APPENDIX D

HYDROLOGY STUDIES

Hydrology and Hydraulics Report

Rockland Business Park

2220 2212 2218 and 2226 North Rosemead

South El Monte, CA

February 2024

This Hydrology Report has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

_____

Jacob Vandervis, P.E.
Registered Civil Engineer No. C46301
Exp.: 12/31/24

Prepared for:

Rosemead Holding, LLC
221 N. Orange Ave.
City of Industry, CA
91744

Prepared by:

Tait & Associates, Inc.
701 N. Parkcenter Drive
Santa Ana, CA 92705
(714) 560-8200

TAIT JOB # **SP8613**

TABLE OF CONTENTS

Section 1 Introduction and Background

The Client has retained Tait & Associates (Tait) to prepare the drainage design for Rockland Business Park. The Project is approximately 5.13 acres and it is located in the City of South El Monte (City), California located on North Rosemead Boulevard. The Hydrology & Hydraulics Reports studies the existing and proposed condition drainage system and patterns. This study follows the requirements of the Los Angeles County Hydrology Manual (LACHM), dated 2006. The hydrology analysis was prepared for the 10-, 25- and 50-year storm events for both the existing and proposed condition. The following sections include the general project characteristics, the drainage design, criteria and methodology utilized for the drainage analysis and study.

1.1 Project Description

The proposed development is for commercial uses, and it includes one warehouse building with loading docks. The site area is 5.13 acres. The development will also include a parking lot, and other infrastructure to support the development of the proposed project.

The project is located in the City of South EL Monte, California, on the Northwest block of Rosemead Boulevard and Rush Street. The project is bordered by Rosemead Boulevard to the west, and a variety of industrial and commercial developments to the South, East, and North of the property. See Figure 1 below Project Location.

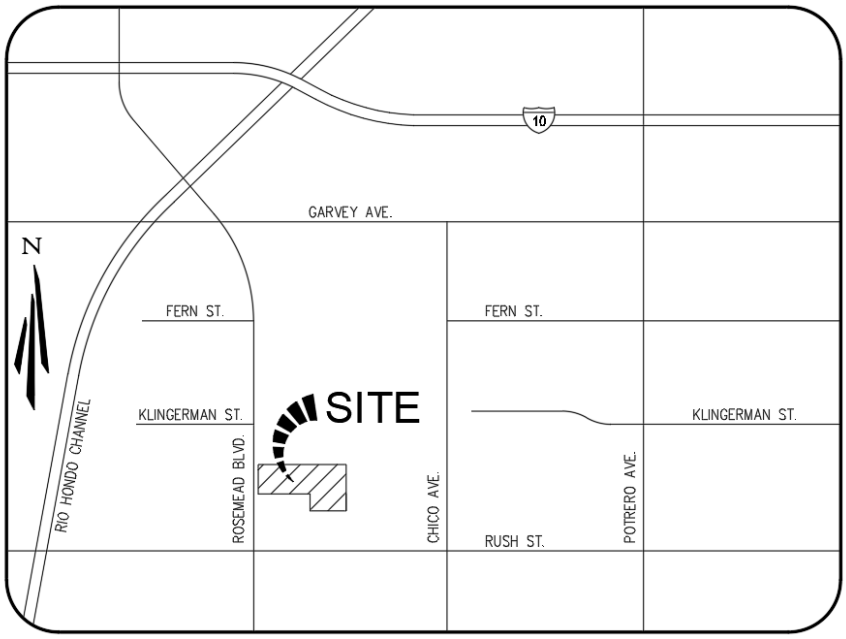


Figure 1: Project Location Map (Not To Scale)

Section 2 Hydrology and Watershed Characteristics

The following sections describe the proposed project site existing and proposed hydrologic characteristics, and existing soil conditions.

2.1 Project Site Existing Conditions

The project site is located within the Los Angeles River Watershed, of the Los Angeles County Flood Control District (LACFCD) drainage system. In the existing condition, approximately 5.13 acres sheet flows westerly to Rosemead Boulevard. Three existing onsite grated inlets capture flows and discharge to the Rosemead Storm drain system. Stormwater enters the LACFCD Storm Drain system where it discharges into the Rio Hondo Channel directly west of the Rush Street and Loma Avenue Intersection. The Hondo Channel outlets at the Los Angeles River which ultimately discharges to the Pacific Ocean.

In the existing condition the majority of the site is impervious, consisting of several industrial use buildings and paved parking surfaces. The 5.13 acres is completely developed with the site generally sloping from west to east towards Rosemead Boulevard. Overall, the site has mild slopes with less than 3% generally in the paved areas. Site elevations range from 234 to 238 above Mean Sea Level. The site is surrounded in the existing condition by other industrial and commercial facilities.

2.2 Project Site Proposed Conditions

In the Proposed Condition a commercial building surrounding parking and minimal landscaping will be built. The project will include a truck dock to support the commercial building use. Parking and surrounding areas will slope generally north or south with mild slopes in the 1-4% range. Two existing catch basins connections to the public storm drain main will be utilized in the proposed condition as Outlets 1 and 2. No new connections to the LACFCD storm drain are proposed.

2.3 Rainfall Depth and Soil Type

The Los Angeles County Hydrology Manual (LACHM), dated 2006, utilizes an isohyetal map with the 50-year storm event rainfall depths. The isohyetal map is provided online with a GIS tool in which the project location is obtained, and the 50-year rainfall depth can be determined for the project location. This online tool also provides the soil identification number. *Appendix B* provides the Isohyetal Map and the Soil Type Map for the project site. Per LACHM the project site 50-year storm event rainfall depth is 6.05-inches, and the soil identification number is 006. Further soil information can be found in the geotechnical soils report dated December 202 prepared by TGR Geotechnical, INC. and included in *Appendix C.*

Section 3 Design Criteria and Methodology

3.1 Hydrology Analysis

The procedures outlined in the 2006 County of Los Angeles Hydrology Manual (LACHM) and the Modified Rational Method (MODRAT) were used to compute watershed runoff rates. The MODRAT is a hydrologic model based on the Rational Method and developed by the County of Los Angeles Department of Public Works (LADPW). This hydrologic model uses a time of concentration and a design storm to create runoff hydrographs from a drainage area of any size up to 40 acres over a specific period. The 10-year storm event and 50 -year storm event existing and proposed condition hydrology analyses were prepared to support the storm drain system design. The drainage area delineation was prepared using the proposed grading. The soils data and rainfall depth provided by LADPW were used to obtain the hydrologic parameters.

A summary of the results is provided in Section 5. Existing hydrology calculations are provided in *Appendix D* and the proposed hydrology calculations are provided in *Appendix E*.

3.2 Existing Condition

In the existing condition, the project site is divided into three Drainage Areas A-1, A-2 and A-3 that discharge to Outlets 1, 2 and 3 respectively (see Existing Condition Hydrology Map in *Appendix A*). Drainage Area A-1 has a total area of 1.60 acres that discharges to the Southwest corner of the property into Rosemead Boulevard and is entirely impervious. Drainage Area A-2 encompasses about 1.66 acres of buildings and parking that sheet flows towards Rosemead Boulevard on the Western side of the project site into an existing catch basin. This catch basin discharges to Rosemead Storm drain system. Drainage Area A-3 discharges to Rosemead Boulevard storm drain at the Southwest corner of the property via a grated inlet basin. It consists of approximately 1.87 acres of land.

3.3 Proposed Condition

In the Proposed Condition, the project site was divided into 2 Drainage Areas A and B, as shown on the Proposed Condition Hydrology Exhibit on *Appendix A*. Drainage Areas A and B will discharge to Rosemead Blvd storm drain with a total tributary area of about 5.13 acres, following the existing condition patterns. Drainage Areas A and B consist of a commercial building, parking lot and the driveways. Drainage area A is 2.2 acers. The building and parking areas sheet flow generally north to various catch basins located along the perimeter of the site. Water will be conveyed via underground storm drainpipe to a detention system that is sized for the water quality volume. Low flows will enter through a diversion structure to a Modular Wetland System (MWS) for treatment before discharging to an existing catch basin on Rosemead Boulevard at Outlet #1. High flows will bypass the MWS via the diversion manhole structure and discharge directly to the catch basin. Drainage area B is 2.9 acres draining to the

south of the property. Stormwater will sheet flow to various catch basin located along the permitter of the parking area. There water will be conveyed via underground storm drain to a detention system sized for the water quality volume. Low flows will enter through a diversion structure to a Modular Wetland System (MWS) for treatment before discharging to an existing catch basin on Rosemead Boulevard. High flows will bypass the MWS via the diversion manhole structure and discharge directly to the catch basin at Outlet #2. Section 4.1 provides more information on the Proposed Condition drainage design.

Section 4 Hydraulic Design Criteria, Methodology, and Analysis

4.1 Hydraulic Design Criteria

The hydraulic analysis of the proposed storm drain system was prepared using the Federal Highway Administration Urban Drainage Design Program Hydraulic Toolbox. This software uses the Manning's equation and assumes normal depth conditions to calculate the capacity of a circular pipe. The proposed pipe slope, manning's, diameter, and flow were input to determine the appropriate pipe size for each storm drain line segment of the proposed project.

There is an existing 54-inch RCP storm drain in Rosemead Boulevard owned by the County of Los Angeles and identified as MTD0138. The asbuilt is included in *Appendix F*. Two existing catch basins located in front of the site connect to this storm drain line. Per the LACHM Section 4.7 the total capacity of sub-surface and surface level of flood protection must equal or exceed the original surface capacity. The project proposes to connect to the existing catch basins via proposed storm drains (sub-surface) connections, the storm drain system will carry flows up to its capacity, which will be influenced by the downstream receiving systems capacity. Flows not captured by the proposed storm drain system will continue as overland flow towards Rosemead Boulevard similar to the existing condition. The discharge to the existing 54-inch RCP is limited to the existing site discharge. Therefore, the project does not create any negative impacts downstream and maintains existing drainage conditions.

Appendix F includes calculations prepared for the proposed on-site storm drain system. Additionally, the FEMA FIRM map is included in *Appendix F*. The onsite catch basins were sized using Hydraulic toolbox. *Appendix F* includes additional calculations.

4.2 Hydraulic and Catch Basin Design

All catch basins were sized to handle 25-year flows Rational method flows as described in section 3.1.1. A summary of the catch basin sizing can be found in Table 1. Further calculations provided in Appendix F.

Table 1: Catch basin Summary

Catch Basin ID	Tributary Area ID or Node Number	25 Year Proposed Peak Flow Rate (CFS)	Sump/Flow By
CB#1	A1	0.90	SUMP
CB#2	A2	3.13	SUMP
CB#3	A3	0.22	SUMP
CB#4	A4	2.09	SUMP

Table 1: Catch basin Summary			
Catch Basin ID	**Tributary Area ID or Node Number**	**25 Year Proposed Peak Flow Rate (CFS)**	**Sump/Flow By**
CB#5	B1	0.42	SUMP
CB#6	B2	2.47	SUMP
CB#7	B3	1.79	SUMP
CB#8	B4	0.45	SUMP
CB#9	B5	2.81	SUMP

Section 5 Results Analysis

The proposed construction involves the development of approximately 5.13 acres of a commercial site that will be utilized as a distribution center. The project hydrological analysis was prepared for the 10-year and 50-year storm event. The peak flow rate in the proposed condition will not exceed the existing condition and therefore no hydraulic mitigation is proposed at this time. Table 3 summarizes the discharges to Rosemead Boulevard storm drain.

Table 2: Existing Condition Summary

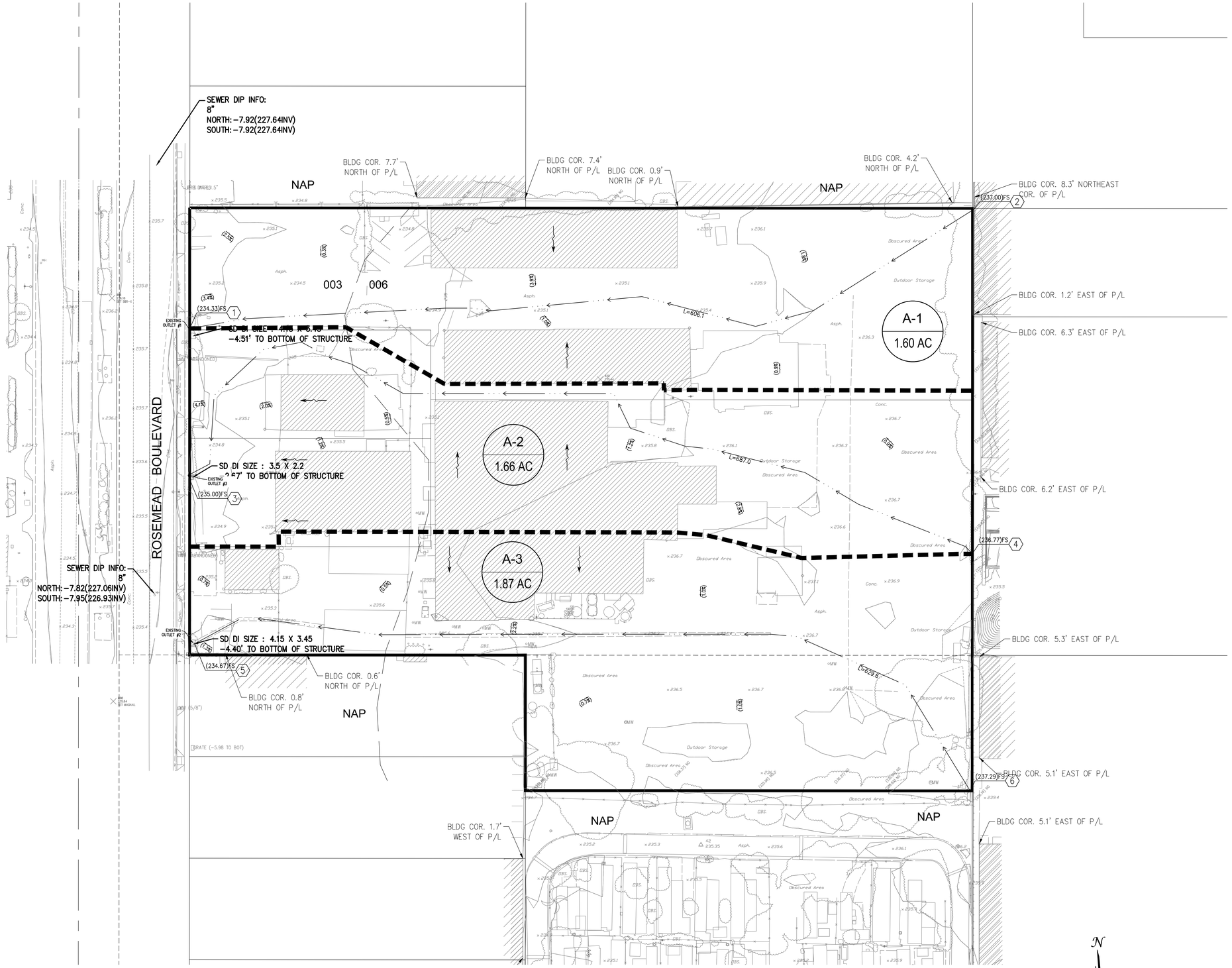
Subarea	Outfall	Area (ac)	10-year peak flow (cfs)	50-Year Peak Flows (cfs)
A-1	1	1.60	2.82	4.44
A-2	2	1.66	2.92	4.60
A-3	3	1.87	2.87	4.61
TOTAL		5.13	8.61	13.65

Table 3: Proposed Condition Summary

Drainage Area	Outfall	Area (ac)	10-year peak flow (cfs)	50-Year Peak Flows (cfs)
A	1	2.24	3.44	5.25
B	2	2.89	4.62	7.11
TOTAL		5.13	8.06	12.36

TECHNICAL APPENDIX

Appendix A – Exhibits



LEGEND

- EXISTING CONTOUR
- FLOW LINE
- (0.5%) EXISTING SLOPE
- EXISTING STORM DRAIN
- AREA BOUNDARY
- SUB-AREA BOUNDARY
- NODE
- SOIL BOUNDARY
- X-# / #.##AC AREA ID / AREA (AC)

ABBREVIATIONS

EX	EXISTING
FS	FINISHED SURFACE
FG	FINISHED GRADE
INV	INVERT

* ASSUMES ROOF RUNOFF IS 2% FOR HYDROLOGY MODELING PURPOSES

N

0 30' 60'

SCALE: 1" = 30'

811 Know what's below Call before you dig.

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

NO.	DESCRIPTION	BY	DATE
REVISIONS			

TAIT & ASSOCIATES
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com
ENGINEERING ENVIRONMENTAL PLANNING LAND SURVEYING
Since 1964
Orange County Sacramento Denver Dallas
San Diego Riverside Boise Atlanta

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER JACOB VANDERVIS No. C46301 EXP. 12-31-24 CIVIL STATE OF CALIFORNIA

JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

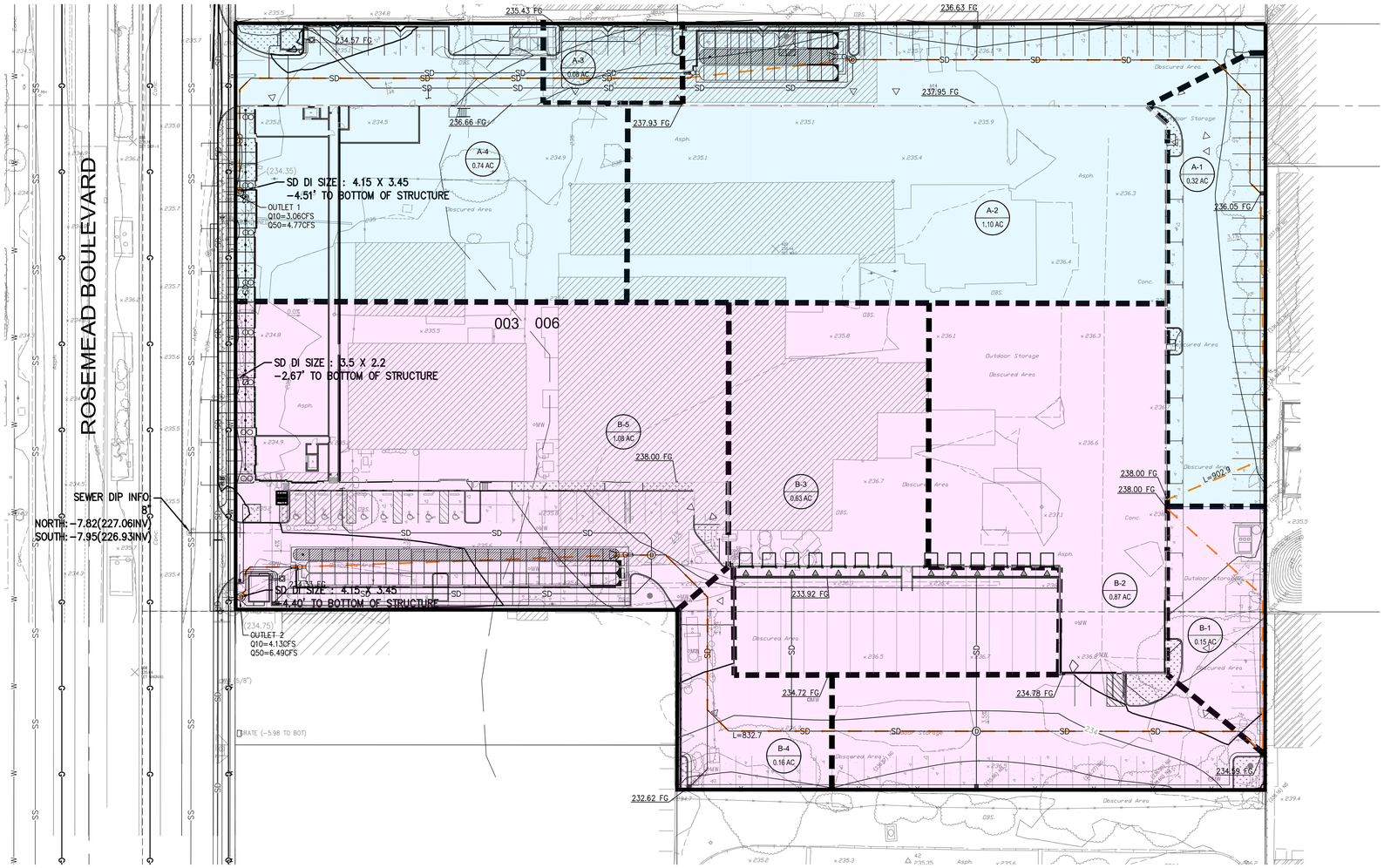
EXISTING HYDROLOGY MAP

DRAWN:
DATE:
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO: SP9613

11/23/2020 Design Development

1 OF 3

Jul 17, 2021 - 3:35pm by CSutherland K:\Drawings\SP\SP9613 - South El Monte\HYDRO\SP9613-EX HYDRO.dwg



LEGEND

- PROPOSED CONTOUR
- FLOW PATH
- SURFACE DIRECTION OF FLOW
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN ≤ 12"
- PROPOSED STORM DRAIN > 12"
- STORM DRAIN PIPE FLOW
- AREA BOUNDARY
- SUB-AREA BOUNDARY
- SOIL BOUNDARY
- NODE
- AREA ID (X-# / #.##AC)
- LANDSCAPE AREA
- DRAINAGE AREA A
- DRAINAGE AREA B

ABBREVIATIONS

FG	FINISHED GRADE
INV	INVERT
FFE	FINISHED FLOOR ELEVATION
PE	PAD ELEVATION
CF	CUBIC FEET
MWS	MODULAR WETLAND SYSTEM

N

0 30' 60'

SCALE: 1" = 30'

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

811 Know what's below Call before you dig.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER JACOB VANDERVIS No. C46301 EXP. 12-31-24 CIVIL STATE OF CALIFORNIA

JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

NO.	DESCRIPTION	BY	DATE
	REVISIONS		

TAIT & ASSOCIATES Since 1964

701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

ENGINEERING ENVIRONMENTAL PLANNING LAND SURVEYING

Orange County Sacramento Dallas Denver Boise Atlanta Phoenix

PROPOSED HYDROLOGY MAP
ROCKLAND BUSINESS PARK
2222 ROSEMEAD BLVD.
SOUTH EL MONTE, CALIFORNIA

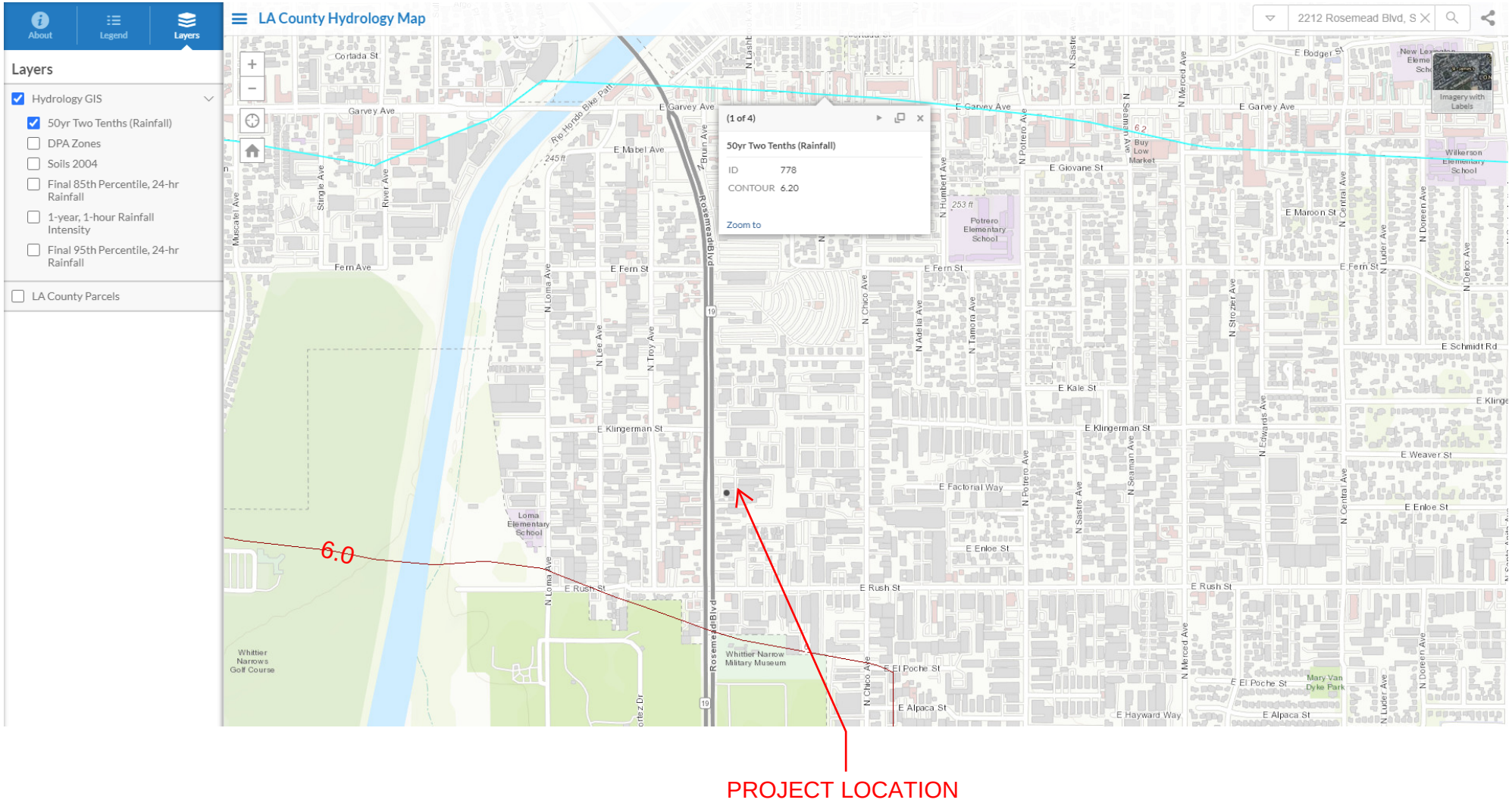
DRAWN:
DATE:
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO. SP8613

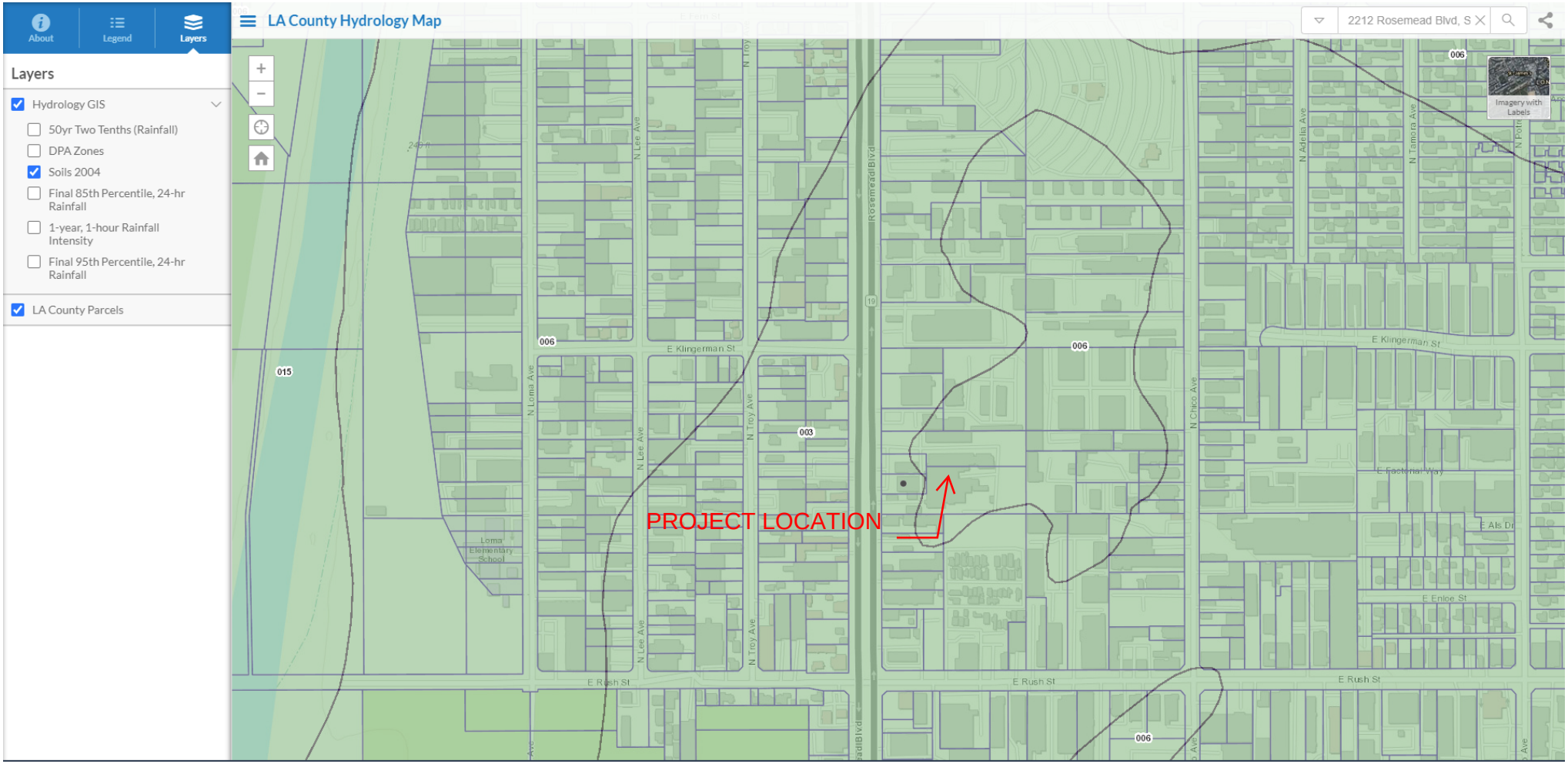
11/23/2020 Design Development

1 OF 3

Feb 23, 2024 - 7:09am by cauthentod K:\Develop\SP\SP8613 - South El Monte\Hydrology\SP8613-PR HYDRO.dwg

Appendix B – Maps


About
Legend
Layers
LA County Hydrology Map
2212 Rosemead Blvd, S
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
(1 of 4)
50yr Two Tenths (Rainfall)
ID 778
CONTOUR 6.20
Zoom to
6.0
6.2
PROJECT LOCATION


About
Legend
Layers
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
LA County Hydrology Map
2212 Rosemead Blvd, S
PROJECT LOCATION
E Klingerman St
E Rush St
N Lee Ave
N Troy Ave
N Loma Ave
N Chico Ave
N Adella Ave
N Tamora Ave
Rosemead Blvd
Loma Elementary School
006
015
003

Appendix C – Infiltration Testing Report

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

December 11, 2020 Project No. 20-7106

Xebec Building Company
3010 Old Ranch Parkway, Suite 480
Seal Beach, CA 90740

Attention: Sylvia Tran, Business Development and Project Manager

Subject: Geotechnical Investigation, Proposed Industrial Building, 2200 Rosemead Blvd., South El Monte, California

Sylvia,

In accordance with your request and authorization, TGR Geotechnical, Inc. (TGR) has performed a geotechnical investigation for the proposed development at the subject site in the City of South El Monte, California. This report presents the findings of our geotechnical investigation, including site seismicity and seismic settlement and provides geotechnical design recommendations for the proposed improvements. The work was performed in general accordance with our proposal dated October 29, 2020.

Based on our investigation the proposed development is feasible from a geotechnical viewpoint provided the recommendations presented in this report are implemented during design and construction.

If you have any questions regarding this report, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

TGR GEOTECHNICAL, INC.

Sanjay Govil, PhD, PE, GE 2382
Principal Geotechnical Engineer

Edward L. Burrows, M.S, PG, CEG 1750
Principal Engineering Geologist

Distribution: (4) Addressee

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

Attachments:

Plate 1 – Boring Location Map

Figure 1 – Site Location Map
Figure 2 – Regional Geology Map
Figure 3 – Historic High Groundwater Map
Figure 4 – Regional Fault Map
Figure 5 – Seismic Hazard Zone Map

Appendix A – References
Appendix B – Log of Borings
Appendix C – Laboratory Testing Procedures and Results
Appendix D – Site Seismic Design and De-Aggregated Parameters
Appendix E – Liquefaction Analysis
Appendix F – Standard Grading Specifications

EXECUTIVE SUMMARY

Presented below are significant elements of our findings from a geotechnical viewpoint. These findings are based on our field exploration, laboratory testing, and geologic and engineering analysis.

Geotechnical/Geologic Concerns

- The site is underlain by undocumented fill 5 to 13 feet thick underlain by various thickness of alluvial deposits comprised of sand, silty sand, sandy silt and clay. The sands are generally loose to medium dense. At the greater depth, the sands are medium dense to dense. The undocumented fill is unsuitable for support of structures and shall be removed and replaced as engineered fill.
- There are no known faults passing through or adjacent to the subject site. The subject site is not located within an Alquist-Priolo Earthquake Fault Zone. The closest faults to the subject site are the East Montebello Fault mapped approximately 1.15 miles to the southwest of the site, Whittier Fault located 3.5 miles southeast of the site, the Raymond Fault mapped approximately 5.45 miles northwest of the site, the Walnut Creek Fault mapped approximately 6.10 miles east of the site and the Sierra Madre Fault mapped 7.9 miles north of the subject site.
- The expansion potential is considered to be very low.
- At the time of our drilling, groundwater was encountered at a depth of 48 feet below ground surface. The depth to historic high groundwater is approximately 5 feet below existing ground surface. Groundwater is not expected to impact the proposed development.
- The subject site is located within an area having a potential for liquefaction. Liquefaction analysis was performed using the data from borings B-2 and B-7 and a historic high groundwater of 5 feet below existing grade. The total seismic settlement is estimated to range from 1.44 to 1.99 inches.
- All depressions resulting from demolition activities shall be properly backfilled with engineered fill (minimum 90 percent) under the direction of the geotechnical consultant.

Foundations

- The proposed light weight buildings may be supported on conventional shallow pad or continuous footing foundation systems.
- An allowable bearing capacity of 2,000 psf may be utilized for foundation design for footings supported on minimum 90 percent compacted engineered fill.
- The minimum recommended footing width is eighteen (18) inches for continuous footing and twenty-four (24) inches for pad footing.
- All shallow foundations should extend a minimum of twenty-four (24) inches below the lowest adjacent grade.
- All shallow foundations shall be supported on three (3) feet or half the width of the footing (whichever is greater) of engineered fill with minimum ninety (90) percent relative compaction.

- Laboratory test results indicate that concrete in contact with onsite soils should be designed for exposure class S0 (minimum 2,500 psi concrete).

Slab-on-Grade

- Slab-on-grade should be a minimum of 5-inches thick.
- Slab-on-grade shall be reinforced with a minimum of No. 4 reinforcing bar on 18-inch centers in two horizontally perpendicular directions.
- The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of three (3) feet.
- Areas requiring moisture sensitive flooring shall be underlain by a minimum 15-mil visqueen (Stego Wrap or equivalent).

Pavement Design

ASPHALT PAVEMENT SECTION					PCC PAVEMENT SECTION		
Pavement Utilization	Traffic Index	Asphalt (Inch)	Aggregate Base (Inch)	Total (Inch)	PCC	Aggregate Base (Inch)	Total (Inch)
Parking Stalls	4.5	3.0	4.0	7.0	--	--	--
Auto Driveways	5.0	3.0	4.0	7.0	--	--	--
Truck Aisles/ Driveways	6.0	4.0	4.0	8.0	**7	--	7
Loading Dock	7.0	4.0	6.0	10.0	**7	--	7

**Minimum concrete compressive strength of 3,500 psi.

INTRODUCTION

Site Descriptions and Proposed Project Development

The subject site is located at 2200 Rosemead Boulevard (Figure 1) in the City of South Elmonte, California. It is our understanding that site is approximately 4.38 acres. Based on our review of the Conceptual Site Plan, we understand that the proposed development will consist of a new 93,490 sq. ft. building with associated truck docks on the north side of the building and drive aisles and vehicle parking on the north, south and west sides of the building.

Scope of Work

The scope of work for this geotechnical investigation included the following:

- Site reconnaissance to assess current site conditions, mark borings and review of readily available previous geotechnical and/or environmental reports for the subject and/or adjacent properties.
- Sampling and logging seven (7) hollow stem auger borings utilizing a hollow stem drill rig to an approximate maximum depth of 51.5 feet at the subject site to evaluate subsurface soil conditions. The borings were backfilled with bentonite and concrete patched, as necessary.
- Percolation testing of the near surface soils (upper 5 feet) at three locations. The testing procedures followed the County of Los Angeles guidelines.
- Laboratory testing of selected samples to include in-situ moisture density, corrosion, shear, consolidation, passing No. 200 sieve, R-value, maximum density and optimum moisture content.
- Engineering analysis including site seismicity, foundation design, liquefaction analysis and settlement.
- Preparation of this report summarizing subsurface soil conditions, site seismicity, results of liquefaction analysis, seismic settlement, hydro-collapse potential and provide pertinent geotechnical/geologic information that may influence the proposed development.

Field Investigation

Field exploration was performed on November 13 and November 14, 2020 by an engineer from our firm who logged the borings and obtained representative samples, which were subsequently transported to the laboratory for further review and testing. The approximate locations of the borings are indicated on the enclosed Boring Location Map (Plate 1).

The subsurface conditions were explored by drilling, sampling, and logging six borings with a truck mounted hollow stem drill rig. Borings B-2, B-6 and B-7 were advanced to an approximate depth of fifty-one and a half (51.5) feet below existing grade, Boring B-5 was advanced to an approximate depth of twenty-six and a half (26.5) feet, Borings B-1 and B-4 were advanced to an approximate depth of sixteen and a half (6.5) feet and Boring B-3 was advanced to an approximate depth of eleven and a half (11.5) feet. Subsequent to drilling, all borings were backfilled with bentonite and the surface was repaired with concrete as necessary. The logs of borings presenting soil conditions and descriptions are presented in Appendix B.

The drill rig was equipped with a sampling apparatus to allow for recovery of driven modified California Ring Sampler (CRS), 3-inch outside diameter, and 2.42-inch inside diameter and SPT samples.

The samples were driven using an automatic 140-pound hammer falling freely from a height of 30 inches. The blow counts for CRS were converted to equivalent SPT blow counts. Soil descriptions were entered on the logs in general accordance with the Unified Soil Classification System (USCS). Driven samples and bulk samples of the earth materials encountered at selected intervals were recovered from the borings. The locations and depths of the soil samples recovered are indicated on the logs in Appendix B.

Percolation Testing

Percolation testing was performed at the subject site. Presented below are the infiltration rates from the percolation tests performed within the upper 5 feet. These do not include any factor of safety.

- P-1 at 0-5 feet 0.0 inches per hour
- P-2 at 0-5 feet 0.4 inches per hour
- P-3 at 0-5 feet 0.1 inches per hour

The infiltration test rates were generally determined utilizing the County of Los Angeles guidelines. Based on the percolation test results the site is generally considered **not suitable** for stormwater infiltration.

Laboratory Testing

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to evaluate the geotechnical properties of the subsurface soils. The following tests were performed:

- In-situ moisture content (ASTM D2216) and dry density (ASTM D7263);
- Maximum Dry Density and Optimum Moisture Content (ASTM D1557);
- Soluble Sulfates (CAL 417A);
- Consolidation (ASTM D2435);
- Direct Shear Strength (ASTM D3080);
- R-Value (CAL 301); and
- Passing No. 200 sieve (ASTM 1140).

Laboratory tests for geotechnical characteristics were performed in general accordance with the ASTM procedures. The results of the in-situ moisture content and density tests are shown on the borings logs. The results of the laboratory tests are presented in Appendix C.

GEOTECHNICAL FINDINGS

Geology

Regional Geologic Setting

The project site is located in the central portion of the El Monte and Baldwin Park quadrangles, Los Angeles County, California. Per the Geologic Map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California (Dibblee, 1999), the subject site is underlain by Quaternary alluvial deposits comprised of gravel, sand and silt of valleys and floodplains. Figure 2 presents the Regional Geology Map.

Earth Units

Based on our subsurface investigation, the subject area is underlain by 5 to 13 feet of undocumented fill consisting of silty sand, sandy clay and sandy silt underlain by Quaternary age alluvial deposits, consisting of sand, silty sand, sandy silt and sandy clay interbedded to the total depth explored of 51.5 feet below grade. The undocumented fill is not considered suitable for support of structures and shall be removed and replaced as engineered fill. Detailed descriptions of the earth units encountered in our borings are presented in the log of the borings. (Appendix B)

Groundwater

Subsurface water was encountered during the exploration at approximately 48 feet below existing ground surface. Based on our review of available historical groundwater information (CDMG, 1998) regional groundwater has been mapped in the general site area at approximately 5 feet below site grade (Figure 3). Seasonal and long-term fluctuations in the groundwater may occur as a result of variations in subsurface conditions, rainfall, run-off conditions and other factors. Therefore, variations from our observations may occur. Static groundwater is not anticipated to impact the proposed development.

Seismic Review

Faulting and Seismicity

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional faults such as the San Andreas, San Jacinto and Elsinore fault zones. These fault systems produce approximately 5 to 35 millimeters per year of slip between the plates.

By definition of the State Mining and Geology Board, an active fault is one which has had surface displacement within the Holocene Epoch (roughly the last 11,000 years). The State Mining and Geology Board has defined a potentially active fault as any fault which has been active during the Quaternary Period (approximately the last 1,600,000 years). These definitions are used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Geologic Hazard Zones Act of 1972 and as subsequently revised in 1994 (Hart, 1997) as the Alquist-Priolo Geologic Hazard Zoning Act and Earthquake Fault Zones.

The intent of the act is to require fault investigations on sites located within Special Studies Zones to preclude new construction of certain inhabited structures across the trace of active faults.

The subject site is not included within any Earthquake Fault Zones as created by the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1997). Our review of geologic literature pertaining to the site area indicates that there are no known active or potentially active faults located within or immediately adjacent to the subject property.

The nearest fault to the subject site is the East Montebello Fault mapped approximately 1.15 miles to the southwest of the site. Other faults nearby include the Whittier Fault located 3.5 miles southeast of the site, the Raymond Fault mapped approximately 5.45 miles northwest of the site, the Walnut Creek Fault mapped approximately 6.10 miles east of the site and the Sierra Madre Fault mapped 7.9 miles north of the subject site. The regional fault map, Figure 4, shows the location of the subject site in respect to the regional faults.

Secondary Seismic Hazards

Surface Fault Rupture and Ground Shaking

Since no known faults are located within the site, surface fault rupture is not anticipated. However, due to the close proximity of known active and potentially active faults, severe ground shaking should be expected during the life of the proposed structures.

Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when these ground conditions exist: 1) Shallow groundwater; 2) Low density, fine, clean sandy soils; and 3) High-intensity ground motion. Effects of liquefaction can include sand boils, settlement, and bearing capacity failures below foundations.

A review of the Seismic Hazard Zone Map, El Monte Quadrangle indicates that the project site is located in an area identified as having a potential for soil liquefaction. During our exploration groundwater was not encountered to a depth of approximately 51.5 feet below existing ground surface. The analysis utilized peak ground acceleration (PGA_M) of 0.899g and a moment magnitude of 6.89 (based on de-aggregation). Although groundwater was encountered to a depth of 48 feet, a historic depth to groundwater of 5 feet below existing grade was utilized in the calculations. The results are presented in Appendix E.

Seismically Induced Settlement

Ground accelerations generated from a seismic event can produce settlements in sands or in granular earth materials both above and below the groundwater table. This phenomenon is often referred to as seismic settlement and is most common in relatively clean sands, although it can also occur in other soil materials. The total seismic settlement of granular soils is estimated to range from 1.44 to 1.99 inches with a differential settlement of 0.25 inches over 60 feet. The calculations are presented in Appendix E.

