TWO INCH TO THREE INCH, TO ACCOMMODATE STANDARD SURF GATET SIZES AS FIELD CONDITIONS DICTATE.

SURF GATET PATENTED U.S. PATENT No. # 7,234,894
and U.S. PATENT No. # 7,467,911
ADDITIONAL PATENTS PENDING
PROPRIETARY & CONFIDENTIAL

ALL PARTS, BOLTS & FASTENERS ARE 304 STAINLESS STEEL
PARTS VARY IN SIZE BASED ON CATCH BASIN DIMENSIONS

American Stormwater
MULTI GATET ASSEMBLY
12/18/07 SCALE: NTS DRAWN BY: J.A. CHECKED BY: T.W. APPROVED BY: R.F.
3 OF 3
11

DEBRIS GATE AND FILTER DETAILS

NOT TO SCALE

DRAFTER J. K. CHILDERS | DESIGNER H. Y. OH | CHECKER V. NARSIM | CADD PART NUMBER XXX | REVIEWED BY XXX | DATE XXX

DDN 364-1107-F7.1-14

REVISIONS				
NO.	DATE	INIT.		APPV'D

BENCHMARK

BENCH MARK NUMBER: CC 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: | DATE

DRAWN BY	SAS
CHECKED	- GHO
RECOMMENDED	-
APPROVED	KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER

DATE: 4/28/09

PLANS PREPARED BY:
COORY ENGINEERING:
12631 E. IMPERIAL HWY, SUITE F-124 SANTA FE SPRINGS, CA 90670 (562) 868-8266

SAMIR M. KHOURY R.C.E. 30567 DATE 4/28/09
EXP. 3-31-2010

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 EXP. 3-31-2010 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
DETAILS
IRWINDALE CALIFORNIA

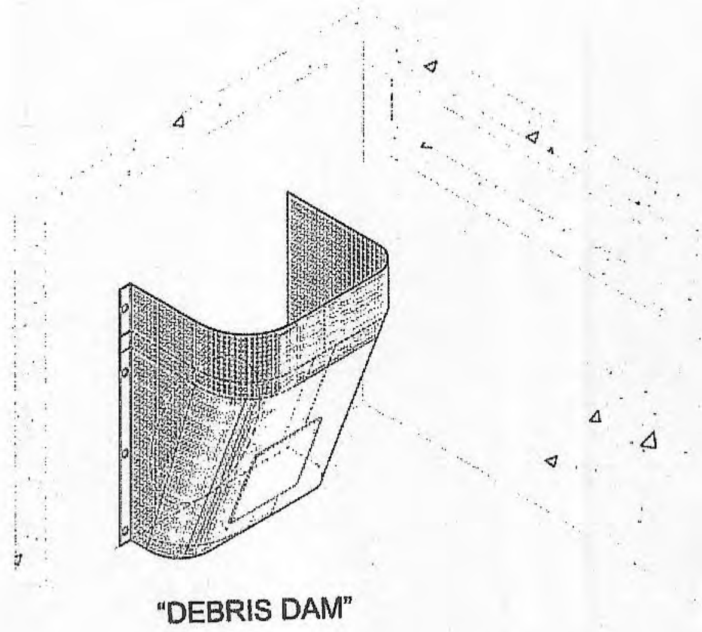
MTD
SHT 17 OF 19

SHT 35-D OF 74

CITY OF IRWINDALE & IRWINDALE REDEVELOPMENT AGENCY

DEPARTMENT OF PUBLIC WORKS

STORM DRAIN MTD #1595
IN E. LIVE OAK AVE. & ARROW HWY.



GENERAL NOTES:

1. Catch basin insert components shall be of 304 stainless steel, gauge 14.
2. Concrete wedge anchor depth, embedment, shall be a minimum of three (3) inches.
3. The diverter shall be placed at a minimum angle of ninety (90) degrees in the catchment area.
4. Height and width of the CB insert varies, depends on field conditions.
5. The perforations of the CB insert shall be 5 mm diameter through out.
6. CB insert shall have a smooth & straight perimeter with no jagged edges.
7. Number of rivets will vary from 12 to 30 depending on size of CB insert.
8. CB insert shall be a minimum of 18" inches of vertical screen excluding the diverter vertical dimension.
9. CB maintenance door is optional on all units.
10. CB insert shall not interfere with the operation of a CB screen cover that swings inward.
11. 1" X 1" 14 ga. stainless steel horizontal stiffener added as needed.
12. All dimensions vary based on depth & size of catch basin
13. Some large discharge pipe diameter configurations may not be able to accommodate insert installation. Consultation with the engineer is required for these situations.
14. Mounting holes in screen may vary to accommodate unevenness of catch basin.
15. All catch basins having a curb opening length equal or less than 7 (seven) feet, with the discharge pipe located on the front or rear shall have a corner wall mounted insert installed, as shown in sheet 2 (two). Installations in the front, only, shall include a solid or perforated diverter (Gauge 14 or gauge 16) above the insert to divert flow to the catchment area as shown.
16. Based on field conditions, insert configuration and assembly (see sheet 1) will vary. Contractor shall determine best option based on field conditions.
17. Any gaps greater than 5mm on the sides and bottom of insert, after being installed, shall be filled / caulked with a product approved by the engineer.

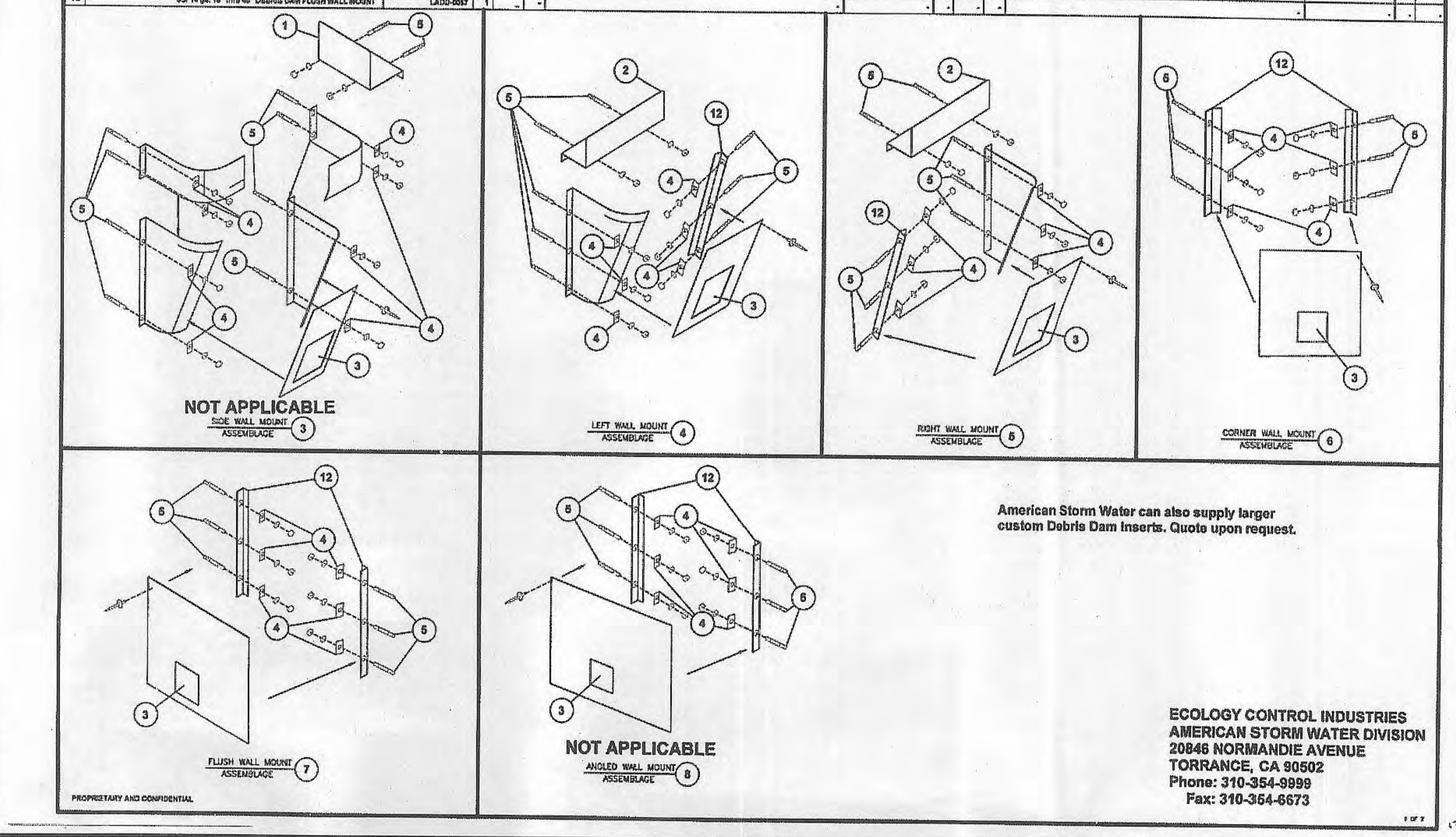
Catch Basin Insert

NOTE:
OMIT "DEBRIS DAM" FOR CATCH BASIN DEPTHS OVER 10' DEEP.

Table of Contents

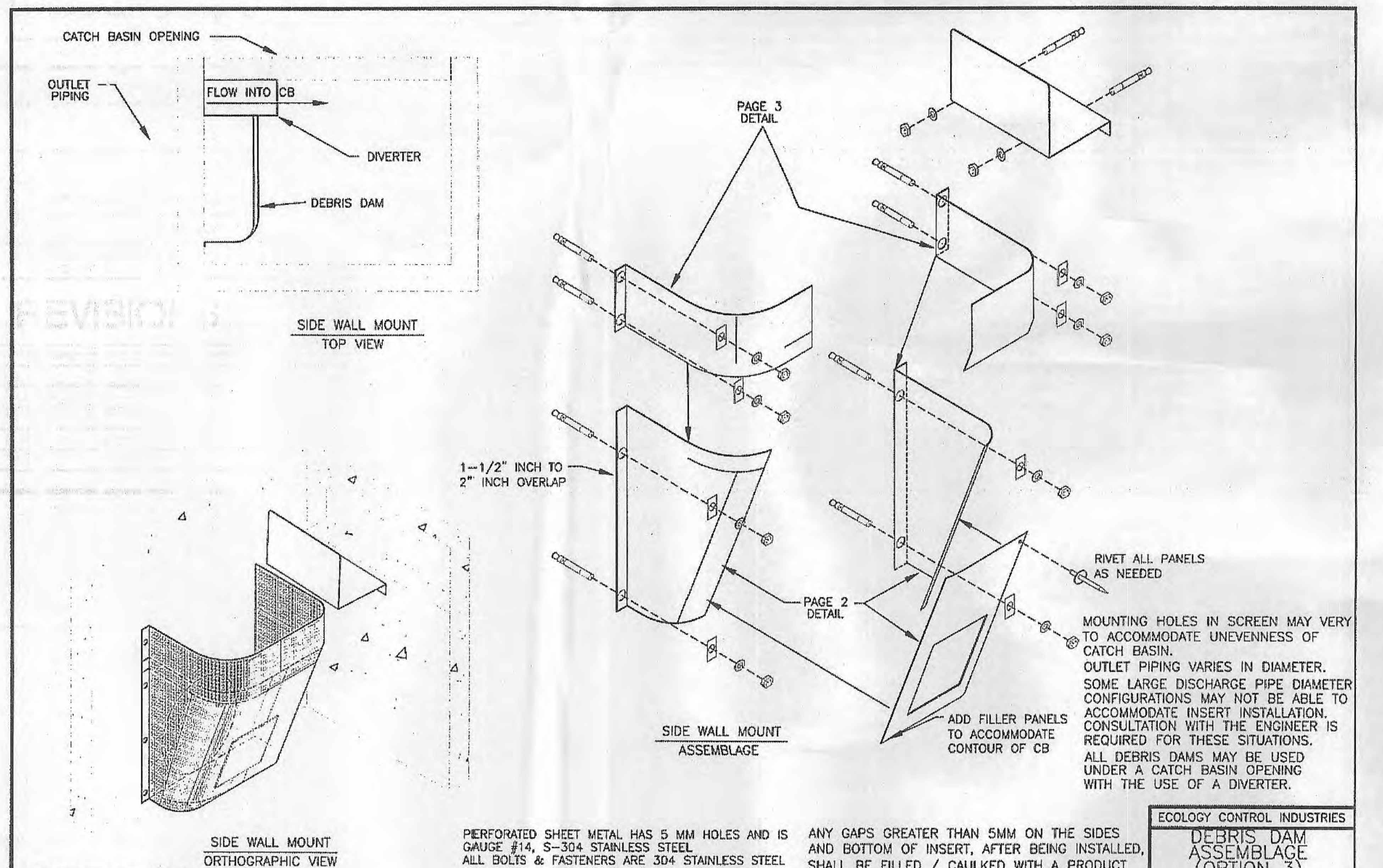
Submitted By:
ECOLOGY CONTROL INDUSTRIES
AMERICAN STORM WATER DIVISION
20846 NORMANDIE AVENUE
TORRANCE, CA 90502
Phone: 310-354-9999
Fax: 310-354-6673