Lateral Spreading

Seismically induced lateral spreading involves primarily movement of earth materials due to earth shaking. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. The topography in the vicinity of the subject site is relatively flat. Therefore, the potential for lateral spreading at the subject site is considered very low.

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

DISCUSSIONS AND CONCLUSIONS

General

Based on our field exploration, laboratory testing and engineering analysis, it is our opinion that the proposed structure and proposed grading will be safe against hazard from landslide, settlement, or slippage and the proposed construction will have no adverse effect on the geologic stability of the adjacent properties provided our recommendations presented in this report are followed.

Conclusions

Based on our findings and analyses, the subject site is likely to be subjected to moderate to severe ground shaking due to the proximity of known active and potentially active faults. This may reasonably be expected during the life of the structure and should be designed accordingly.

The primary conditions affecting the proposed project site development are as follows:

- Presence of 5 to 13 feet of undocumented fill.
- Liquefaction induced seismic settlement of granular soils.

The engineering evaluation performed concerning site preparation and the recommendations presented are based on information provided to us and obtained by us during our office and fieldwork. This report is prepared for the development of the new 93,490 sq. ft. building with associated truck docks, drive aisles and vehicle parking on the subject property. In the event that any significant changes are made to the proposed development, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the recommendations of this report are verified or modified in writing by TGR.

RECOMMENDATIONS

Seismic Design Parameters

When reviewing the 2019 California Building Code the following data should be incorporated into the design.

Parameter	Value
Latitude (degree)	34.05368
Longitude (degree)	-118.06368
Site Class	D
Site Coefficient, F_a	1.0
Site Coefficient, F_v	null
Mapped Spectral Acceleration at 0.2-sec Period, S_s	1.897 g
Mapped Spectral Acceleration at 1.0-sec Period, S_1	0.682 g
Spectral Acceleration at 0.2-sec Period Adjusted for Site Class, S_{MS}	1.897 g
Spectral Acceleration at 1.0-sec Period Adjusted for Site Class, S_{M1}	null
Design Spectral Acceleration at 0.2-sec Period, S_{DS}	1.265 g
Design Spectral Acceleration at 1.0-sec Period, S_{D1}	null

Site Specific Response Spectra

The USGS Unified Hazard tool, the USGS RTGM Calculator and the USGS App for Deterministic Spectra Acceleration were utilized to develop site specific ground motion spectra. The analysis was performed utilizing the following attenuation relationships that are part of NGA as required by 2019 CBC code requirements.

- Campbell & Bozorgnia (2014)
- Boore, Stewart, Seyhan & Atkinson (2014)
- Chiou & Youngs (2014)
- Abrahamson, Silva & Kamal (2014)

The results of the Site Specific Response Spectra are incorporated in Table 1 and on Figure 1 in Appendix D. The results include deterministic spectra at 5% damping, maximum rotated component at 0.84 fractile and the probabilistic spectra, maximum rotated component at 5% damping for a return period of 2475 year and subsequently multiplied by risk coefficient to obtain the MCER probabilistic spectral acceleration. The Vs30 utilized was 260 m/s.

The above generated spectral accelerations were compared against the minimum code requirements in ASCE7-16 (Chapters 11 and 21) resulting in the final design response spectra which is presented in Table 1 and on Figure 1 in Appendix D.

Based on Table 1 and Figure 1, the recommended Site Specific S_{DS} and S_{D1} are as follows:

S_{DS} = 1.115
S_{D1} = 0.958

The structural consultant should review the above parameters and the 2019 California Building Code to evaluate the seismic design.

Conformance to the criteria presented in the above table for seismic design does not constitute any type of guarantee or assurance that significant structural damage or ground failure will not occur during a large earthquake event. The intent of the code is “life safety” and not to completely prevent damage of the structure, since such design may be economically prohibitive.

Foundation Design Recommendations

The proposed buildings may be supported on continuous and/or spread footings. Bearing capacity recommendations for shallow foundations are presented below. These recommendations assume that the footings will be supported on a minimum of three (3) feet or half the width of the footing (whichever is greater) of engineered fill. All existing undocumented fill is considered unsuitable for the support of structures and shall be removed and replaced as engineered fill.

For foundations supported on three (3) feet or half the width of the footing (whichever is greater) of engineered fill with minimum ninety (90) percent relative compaction an allowable bearing pressure of 2000 pounds per square foot may be used in design.

All shallow foundations should extend a minimum of twenty-four (24) inches below the lowest adjacent grade. The minimum recommended footing width is eighteen (18) inches for continuous footing and twenty-four (24) inches for pad footing. A minimum reinforcement of two (2) No. 4 steel bar top and two (2) No. 4 steel bar bottom is required for continuous footings from a geotechnical viewpoint. Foundation design details such as concrete strength, reinforcements, etc should be established by the Structural Engineer.

A one-third (1/3) increase on the aforementioned bearing pressure may be used in design for short-term wind or seismic loads.

The total and differential static settlement is anticipated to be 1 inch and 0.5 inches over 60 feet or less. The total and differential seismic settlement is 1.99 inches and 0.25 inches over 60 feet or less.

Resistance to lateral loads including wind and seismic forces may be provided by frictional resistance between the bottom of concrete and the underlying fill soils and by passive pressure against the sides of the foundations. A coefficient of friction of 0.40 may be used between concrete foundation and underlying soil. The recommended passive pressure of the engineered fill may be taken as an equivalent fluid pressure of 250 pounds per cubic foot (2,500 psf max).

Footings located near property lines where the lateral removal cannot be achieved shall be designed for a reduced bearing capacity of 1,500 pounds per square foot and the passive resistance shall be ignored.

Retaining Wall Recommendations

The following soil parameters may be used for the design of the retaining wall with level backfill and a maximum height of six (6) feet:

Conditions	Parameters
Active (Level)	40 psf/ft
Passive	250 (maximum 2,500 psf)
Friction Coefficient	0.40

- The passive pressure in the upper 6 inches of soil not confined by slabs or pavement should be neglected.
- All footings should meet the setback requirements presented in 2019 CBC.
- The retaining wall should be provided with a drainage system (Miradrain or equivalent) to prevent buildup of hydrostatic pressure behind the walls. We do not recommend omitting the drains behind walls.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall shall be considered as lateral surcharge. For lateral surcharge conditions, we recommend utilizing a horizontal load equal to 50 percent of the vertical load, as a minimum. This horizontal load should be applied below the 1:1 projection plane. To minimize the surcharge load from an adjacent footing, deepened footings may be considered.

Slab-On-Grade

Slab-on-grade should be a minimum of 5-inches thick and reinforced with a minimum of No. 4 reinforcing bar on 18-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The slab should not be structurally connected to the buildings. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of three (3) feet. Prior to placement of concrete, the subgrade soils should be moistened to near optimum moisture content and verified by our field representative.

The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition and the anticipated use of the building. For moisture sensitive flooring, the floor slab should be underlain by minimum 15-mil impermeable polyethylene membrane (Stego Wrap, Moistop Plus, or any equivalent meeting the requirements of ASTM E1745, Class A rating) as a capillary break. Sand may be placed above

and below the impermeable polyethylene membrane at the discretion of the project structural engineer/concrete contractor for proper curing and finish of the concrete slab-on-grade and protection of the membrane and is considered outside the scope of geotechnical engineering.

Flatwork

Flatwork should be a minimum of 4-inches thick should be reinforced with a minimum of No. 3 reinforcing bar on 24-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM D1557) to a minimum depth of one (1) foot. Prior to placement of concrete, the subgrade soils should be moistened to near optimum moisture content and verified by our field representative. The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition.

Modulus of Subgrade Reaction

The modulus of subgrade reaction may be taken as 125 pci (K_1) for one (1) square foot footing/slab founded on site soils. This value should be reduced for change in size per the following formula:

$$K = K_1 \left(\frac{B+1}{2B} \right)^2$$

Where B = Width of Mat;
K = Coefficient of Subgrade Reaction of Footings Measuring B(ft) x B(ft).

Cement Type and Corrosion

Based on laboratory testing concrete used should be designed in accordance with the provisions of ACI 318-14, Chapter 19 for Exposure Class S0 with a minimum confined compressive strength of 2,500 psi and for Exposure Class C1 (Moderate) – Concrete in contact with site soils exposed to moisture but not to significant external source of chloride per ACI 318-14 Table 19.3.1.1. Corrosion tests indicate a moderate corrosion potential for ferrous metals exposed to site soils.

Corrosion tests indicate corrosive potential for ferrous metals exposed to site soils.

TGR does not practice corrosion engineering. If needed, a qualified specialist should review the site conditions and evaluate the corrosion potential of the site soil to the proposed improvements and to provide the appropriate corrosion mitigations for the project.

Expansive Soil

Onsite silty clay soils and sandstone/siltstone bedrock have an expansion index of 8, correlating to a “Very Low” expansion potential.

Shrinkage/Subsidence

Removal and recompaction of the near surface soils is estimated to result in shrinkage ranging from 5 to 10 percent. Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be between one and two tenths of a foot.

Site Development Recommendations

General

During earthwork construction, all site preparation and the general procedures of the contractor should be observed, and the fill selectively tested by a representative of TGR. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and/or additional recommendations will be offered. During demolition of the existing building and associated site work, voids created from removal of buried elements (footings, pipelines, septic pits etc) shall be backfilled with engineered fill (min 90% relative compaction per ASTM D1557) under the observation of TGR.

Grading

All grading should conform to the guidelines presented in the California Building Code (2019 edition), except where specifically superseded in the text of this report. Prior to grading, TGR's representative should be present at the pre-construction meeting to provide grading guidelines, if needed, and review any earthwork.

All undocumented fill within the building footprint and 5 feet or depth of fill outside laterally and under retaining/site walls should be removed and replaced with engineered fill. The site is underlain by approximately 3 to 13 feet of undocumented fill. This fill is considered unsuitable for the support of structures and shall be removed and replaced with engineered fill. Oversize particles may be encountered during grading. All particles greater than 4-inches shall be removed and disposed offsite.

To support the foundation a minimum three (3) feet or half the width of the footing (whichever is greater) of approved engineered fill should be placed under the footings. A minimum of three (3) feet of engineered fill is recommended under slab-on-grade, and a minimum of two (2) feet of engineered fill is recommended under flatwork and pavement. Site soils could be reused as engineered fill provided, they are free of oversized particles and the recommendations presented in this report are implemented. Exposed bottoms should be scarified a minimum of 6-inches, moisture conditioned and compacted to a minimum 90 percent relative compaction. Subsequently, site fill soils should be re-compacted to a minimum of ninety (90) percent relative compaction at near optimum moisture content. The lateral extent of removals beyond the building/structure/footing limits should be equal to at least the depth of fill or 5 feet, whichever is greater.

The depth of over-excavation should be reviewed by the Geotechnical Consultant during the actual construction. Any subsurface obstruction buried structural elements, and unsuitable material encountered during grading, should be immediately brought to the attention of the Geotechnical Consultant for proper exposure, removal and processing, as recommended.

Fill Placement

Prior to any fill placement TGR should observe the exposed surface soils. The site soils may be re-used as engineered fill provided, they are free of organic content and particle size greater than 4-inches. All particles greater than 4-inches shall be removed and disposed offsite. Fill shall be moisture-conditioned near optimum and compacted to a minimum relative compaction of 90 percent in accordance with ASTM D1557. Any import soils shall be non-expansive and approved by TGR Geotechnical Inc.

Compaction

Prior to fill placement, the exposed surface should be scarified to a minimum depth of six (6) inches, fill placed in six (6) inch loose lifts moisture conditioned to near optimum and compacted to a minimum relative compaction of ninety (90) percent in accordance with ASTM D 1557.

Trenching

All excavations should conform to CAL-OSHA and local safety codes.

Temporary Excavation and Shoring

Temporary construction excavations in sandy soils may be anticipated during the proposed development. Sandy soils may be cut vertically without shoring to a depth of approximately four (4) feet below adjacent surrounding grade. For deeper cuts, the slopes should be properly shored or sloped back to at least 1.5H:1V (Horizontal: Vertical) or flatter. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. No surcharge loads should be permitted within a horizontal distance equal to the height of cut from the toe of excavation unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any nearby adjacent existing site facilities should be properly shored to maintain foundation support at the adjacent structures.

Drainage

Positive site drainage should be maintained at all times. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. Pad drainage should be directed towards street/parking or other approved area.

Utility Trench Backfill

All utility trench backfills in structural areas and beneath hardscape features should be brought to near optimum moisture content and compacted to a minimum relative compaction of 90 percent of the laboratory standard. Flooding/jetting is not recommended.

Sand backfill, (unless trench excavation material), should not be allowed in parallel exterior trenches adjacent to and within an area extending below a 1:1 plane projected from the outside bottom edge of the footing. All trench excavations should minimally conform to CAL-OSHA and

local safety codes. Soils generated from utility trench excavations may be used provided it is moisture conditioned and compacted to 90 percent minimum relative compaction.

Preliminary Pavement Design

The Caltrans method of design was utilized to develop the following asphalt pavement section. The section was developed based on a tested "R-Value" for compacted site subgrade soils of 59.

Traffic indices of 4.5, 5, 6, and 7 were assumed for use in the evaluation of automobile parking stalls and driveways, and medium and heavy truck driveways, respectively. The traffic indices are subject to approval by controlling authorities and shall be approved by the project civil engineer.

ASPHALT PAVEMENT SECTION					PCC PAVEMENT SECTION		
Pavement Utilization	Traffic Index	Asphalt (Inch)	Aggregate Base (Inch)	Total (Inch)	PCC	Aggregate Base (Inch)	Total (Inch)
Parking Stalls	4.5	3.0	4.0	7.0	--	--	--
Auto Driveways	5.0	3.0	4.0	7.0	--	--	--
Truck Aisles/ Driveways	6.0	4.0	4.0	8.0	**7	--	7
Loading Dock	7.0	4.0	6.0	10.0	**7	--	7

**Minimum concrete compressive strength of 3,500 psi.

Aggregate base material should consist of CAB/CMB complying with the specifications in Section 200.2.2 of the current "Standard Specifications for Public Works Construction" and should be compacted to at least ninety-five (95) percent of the maximum dry density (ASTM D1557). The surface of the aggregate base should exhibit a firm and unyielding condition just prior to the placement of asphalt concrete paving.

The pavement subgrade should be constructed in accordance with the recommendations presented in the grading section of this report.

The R-value and the associated pavement section should be confirmed at the completion of site grading.

An increase in the PCC pavement slab thickness, placement of steel reinforcement (or other alternatives such as Fibermesh) and joint spacing due to loading conditions including shrinkage and thermal effects may be necessary and should be incorporated by the structural engineer as necessary to prevent adverse impact on pavement performance and maintenance.

Geotechnical Review of Plans

All grading and foundation plans should be reviewed and accepted by the geotechnical consultant prior to construction. If significant time elapses since preparation of this report, the geotechnical consultant should verify the current site conditions, and provide any additional recommendations (if necessary) prior to construction.

Geotechnical Observation/Testing During Construction

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, periodic special inspection shall be performed to:

- Verify materials below shallow foundations are adequate to achieve the design bearing capacity;
- Verify excavations are extended to the proper depth and have reached proper material;
- Verify classification and test compacted materials; and
- Prior to placement of compacted fill, inspect subgrade and verify that the site has been prepared properly

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, continuous special inspection shall be performed to:

- Verify use of proper materials, densities and lift thickness during placement and compaction of compacted fill.

The geotechnical consultant should also perform observation and/or testing at the following stages:

- During any grading and fill placement;
- During utility trench excavation and backfill;
- After foundation excavation and prior to placing concrete;
- During placement of aggregate base and asphalt concrete or Portland cement concrete;
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

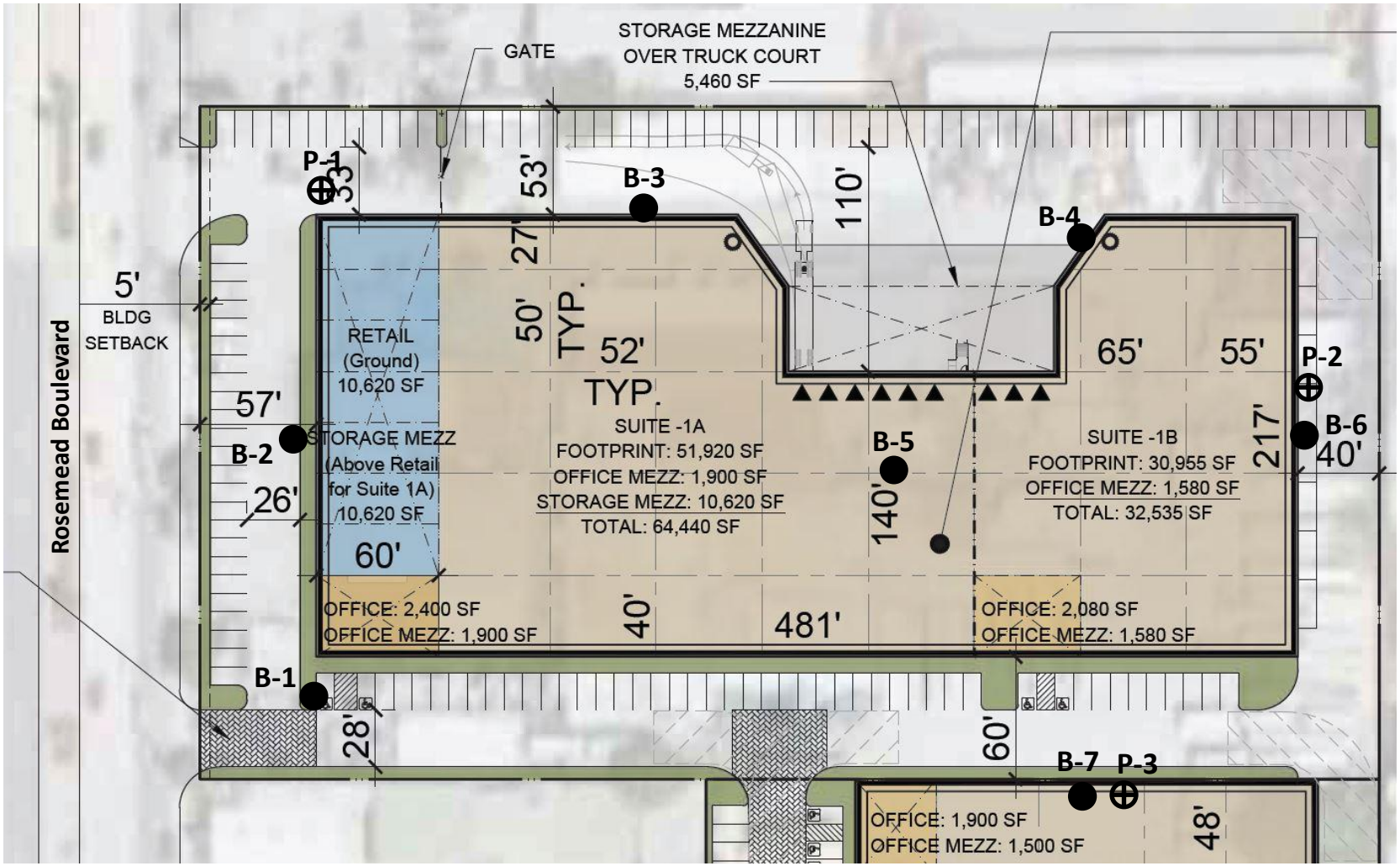
Limitations

This report was prepared for a specific client and a specific project, based on the client's needs, directions and requirements at the time.

This report was necessarily based upon data obtained from a limited number of observances, site visits, soil and/or other samples, tests, analyses, histories of occurrences, spaced subsurface exploration and limited information on historical events and observations. Such information is necessarily incomplete. Variations can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can and do occur over time.

This report is not authorized for use by, and is not to be relied upon by any party except the client with whom TGR contracted for the work. Use or reliance on this report by any other party

is that party's sole risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify TGR from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of TGR.