NO.	DESCRIPTION	PART NO.	QTY.	WT.	NO.	DESCRIPTION	PART NO.	QTY.	WT.	NO.	DESCRIPTION	PART NO.	QTY.	WT.
1	SS/ 16 ga. PERFORATED SCREEN DIVERTER 16" LONG	[illegible]	1	_	11	SS/ 14 ga. 18" thru 48" DEBRIS DAM ANGLED WALL MOUNT	[illegible]	1	-					
2	SS/ 16 ga. PERFORATED SCREEN DIVERTER 27" LONG	[illegible]	1	_	12	SS/ 1" X 1" PERFORATED STIFFENER MOUNTING BRACKETS	[illegible]	[illegible]	-					
3	SS/ 14 ga. DOOR PANEL AND HARDWARE	[illegible]	1	_	-									
4	SS/ 16 ga. 1" X 4" X 3/8" HOLE, CLIPS	[illegible]	6	_	-									
5	SS/ 3/8" - 16 X 3" RED HEAD	[illegible]	6	_	-									
6	SS/ 14 ga. 18" thru 48" DEBRIS DAM SIDE WALL MOUNT	[illegible]	1	_	-									
7	SS/ 14 ga. 18" thru 48" DEBRIS DAM LEFT WALL MOUNT	[illegible]	1	_	-									
8	SS/ 14 ga. 18" thru 48" DEBRIS DAM RIGHT WALL MOUNT	[illegible]	1	_	-									
9	SS/ 14 ga. 18" thru 48" DEBRIS DAM CORNER WALL MOUNT	[illegible]	1	_	-									
10	SS/ 14 ga. 18" thru 48" DEBRIS DAM FLUSH WALL MOUNT	[illegible]	1	_	-									



American Storm Water can also supply larger custom Debris Dam Inserts. Quote upon request.

ECOLOGY CONTROL INDUSTRIES
AMERICAN STORM WATER DIVISION
20846 NORMANDIE AVENUE
TORRANCE, CA 90502
Phone: 310-354-9999
Fax: 310-354-6673

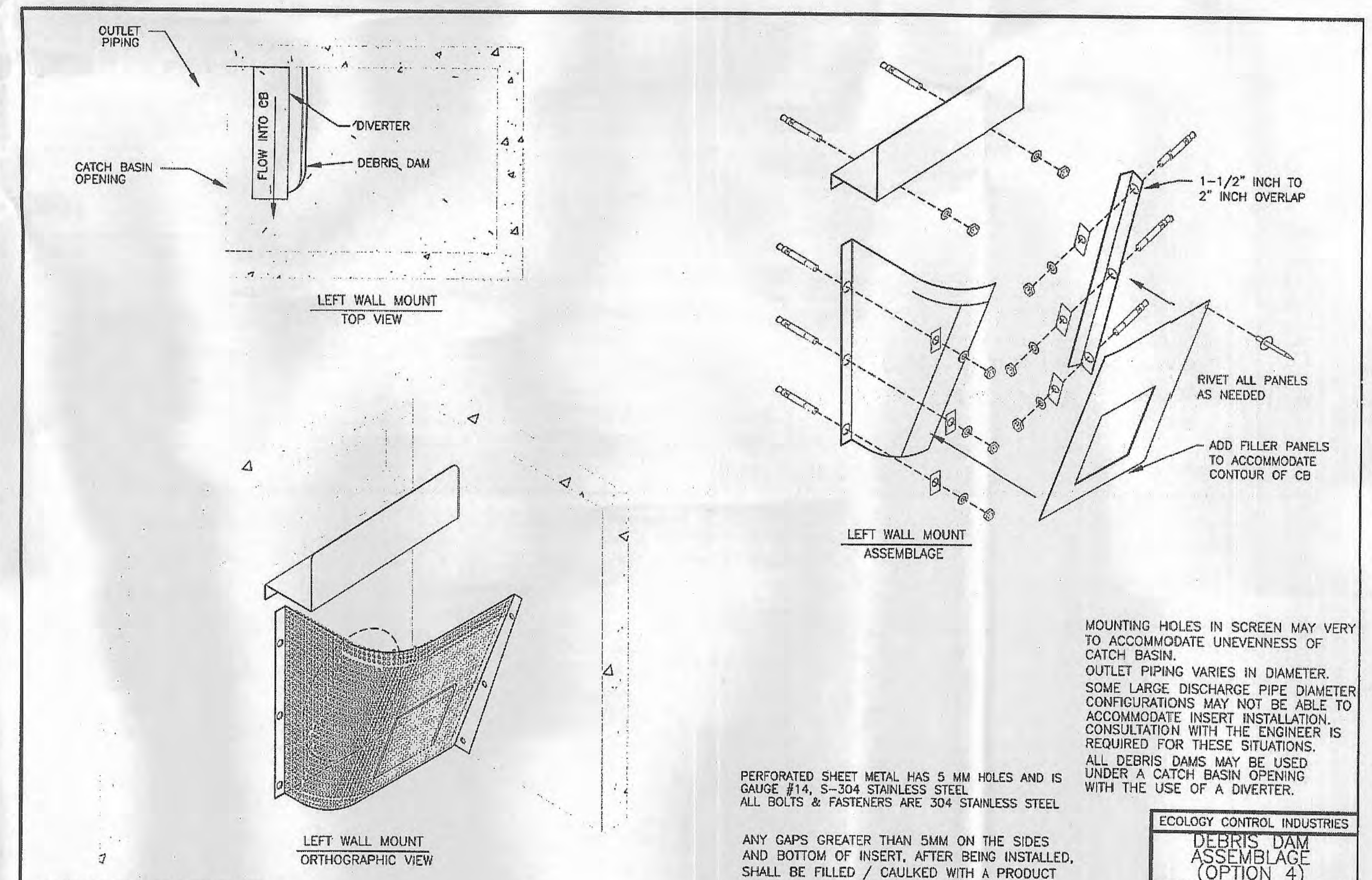


MOUNTING HOLES IN SCREEN MAY VERY TO ACCOMMODATE UNEVENNESS OF CATCH BASIN.
OUTLET PIPING VARIES IN DIAMETER.
SOME LARGE DISCHARGE PIPE DIAMETER CONFIGURATIONS MAY NOT BE ABLE TO ACCOMMODATE INSERT INSTALLATION. CONSULTATION WITH THE ENGINEER IS REQUIRED FOR THESE SITUATIONS.
ALL DEBRIS DAMS MAY BE USED UNDER A CATCH BASIN OPENING WITH THE USE OF A DIVERTER.

PERFORATED SHEET METAL HAS 5 MM HOLES AND IS GAUGE #14, S-304 STAINLESS STEEL
ALL BOLTS & FASTENERS ARE 304 STAINLESS STEEL

ANY GAPS GREATER THAN 5MM ON THE SIDES AND BOTTOM OF INSERT, AFTER BEING INSTALLED, SHALL BE FILLED / CAULKED WITH A PRODUCT APPROVED BY THE ENGINEER.

ECOLOGY CONTROL INDUSTRIES
DEBRIS DAM ASSEMBLAGE (OPTION 3)
2 OF 7



MOUNTING HOLES IN SCREEN MAY VERY TO ACCOMMODATE UNEVENNESS OF CATCH BASIN.
OUTLET PIPING VARIES IN DIAMETER.
SOME LARGE DISCHARGE PIPE DIAMETER CONFIGURATIONS MAY NOT BE ABLE TO ACCOMMODATE INSERT INSTALLATION. CONSULTATION WITH THE ENGINEER IS REQUIRED FOR THESE SITUATIONS.
ALL DEBRIS DAMS MAY BE USED UNDER A CATCH BASIN OPENING WITH THE USE OF A DIVERTER.

PERFORATED SHEET METAL HAS 5 MM HOLES AND IS GAUGE #14, S-304 STAINLESS STEEL
ALL BOLTS & FASTENERS ARE 304 STAINLESS STEEL

ANY GAPS GREATER THAN 5MM ON THE SIDES AND BOTTOM OF INSERT, AFTER BEING INSTALLED, SHALL BE FILLED / CAULKED WITH A PRODUCT APPROVED BY THE ENGINEER.

ECOLOGY CONTROL INDUSTRIES
DEBRIS DAM ASSEMBLAGE (OPTION 4)
3 OF 7

DEBRIS GATE AND FILTER DETAILS

NOT TO SCALE

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

DDN 364-1107-F7.1-.14

REVISIONS

NO.	DATE	INIT.		APPV'D

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL CF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: DATE

DRAWN BY	SAS
CHECKED	- GHO
RECOMMENDED	-
APPROVED	KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER 4/28/09 DATE

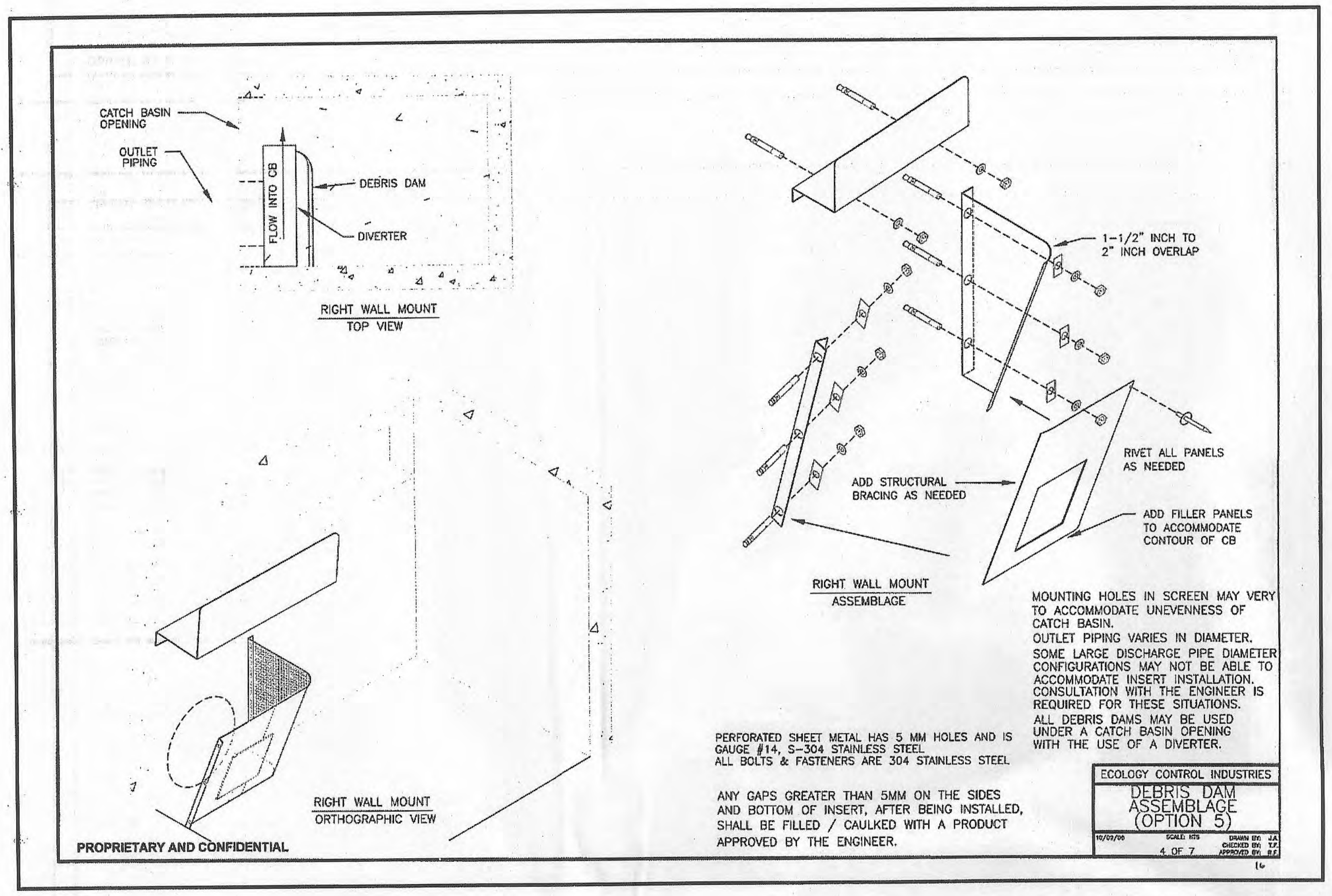
PLANS PREPARED BY:
COORY ENGINEERING:
13631 E. IMPERIAL HWY, SUITE F-124 SANTA FE SPRINGS, CA 90670 (562) 868-8268

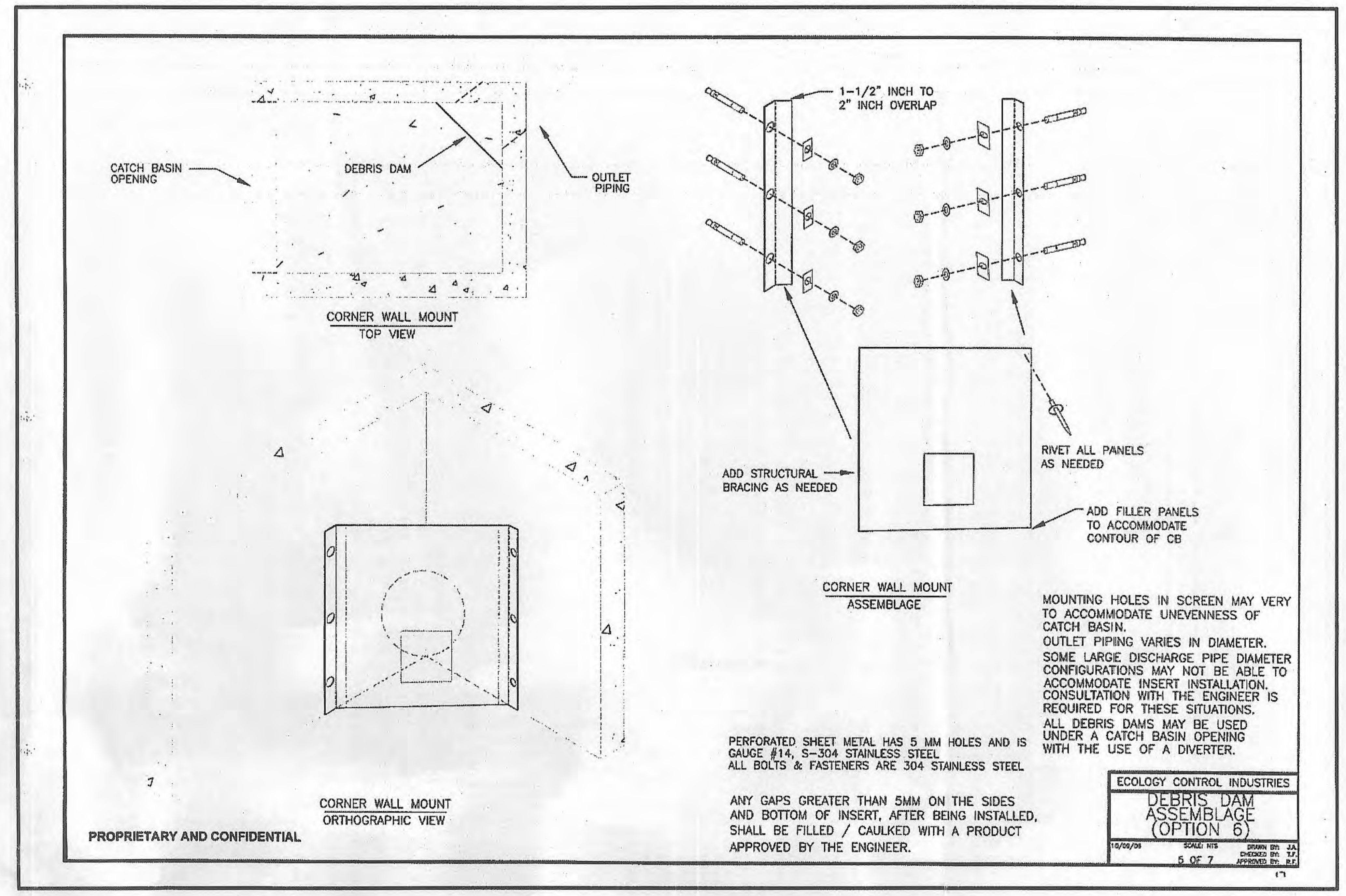
SAMIR M. KHOURY R.C.E. 30567 4/28/09 DATE
EXP. 3-31-2010

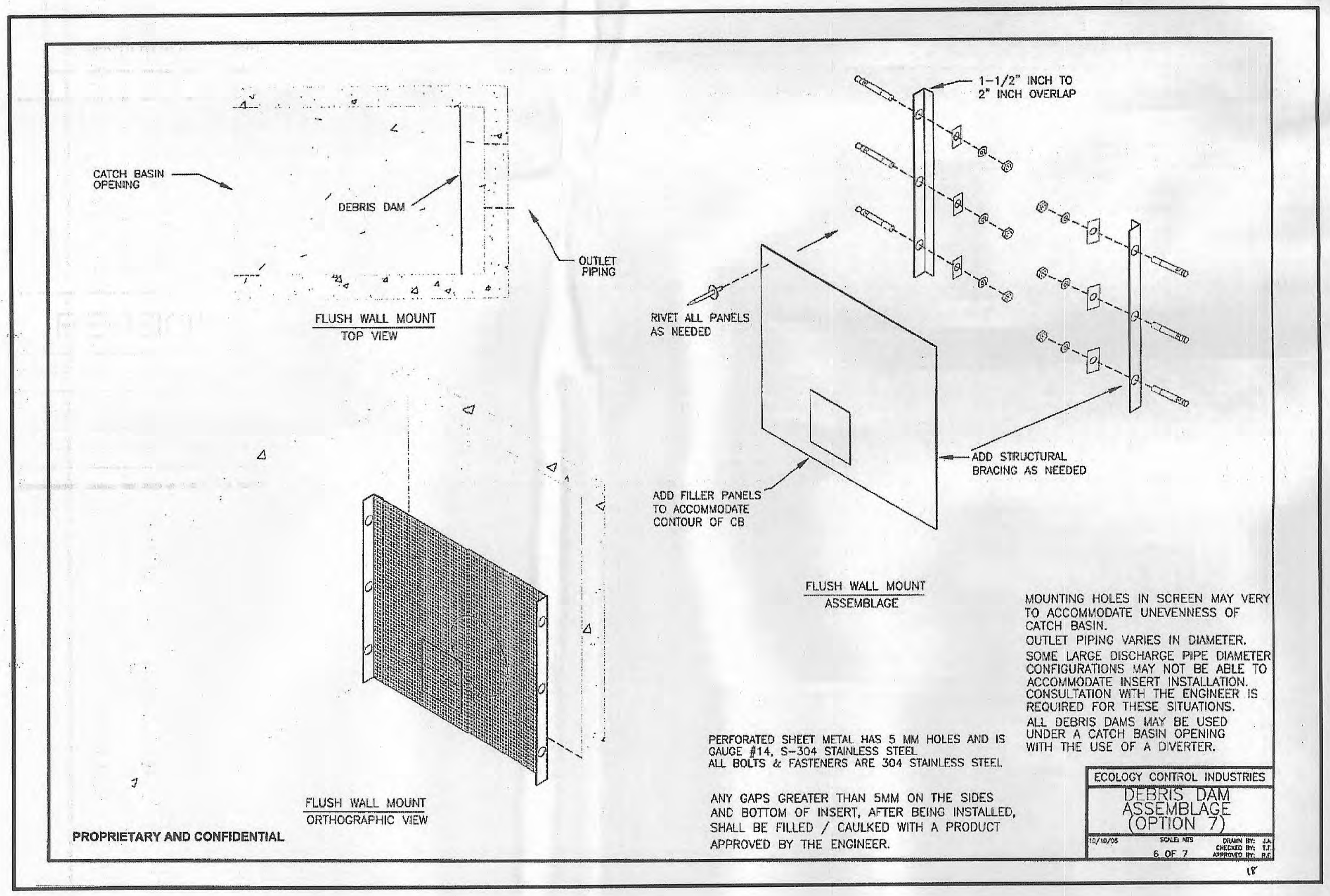
REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 EXP. 3-31-2010 CIVIL STATE OF CALIFORNIA

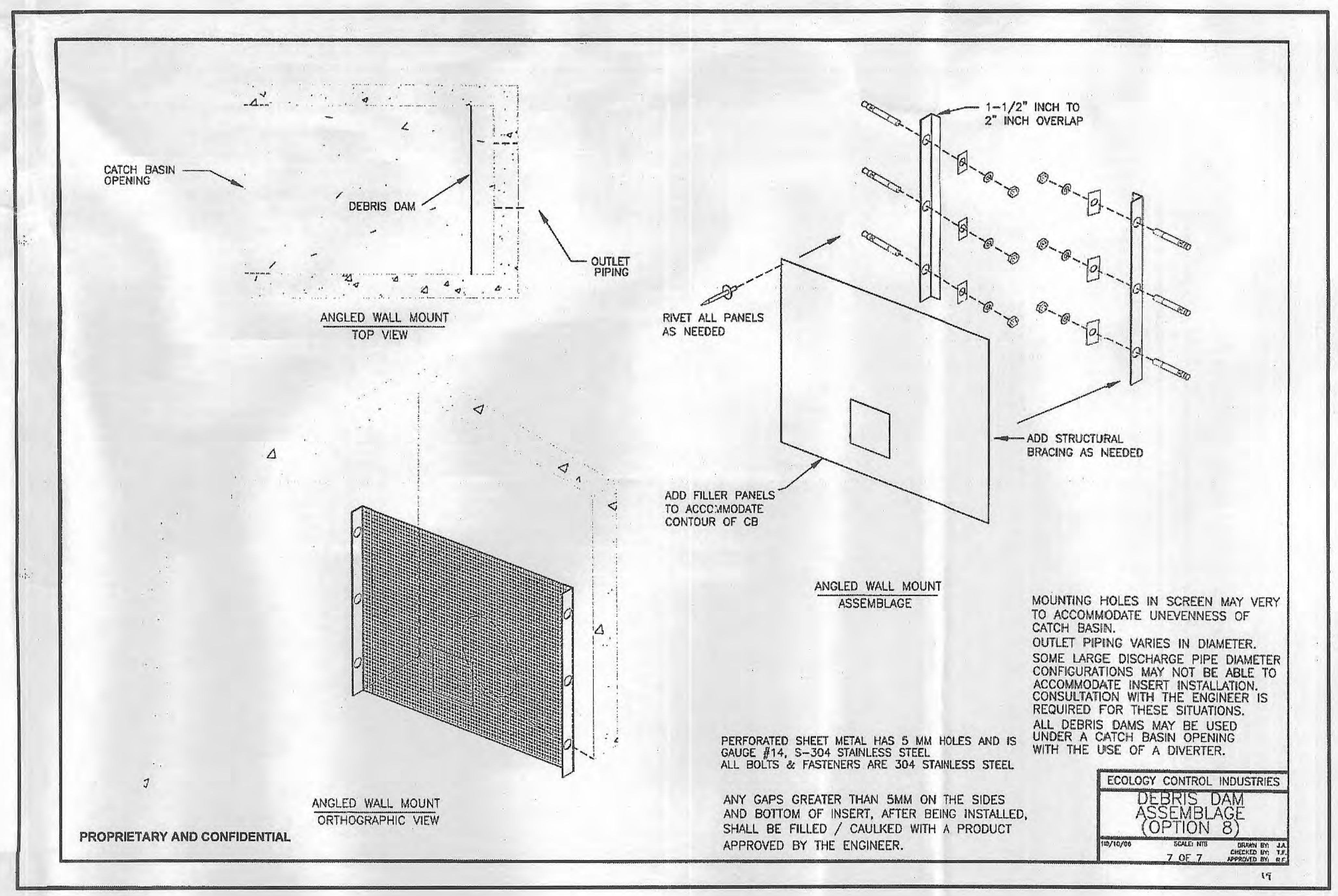
CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
DETAILS
IRWINDALE CALIFORNIA

MTD
SHT 18 OF 19
- - -
SHT 35-E OF 74









DEBRIS GATE AND FILTER DETAILS

NOT TO SCALE

NOTE:
OMIT "DEBRIS DAM" FOR CATCH BASIN DEPTHS OVER 10' DEEP.