B-7 APPROXIMATE LOCATION OF EXPLORATORY BORING

P-3 APPROXIMATE LOCATION OF EXPLORATORY BORING

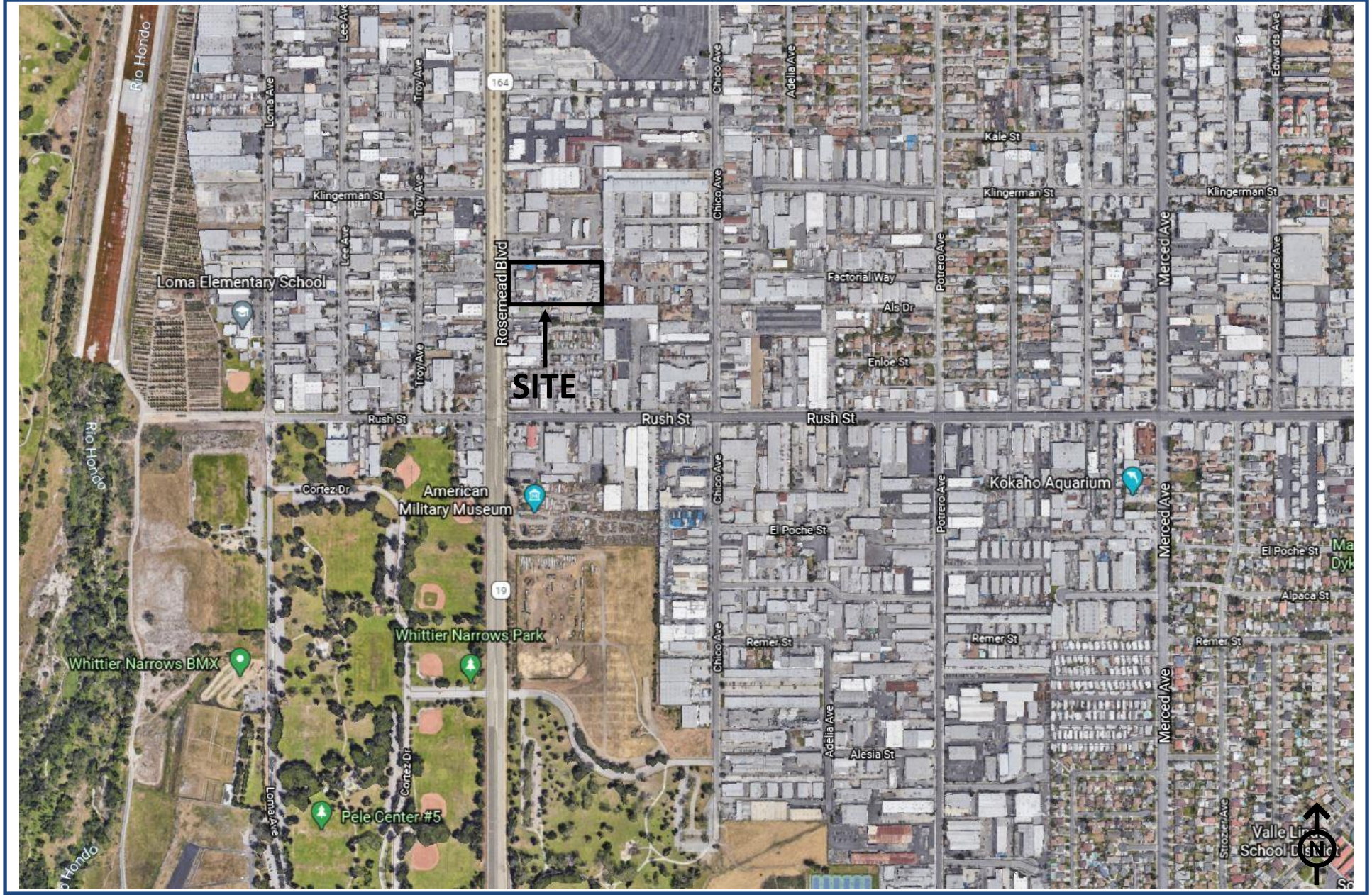
N

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

BORING LOCATION MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

PLATE 1

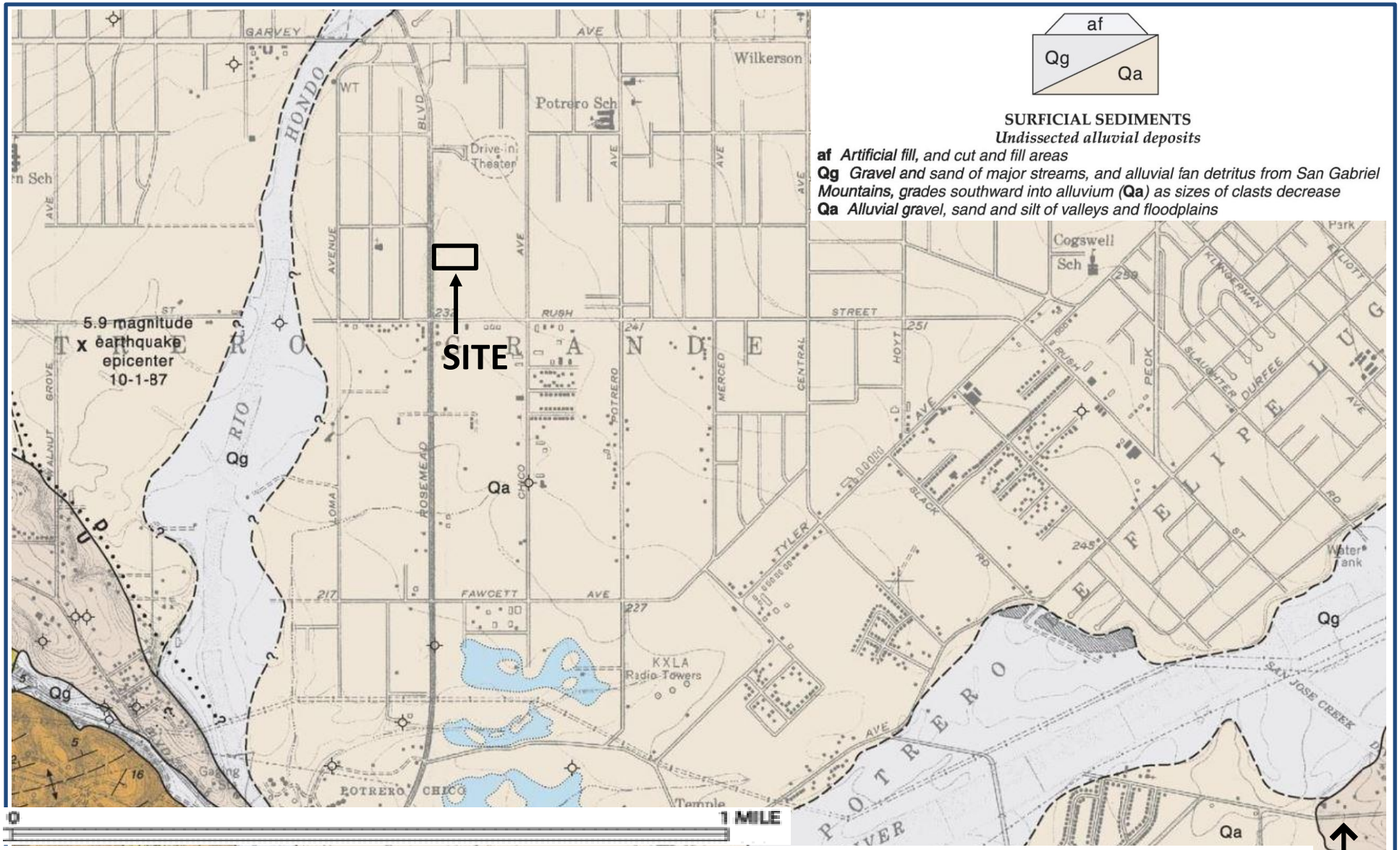


TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SITE LOCATION MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 1



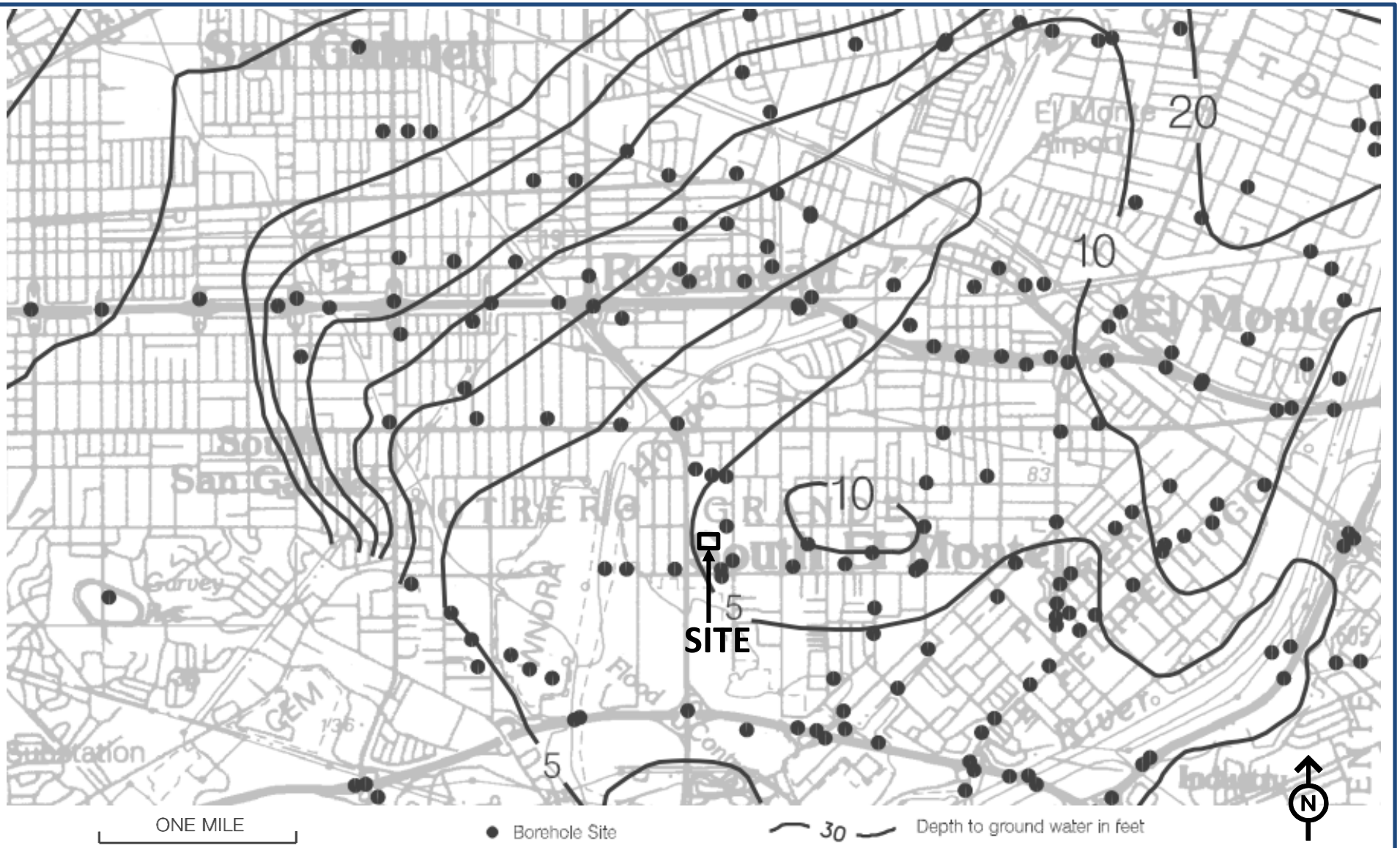
Dibblee, T.W., and Ehrenspeck, H.E., 1999, Geologic map of the El Monte and Baldwin Park quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-69, scale 1:24,000..

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

REGIONAL GEOLOGY MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 2



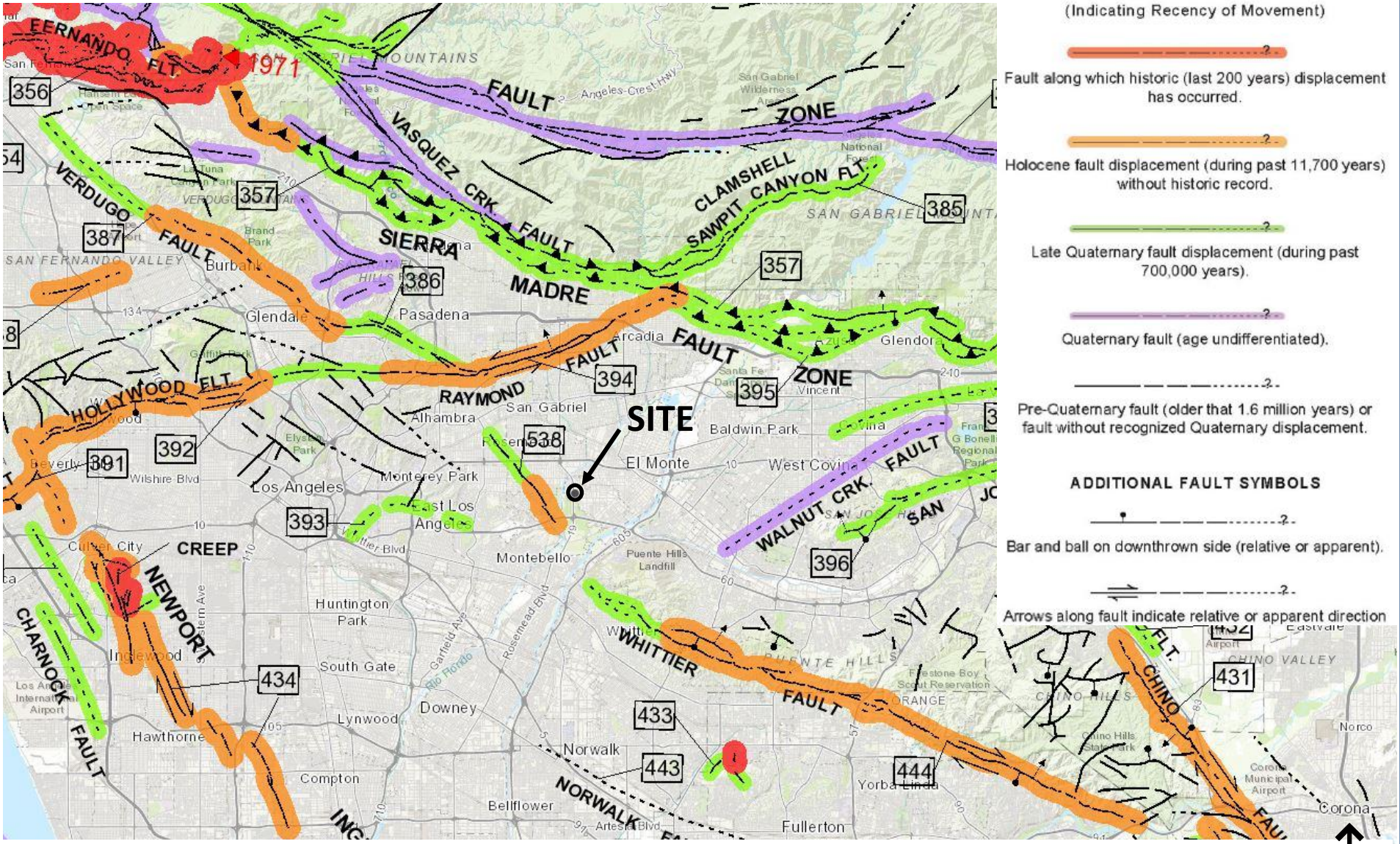
Modified From: California Department of Conservation, Division of Mines and Geology, 1998, Seismic Hazard Zone Report for the El Monte 7.5-Minute Quadrangle, Los Angeles County, California, Report 024.

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

HISTORIC HIGH GROUNDWATER MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 3



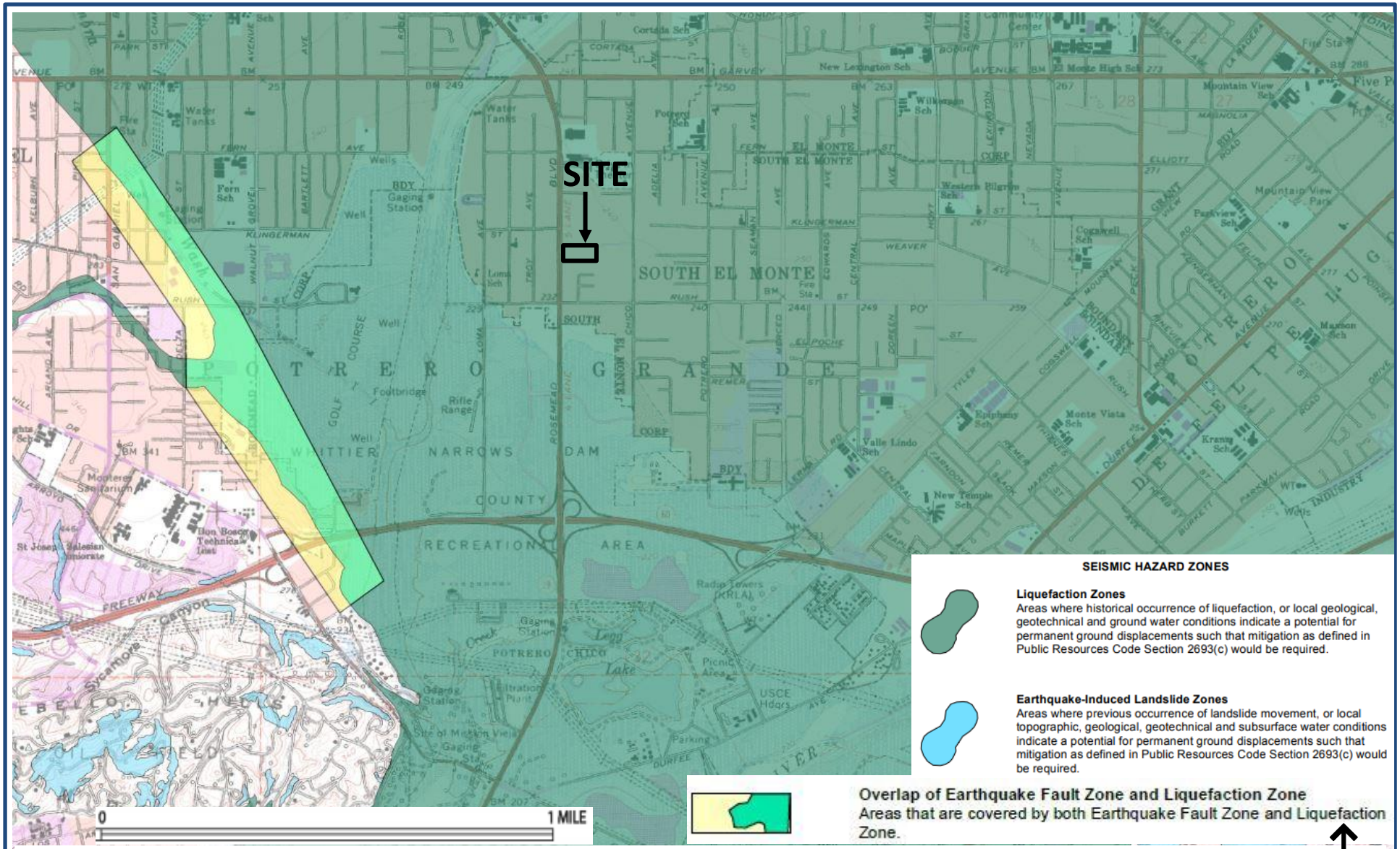
Modified From: Jennings, C. W., 2010, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

REGIONAL FAULT MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 4



Modified From: State of California Division of Mines and Geology, Earthquake Zones of Required Investigation, El Monte Quadrangle Released March 25, 1999, scale 1:24,000

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SEISMIC HAZARD ZONE MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 5

Test Hole	Total Depth (in)	Initial Depth (in)	Final Depth (in)	∆Water Level (in)	Initial Time (min)	Final Time (min)	∆ Time (min)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Infiltration Rate (in/hr)
P-1	60	3	3.5	0.5	0.0	10.0	10.0	57	56.5	56.75	0.1
	60	3.5	4	0.5	10.0	20.0	10.0	56.5	56	56.25	0.1
	60	4	4.625	0.625	20.0	30.0	10.0	56	55.375	55.69	0.1
	60	4.625	6	1.375	30.0	60.0	30.0	55.375	54	54.69	0.0
	60	6	7.125	1.125	60.0	90.0	30.0	54	52.875	53.44	0.0
	60	7.125	8	0.875	90.0	120.0	30.0	52.875	52	52.44	0.0
	60	8	9	1	120.0	150.0	30.0	52	51	51.50	0.0
	60	3.875	5.25	1.375	150.0	181.0	31.0	56.125	54.75	55.44	0.0
	60	3.625	5.875	2.25	182.0	212.0	30.0	56.375	54.125	55.25	0.1
	60	3.375	4.625	1.25	215.0	245.0	30.0	56.625	55.375	56.00	0.0
P-2	60	2.625	11.125	8.5	0.0	10.0	10.0	57.375	48.875	53.13	0.4
	60	2.75	11	8.25	12.0	22.0	10.0	57.25	49	53.13	0.4
	60	3	11.5	8.5	22.0	33.0	11.0	57	48.5	52.75	0.4
	60	3.5	11.375	7.875	36.0	46.0	10.0	56.5	48.625	52.56	0.4
	60	2.375	10.75	8.375	47.0	57.0	10.0	57.625	49.25	53.44	0.4
	60	3.125	11.25	8.125	59.0	69.0	10.0	56.875	48.75	52.81	0.4
	60	2.625	11.125	8.5	70.0	80.0	10.0	57.375	48.875	53.13	0.4
	60	3	11.25	8.25	84.0	94.0	10.0	57	48.75	52.88	0.4
P-3	60	4.5	5.625	1.125	0.0	10.0	10.0	55.5	54.375	54.94	0.1
	60	4	4.75	0.75	30.0	40.0	10.0	56	55.25	55.63	0.1
	60	3.5	4.625	1.125	40.0	50.0	10.0	56.5	55.375	55.94	0.1
	60	3.5	4.5	1	50.0	64.0	14.0	56.5	55.5	56.00	0.1
	60	4	4.75	0.75	67.0	77.0	10.0	56	55.25	55.63	0.1
	60	3.5	4.75	1.25	78.0	91.0	13.0	56.5	55.25	55.88	0.1
	60	3	4	1	94.0	104.0	10.0	57	56	56.50	0.1
	60	3.5	4.375	0.875	105.0	115.0	10.0	56.5	55.625	56.06	0.1
	60	3.625	4.5	0.875	117.0	127.0	10.0	56.375	55.5	55.94	0.1
	60	3.5	4.375	0.875	128.0	138.0	10.0	56.5	55.625	56.06	0.1

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

ΔH = Change in height

Δt = Time interval

r = Radius

I_t Infiltration Rate

H_{ave} Average Head Height over the time interval

APPENDIX A
REFERENCES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX A

References

California, State of, Department of Conservation, Division of Mines and Geology, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, CDMG Special Publication 117A.

_____, 1998, Maps of Known Active Fault Near – Source Zones in California and Adjacent Portions of Nevada.

_____, 1998, Seismic Hazard Zone Report for the El Monte 7.5-Minute Quadrangle, Los Angeles County, California, Report 022.

_____, 1999, State of California Seismic Hazard Zones Map, El Monte Quadrangle, Official Map Released March 25, 1999, Revised June 15, 2017, Scale 1:24,000.

Dibblee, T.W., and Ehrenspeck, H.E., 1999, Geologic map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-69, scale 1:24,000.