DRAFTER	DESIGNER	CHECKER	CADD PART NUMBER	REVIEWED	DATE
J. K. CHILDERS	H. Y. OH	V. NARSIM	XXX	BY XXX	XXX

REVISIONS

NO.	DATE	INIT.		APPV'D

BENCHMARK

BENCH MARK NUMBER: CG 2637 BENCH MARK ELEV. = 353.870
FC BR CAP IN S END W WINGWALL OF BRIDGE NO 964 @ SE COR PECK RD & LIVE OAK ST 48 FT S & 82 FT E APPROX C/L INT MKD (67-76 1995), NGVD 29 DATUM

PREPARED UNDER THE SUPERVISION OF: DATE

DRAWN BY	SAS
CHECKED	- GHO
RECOMMENDED	
APPROVED	KWOK TAM, P.E. PUBLIC WORKS DIRECTOR/CITY ENGINEER 4/28/09 DATE

PLANS PREPARED BY:
COORY ENGINEERING:
12631 E. IMPERIAL HWY, SUITE F-124 SANTA FE SPRINGS, CA 90670 (562) 868-8266

4/29/09
SAMIR M. KHOURY R.C.E. 30567 DATE
EXP. 3-31-2010

REGISTERED PROFESSIONAL ENGINEER SAMIR M. KHOURY No. 30567 EXP. 3-31-2010 CIVIL STATE OF CALIFORNIA

CITY OF IRWINDALE
STORM DRAIN IMPROVEMENT PLANS M.T.D. #1595
ARROW HIGHWAY & E. LIVE OAK AVENUE
DETAILS
IRWINDALE **CALIFORNIA**

MTD
SHT 19 OF 19
- - -
SHT 35-F OF 74

DDN 364-1107-F7.1-14

APPENDIX G

BMP Maintenance Literature

Bio Clean®

A Forterra Company

WetlandMod®

A Stormwater Biofiltration Solution

OVERVIEW

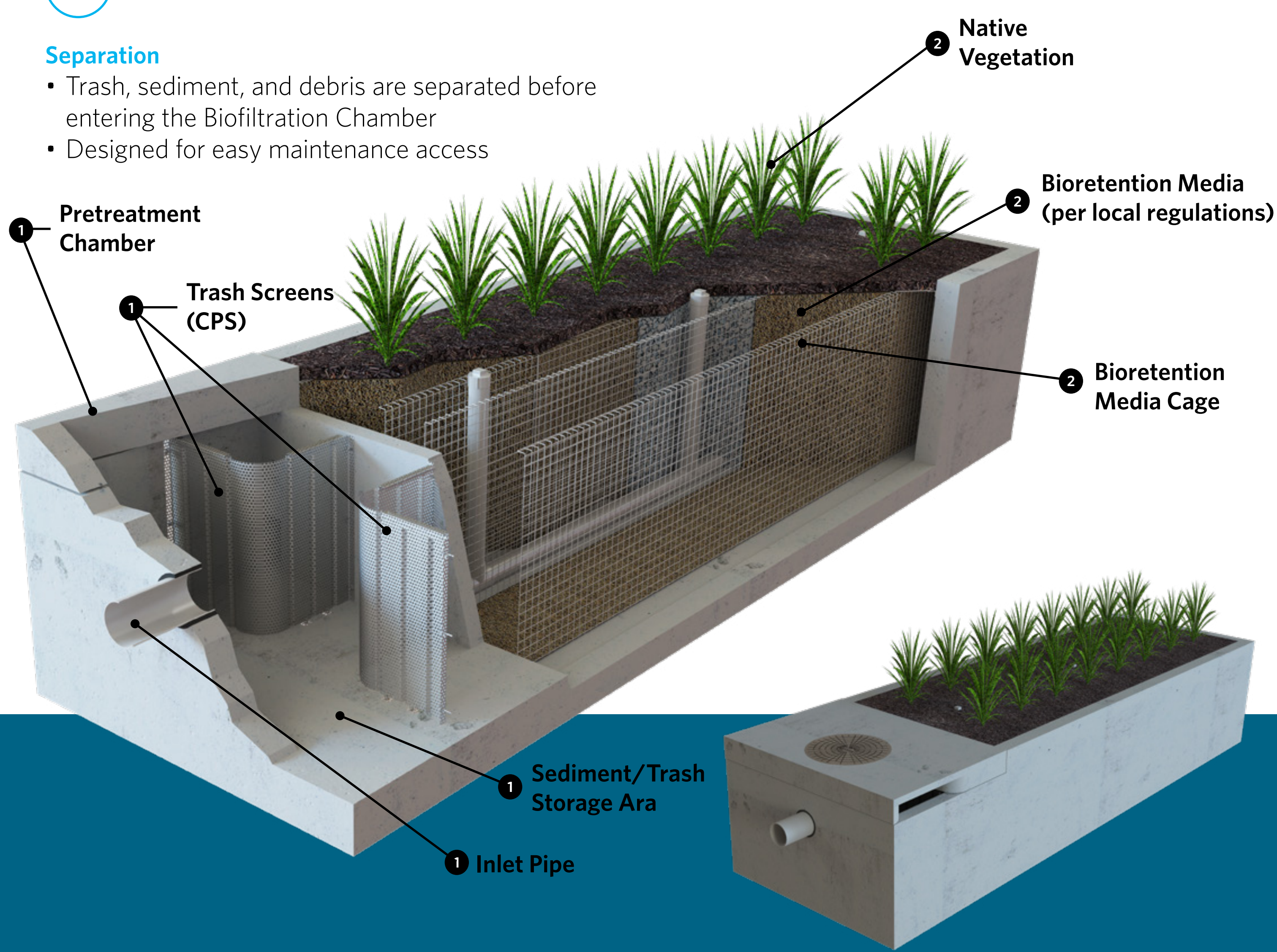
The WetlandMod® provides the ***right*** direction in stormwater bioretention/biofiltration treatment, leveraging the same horizontal flow advantages as the Modular Wetlands® System Linear to combine screening, separation, and biofiltration treatment stages.

WetlandMod is a modular compact solution, and Low Impact Development (LID) solution which is functionally equivalent to bioretention, with up to a 50% smaller footprint and the ability to reduce and control water volume in a more efficient way.

1 PRETREATMENT CHAMBER

Separation

- Trash, sediment, and debris are separated before entering the Biofiltration Chamber
- Designed for easy maintenance access



2 BIOFILTRATION CHAMBER

Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

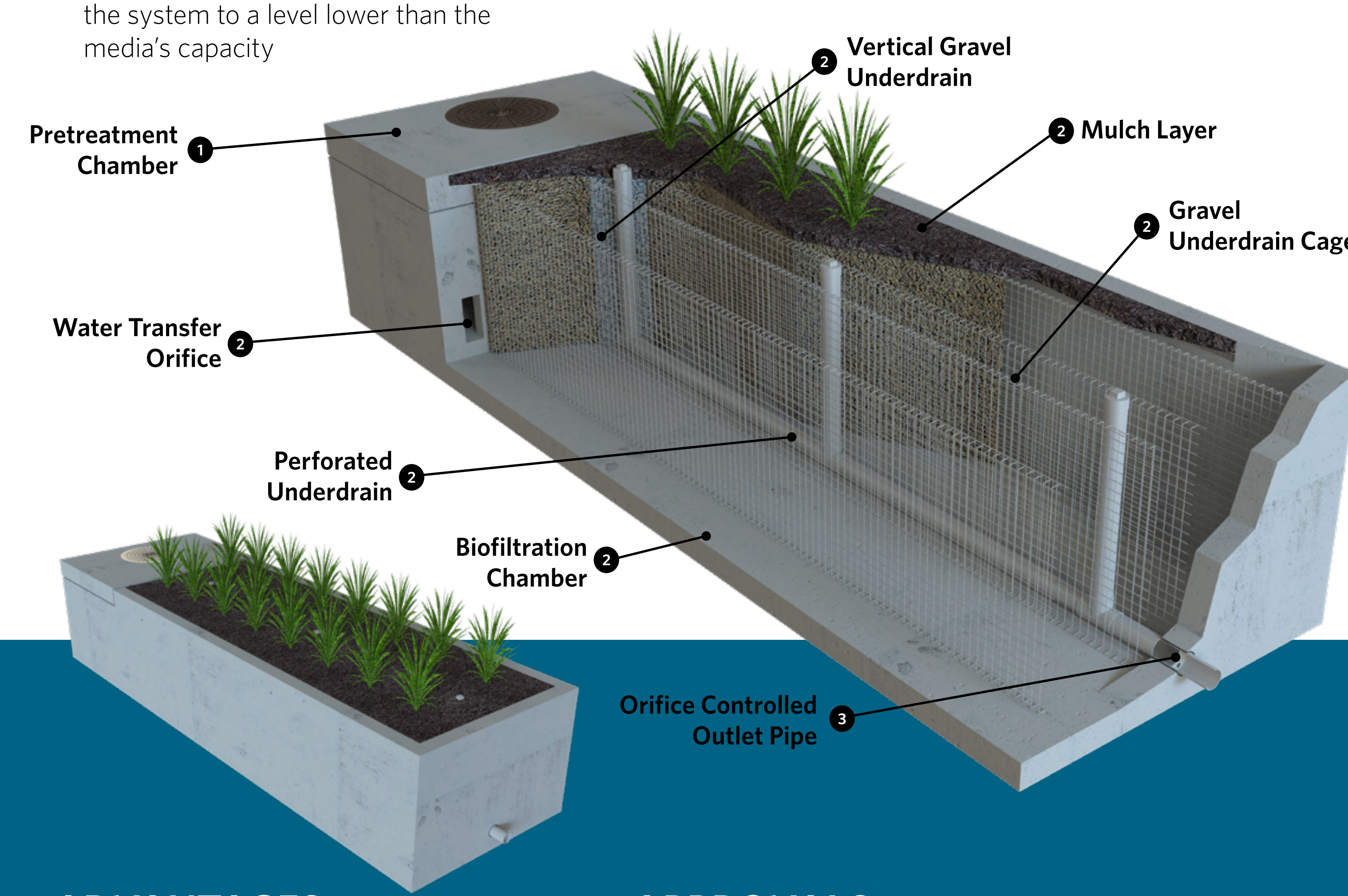
Patented Vertical Void Area

- Vertical ponding area between the walls and biofiltration media
- Maximizes surface area of the media for higher treatment capacity

3 DISCHARGE

Flow Control

- Orifice plate controls flow of water through the system to a level lower than the media's capacity
- Extends the life of the media and improves performance



ADVANTAGES

- REDUCES CLOGGING
- BUILT-IN PRETREATMENT
- USES AGENCY PRESCRIBED BIORETENTION SOILS
- NO DEPRESSED LANDSCAPING/ PONDING WATER
- 50% SMALLER FOOTPRINT
- LID COMPLIANT
- NO STANDING WATER / VECTOR CONTROL ISSUES

ADVANTAGES

- 5" - 12"/ HOUR INFILTRATION RATE
- LOW MAINTENANCE COSTS
- INCREASED AESTHETIC APPEAL
- NO SAFETY CONCERNS

APPROVALS

WA

WASHINGTON ECOLOGY

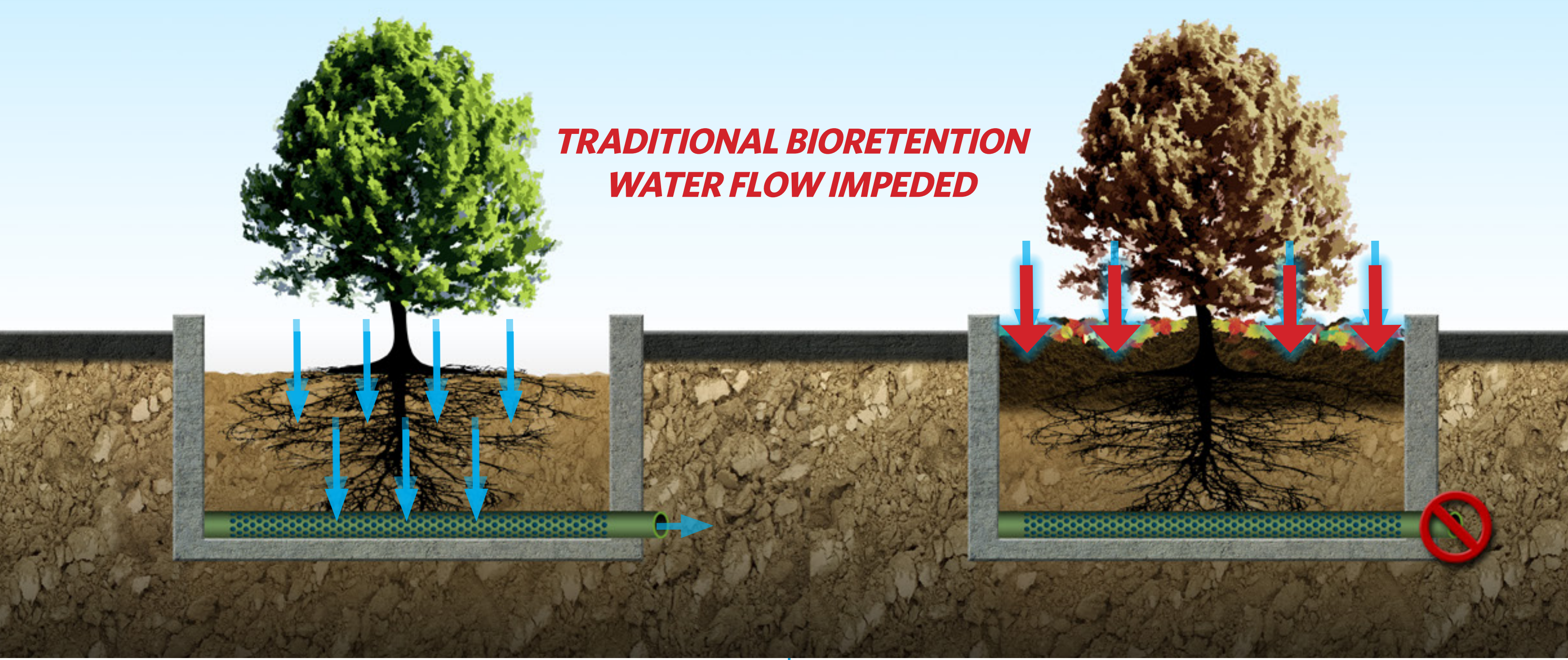
Functionally Equivalent to a Bioretention Facility for Treating Stormwater

(Bioretention examples: Planter Boxes, Rain Gardens, Biofiltration)

ALTERNATIVE DOWNWARD FLOW FLAWS

Bioretention systems have an inherent flaw — the force of gravity. As stormwater runoff carries pollutants into the system, including sediments and hydrocarbons, they are deposited on top of the bioretention media where it accumulates and quickly clogs the filter media.

It has been documented that sediment accumulation from just a few storm events can completely clog a bioretention system. This leads to drastically reduced infiltration rates, expensive maintenance burdens, and safety issues associated with standing water, depressed landscaping, and vector control.



Downward flow systems filter water in a single vertical direction, forcing polluted material to build up on the top.

As sediment rapidly builds up on the media bed, flow is impeded and the bioretention system quickly clogs or fails.

	Standard Bioretention	WetlandMod System
Total Suspended Solids (TSS) Performance Above 90%?	✔ Yes	✔ Yes
Water Volume Treated	✘ 1.074 Million Gallons	✔ 1.596 Million Gallons (33%More)
Sediment Load Treated	✘ 8,224 Pounds	✔ 11,460 Pounds (28% More)

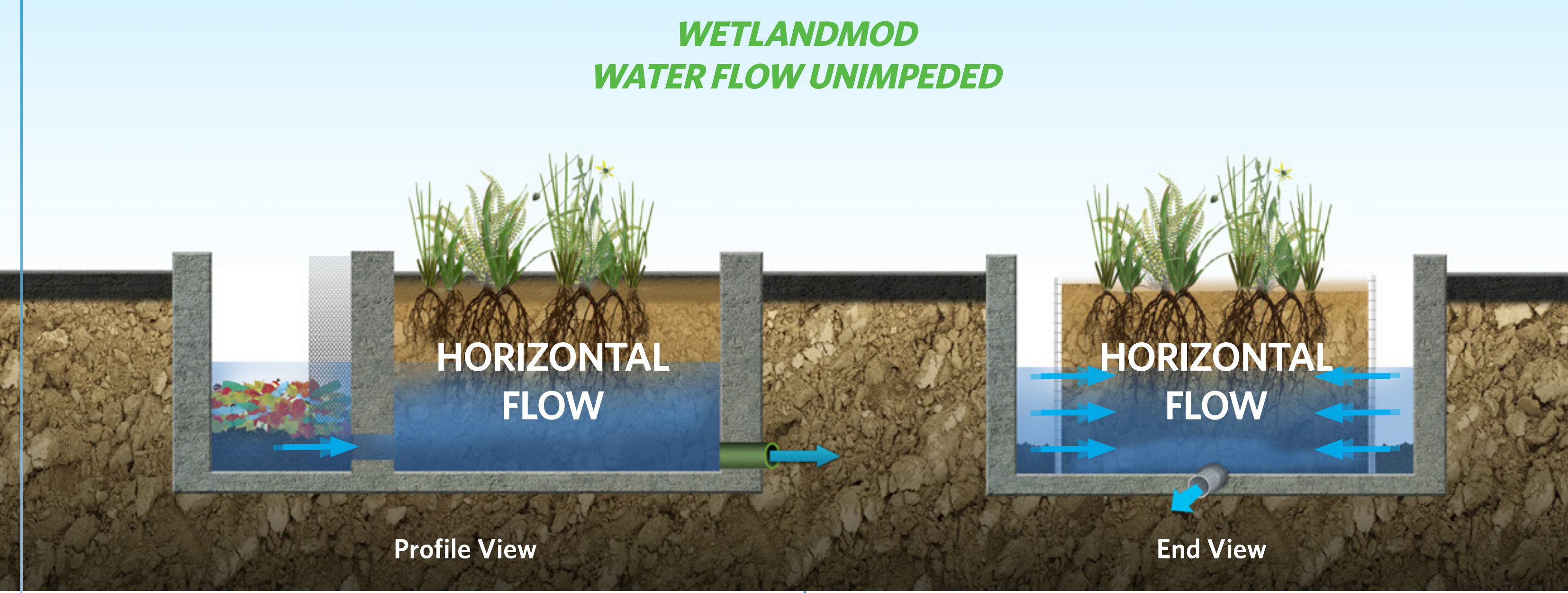
Notes
1. Numbers scaled to a 1306 sqft bioretention system which is typical sizing for a 1 acre commercial development
2. Testing stopped once infiltration rate fell below 5 in/hr at which point the system is no longer treating the design flow rate or water quality volume.
3. Based upon independent third-party comparative testing.

OPERATION

WETLANDMOD FLOW DIRECTION

Horizontal flow biofiltration systems allow sediments to accumulate adjacent to the media bed, drastically reducing clogging, and focusing maintenance attention to one area; for long-term efficiency and treatment quality.

WetlandMod's horizontal design also allows water to consistently flow subsurface, clear of obstructions in a more controlled state.



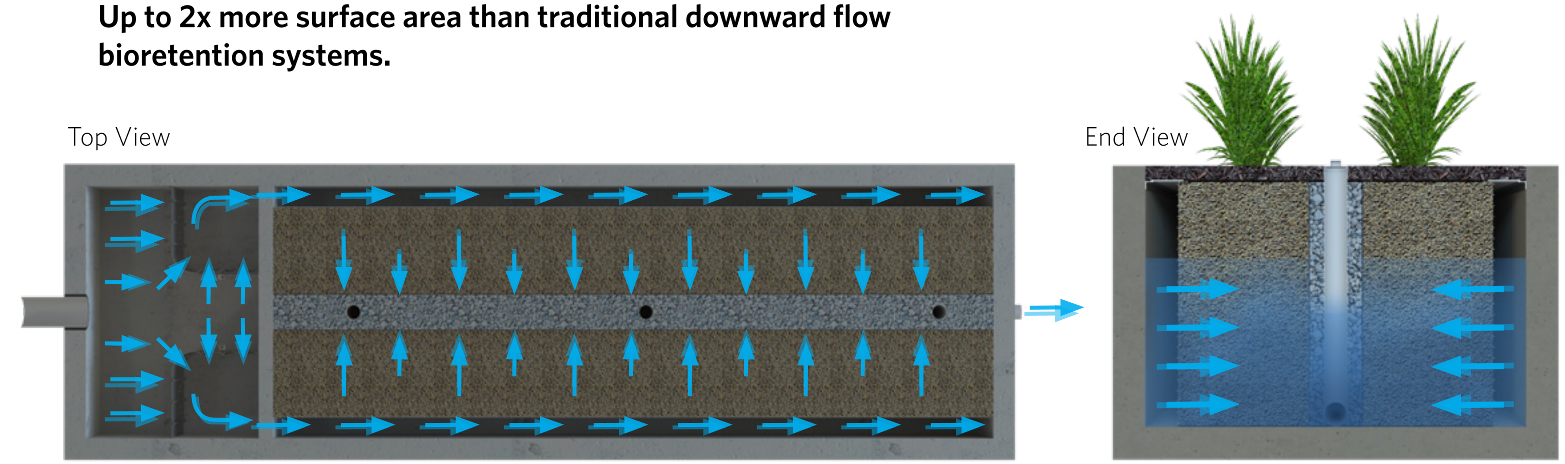
Sediment, trash and debris entering the WetlandMod accumulate adjacent to vertical media surface, reducing clogging.

The vertical ponding area (void area) maximizes sedimentation and minimizes clogging issues associated with downward flow bioretention.

BIOFILTRATION CHAMBER

The patented void area maximizes surface area and minimizes footprint, saving space and money. The unique design accomplishes this by allowing water to penetrate the media bed, not only from the top, but from each side.

Up to 2x more surface area than traditional downward flow bioretention systems.

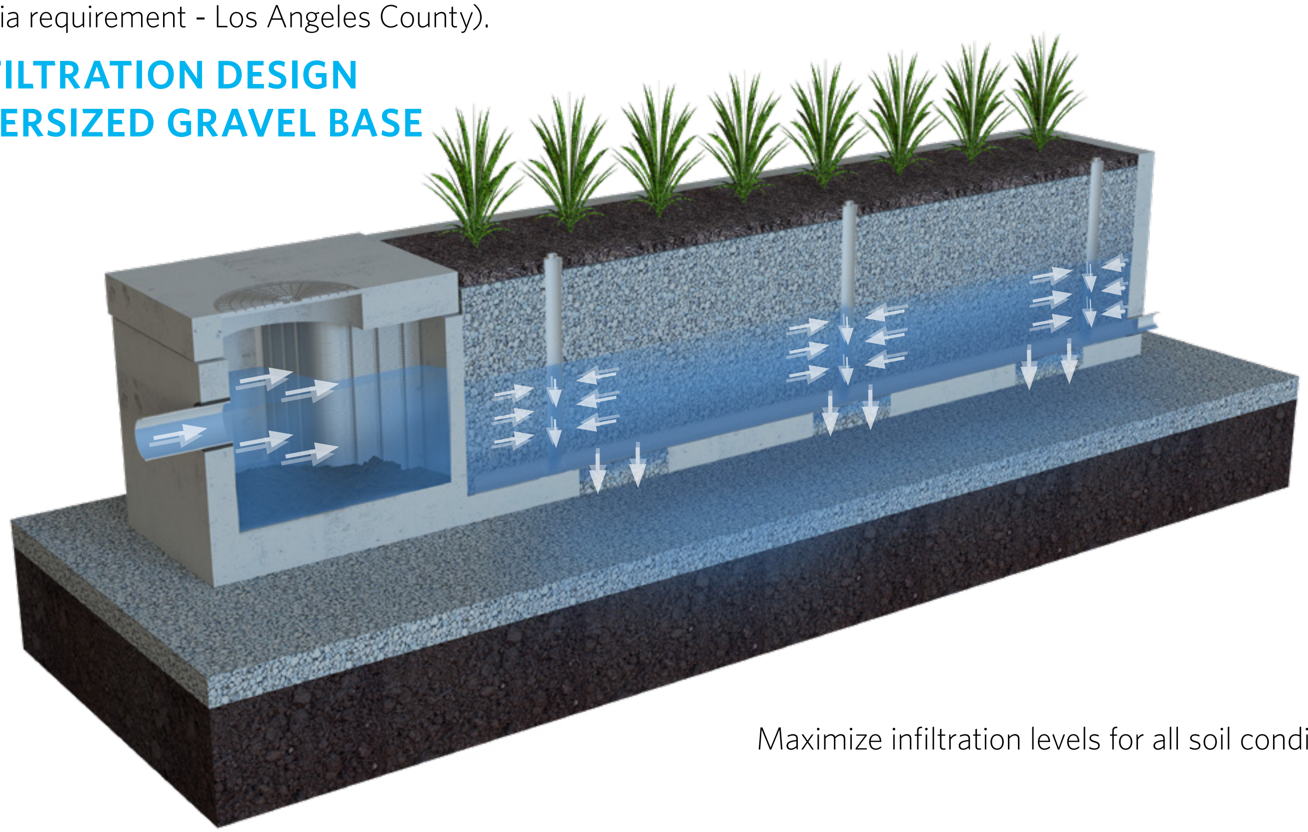


CONFIGURATIONS

The goal of the WetlandMod system is to minimize footprint and land costs associated with traditional bioretention/biofiltration systems. This is acheived by utilizing horizontal flow technology and combining it with traditional downward flow, therefore maximizing the surface area for a given footprint.

WetlandMod is constructed from modular precast concrete structures. The system can be configured as standard curb type, multiple inlet pipes, and/or grate options into the pretreatment chamber with optional internal bypass. The biofiltration chambers can be designed for various length and width combinations (shown below) to allow for easy integration with parking lot island designs. The system comes in two standard widths: 5 feet (18" minimum media requirement - San Diego County and Bay Area Region) and 6 feet (24" minimum media requirement - Los Angeles County).

INFILTRATION DESIGN
OVERSIZED GRAVEL BASE

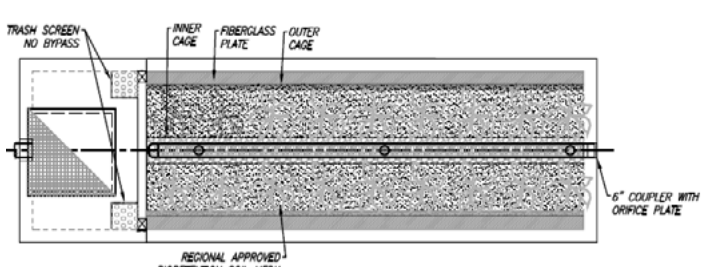


Maximize infiltration levels for all soil conditions.