Hart, E. W., 1997, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Special Study Zones Maps: Department of Conservation, Division of Mines and Geology, Special Publication 42

International Code Council (ICC), California Building Code, 2019 Edition

Jennings, C. W., 2010, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000

APPENDIX B
LOG OF BORINGS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

THE FOLLOWING DESCRIBES THE TERMS AND SYMBOLS USED ON THE LOG OF BORINGS TO SUMMARIZE THE RESULTS OBTAINED IN THE FIELD INVESTIGATION AND SUBSEQUENT LABORATORY TESTING

DENSITY AND CONSISTENCY

The consistency of fine grained soils and the density of coarse grained soils are described on the basis of the Standard Penetration Test as follows:

COARSE GRAINED SOILS		ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (Tsf)	FINE GRAINED SOILS	
Very Loose	< 4	< 0.25	Very Soft	< 2
Loose	4 – 10	0.35 – 0.50	Soft	2 – 4
Medium	10 – 30	0.50 – 1.0	Firm (Medium)	4 – 8
Dense	30 – 50	1.0 – 2.0	Stiff	8 – 15
Very Dense	> 50	2.0 – 4.0	Very Stiff	15 – 30
		> 4.0	Hard	> 30

PARTICLE SIZE DEFINITION (As per ASTM D2487 and D422)

Boulder	⇒ Larger than 12 inches	Coarse Sands	⇒ No. 10 to No. 4 sieve
Cobbles	⇒ 3 to 12 inches	Medium Sands	⇒ No. 40 to No. 10 sieve
Coarse Gravel	⇒ 3/4 to 3 inches	Fine Sands	⇒ No. 200 to 40 sieve
Fine Gravel	⇒ No. 4 to 3/4 inches	Silt	⇒ 5µm to No. 200 sieve
		Clay	⇒ Smaller than 5µm

SOIL CLASSIFICATION

Soils and bedrock are classified and described based on their engineering properties and characteristics using ASTM D2487 and D2488.

Percentage description of minor components:

Trace	1 – 10%	Some	20 – 35%
Little	10 – 20%	And or y	25 – 50%

Stratified soils description:

Parting	0 to 1/16 inch thick	Layer	½ to 12 inches thick
Seam	1/16 to ½ inch thick	Stratum	> 12 inches thick

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

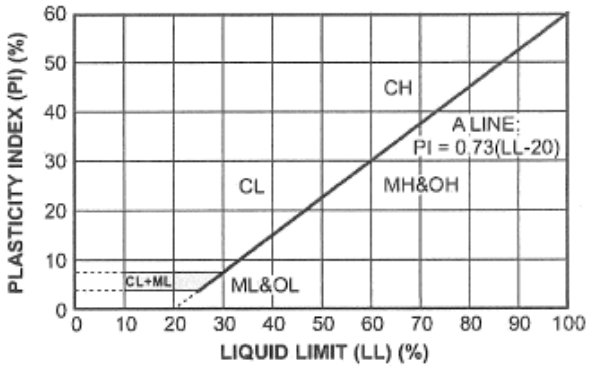
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



PARTICLE SIZE LIMITS

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	
	3"	¾"	NO. 4	NO. 10	NO. 40	NO. 200

LOG OF EXPLORATORY BORING B-1

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			R Value
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				3		SM	Native: Silty Sand- brown with orange oxidation, some clay, fine to medium sand, medium dense, moist	24	78	
10				23		SP-SM	Sand- yellowish brown, some silt, medium sand, medium dense, slightly moist	4	106	
15				27		SP-SM	.....same as above	4	103	
							Bottom of Boring at 16.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 2

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand to Clay- brown to dark brown, medium stiff, moist			EI, Max, Remolded Shear
5			■	8		SP	Native: Silty Sand- brown, fine to medium sand, medium dense, moist	14	113	Consol, -200= 31.4%
10			■	26		SP	Sand- yellowish brown, medium to coarse sand, medium dense, moist	3	110	-200= 6.5%
15			■	16		SP	.....same as above	6	116	-200= 9.8%
20			■	34		SP	.....same as above	3	113	-200= 10%
25			▨	19		SP	Sand- brown, medium sand, some clay, medium dense, moist	7		-200= 11.1%

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 3

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
			☒	16		SP	Sand- brown, medium to coarse sand, some clay, medium dense, moist	12		-200= 16.4%, LL= 31, PL= 27.2
35			☒	35		SP	Sand- brown, fine to medium sand, medium dense, slightly moist	5		
40			☒	40		SP	Sand- grayish brown, fine grained, medium dense to dense, slightly moist to moist	4		
45			☒	39		SP	Sand- brown to grayish brown, some clay, medium sand, medium dense very moist	24		-200= 19.1%
							▼			
50			☒	47		SP	....same as above, coarse sand	14		
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 4

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-3

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			
5			■	3	5	CL		42	78	
							Native: Silty Sand- brown with orange oxidation, some clay, fine to medium sand, medium dense, moist			
10			■	12	17	SP-SC	Sand- light brown, fine to medium sand, some clay, medium dense, slightly moist	5	99	
							Bottom of Boring at 11.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 5

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-4

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							2 to 3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				9		SP	Native: Sand- brown with orange oxidation, fine to medium sand, medium dense, moist	3	107	
10				20		SP-SM	Sand- yellowish brown, some silt, fine sand, medium dense, slightly moist	8	94	
15				20		SP-SC	.....same as above	16	106	
							Bottom of Boring at 16.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 6

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/8/20

LOG OF EXPLORATORY BORING B-5

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch concrete on top surface			
							Fill: Silty sand- dark brown, medium dense, moist			Corrosion
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				8		SM	Native: Sandy Silt to Silty Sand- brown, fine sand, medium dense, moist	20	108	
10				15		SC-SM	Sand- yellowish brown, some silt, fine sand, medium dense, slightly moist	3	98	
15				41		SC-SM	.....same as above	5	104	
20				37		SC-SM	.....same as above, grayish brown, medium to coarse sand	3	114	
25				16		SM	Silty Sand- grayish brown, fine grained sand, some scattered fine gravels, medium dense, moist	20	100	
							Bottom of Boring at 26.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 7

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-6

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			
							Clay- dark brown, medium stiff, moist			
5			■	15		SM	Silty Sand- brown to light brown, medium sand, pieces of bricks and a cobble upto 2.5 inch diameter, medium dense, moist	13	108	
10			■	6		ML	Sandy Silt- grayish brown, fine sand, medium stiff, moist	26	93	Consol, -200= 68.3%
							NATIVE: Silty Sand, grayish brown, medium dense, slightly moist			
15			■	9		SP	Sand- grayish brown, some silt, medium to coarse sand, dense, moist	11	91	Consol, -200= 19.2%
20			■	11		SP	.....same as bove	26	84	-200= 21%
25			⊠	14		SP	Sand- grayish brown, fine to medium sand, some sand, medium dense, moist	20		-200= 8.5%, LL= 45, PL= 37.8

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 8

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-6

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
			☒	41		SP	Sand- grayish brown, medium dense, fine to medium grained, some clay, moist	5		
35			☒	26		SC	Sand to Clayey Sand- brown to grayish brown, sandy clay at tip, medium dense, moist	15		-200= 33.2%
40			☒	29		SC	Clayey Sand- grayish brown, medium dense, moist, sandy clay at tip	14		
45			☒	21		CL	Sandy Clay/Clayey Sand- grayish brown, medium stiff/dense, moist ▼	25		-200= 48.9%, LL= 26, PL= 20.5
50			☒	25		SP	Gravelly Sand- brown, medium to coarse sand, clayey layer at tip, medium dense, wet	20		
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite slurry and capped with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 9

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-7

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Dirt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			
							Clay- dark brown, medium stiff, moist			
5				10		CL	Native: Sandy Silt- grayish brown with orange oxidation, fine grained sand, medium stiff, moist	22	103	-200= 58.8%, LL= 23%, PL= 19%
10				10		ML	Silty Sand- grayish brown, fine to medium grained sand, medium dense, moist	13	100	-200= 39.1%
15				20		SP	Sand- grayish brown, fine to medium grained sand, slightly moist, medium dense	3	98	-200= 10.9%
20				25		SP	.....same as above, yellowish brown, fine to medium grained, medium dense, moist	4	103	-200= 6.4%
25				29		SP	.....same as above, grayish brown	2		-200= 5%

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 10

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7107 XEBEC RUSH STREET.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-7

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
				24		SP	.....same as above, yellowish brown, fine to medium sand, slightly moist, medium dense	7		-200= 21%
35				8		CL	Sandy Clay- dark grayish brown, fine sand, medium stiff, moist	22		-200= 64.3%, LL= 29%, PL=25.8%
40				11		CL	.....same as above	23		-200= 57.4%, LL= 33.5%, PL= 30%
45				28		SP	Silty Sand- grayish brown, fine to medium sand, medium dense, moist ▼	16		-200= 23.2%
50				50		SP	GRAVELLY SAND- grayish brown, medium to coarse sand, medium to coarse gravel, wet, dense	14		-200= 5%
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 11

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING P-1

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			-200= 78.8%
5							Bottom of Boring at 5 feet No Groundwater encountered No caving observed Boring backfilled with pea gravels and patched with asphalt			

Shelby Tube; Standard Split Spoon; No recovery; Modified California; Water Table ATD

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 12

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING P-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
										-200=46%
							Sandy Clay- brown to dark brown, medium stiff, moist			
5							Bottom of Boring at 5 feet No Groundwater encountered No caving observed Boring backfilled with pea gravels and patched with asphalt			

Shelby Tube
Standard Split Spoon
No recovery
Modified California
Water Table ATD

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 13

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING P-3

Sheet **1** of **1**

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
		■	■				Dirt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			-200= 60.5%
		■	■				Clay- dark brown, medium stiff, moist			
5		■	■				Bottom of Boring at 5 feet No caving observed No groundwater encountered Boring backfilled with gravels			
10										

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 14

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7107 XEBEC RUSH STREET.GPJ TGR.GEOTECH.GDT 12/14/20

APPENDIX C
LABORATORY TEST RESULTS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX C

Laboratory Testing Procedures and Results

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM Test Method D1557. The results of these tests are presented in the test data and in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-2 @ 0-5 feet	Silty Sand with Sandy Clay	122.5	12%

Direct Shear Tests: Direct shear test was performed on selected remolded and/or undisturbed sample, which was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1-hour prior to application of shearing force. The sample was tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inches per minute (depending upon the soil type). The test result is presented in the test data and below:

Sample Location	Sample Description	Friction Angle (degrees)	Apparent Cohesion (psf)
B-2 @ 0-5 feet	Remolded Shear – Silty Sand with Sandy Clay, Ultimate	31	144

Consolidation Tests (ASTM D2435): Consolidation test were performed on selected, relatively undisturbed ring samples. Samples were placed in a consolidometer and loads were applied in geometric progression. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. The consolidation pressure curves are presented in the test data.

Wash Sieve Test: Typical materials were washed over No. 200 sieve (ASTM Test Method D1140). The test results are presented below:

Sample Location	% Passing No. 200 Sieve
B-2 @ 5 feet	31.4%

B-2 @ 10 feet	6.5%
B-2 @ 15 feet	9.8%
B-2 @ 20 feet	10.0%
B-2 @ 25 feet	11.1%
B-2 @ 30 feet	16.4%
B-2 @ 45 feet	19.1%
B-6 @ 10 feet	68.3%
B-6 @ 15 feet	19.2%
B-5 @ 20 feet	21.0%
B-6 @ 25 feet	8.5%
B-6 @ 35 feet	33.2%
B-6 @ 45 feet	48.9%
B-7 @ 5 feet	58.8%
B-7 @ 10 feet	39.1%
B-7 @ 15 feet	10.9%
B-7 @ 20 feet	6.4%
B-7 @ 30 feet	21.0%
B-7 @ 35 feet	64.3%
B-7 @ 40 feet	57.4%
B-7 @ 45 feet	23.2%
P-1 @ 0-5 feet	76.0%
P-2 @ 0-5 feet	45.6%
P-3 @ 0-5 feet	60.5%

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

Corrosivity Test: Electrical conductivity, pH, and soluble chloride tests were conducted on representative samples and the results are presented in the test data and in the table below:

Sample Location	Sample Description	Soluble Chloride (CAL.422) ppm	Electrical Resistivity (CAL.643) (ohm-cm)	PH (CAL.747)	Potential Degree of Attack on Steel
B-5 @ 0-5 feet	Silty Sand with Sandy Clay	118	2,000	9.8	Corrosive

Soluble Sulfates: The soluble sulfate content of selected sample was determined by standard geochemical methods. The test result is presented in the table below:

Sample Location	Sample Description	Water Soluble Sulfate in Soil, (% by Weight)	Sulfate Content (ppm)	Exposure Class*
B-5 @ 0-5 feet	Silty Sand with Sandy Clay	0.0641	641	S0

* Based on the current version of ACI 318-14 Building Code, Table No. 19.3.1.1; Exposure Categories and Classes.

R-Value: The resistance "R"-Value was determined by the California Materials Method No. 301 for subgrade soils. One sample was prepared and exudation pressure and "R"-Value determined. The graphically determined "R"-Value at exudation pressure of 300 psi is summarized in the table below:

Sample Location	Sample Description	R-Value
B-1 @ 0-5 feet	Silty Sand with Sandy Clay	59

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX D
SITE SEISMIC DESIGN AND DE-AGGREGATED PARAMETERS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

TABLE 1

SITE SPECIFIC GROUND MOTION ANALYSIS

2200 Rosemead Boulevard, South El Monte, CA

SA Period (sec)	Probabilistic Spectral Acceleration (g)	Risk Coefficients	Probabilistic Spectral Acceleration MCER (g)	Deterministic Spectral Acceleration (g)	Is Largest Deterministic Spectral Acceleration <1.5*Fa	Deterministic MCER	Site Specific MCER	2/3 of Spite Specific MCER	80% Code Design	Site Specific Design Response Spectrum
	Rotated Maximum		Rotated Maximum	Rotated Maximum 84th Percentile						
0	0.8789	0.896	0.7875	0.7177		0.7177	0.7177	0.4785	0.4047	0.4785
0.1	1.4839	0.896	1.3296	1.1185		1.1185	1.1185	0.7457	0.7424	0.7457
0.2	1.9855	0.896	1.7790	1.5293		1.5293	1.5293	1.0196	1.0117	1.0196
0.3	2.2658	0.896	2.0298	1.8130		1.8130	1.8130	1.2087	1.0117	1.2087
0.5	2.2631	0.896	2.0268	1.8590		1.8590	1.8590	1.2393	1.0117	1.2393
0.75	1.9330	0.895	1.7306	1.5978	No	1.5978	1.5978	1.0652	1.0117	1.0652
1	1.6796	0.895	1.5032	1.3975		1.3975	1.3975	0.9316	0.9093	0.9316
2	0.9194	0.895	0.8228	0.7187		0.7187	0.7187	0.4792	0.4547	0.4792
3	0.6006	0.895	0.5375	0.4397		0.4397	0.4547	0.3031	0.3031	0.3031
4	0.4263	0.895	0.3815	0.2811		0.2811	0.3410	0.2273	0.2273	0.2273
5	0.3270	0.895	0.2927	0.1929		0.1929	0.2728	0.1819	0.1819	0.1819

Code Sds	1.265	Crs =	0.896	Code Ss =	1.897	**Site Specific S_{DS} =**	**1.115**
Code Sd1	1.137	Cr1 =	0.895	Code S1 =	0.682	**Site Specific S_{D1} =**	**0.958**
To	0.18	Code Fa =	1	Sms =	1.897		
Ts	0.90	Code Fv =	2.5	Sm1 =	1.705		
TL	8						
Input							

FIGURE 1
Site Specific Design Response Spectra
2200 Rosemead Boulevard, South El Monte, CA

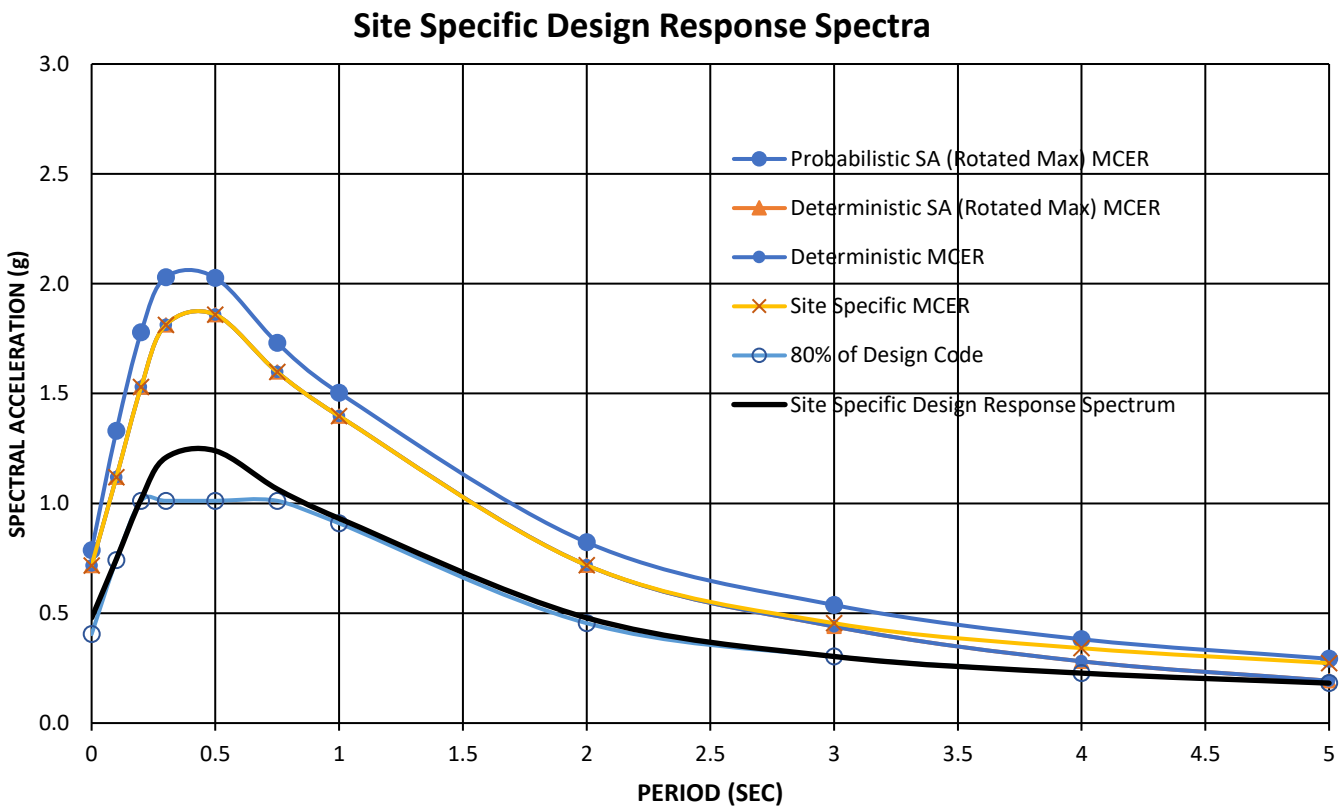


TABLE 2

Probabilistic Response Spectrum ASCE 7-16 Method 2

2200 Rosemead Boulevard, South El Monte, CA

Period (g)	UHGM (g)	RTGM (g)	Max Dir Scale factor	Max Dir RTGM (g)
0	0.842	0.799	1.1	0.879
0.1	1.396	1.349	1.1	1.484
0.2	1.854	1.805	1.1	1.986
0.3	2.143	2.014	1.125	2.266
0.5	2.098	1.926	1.175	2.263
0.75	1.713	1.562	1.2375	1.933
1	1.442	1.292	1.3	1.680
2	0.759	0.681	1.35	0.919
3	0.478	0.429	1.4	0.601
4	0.328	0.294	1.45	0.426
5	0.243	0.218	1.5	0.327

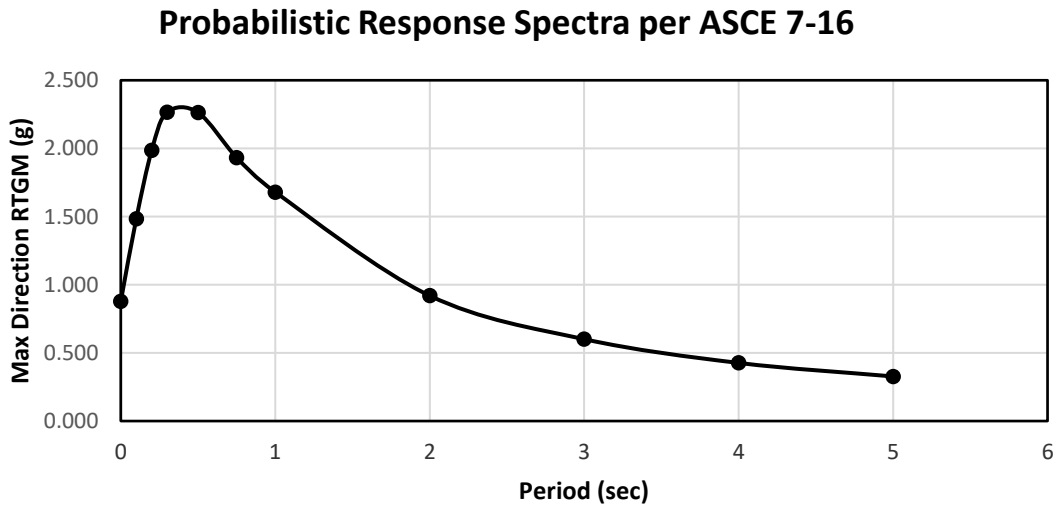
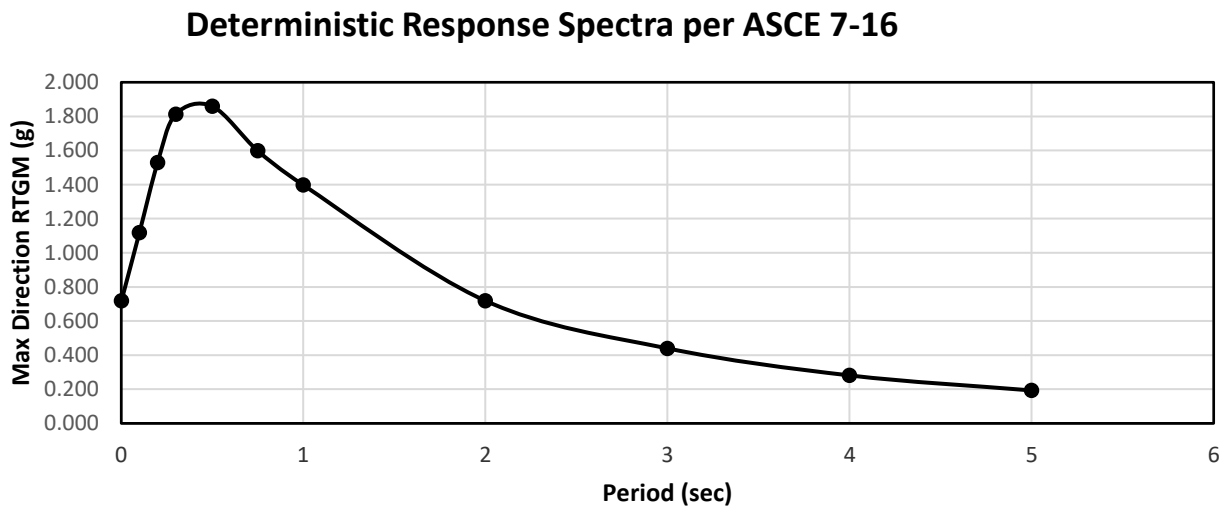