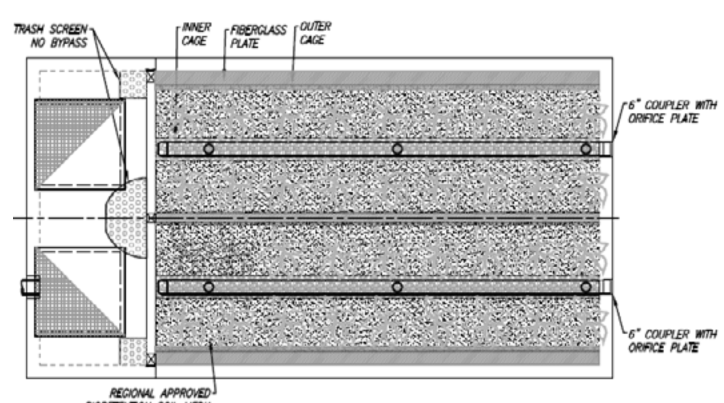
HIGHLY MODULAR

Our standard 6 foot single row and 11 foot double row models, for 24" soil media thickness, are commonly used together to meet wide design requirements and address transportation challenges.

Single Row



Double Row



INSTALLATION

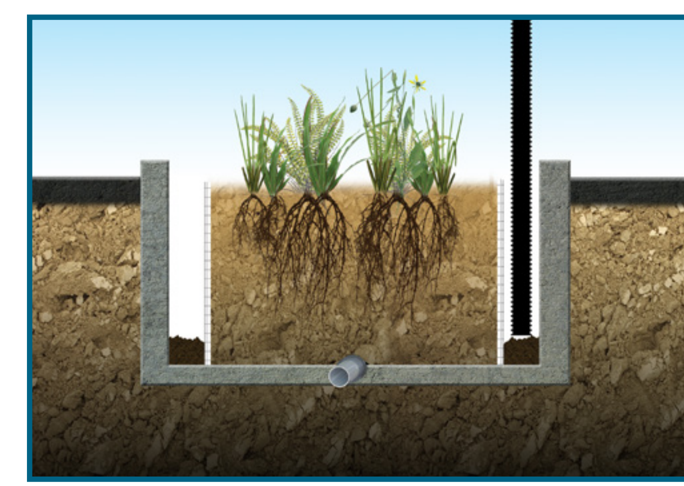
Simple vault and media installation.

All-in-one treatment train, no need for separate trash capture manhole or vault.

MAINTENANCE

A quick and easy maintenance regimen begins with a simple design, and the WetlanMod features benefits that no other bioretention system can replicate. First, the WetlandMod's pretreatment chamber can be accessed via a manhole cover or grate, providing consolidated access to most of the trash, debris, and sediment. The perimeter void areas are more easily accessible with a conventional vacuum truck, allowing plant beds to remain undisturbed.

The average maintenance time is 45 minutes using a standard vacuum truck.



The WetlandMod is designed for easy hose line access to every debris and sediment chamber.

In areas under C.3 guidance, there is no need for removal and replacement of the 6 inches or more of top soil, so there is no risk of damaging the plants and irrigation systems (if needed) that may occur during the topsoil replacement with a vertical flow planter.

Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

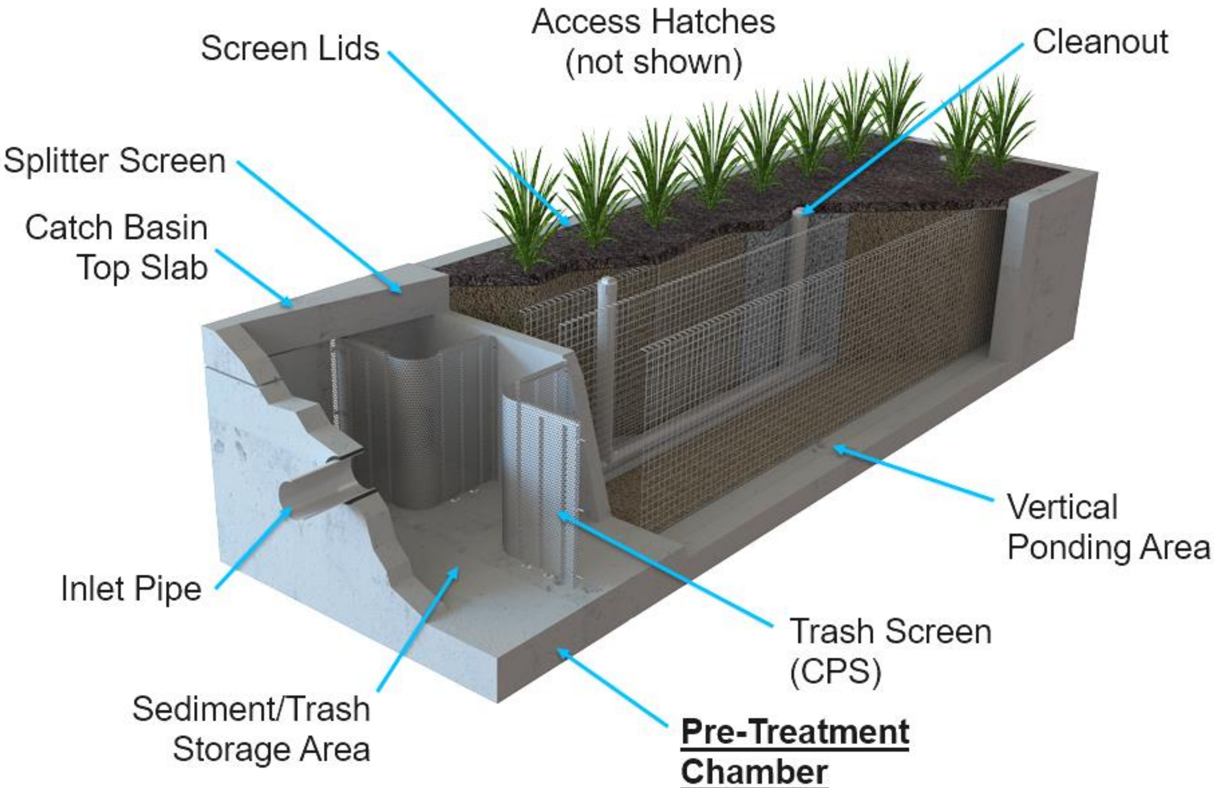
02202020ZC

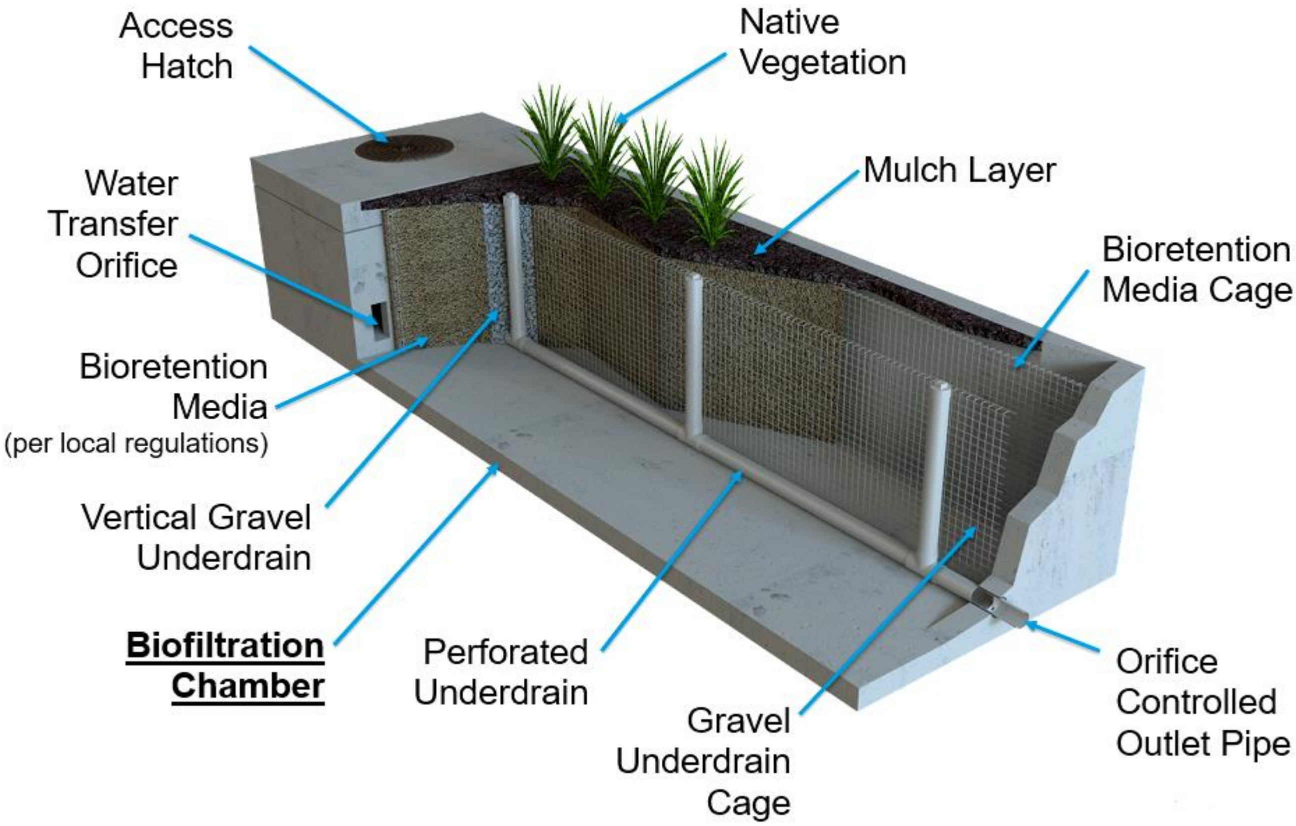
Inspection Guidelines for WetlandMOD

Inspection Summary

- Inspect Pre-Treatment Chamber – average inspection interval is 6 to 12 months.
    - (5-*minute average inspection time*).
- Inspect Biofiltration Chamber – average inspection interval is 6 to 12 months.
    - (1*0-minute average inspection time*).
- NOTE: Pollutant loading varies greatly from site to site and no two sites are the same. Therefore, the first year requires inspection monthly during the wet season and every other month during the dry season in order to observe and record the amount of pollutant loading the system is receiving.

System Diagram





Inspection Overview

As with all stormwater BMPs inspection and maintenance on the WetlandMOD is necessary. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance a BMP will exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the WetlandMOD:

- WetlandMOD Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers (if applicable)
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure.
- Protective clothing and eye protection.

- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system.

Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the WetlandMOD are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long-term inspection and maintenance interval requirements.

The WetlandMOD can be inspected though visual observation without entry into the system. All necessary pre-inspection steps must be carried out before inspection occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access. Once the top tray is removed the following apply:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the pre-treatment chamber and biofiltration chamber once the access hatch is removed. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the system and all of its chambers.
- Look for any out of the ordinary obstructions in the inflow pipe, around the trash screen (CPS), on the surface of the media, or in the drain down riser. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, debris and sediment accumulated in the chamber. Utilizing a tape measure or measuring stick estimate the amount of trash, debris and sediment on the floor of each chamber. Record this depth on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components.
- Obstructions in the system or its inlet or outlet.

- Excessive accumulation of floatables more than 12” in depth in the pre-treatment chamber.
- Excessive accumulation of sediment of more than 6” in depth in the biofiltration chamber.
- Excessive build up on the vertical surface of the biofiltration media.
- Overgrown vegetation.
- Storage area around media cage has standing water 72 hours after a storm event.

Inspection Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Media.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

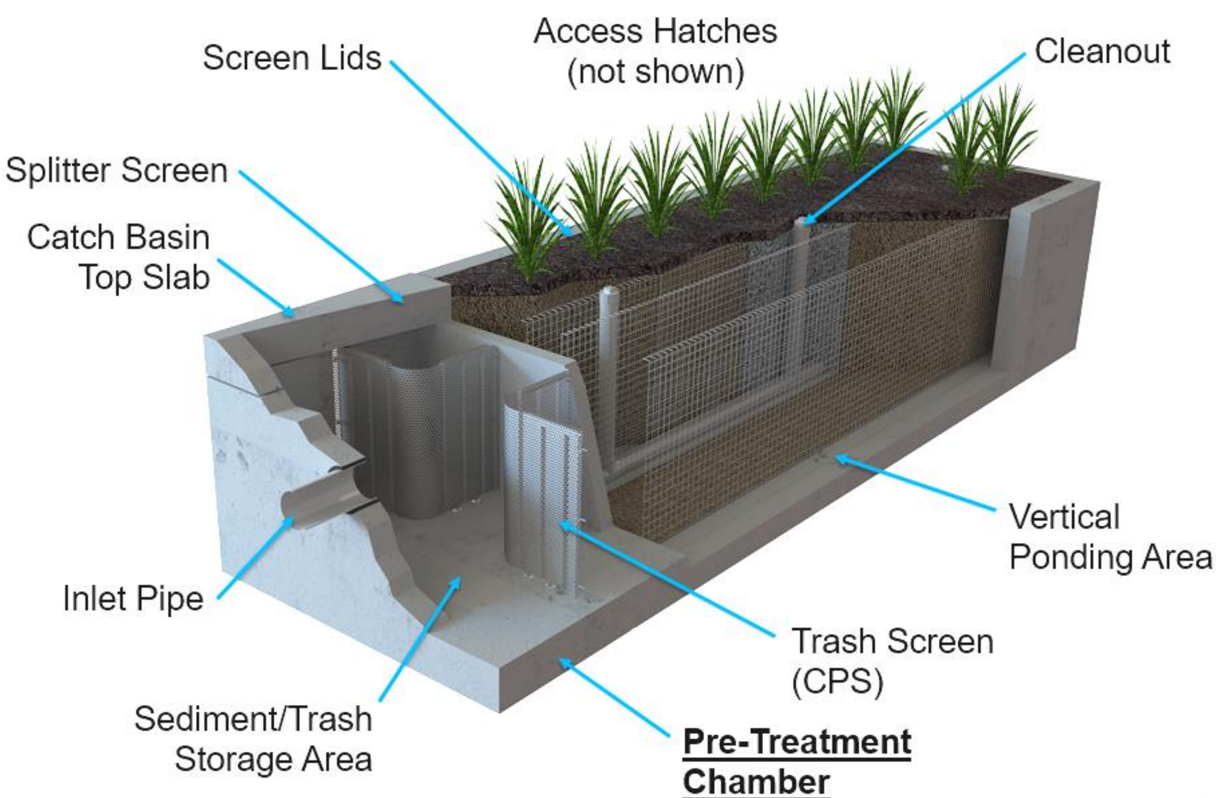
Bio Clean
A Forterra Company

Maintenance Guidelines for WetlandMOD

Maintenance Summary

- Remove Sediment and Trash from Pre-Treatment Chamber – average maintenance interval is 6 to 12 months.
  - (*15 minute average service time*).
- Removed Sediment and Pressure Wash Biofiltration Media Surface – average maintenance interval 12 to 24 months.
  - *(15-60 minutes depending on size of system).*
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Overview

The time has come to maintain your WetlandMOD. To ensure successful and efficient maintenance on the system we recommend the following. The WetlandMod can be maintained by removing the access hatches. The mulch over the top tray should be removed prior to removing the top hatch over the biofiltration chamber. All necessary pre-maintenance steps must be carried out before maintenance occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once traffic control has been set up per local and state regulations and access covers have been safely opened the maintenance process can begin. It should be noted that no maintenance activities require confined space entry but if entry is done all confined space requirements must be strictly followed before entry into the system. In addition the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepare a pre-checks (OSHA, safety, confined space entry) are performed.

Maintenance Equipment

Following is a list of equipment required for maintenance of the WetlandMOD:

- WetlandMOD Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers (if applicable)
- Protective clothing, flashlight and eye protection.
- Vacuum assisted truck with pressure washer.
- Replacement pre-filter wraps (order from manufacturer).

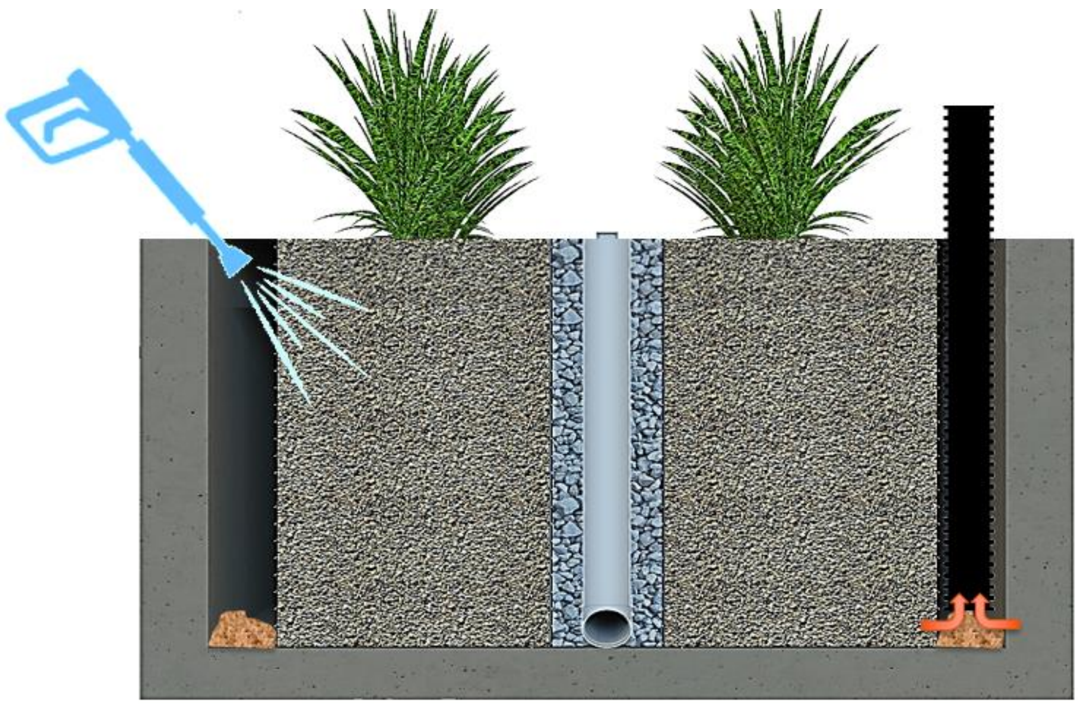
Maintenance Steps

1. Pre-Treatment Chamber (first chamber that contains trash screens)

   A. Remove access hatch and position vacuum truck accordingly.
   B. With a pressure washer spray down pollutants accumulated on trash screens.
   C. Vacuum out all accumulated pollutants including trash, debris and sediments. Be sure to vacuum the floor, screens, and walls along with outlet side of screens.

2. Biofiltration Chamber (vegetated chamber)

   A. Remove the mulch along each side of the unit. Rake away from side walls. Remove top covers to gain access to void areas.
   B. Pressure wash off the vertical surface of the media be using a pressure washer and a vacuum hose to collect and material on the floor around the cage. Pressure wash down into the media to allow accumulated sediments to flow back into the surrounding perimeter separation area for collection with the vac hose.
   C. Replace the top covers.
   D. Trim any vegetation that is overgrown.
   E. Replace the mulch to cover the top covers.



Maintenance Notes

1. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
2. Entry into chambers may require confined space training based on state and local regulations.
3. No fertilizer shall be used in the Biofiltration Chamber.
4. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment

Inspection Form

Bio Clean, A Forterra Company
P. 760.433-7640
F. 760-433-3176
E. stormwater@forterrabp.com

www.biocleanenvironmental.com

Bio Clean
A Forterra Company

Inspection Report
WetlandMOD System

Project Name ______________________

Project Address ______________________
(city) (Zip Code)

Owner / Management Company ______________________

Contact ______________________ Phone ( ) –

Inspector Name ______________________ Date ____/____/______ Time ________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________ Additional Notes ______________________

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

WetlandMod System: ______________ Size (Model): ______________

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ______________________

Maintenance Report

Bio Clean, A Forterra Company
P. 760.433-7640
F. 760-433-3176
E. stormwater@forterrabp.com

www.biocleanenvironmental.com

Cleaning and Maintenance Report
WetlandMOD System

Bio Clean A Forterra Company

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Project Name ____________________

Project Address ____________________ (city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone ( ) –

Inspector Name ____________________ Date ____ / ____ / ______ Time ________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

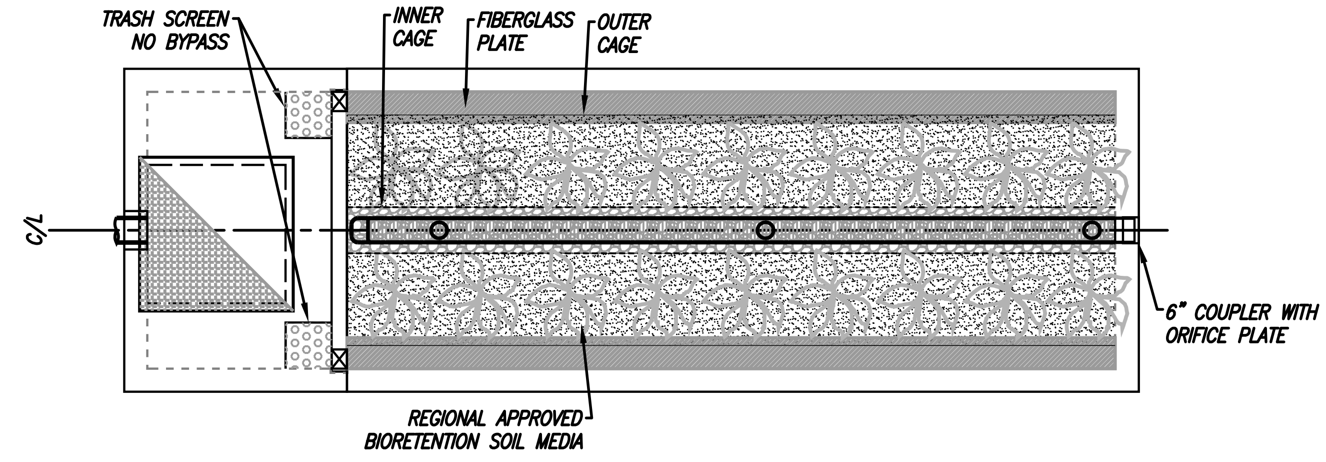
Weather Condition ____________________ Additional Notes ____________________

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	WM Catch Basins						
		WM Sedimentation Basin						
		CPS Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

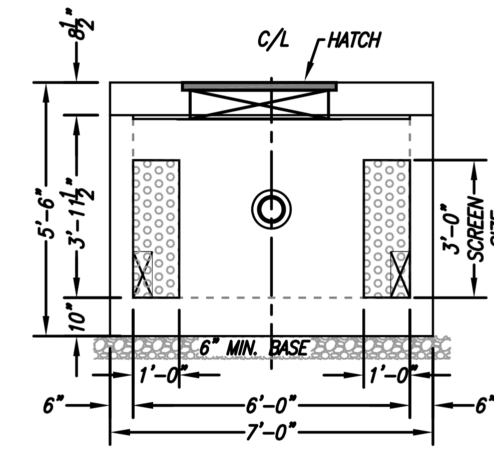
Comments:

SITE SPECIFIC DATA

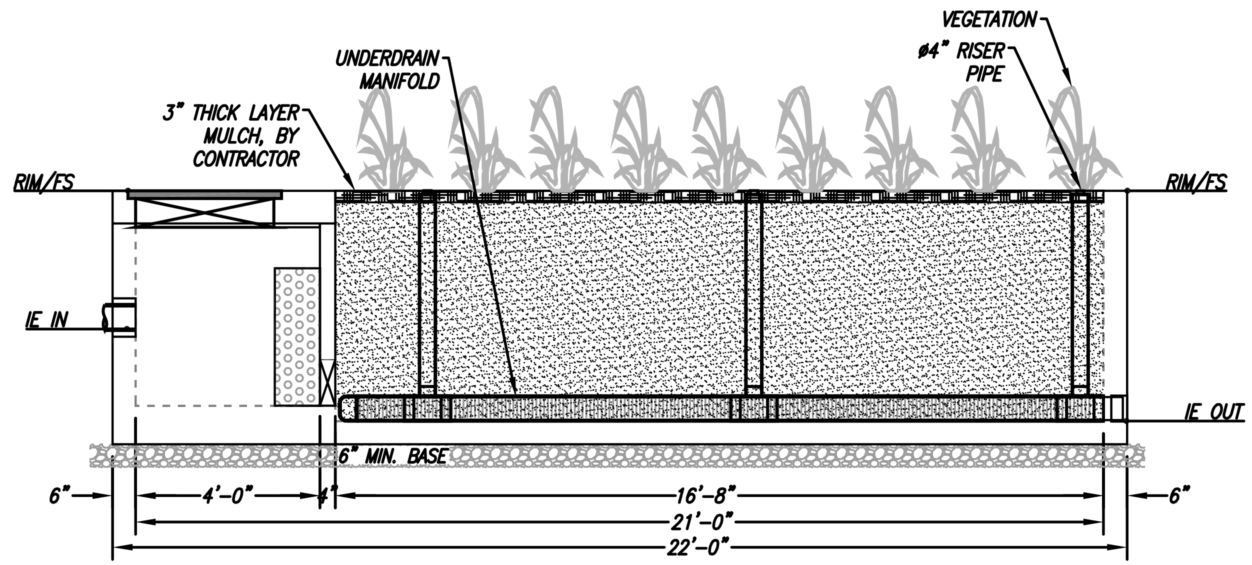
PROJECT ID			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
---		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	N/K	N/K	N/K
INLET PIPE			
OUTLET PIPE	-5.00	PVC-SDR35	6"
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	0.00
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	36" X 36"	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			---
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			---
ORIFICE DIAMETER (IN)			---
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			