TABLE 3

Deterministic Response Spectrum ASCE 7-16

2200 Rosemead Boulevard, South El Monte, CA

Period (g)	Mean Spectra (g)	Sigma (g)	84th-Percentile Spectral Acceleration (g)	Max Dir Scale factor	Max Dir Deterministic SA (g)
0.001	0.391	0.512	0.652	1.1	0.718
0.1	0.592	0.541	1.017	1.1	1.119
0.2	0.833	0.513	1.390	1.1	1.529
0.3	0.938	0.541	1.612	1.125	1.813
0.5	0.866	0.603	1.582	1.175	1.859
0.75	0.675	0.649	1.291	1.2375	1.598
1	0.546	0.678	1.075	1.3	1.397
2	0.262	0.708	0.532	1.35	0.719
3	0.154	0.713	0.314	1.4	0.440
4	0.096	0.703	0.194	1.45	0.281
5	0.064	0.705	0.129	1.5	0.193



2200 Rosemead Blvd, South El Monte, CA 91733, USA

Latitude, Longitude: 34.0536765, -118.0636838

Date	11/11/2020, 8:37:25 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.897	MCE_R ground motion. (for 0.2 second period)
S_1	0.682	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.897	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.265	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.817	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.899	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.897	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.118	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.304	Factored deterministic acceleration value. (0.2 second)
S1RT	0.682	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.762	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.732	Factored deterministic acceleration value. (1.0 second)
PGAd	0.922	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.896	Mapped value of the risk coefficient at short periods
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

While the information presented on this website is believed to be correct, SEAOC /OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

34.054

Time Horizon

Return period in years

2475

Longitude

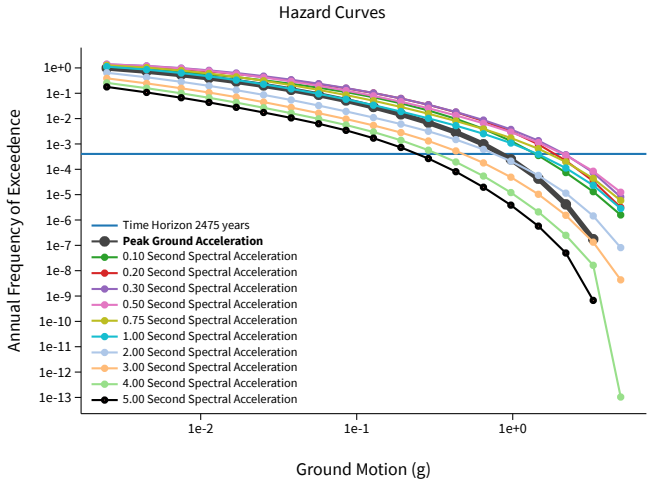
Decimal degrees, negative values for western longitudes

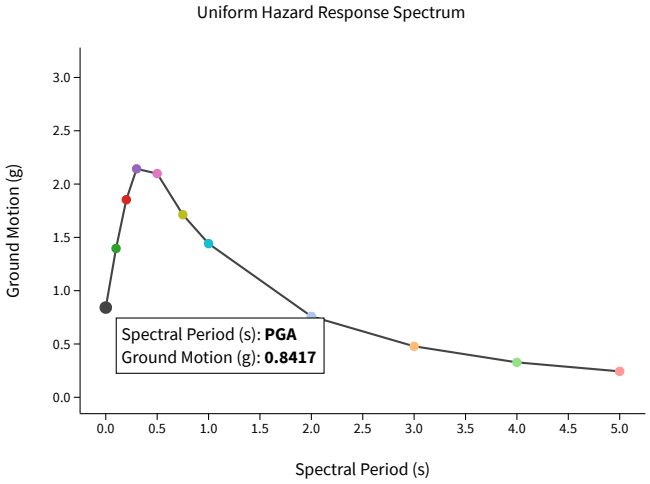
-118.063

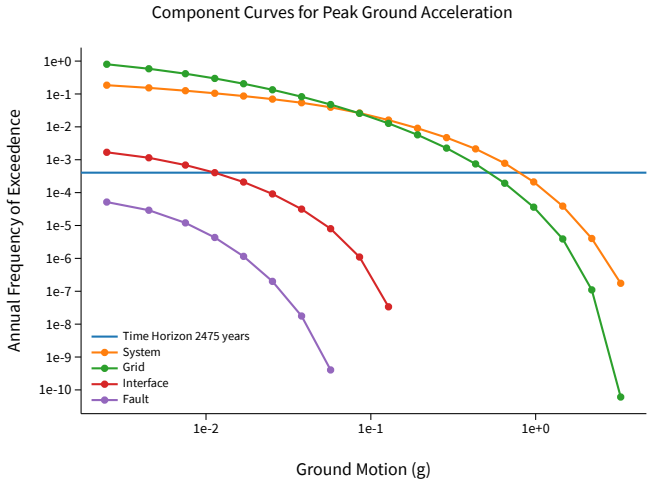
Site Class

259 m/s (Site class D)

Hazard Curve





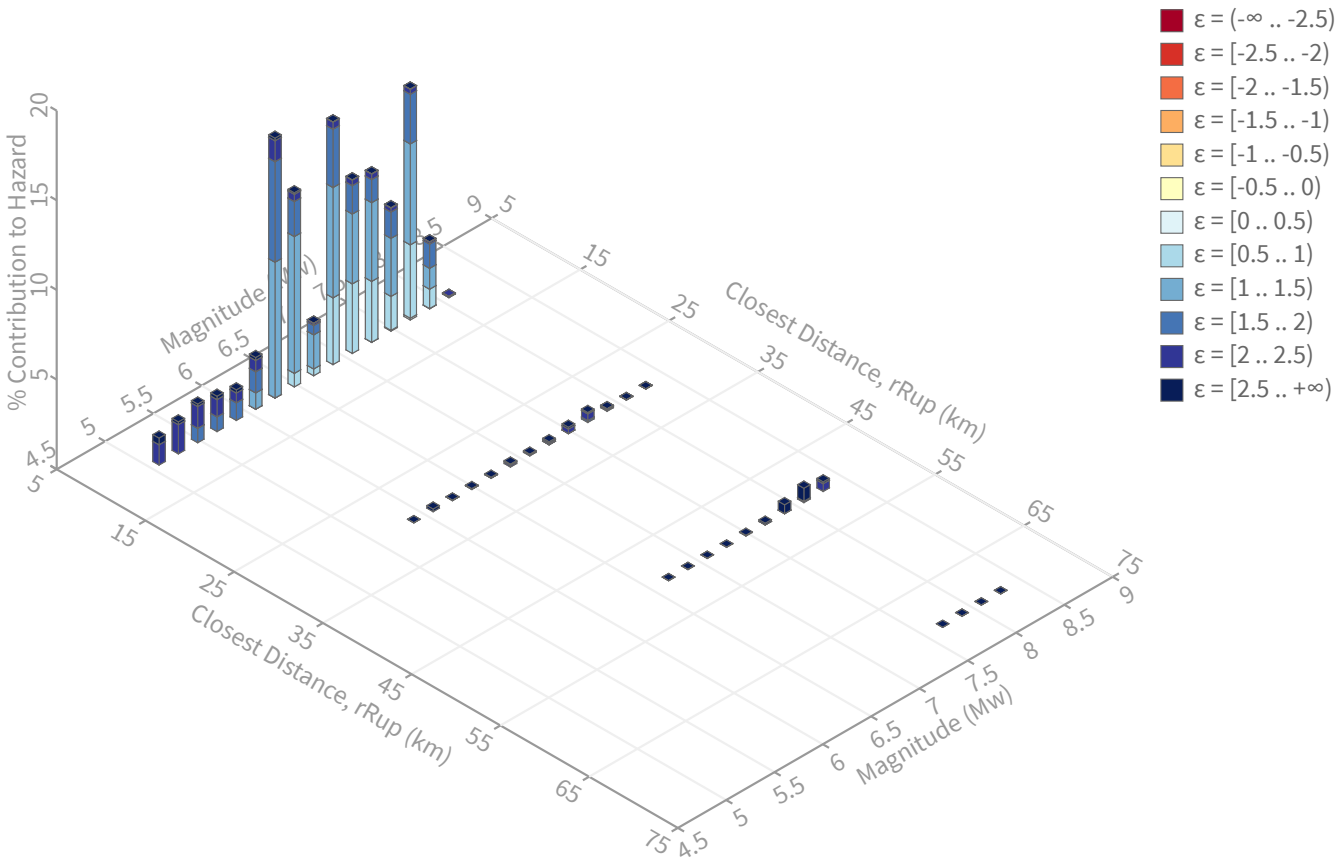


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.84165262 g

Recovered targets

Return period: 2939.5193 yrs
Exceedance rate: 0.00034019168 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.08 %

Mean (over all sources)

m: 6.89
r: 10.28 km
ε_0: 1.45 σ

Mode (largest m-r bin)

m: 6.3
r: 6.86 km
ε_0: 1.54 σ
Contribution: 14.49 %

Mode (largest m-r-ε_0 bin)

m: 6.52
r: 6.92 km
ε_0: 1.31 σ
Contribution: 7.63 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							44.04
Elysian Park (Upper) [0]		5.83	6.48	1.41	118.097°W	34.077°N	309.42	11.20
Whittier alt 1 [7]		6.46	6.71	1.36	118.046°W	33.999°N	165.72	7.38
Puente Hills [2]		9.90	7.30	0.94	118.093°W	33.959°N	194.52	7.21
Raymond [1]		9.00	7.22	1.54	118.083°W	34.132°N	347.79	4.81
Compton [1]		17.20	7.26	1.37	118.247°W	33.801°N	211.18	2.87
Puente Hills [3]		10.61	6.81	1.28	118.143°W	33.972°N	219.04	2.00
Sierra Madre [4]		14.62	7.69	1.70	118.061°W	34.185°N	0.56	1.86
Compton [2]		17.48	7.53	1.44	118.286°W	33.817°N	218.01	1.29
Puente Hills [1]		10.95	7.18	1.30	118.052°W	33.949°N	174.89	1.01
UC33brAvg_FM32	System							41.06
Elysian Park (Upper) [0]		5.83	7.06	1.17	118.097°W	34.077°N	309.42	9.98
Whittier alt 2 [6]		6.55	7.03	1.17	118.046°W	33.998°N	166.13	5.64
Puente Hills (Santa Fe Springs) [0]		9.39	6.95	1.02	118.023°W	33.950°N	162.41	5.51
Raymond [1]		9.00	7.21	1.53	118.083°W	34.132°N	347.79	5.06
Puente Hills (Coyote Hills) [1]		10.47	7.25	1.02	118.044°W	33.915°N	173.68	3.14
Compton [1]		17.20	7.32	1.35	118.247°W	33.801°N	211.18	3.06
Puente Hills (LA) [0]		7.15	7.16	0.91	118.116°W	33.990°N	214.84	2.28
Sierra Madre [4]		14.62	7.72	1.70	118.061°W	34.185°N	0.56	1.77
Compton [2]		17.48	7.50	1.45	118.286°W	33.817°N	218.01	1.10
UC33brAvg_FM32 (opt)	Grid							7.68
PointSourceFinite: -118.063, 34.112		7.99	5.73	1.90	118.063°W	34.112°N	0.00	2.08
PointSourceFinite: -118.063, 34.112		7.99	5.73	1.90	118.063°W	34.112°N	0.00	2.08
UC33brAvg_FM31 (opt)	Grid							7.22
PointSourceFinite: -118.063, 34.112		8.07	5.69	1.92	118.063°W	34.112°N	0.00	1.96
PointSourceFinite: -118.063, 34.112		8.07	5.69	1.92	118.063°W	34.112°N	0.00	1.96

APPENDIX E
LIQUEFACTION ANALYSIS

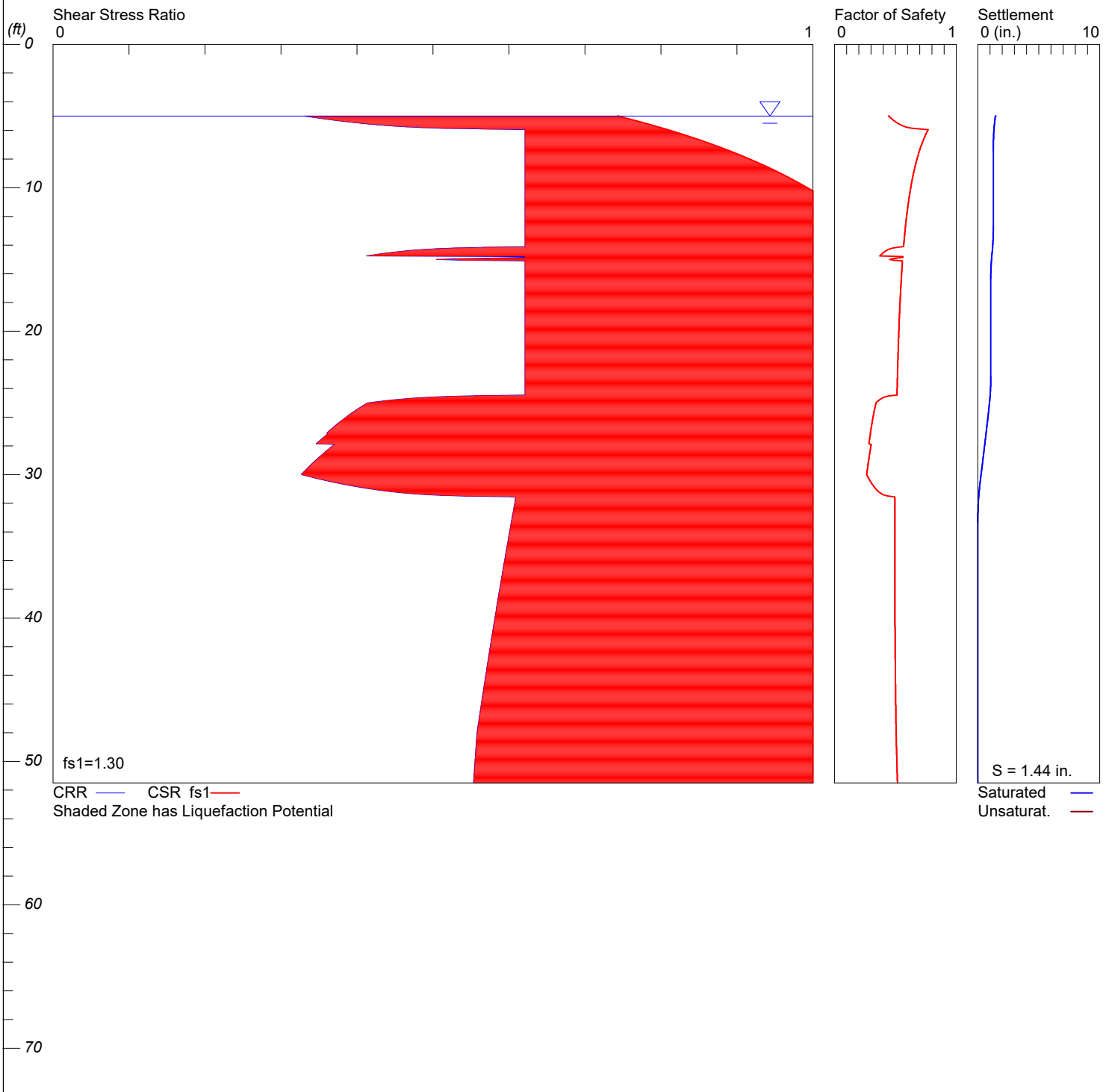
TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

LIQUEFACTION ANALYSIS

2200 Rosemead Boulevard

Hole No.=B-2 Water Depth=5 ft

Magnitude=6.89
Acceleration=0.89g



****
LIQUEFACTION ANALYSIS SUMMARY

****
Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 12/11/2020 2:41:18 PM

Input File Name: P:\2020 Projects\20-7106 XBC, 2200 Rosemead Blvd., South El Monte\Liquify2\B-2.liq
Title: 2200 Rosemead Boulevard
Subtitle: PN: 20-7106

Surface Elev.=
Hole No.=B-2
Depth of Hole= 51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration= 0.89 g
Earthquake Magnitude= 6.89

Input Data:
Surface Elev.=
Hole No.=B-2
Depth of Hole=51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration=0.89 g
Earthquake Magnitude=6.89
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	8.00	120.00	31.40
10.00	26.00	120.00	6.50
15.00	16.00	120.00	9.80
20.00	34.00	120.00	10.00
25.00	19.00	120.00	11.10
30.00	16.00	120.00	16.40
35.00	35.00	120.00	5.00
40.00	40.00	120.00	5.00
45.00	39.00	120.00	19.10
50.00	47.00	120.00	5.00

Output Results:

Settlement of Saturated Sands=1.44 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=1.44 in.
Differential Settlement=0.721 to 0.951 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
5.00	0.33	0.74	0.44*	1.44	0.00	1.44
5.05	0.34	0.75	0.45*	1.43	0.00	1.43
5.10	0.34	0.75	0.46*	1.43	0.00	1.43
5.15	0.35	0.75	0.46*	1.42	0.00	1.42
5.20	0.36	0.76	0.47*	1.41	0.00	1.41
5.25	0.36	0.76	0.48*	1.40	0.00	1.40
5.30	0.37	0.77	0.49*	1.40	0.00	1.40
5.35	0.38	0.77	0.49*	1.39	0.00	1.39
5.40	0.39	0.77	0.50*	1.38	0.00	1.38
5.45	0.40	0.78	0.51*	1.38	0.00	1.38
5.50	0.40	0.78	0.52*	1.37	0.00	1.37
5.55	0.41	0.78	0.53*	1.37	0.00	1.37
5.60	0.42	0.79	0.54*	1.36	0.00	1.36
5.65	0.44	0.79	0.55*	1.35	0.00	1.35
5.70	0.45	0.79	0.57*	1.35	0.00	1.35
5.75	0.46	0.80	0.58*	1.34	0.00	1.34
5.80	0.48	0.80	0.60*	1.34	0.00	1.34
5.85	0.51	0.80	0.64*	1.33	0.00	1.33
5.90	0.56	0.81	0.70*	1.33	0.00	1.33
5.95	0.62	0.81	0.77*	1.32	0.00	1.32
6.00	0.62	0.81	0.76*	1.32	0.00	1.32
6.05	0.62	0.81	0.76*	1.31	0.00	1.31
6.10	0.62	0.82	0.76*	1.31	0.00	1.31
6.15	0.62	0.82	0.76*	1.31	0.00	1.31
6.20	0.62	0.82	0.75*	1.30	0.00	1.30
6.25	0.62	0.83	0.75*	1.30	0.00	1.30

6.30	0.62	0.83	0.75*	1.30	0.00	1.30
6.35	0.62	0.83	0.75*	1.29	0.00	1.29
6.40	0.62	0.84	0.74*	1.29	0.00	1.29
6.45	0.62	0.84	0.74*	1.29	0.00	1.29
6.50	0.62	0.84	0.74*	1.29	0.00	1.29
6.55	0.62	0.84	0.74*	1.29	0.00	1.29
6.60	0.62	0.85	0.73*	1.28	0.00	1.28
6.65	0.62	0.85	0.73*	1.28	0.00	1.28
6.70	0.62	0.85	0.73*	1.28	0.00	1.28
6.75	0.62	0.86	0.73*	1.28	0.00	1.28
6.80	0.62	0.86	0.72*	1.28	0.00	1.28
6.85	0.62	0.86	0.72*	1.28	0.00	1.28
6.90	0.62	0.86	0.72*	1.28	0.00	1.28
6.95	0.62	0.87	0.72*	1.28	0.00	1.28
7.00	0.62	0.87	0.71*	1.28	0.00	1.28
7.05	0.62	0.87	0.71*	1.28	0.00	1.28
7.10	0.62	0.87	0.71*	1.27	0.00	1.27
7.15	0.62	0.88	0.71*	1.27	0.00	1.27
7.20	0.62	0.88	0.71*	1.27	0.00	1.27
7.25	0.62	0.88	0.70*	1.27	0.00	1.27
7.30	0.62	0.88	0.70*	1.27	0.00	1.27
7.35	0.62	0.89	0.70*	1.27	0.00	1.27
7.40	0.62	0.89	0.70*	1.27	0.00	1.27
7.45	0.62	0.89	0.70*	1.27	0.00	1.27
7.50	0.62	0.89	0.69*	1.27	0.00	1.27
7.55	0.62	0.90	0.69*	1.27	0.00	1.27
7.60	0.62	0.90	0.69*	1.27	0.00	1.27
7.65	0.62	0.90	0.69*	1.27	0.00	1.27
7.70	0.62	0.90	0.69*	1.27	0.00	1.27
7.75	0.62	0.91	0.69*	1.27	0.00	1.27
7.80	0.62	0.91	0.68*	1.27	0.00	1.27
7.85	0.62	0.91	0.68*	1.27	0.00	1.27
7.90	0.62	0.91	0.68*	1.27	0.00	1.27
7.95	0.62	0.91	0.68*	1.27	0.00	1.27
8.00	0.62	0.92	0.68*	1.27	0.00	1.27
8.05	0.62	0.92	0.68*	1.27	0.00	1.27
8.10	0.62	0.92	0.67*	1.27	0.00	1.27
8.15	0.62	0.92	0.67*	1.27	0.00	1.27
8.20	0.62	0.93	0.67*	1.27	0.00	1.27
8.25	0.62	0.93	0.67*	1.27	0.00	1.27
8.30	0.62	0.93	0.67*	1.27	0.00	1.27
8.35	0.62	0.93	0.67*	1.27	0.00	1.27
8.40	0.62	0.93	0.67*	1.27	0.00	1.27
8.45	0.62	0.94	0.66*	1.27	0.00	1.27
8.50	0.62	0.94	0.66*	1.27	0.00	1.27
8.55	0.62	0.94	0.66*	1.27	0.00	1.27
8.60	0.62	0.94	0.66*	1.27	0.00	1.27
8.65	0.62	0.94	0.66*	1.27	0.00	1.27
8.70	0.62	0.95	0.66*	1.27	0.00	1.27
8.75	0.62	0.95	0.66*	1.27	0.00	1.27

8.80	0.62	0.95	0.65*	1.27	0.00	1.27
8.85	0.62	0.95	0.65*	1.27	0.00	1.27
8.90	0.62	0.95	0.65*	1.27	0.00	1.27
8.95	0.62	0.96	0.65*	1.27	0.00	1.27
9.00	0.62	0.96	0.65*	1.27	0.00	1.27
9.05	0.62	0.96	0.65*	1.27	0.00	1.27
9.10	0.62	0.96	0.65*	1.27	0.00	1.27
9.15	0.62	0.96	0.64*	1.27	0.00	1.27
9.20	0.62	0.97	0.64*	1.27	0.00	1.27
9.25	0.62	0.97	0.64*	1.27	0.00	1.27
9.30	0.62	0.97	0.64*	1.27	0.00	1.27
9.35	0.62	0.97	0.64*	1.27	0.00	1.27
9.40	0.62	0.97	0.64*	1.27	0.00	1.27
9.45	0.62	0.97	0.64*	1.27	0.00	1.27
9.50	0.62	0.98	0.64*	1.27	0.00	1.27
9.55	0.62	0.98	0.64*	1.27	0.00	1.27
9.60	0.62	0.98	0.63*	1.27	0.00	1.27
9.65	0.62	0.98	0.63*	1.27	0.00	1.27
9.70	0.62	0.98	0.63*	1.27	0.00	1.27
9.75	0.62	0.98	0.63*	1.27	0.00	1.27
9.80	0.62	0.99	0.63*	1.27	0.00	1.27
9.85	0.62	0.99	0.63*	1.27	0.00	1.27
9.90	0.62	0.99	0.63*	1.27	0.00	1.27
9.95	0.62	0.99	0.63*	1.27	0.00	1.27
10.00	0.62	0.99	0.63*	1.27	0.00	1.27
10.05	0.62	0.99	0.62*	1.27	0.00	1.27
10.10	0.62	1.00	0.62*	1.27	0.00	1.27
10.15	0.62	1.00	0.62*	1.27	0.00	1.27
10.20	0.62	1.00	0.62*	1.27	0.00	1.27
10.25	0.62	1.00	0.62*	1.27	0.00	1.27
10.30	0.62	1.00	0.62*	1.27	0.00	1.27
10.35	0.62	1.00	0.62*	1.27	0.00	1.27
10.40	0.62	1.01	0.62*	1.27	0.00	1.27
10.45	0.62	1.01	0.62*	1.27	0.00	1.27
10.50	0.62	1.01	0.62*	1.27	0.00	1.27
10.55	0.62	1.01	0.62*	1.27	0.00	1.27
10.60	0.62	1.01	0.61*	1.27	0.00	1.27
10.65	0.62	1.01	0.61*	1.27	0.00	1.27
10.70	0.62	1.01	0.61*	1.27	0.00	1.27
10.75	0.62	1.02	0.61*	1.27	0.00	1.27
10.80	0.62	1.02	0.61*	1.27	0.00	1.27
10.85	0.62	1.02	0.61*	1.27	0.00	1.27
10.90	0.62	1.02	0.61*	1.27	0.00	1.27
10.95	0.62	1.02	0.61*	1.27	0.00	1.27
11.00	0.62	1.02	0.61*	1.27	0.00	1.27
11.05	0.62	1.02	0.61*	1.27	0.00	1.27
11.10	0.62	1.03	0.61*	1.27	0.00	1.27
11.15	0.62	1.03	0.60*	1.27	0.00	1.27
11.20	0.62	1.03	0.60*	1.27	0.00	1.27
11.25	0.62	1.03	0.60*	1.27	0.00	1.27

11.30	0.62	1.03	0.60*	1.27	0.00	1.27
11.35	0.62	1.03	0.60*	1.27	0.00	1.27
11.40	0.62	1.03	0.60*	1.27	0.00	1.27
11.45	0.62	1.04	0.60*	1.27	0.00	1.27
11.50	0.62	1.04	0.60*	1.27	0.00	1.27
11.55	0.62	1.04	0.60*	1.27	0.00	1.27
11.60	0.62	1.04	0.60*	1.27	0.00	1.27
11.65	0.62	1.04	0.60*	1.27	0.00	1.27
11.70	0.62	1.04	0.60*	1.27	0.00	1.27
11.75	0.62	1.04	0.60*	1.27	0.00	1.27
11.80	0.62	1.04	0.59*	1.27	0.00	1.27
11.85	0.62	1.05	0.59*	1.27	0.00	1.27
11.90	0.62	1.05	0.59*	1.27	0.00	1.27
11.95	0.62	1.05	0.59*	1.27	0.00	1.27
12.00	0.62	1.05	0.59*	1.27	0.00	1.27
12.05	0.62	1.05	0.59*	1.27	0.00	1.27
12.10	0.62	1.05	0.59*	1.27	0.00	1.27
12.15	0.62	1.05	0.59*	1.27	0.00	1.27
12.20	0.62	1.05	0.59*	1.27	0.00	1.27
12.25	0.62	1.06	0.59*	1.27	0.00	1.27
12.30	0.62	1.06	0.59*	1.27	0.00	1.27
12.35	0.62	1.06	0.59*	1.27	0.00	1.27
12.40	0.62	1.06	0.59*	1.27	0.00	1.27
12.45	0.62	1.06	0.59*	1.27	0.00	1.27
12.50	0.62	1.06	0.59*	1.27	0.00	1.27
12.55	0.62	1.06	0.58*	1.27	0.00	1.27
12.60	0.62	1.06	0.58*	1.27	0.00	1.27
12.65	0.62	1.06	0.58*	1.27	0.00	1.27
12.70	0.62	1.07	0.58*	1.27	0.00	1.27
12.75	0.62	1.07	0.58*	1.27	0.00	1.27
12.80	0.62	1.07	0.58*	1.27	0.00	1.27
12.85	0.62	1.07	0.58*	1.27	0.00	1.27
12.90	0.62	1.07	0.58*	1.27	0.00	1.27
12.95	0.62	1.07	0.58*	1.27	0.00	1.27
13.00	0.62	1.07	0.58*	1.27	0.00	1.27
13.05	0.62	1.07	0.58*	1.27	0.00	1.27
13.10	0.62	1.07	0.58*	1.26	0.00	1.26
13.15	0.62	1.08	0.58*	1.26	0.00	1.26
13.20	0.62	1.08	0.58*	1.26	0.00	1.26
13.25	0.62	1.08	0.58*	1.26	0.00	1.26
13.30	0.62	1.08	0.58*	1.26	0.00	1.26
13.35	0.62	1.08	0.58*	1.26	0.00	1.26
13.40	0.62	1.08	0.57*	1.26	0.00	1.26
13.45	0.62	1.08	0.57*	1.26	0.00	1.26
13.50	0.62	1.08	0.57*	1.25	0.00	1.25
13.55	0.62	1.08	0.57*	1.25	0.00	1.25
13.60	0.62	1.08	0.57*	1.25	0.00	1.25
13.65	0.62	1.09	0.57*	1.25	0.00	1.25
13.70	0.62	1.09	0.57*	1.24	0.00	1.24
13.75	0.62	1.09	0.57*	1.24	0.00	1.24

13.80	0.62	1.09	0.57*	1.24	0.00	1.24
13.85	0.62	1.09	0.57*	1.23	0.00	1.23
13.90	0.62	1.09	0.57*	1.23	0.00	1.23
13.95	0.62	1.09	0.57*	1.23	0.00	1.23
14.00	0.62	1.09	0.57*	1.22	0.00	1.22
14.05	0.62	1.09	0.57*	1.22	0.00	1.22
14.10	0.62	1.09	0.57*	1.22	0.00	1.22
14.15	0.57	1.10	0.52*	1.21	0.00	1.21
14.20	0.53	1.10	0.48*	1.21	0.00	1.21
14.25	0.50	1.10	0.46*	1.20	0.00	1.20
14.30	0.49	1.10	0.44*	1.20	0.00	1.20
14.35	0.47	1.10	0.43*	1.19	0.00	1.19
14.40	0.46	1.10	0.42*	1.19	0.00	1.19
14.45	0.45	1.10	0.41*	1.18	0.00	1.18
14.50	0.45	1.10	0.40*	1.18	0.00	1.18
14.55	0.44	1.10	0.40*	1.17	0.00	1.17
14.60	0.43	1.10	0.39*	1.16	0.00	1.16
14.65	0.42	1.10	0.38*	1.16	0.00	1.16
14.70	0.42	1.11	0.38*	1.15	0.00	1.15
14.75	0.41	1.11	0.37*	1.15	0.00	1.15
14.80	0.62	1.11	0.56*	1.14	0.00	1.14
14.85	0.62	1.11	0.56*	1.14	0.00	1.14
14.90	0.58	1.11	0.52*	1.13	0.00	1.13
14.95	0.53	1.11	0.48*	1.13	0.00	1.13
15.00	0.50	1.11	0.45*	1.12	0.00	1.12
15.05	0.54	1.11	0.48*	1.12	0.00	1.12
15.10	0.62	1.11	0.56*	1.11	0.00	1.11
15.15	0.62	1.11	0.56*	1.11	0.00	1.11
15.20	0.62	1.11	0.56*	1.10	0.00	1.10
15.25	0.62	1.12	0.56*	1.10	0.00	1.10
15.30	0.62	1.12	0.56*	1.10	0.00	1.10
15.35	0.62	1.12	0.56*	1.09	0.00	1.09
15.40	0.62	1.12	0.56*	1.09	0.00	1.09
15.45	0.62	1.12	0.56*	1.09	0.00	1.09
15.50	0.62	1.12	0.55*	1.08	0.00	1.08
15.55	0.62	1.12	0.55*	1.08	0.00	1.08
15.60	0.62	1.12	0.55*	1.08	0.00	1.08
15.65	0.62	1.12	0.55*	1.08	0.00	1.08
15.70	0.62	1.12	0.55*	1.08	0.00	1.08
15.75	0.62	1.12	0.55*	1.07	0.00	1.07
15.80	0.62	1.12	0.55*	1.07	0.00	1.07
15.85	0.62	1.12	0.55*	1.07	0.00	1.07
15.90	0.62	1.13	0.55*	1.07	0.00	1.07
15.95	0.62	1.13	0.55*	1.07	0.00	1.07
16.00	0.62	1.13	0.55*	1.07	0.00	1.07
16.05	0.62	1.13	0.55*	1.07	0.00	1.07
16.10	0.62	1.13	0.55*	1.07	0.00	1.07
16.15	0.62	1.13	0.55*	1.07	0.00	1.07
16.20	0.62	1.13	0.55*	1.07	0.00	1.07
16.25	0.62	1.13	0.55*	1.06	0.00	1.06

16.30	0.62	1.13	0.55*	1.06	0.00	1.06
16.35	0.62	1.13	0.55*	1.06	0.00	1.06
16.40	0.62	1.13	0.55*	1.06	0.00	1.06
16.45	0.62	1.13	0.55*	1.06	0.00	1.06
16.50	0.62	1.13	0.55*	1.06	0.00	1.06
16.55	0.62	1.13	0.55*	1.06	0.00	1.06
16.60	0.62	1.14	0.55*	1.06	0.00	1.06
16.65	0.62	1.14	0.55*	1.06	0.00	1.06
16.70	0.62	1.14	0.55*	1.06	0.00	1.06
16.75	0.62	1.14	0.55*	1.06	0.00	1.06
16.80	0.62	1.14	0.55*	1.06	0.00	1.06
16.85	0.62	1.14	0.55*	1.06	0.00	1.06
16.90	0.62	1.14	0.54*	1.06	0.00	1.06
16.95	0.62	1.14	0.54*	1.06	0.00	1.06
17.00	0.62	1.14	0.54*	1.06	0.00	1.06
17.05	0.62	1.14	0.54*	1.06	0.00	1.06
17.10	0.62	1.14	0.54*	1.06	0.00	1.06
17.15	0.62	1.14	0.54*	1.06	0.00	1.06
17.20	0.62	1.14	0.54*	1.06	0.00	1.06
17.25	0.62	1.14	0.54*	1.06	0.00	1.06
17.30	0.62	1.15	0.54*	1.06	0.00	1.06
17.35	0.62	1.15	0.54*	1.06	0.00	1.06
17.40	0.62	1.15	0.54*	1.06	0.00	1.06
17.45	0.62	1.15	0.54*	1.06	0.00	1.06
17.50	0.62	1.15	0.54*	1.06	0.00	1.06
17.55	0.62	1.15	0.54*	1.06	0.00	1.06
17.60	0.62	1.15	0.54*	1.06	0.00	1.06
17.65	0.62	1.15	0.54*	1.06	0.00	1.06
17.70	0.62	1.15	0.54*	1.06	0.00	1.06
17.75	0.62	1.15	0.54*	1.06	0.00	1.06
17.80	0.62	1.15	0.54*	1.06	0.00	1.06
17.85	0.62	1.15	0.54*	1.06	0.00	1.06
17.90	0.62	1.15	0.54*	1.06	0.00	1.06
17.95	0.62	1.15	0.54*	1.06	0.00	1.06
18.00	0.62	1.15	0.54*	1.06	0.00	1.06
18.05	0.62	1.15	0.54*	1.06	0.00	1.06
18.10	0.62	1.15	0.54*	1.06	0.00	1.06
18.15	0.62	1.16	0.54*	1.06	0.00	1.06
18.20	0.62	1.16	0.54*	1.06	0.00	1.06
18.25	0.62	1.16	0.54*	1.06	0.00	1.06
18.30	0.62	1.16	0.54*	1.06	0.00	1.06
18.35	0.62	1.16	0.54*	1.06	0.00	1.06
18.40	0.62	1.16	0.54*	1.06	0.00	1.06
18.45	0.62	1.16	0.54*	1.06	0.00	1.06
18.50	0.62	1.16	0.54*	1.06	0.00	1.06
18.55	0.62	1.16	0.54*	1.06	0.00	1.06
18.60	0.62	1.16	0.54*	1.06	0.00	1.06
18.65	0.62	1.16	0.53*	1.06	0.00	1.06
18.70	0.62	1.16	0.53*	1.06	0.00	1.06
18.75	0.62	1.16	0.53*	1.06	0.00	1.06

18.80	0.62	1.16	0.53*	1.06	0.00	1.06
18.85	0.62	1.16	0.53*	1.06	0.00	1.06
18.90	0.62	1.16	0.53*	1.06	0.00	1.06
18.95	0.62	1.16	0.53*	1.06	0.00	1.06
19.00	0.62	1.17	0.53*	1.06	0.00	1.06
19.05	0.62	1.17	0.53*	1.06	0.00	1.06
19.10	0.62	1.17	0.53*	1.06	0.00	1.06
19.15	0.62	1.17	0.53*	1.06	0.00	1.06
19.20	0.62	1.17	0.53*	1.06	0.00	1.06
19.25	0.62	1.17	0.53*	1.06	0.00	1.06
19.30	0.62	1.17	0.53*	1.06	0.00	1.06
19.35	0.62	1.17	0.53*	1.06	0.00	1.06
19.40	0.62	1.17	0.53*	1.06	0.00	1.06
19.45	0.62	1.17	0.53*	1.06	0.00	1.06
19.50	0.62	1.17	0.53*	1.06	0.00	1.06
19.55	0.62	1.17	0.53*	1.06	0.00	1.06
19.60	0.62	1.17	0.53*	1.06	0.00	1.06
19.65	0.62	1.17	0.53*	1.06	0.00	1.06
19.70	0.62	1.17	0.53*	1.06	0.00	1.06
19.75	0.62	1.17	0.53*	1.06	0.00	1.06
19.80	0.62	1.17	0.53*	1.06	0.00	1.06
19.85	0.62	1.17	0.53*	1.06	0.00	1.06
19.90	0.62	1.17	0.53*	1.06	0.00	1.06
19.95	0.62	1.17	0.53*	1.06	0.00	1.06
20.00	0.62	1.18	0.53*	1.06	0.00	1.06
20.05	0.62	1.18	0.53*	1.06	0.00	1.06
20.10	0.62	1.18	0.53*	1.06	0.00	1.06
20.15	0.62	1.18	0.53*	1.06	0.00	1.06
20.20	0.62	1.18	0.53*	1.06	0.00	1.06
20.25	0.62	1.18	0.53*	1.06	0.00	1.06
20.30	0.62	1.18	0.53*	1.06	0.00	1.06
20.35	0.62	1.18	0.53*	1.06	0.00	1.06
20.40	0.62	1.18	0.53*	1.06	0.00	1.06
20.45	0.62	1.18	0.53*	1.06	0.00	1.06
20.50	0.62	1.18	0.53*	1.06	0.00	1.06
20.55	0.62	1.18	0.53*	1.06	0.00	1.06
20.60	0.62	1.18	0.53*	1.06	0.00	1.06
20.65	0.62	1.18	0.53*	1.06	0.00	1.06
20.70	0.62	1.18	0.53*	1.06	0.00	1.06
20.75	0.62	1.18	0.53*	1.06	0.00	1.06
20.80	0.62	1.18	0.53*	1.06	0.00	1.06
20.85	0.62	1.18	0.52*	1.06	0.00	1.06
20.90	0.62	1.18	0.52*	1.06	0.00	1.06
20.95	0.62	1.18	0.52*	1.06	0.00	1.06
21.00	0.62	1.18	0.52*	1.06	0.00	1.06
21.05	0.62	1.18	0.52*	1.06	0.00	1.06
21.10	0.62	1.19	0.52*	1.06	0.00	1.06
21.15	0.62	1.19	0.52*	1.06	0.00	1.06
21.20	0.62	1.19	0.52*	1.06	0.00	1.06
21.25	0.62	1.19	0.52*	1.06	0.00	1.06

21.30	0.62	1.19	0.52*	1.06	0.00	1.06
21.35	0.62	1.19	0.52*	1.06	0.00	1.06
21.40	0.62	1.19	0.52*	1.06	0.00	1.06
21.45	0.62	1.19	0.52*	1.06	0.00	1.06
21.50	0.62	1.19	0.52*	1.06	0.00	1.06
21.55	0.62	1.19	0.52*	1.06	0.00	1.06
21.60	0.62	1.19	0.52*	1.06	0.00	1.06
21.65	0.62	1.19	0.52*	1.06	0.00	1.06
21.70	0.62	1.19	0.52*	1.06	0.00	1.06
21.75	0.62	1.19	0.52*	1.06	0.00	1.06
21.80	0.62	1.19	0.52*	1.06	0.00	1.06
21.85	0.62	1.19	0.52*	1.06	0.00	1.06
21.90	0.62	1.19	0.52*	1.06	0.00	1.06
21.95	0.62	1.19	0.52*	1.06	0.00	1.06
22.00	0.62	1.19	0.52*	1.06	0.00	1.06
22.05	0.62	1.19	0.52*	1.06	0.00	1.06
22.10	0.62	1.19	0.52*	1.06	0.00	1.06
22.15	0.62	1.19	0.52*	1.06	0.00	1.06
22.20	0.62	1.19	0.52*	1.06	0.00	1.06
22.25	0.62	1.19	0.52*	1.06	0.00	1.06
22.30	0.62	1.20	0.52*	1.06	0.00	1.06
22.35	0.62	1.20	0.52*	1.06	0.00	1.06
22.40	0.62	1.20	0.52*	1.06	0.00	1.06
22.45	0.62	1.20	0.52*	1.06	0.00	1.06
22.50	0.62	1.20	0.52*	1.06	0.00	1.06
22.55	0.62	1.20	0.52*	1.06	0.00	1.06
22.60	0.62	1.20	0.52*	1.06	0.00	1.06
22.65	0.62	1.20	0.52*	1.06	0.00	1.06
22.70	0.62	1.20	0.52*	1.06	0.00	1.06
22.75	0.62	1.20	0.52*	1.06	0.00	1.06
22.80	0.62	1.20	0.52*	1.06	0.00	1.06
22.85	0.62	1.20	0.52*	1.06	0.00	1.06
22.90	0.62	1.20	0.52*	1.06	0.00	1.06
22.95	0.62	1.20	0.52*	1.06	0.00	1.06
23.00	0.62	1.20	0.52*	1.06	0.00	1.06
23.05	0.62	1.20	0.52*	1.06	0.00	1.06
23.10	0.62	1.20	0.52*	1.06	0.00	1.06
23.15	0.62	1.20	0.52*	1.06	0.00	1.06
23.20	0.62	1.20	0.52*	1.06	0.00	1.06
23.25	0.62	1.20	0.52*	1.06	0.00	1.06
23.30	0.62	1.20	0.52*	1.06	0.00	1.06
23.35	0.62	1.20	0.52*	1.06	0.00	1.06
23.40	0.62	1.20	0.52*	1.06	0.00	1.06
23.45	0.62	1.20	0.52*	1.06	0.00	1.06
23.50	0.62	1.20	0.52*	1.06	0.00	1.06
23.55	0.62	1.20	0.52*	1.06	0.00	1.06
23.60	0.62	1.20	0.52*	1.06	0.00	1.06
23.65	0.62	1.20	0.52*	1.05	0.00	1.05
23.70	0.62	1.20	0.52*	1.05	0.00	1.05
23.75	0.62	1.21	0.52*	1.05	0.00	1.05

23.80	0.62	1.21	0.52*	1.05	0.00	1.05
23.85	0.62	1.21	0.52*	1.05	0.00	1.05
23.90	0.62	1.21	0.51*	1.05	0.00	1.05
23.95	0.62	1.21	0.51*	1.05	0.00	1.05
24.00	0.62	1.21	0.51*	1.04	0.00	1.04
24.05	0.62	1.21	0.51*	1.04	0.00	1.04
24.10	0.62	1.21	0.51*	1.04	0.00	1.04
24.15	0.62	1.21	0.51*	1.04	0.00	1.04
24.20	0.62	1.21	0.51*	1.03	0.00	1.03
24.25	0.62	1.21	0.51*	1.03	0.00	1.03
24.30	0.62	1.21	0.51*	1.02	0.00	1.02
24.35	0.62	1.21	0.51*	1.02	0.00	1.02
24.40	0.62	1.21	0.51*	1.02	0.00	1.02
24.45	0.62	1.21	0.51*	1.01	0.00	1.01
24.50	0.55	1.21	0.46*	1.01	0.00	1.01
24.55	0.52	1.21	0.43*	1.00	0.00	1.00
24.60	0.49	1.21	0.41*	1.00	0.00	1.00
24.65	0.48	1.21	0.40*	0.99	0.00	0.99
24.70	0.47	1.21	0.38*	0.99	0.00	0.99
24.75	0.45	1.21	0.38*	0.98	0.00	0.98
24.80	0.45	1.21	0.37*	0.98	0.00	0.98
24.85	0.44	1.21	0.36*	0.97	0.00	0.97
24.90	0.43	1.21	0.35*	0.97	0.00	0.97
24.95	0.42	1.21	0.35*	0.96	0.00	0.96
25.00	0.41	1.21	0.34*	0.96	0.00	0.96
25.05	0.41	1.21	0.34*	0.95	0.00	0.95
25.10	0.41	1.21	0.34*	0.94	0.00	0.94
25.15	0.41	1.21	0.34*	0.94	0.00	0.94
25.20	0.41	1.21	0.34*	0.93	0.00	0.93
25.25	0.41	1.21	0.33*	0.92	0.00	0.92
25.30	0.40	1.21	0.33*	0.92	0.00	0.92
25.35	0.40	1.21	0.33*	0.91	0.00	0.91
25.40	0.40	1.21	0.33*	0.91	0.00	0.91
25.45	0.40	1.22	0.33*	0.90	0.00	0.90
25.50	0.40	1.22	0.33*	0.89	0.00	0.89
25.55	0.40	1.22	0.33*	0.89	0.00	0.89
25.60	0.40	1.22	0.33*	0.88	0.00	0.88
25.65	0.39	1.22	0.32*	0.87	0.00	0.87
25.70	0.39	1.22	0.32*	0.87	0.00	0.87
25.75	0.39	1.22	0.32*	0.86	0.00	0.86
25.80	0.39	1.22	0.32*	0.85	0.00	0.85
25.85	0.39	1.22	0.32*	0.85	0.00	0.85
25.90	0.39	1.22	0.32*	0.84	0.00	0.84
25.95	0.39	1.22	0.32*	0.83	0.00	0.83
26.00	0.39	1.22	0.32*	0.83	0.00	0.83
26.05	0.38	1.22	0.32*	0.82	0.00	0.82
26.10	0.38	1.22	0.31*	0.81	0.00	0.81
26.15	0.38	1.22	0.31*	0.81	0.00	0.81
26.20	0.38	1.22	0.31*	0.80	0.00	0.80
26.25	0.38	1.22	0.31*	0.80	0.00	0.80

26.30	0.38	1.22	0.31*	0.79	0.00	0.79
26.35	0.38	1.22	0.31*	0.78	0.00	0.78
26.40	0.38	1.22	0.31*	0.78	0.00	0.78
26.45	0.37	1.22	0.31*	0.77	0.00	0.77
26.50	0.37	1.22	0.31*	0.76	0.00	0.76
26.55	0.37	1.22	0.30*	0.75	0.00	0.75
26.60	0.37	1.22	0.30*	0.75	0.00	0.75
26.65	0.37	1.22	0.30*	0.74	0.00	0.74
26.70	0.37	1.22	0.30*	0.73	0.00	0.73
26.75	0.37	1.22	0.30*	0.73	0.00	0.73
26.80	0.37	1.22	0.30*	0.72	0.00	0.72
26.85	0.37	1.22	0.30*	0.71	0.00	0.71
26.90	0.36	1.22	0.30*	0.71	0.00	0.71
26.95	0.36	1.22	0.30*	0.70	0.00	0.70
27.00	0.36	1.22	0.30*	0.69	0.00	0.69
27.05	0.36	1.22	0.30*	0.69	0.00	0.69
27.10	0.36	1.22	0.29*	0.68	0.00	0.68
27.15	0.36	1.22	0.30*	0.67	0.00	0.67
27.20	0.36	1.22	0.29*	0.67	0.00	0.67
27.25	0.36	1.22	0.29*	0.66	0.00	0.66
27.30	0.36	1.22	0.29*	0.65	0.00	0.65
27.35	0.36	1.22	0.29*	0.64	0.00	0.64
27.40	0.36	1.22	0.29*	0.64	0.00	0.64
27.45	0.35	1.22	0.29*	0.63	0.00	0.63
27.50	0.35	1.23	0.29*	0.62	0.00	0.62
27.55	0.35	1.23	0.29*	0.62	0.00	0.62
27.60	0.35	1.23	0.29*	0.61	0.00	0.61
27.65	0.35	1.23	0.29*	0.60	0.00	0.60
27.70	0.35	1.23	0.29*	0.59	0.00	0.59
27.75	0.35	1.23	0.28*	0.59	0.00	0.59
27.80	0.35	1.23	0.28*	0.58	0.00	0.58
27.85	0.35	1.23	0.28*	0.57	0.00	0.57
27.90	0.37	1.23	0.30*	0.57	0.00	0.57
27.95	0.37	1.23	0.30*	0.56	0.00	0.56
28.00	0.37	1.23	0.30*	0.55	0.00	0.55
28.05	0.37	1.23	0.30*	0.55	0.00	0.55
28.10	0.37	1.23	0.30*	0.54	0.00	0.54
28.15	0.36	1.23	0.30*	0.53	0.00	0.53
28.20	0.36	1.23	0.30*	0.52	0.00	0.52
28.25	0.36	1.23	0.29*	0.52	0.00	0.52
28.30	0.36	1.23	0.29*	0.51	0.00	0.51
28.35	0.36	1.23	0.29*	0.50	0.00	0.50
28.40	0.36	1.23	0.29*	0.50	0.00	0.50
28.45	0.36	1.23	0.29*	0.49	0.00	0.49
28.50	0.36	1.23	0.29*	0.48	0.00	0.48
28.55	0.36	1.23	0.29*	0.48	0.00	0.48
28.60	0.35	1.23	0.29*	0.47	0.00	0.47
28.65	0.35	1.23	0.29*	0.46	0.00	0.46
28.70	0.35	1.23	0.29*	0.45	0.00	0.45
28.75	0.35	1.23	0.29*	0.45	0.00	0.45

28.80	0.35	1.23	0.28*	0.44	0.00	0.44
28.85	0.35	1.23	0.28*	0.43	0.00	0.43
28.90	0.35	1.23	0.28*	0.43	0.00	0.43
28.95	0.35	1.23	0.28*	0.42	0.00	0.42
29.00	0.35	1.23	0.28*	0.41	0.00	0.41
29.05	0.34	1.23	0.28*	0.40	0.00	0.40
29.10	0.34	1.23	0.28*	0.40	0.00	0.40
29.15	0.34	1.23	0.28*	0.39	0.00	0.39
29.20	0.34	1.23	0.28*	0.38	0.00	0.38
29.25	0.34	1.23	0.28*	0.38	0.00	0.38
29.30	0.34	1.23	0.28*	0.37	0.00	0.37
29.35	0.34	1.23	0.27*	0.36	0.00	0.36
29.40	0.34	1.23	0.27*	0.35	0.00	0.35
29.45	0.34	1.23	0.27*	0.35	0.00	0.35
29.50	0.34	1.23	0.27*	0.34	0.00	0.34
29.55	0.33	1.23	0.27*	0.33	0.00	0.33
29.60	0.33	1.23	0.27*	0.32	0.00	0.32
29.65	0.33	1.23	0.27*	0.32	0.00	0.32
29.70	0.33	1.23	0.27*	0.31	0.00	0.31
29.75	0.33	1.23	0.27*	0.30	0.00	0.30
29.80	0.33	1.23	0.27*	0.29	0.00	0.29
29.85	0.33	1.23	0.27*	0.29	0.00	0.29
29.90	0.33	1.23	0.27*	0.28	0.00	0.28
29.95	0.33	1.23	0.27*	0.27	0.00	0.27
30.00	0.33	1.23	0.26*	0.26	0.00	0.26
30.05	0.33	1.23	0.27*	0.26	0.00	0.26
30.10	0.33	1.23	0.27*	0.25	0.00	0.25
30.15	0.34	1.23	0.27*	0.24	0.00	0.24
30.20	0.34	1.23	0.28*	0.23	0.00	0.23
30.25	0.35	1.23	0.28*	0.23	0.00	0.23
30.30	0.35	1.23	0.28*	0.22	0.00	0.22
30.35	0.35	1.23	0.29*	0.21	0.00	0.21
30.40	0.36	1.23	0.29*	0.21	0.00	0.21
30.45	0.36	1.23	0.29*	0.20	0.00	0.20
30.50	0.37	1.23	0.30*	0.19	0.00	0.19
30.55	0.37	1.23	0.30*	0.19	0.00	0.19
30.60	0.38	1.23	0.30*	0.18	0.00	0.18
30.65	0.38	1.23	0.31*	0.17	0.00	0.17
30.70	0.38	1.23	0.31*	0.17	0.00	0.17
30.75	0.39	1.23	0.32*	0.16	0.00	0.16
30.80	0.39	1.23	0.32*	0.15	0.00	0.15
30.85	0.40	1.23	0.33*	0.15	0.00	0.15
30.90	0.41	1.23	0.33*	0.14	0.00	0.14
30.95	0.41	1.23	0.33*	0.13	0.00	0.13
31.00	0.42	1.23	0.34*	0.13	0.00	0.13
31.05	0.42	1.23	0.34*	0.12	0.00	0.12
31.10	0.43	1.23	0.35*	0.12	0.00	0.12
31.15	0.44	1.23	0.36*	0.11	0.00	0.11
31.20	0.45	1.23	0.36*	0.10	0.00	0.10
31.25	0.45	1.23	0.37*	0.10	0.00	0.10

31.30	0.46	1.23	0.38*	0.09	0.00	0.09
31.35	0.48	1.23	0.39*	0.09	0.00	0.09
31.40	0.49	1.23	0.40*	0.08	0.00	0.08
31.45	0.51	1.23	0.42*	0.08	0.00	0.08
31.50	0.54	1.23	0.44*	0.07	0.00	0.07
31.55	0.60	1.23	0.49*	0.07	0.00	0.07
31.60	0.61	1.23	0.50*	0.07	0.00	0.07
31.65	0.61	1.23	0.50*	0.06	0.00	0.06
31.70	0.61	1.23	0.50*	0.06	0.00	0.06
31.75	0.61	1.23	0.50*	0.05	0.00	0.05
31.80	0.61	1.23	0.50*	0.05	0.00	0.05
31.85	0.61	1.22	0.50*	0.05	0.00	0.05
31.90	0.61	1.22	0.50*	0.04	0.00	0.04
31.95	0.61	1.22	0.50*	0.04	0.00	0.04
32.00	0.61	1.22	0.50*	0.04	0.00	0.04
32.05	0.61	1.22	0.50*	0.03	0.00	0.03
32.10	0.61	1.22	0.50*	0.03	0.00	0.03
32.15	0.61	1.22	0.50*	0.03	0.00	0.03
32.20	0.61	1.22	0.50*	0.02	0.00	0.02
32.25	0.61	1.22	0.50*	0.02	0.00	0.02
32.30	0.61	1.22	0.50*	0.02	0.00	0.02
32.35	0.61	1.22	0.50*	0.02	0.00	0.02
32.40	0.61	1.22	0.50*	0.02	0.00	0.02
32.45	0.61	1.22	0.50*	0.02	0.00	0.02
32.50	0.61	1.22	0.50*	0.01	0.00	0.01
32.55	0.61	1.22	0.50*	0.01	0.00	0.01
32.60	0.61	1.22	0.50*	0.01	0.00	0.01
32.65	0.61	1.22	0.50*	0.01	0.00	0.01
32.70	0.61	1.22	0.50*	0.01	0.00	0.01
32.75	0.61	1.22	0.50*	0.01	0.00	0.01
32.80	0.60	1.22	0.50*	0.01	0.00	0.01
32.85	0.60	1.22	0.50*	0.01	0.00	0.01
32.90	0.60	1.22	0.50*	0.01	0.00	0.01
32.95	0.60	1.22	0.50*	0.00	0.00	0.00
33.00	0.60	1.22	0.50*	0.00	0.00	0.00
33.05	0.60	1.22	0.50*	0.00	0.00	0.00
33.10	0.60	1.22	0.50*	0.00	0.00	0.00
33.15	0.60	1.22	0.50*	0.00	0.00	0.00
33.20	0.60	1.22	0.50*	0.00	0.00	0.00
33.25	0.60	1.22	0.50*	0.00	0.00	0.00
33.30	0.60	1.22	0.50*	0.00	0.00	0.00
33.35	0.60	1.22	0.50*	0.00	0.00	0.00
33.40	0.60	1.22	0.50*	0.00	0.00	0.00
33.45	0.60	1.22	0.50*	0.00	0.00	0.00
33.50	0.60	1.22	0.50*	0.00	0.00	0.00
33.55	0.60	1.22	0.50*	0.00	0.00	0.00
33.60	0.60	1.22	0.50*	0.00	0.00	0.00
33.65	0.60	1.21	0.50*	0.00	0.00	0.00
33.70	0.60	1.21	0.50*	0.00	0.00	0.00
33.75	0.60	1.21	0.50*	0.00	0.00	0.00

33.80	0.60	1.21	0.50*	0.00	0.00	0.00
33.85	0.60	1.21	0.50*	0.00	0.00	0.00
33.90	0.60	1.21	0.50*	0.00	0.00	0.00
33.95	0.60	1.21	0.50*	0.00	0.00	0.00
34.00	0.60	1.21	0.50*	0.00	0.00	0.00
34.05	0.60	1.21	0.50*	0.00	0.00	0.00
34.10	0.60	1.21	0.50*	0.00	0.00	0.00
34.15	0.60	1.21	0.50*	0.00	0.00	0.00
34.20	0.60	1.21	0.50*	0.00	0.00	0.00
34.25	0.60	1.21	0.50*	0.00	0.00	0.00
34.30	0.60	1.21	0.50*	0.00	0.00	0.00
34.35	0.60	1.21	0.50*	0.00	0.00	0.00
34.40	0.60	1.21	0.50*	0.00	0.00	0.00
34.45	0.60	1.21	0.50*	0.00	0.00	0.00
34.50	0.60	1.21	0.50*	0.00	0.00	0.00
34.55	0.60	1.21	0.50*	0.00	0.00	0.00
34.60	0.60	1.21	0.50*	0.00	0.00	0.00
34.65	0.60	1.21	0.50*	0.00	0.00	0.00
34.70	0.60	1.21	0.50*	0.00	0.00	0.00
34.75	0.60	1.21	0.50*	0.00	0.00	0.00
34.80	0.60	1.21	0.50*	0.00	0.00	0.00
34.85	0.60	1.21	0.50*	0.00	0.00	0.00
34.90	0.60	1.21	0.50*	0.00	0.00	0.00
34.95	0.60	1.21	0.50*	0.00	0.00	0.00
35.00	0.60	1.21	0.50*	0.00	0.00	0.00
35.05	0.60	1.21	0.50*	0.00	0.00	0.00
35.10	0.60	1.21	0.50*	0.00	0.00	0.00
35.15	0.60	1.21	0.50*	0.00	0.00	0.00
35.20	0.60	1.21	0.50*	0.00	0.00	0.00
35.25	0.60	1.20	0.50*	0.00	0.00	0.00
35.30	0.60	1.20	0.50*	0.00	0.00	0.00
35.35	0.60	1.20	0.50*	0.00	0.00	0.00
35.40	0.60	1.20	0.50*	0.00	0.00	0.00
35.45	0.60	1.20	0.50*	0.00	0.00	0.00
35.50	0.60	1.20	0.50*	0.00	0.00	0.00
35.55	0.60	1.20	0.50*	0.00	0.00	0.00
35.60	0.60	1.20	0.50*	0.00	0.00	0.00
35.65	0.60	1.20	0.50*	0.00	0.00	0.00
35.70	0.60	1.20	0.50*	0.00	0.00	0.00
35.75	0.60	1.20	0.50*	0.00	0.00	0.00
35.80	0.59	1.20	0.50*	0.00	0.00	0.00
35.85	0.59	1.20	0.50*	0.00	0.00	0.00
35.90	0.59	1.20	0.50*	0.00	0.00	0.00
35.95	0.59	1.20	0.50*	0.00	0.00	0.00
36.00	0.59	1.20	0.50*	0.00	0.00	0.00
36.05	0.59	1.20	0.50*	0.00	0.00	0.00
36.10	0.59	1.20	0.50*	0.00	0.00	0.00
36.15	0.59	1.20	0.50*	0.00	0.00	0.00
36.20	0.59	1.20	0.50*	0.00	0.00	0.00
36.25	0.59	1.20	0.50*	0.00	0.00	0.00

36.30	0.59	1.20	0.50*	0.00	0.00	0.00
36.35	0.59	1.20	0.50*	0.00	0.00	0.00
36.40	0.59	1.20	0.50*	0.00	0.00	0.00
36.45	0.59	1.20	0.50*	0.00	0.00	0.00
36.50	0.59	1.20	0.50*	0.00	0.00	0.00
36.55	0.59	1.20	0.50*	0.00	0.00	0.00
36.60	0.59	1.20	0.50*	0.00	0.00	0.00
36.65	0.59	1.20	0.50*	0.00	0.00	0.00
36.70	0.59	1.20	0.50*	0.00	0.00	0.00
36.75	0.59	1.19	0.50*	0.00	0.00	0.00
36.80	0.59	1.19	0.50*	0.00	0.00	0.00
36.85	0.59	1.19	0.50*	0.00	0.00	0.00
36.90	0.59	1.19	0.50*	0.00	0.00	0.00
36.95	0.59	1.19	0.50*	0.00	0.00	0.00
37.00	0.59	1.19	0.50*	0.00	0.00	0.00
37.05	0.59	1.19	0.50*	0.00	0.00	0.00
37.10	0.59	1.19	0.50*	0.00	0.00	0.00
37.15	0.59	1.19	0.50*	0.00	0.00	0.00
37.20	0.59	1.19	0.50*	0.00	0.00	0.00
37.25	0.59	1.19	0.50*	0.00	0.00	0.00
37.30	0.59	1.19	0.50*	0.00	0.00	0.00
37.35	0.59	1.19	0.50*	0.00	0.00	0.00
37.40	0.59	1.19	0.50*	0.00	0.00	0.00
37.45	0.59	1.19	0.50*	0.00	0.00	0.00
37.50	0.59	1.19	0.50*	0.00	0.00	0.00
37.55	0.59	1.19	0.50*	0.00	0.00	0.00
37.60	0.59	1.19	0.50*	0.00	0.00	0.00
37.65	0.59	1.19	0.50*	0.00	0.00	0.00
37.70	0.59	1.19	0.50*	0.00	0.00	0.00
37.75	0.59	1.19	0.50*	0.00	0.00	0.00
37.80	0.59	1.19	0.50*	0.00	0.00	0.00
37.85	0.59	1.19	0.50*	0.00	0.00	0.00
37.90	0.59	1.19	0.50*	0.00	0.00	0.00
37.95	0.59	1.19	0.50*	0.00	0.00	0.00
38.00	0.59	1.19	0.50*	0.00	0.00	0.00
38.05	0.59	1.19	0.50*	0.00	0.00	0.00
38.10	0.59	1.19	0.50*	0.00	0.00	0.00
38.15	0.59	1.18	0.50*	0.00	0.00	0.00
38.20	0.59	1.18	0.50*	0.00	0.00	0.00
38.25	0.59	1.18	0.50*	0.00	0.00	0.00
38.30	0.59	1.18	0.50*	0.00	0.00	0.00
38.35	0.59	1.18	0.50*	0.00	0.00	0.00
38.40	0.59	1.18	0.50*	0.00	0.00	0.00
38.45	0.59	1.18	0.50*	0.00	0.00	0.00
38.50	0.59	1.18	0.50*	0.00	0.00	0.00
38.55	0.59	1.18	0.50*	0.00	0.00	0.00
38.60	0.59	1.18	0.50*	0.00	0.00	0.00
38.65	0.59	1.18	0.50*	0.00	0.00	0.00
38.70	0.59	1.18	0.50*	0.00	0.00	0.00
38.75	0.59	1.18	0.50*	0.00	0.00	0.00

38.80	0.59	1.18	0.50*	0.00	0.00	0.00
38.85	0.59	1.18	0.50*	0.00	0.00	0.00
38.90	0.58	1.18	0.50*	0.00	0.00	0.00
38.95	0.58	1.18	0.50*	0.00	0.00	0.00
39.