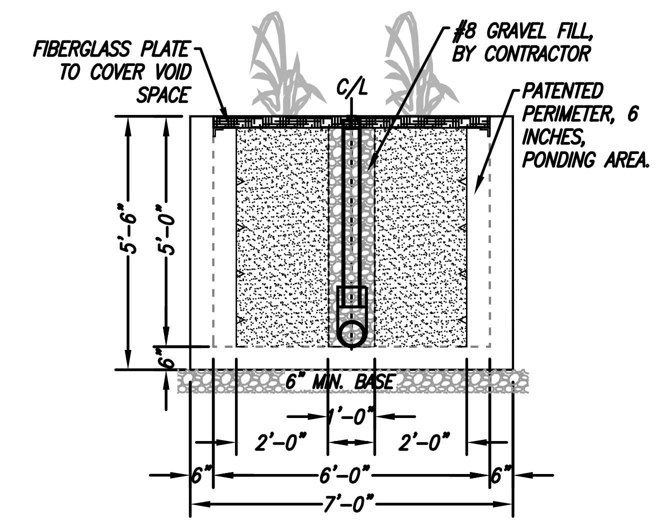
PLAN VIEW



INLET VIEW



ELEVATION VIEW



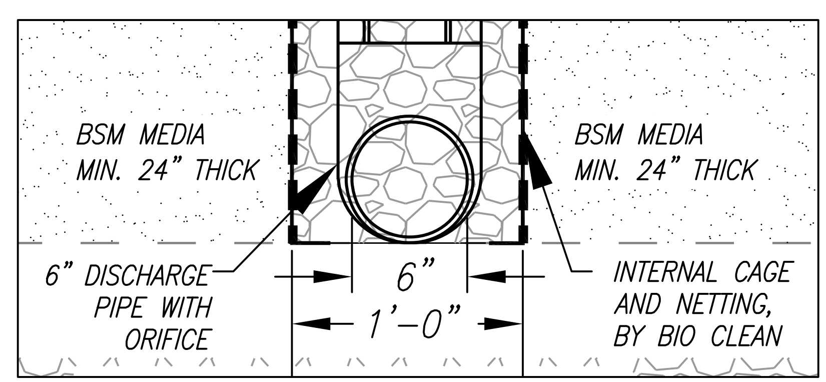
OUTLET VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURER'S STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



INTERNAL CAGE DETAILS

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	2400
TARGETED DRAINDOWN DURATION (HR)	24
WETLANDMEDIA INFILTRATION RATE (IN/HR)	12
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.12
DISCHARGE RATE (CFS)	0.028
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	103.89
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	104.00
NUMBER OF ROW(S)	1

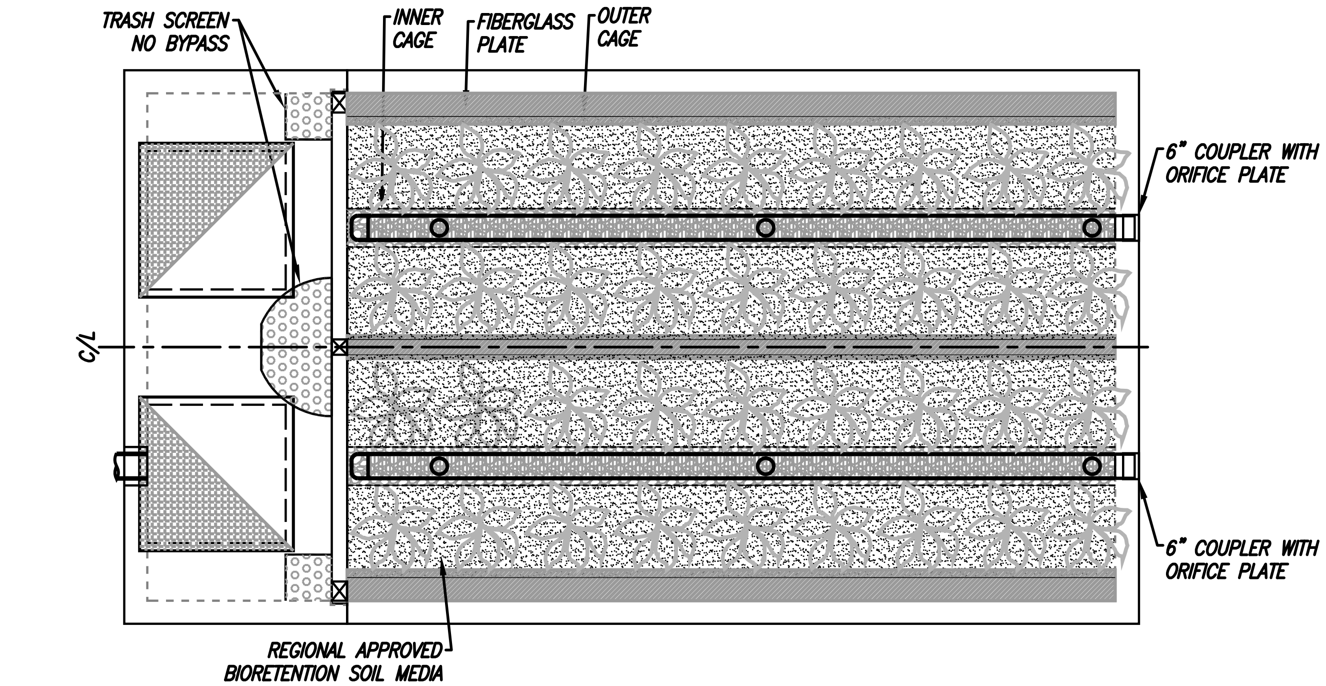
Bio Clean
A Forterra Company

WetlandMOD-6- XX -V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

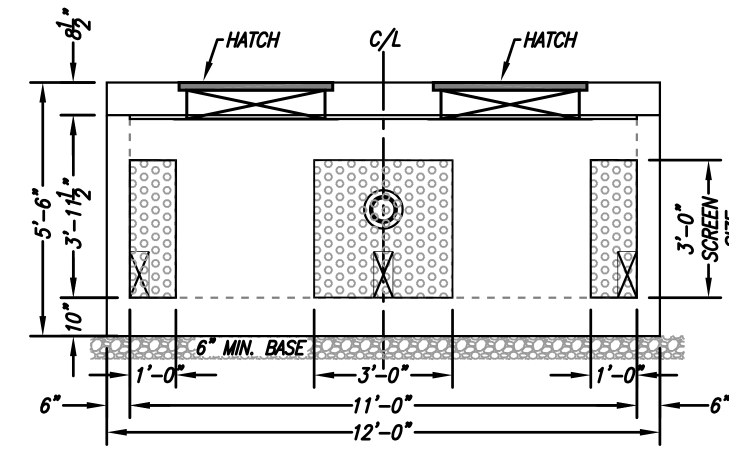
10/25/19GSINGH

SITE SPECIFIC DATA

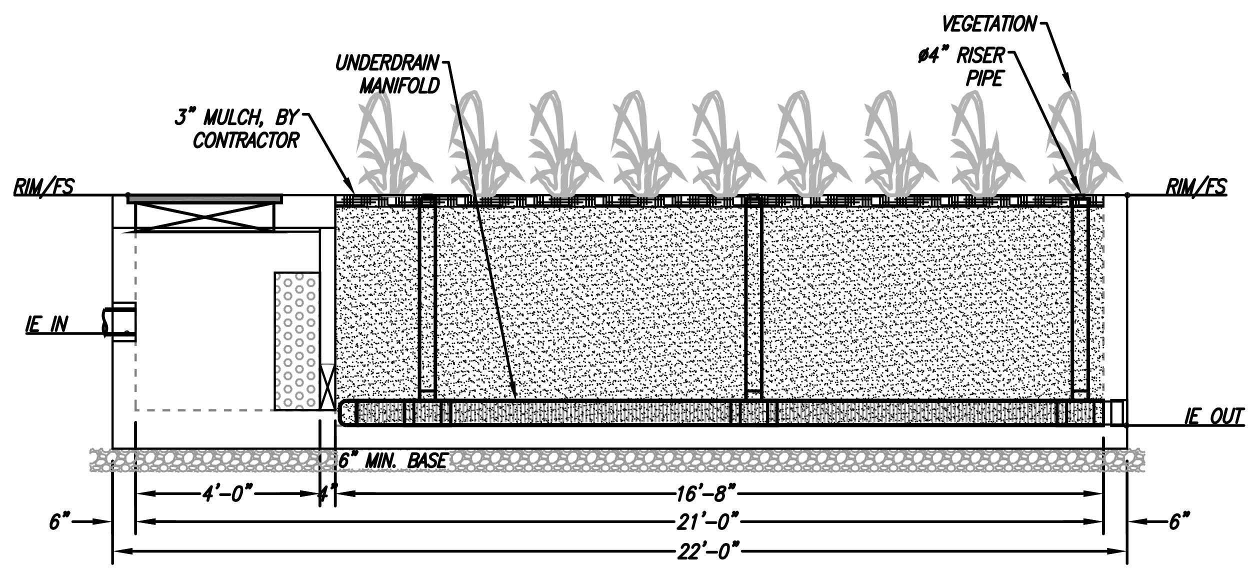
PROJECT ID			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
---		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	N/K	N/K	N/K
INLET PIPE			
OUTLET PIPE	-5.00	PVC-SDR35	6"
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	0.00
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	36" X 36"	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			---
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			---
ORIFICE DIAMETER (IN)			---
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			



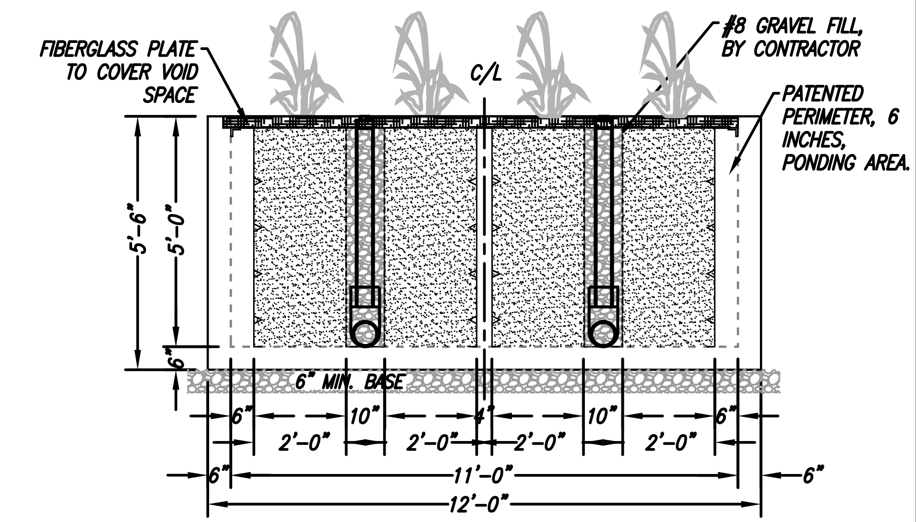
PLAN VIEW



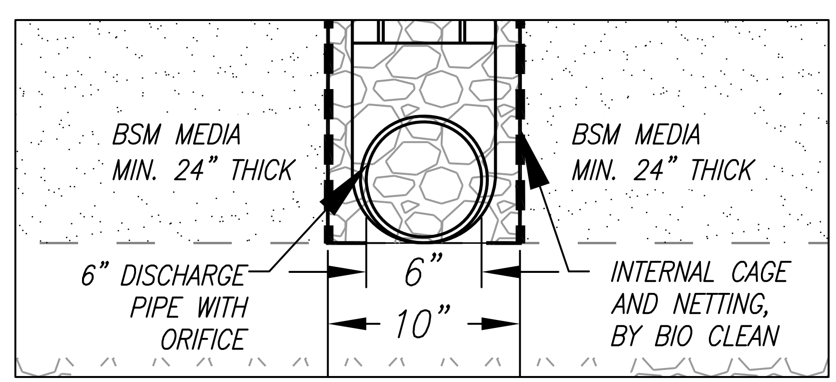
INLET VIEW



ELEVATION VIEW



OUTLET VIEW



INTERNAL CAGE DETAILS

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	2400
TARGETED DRAINDOWN DURATION (HR)	24
WETLANDMEDIA INFILTRATION RATE (IN/HR)	12
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.12
DISCHARGE RATE (CFS)	0.028
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	103.89
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	104.00
NUMBER OF ROW(S)	1

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURER'S STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

10/25/19GSINGH

Bio Clean
A Forterra Company

WetlandMOD-11- XX -V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL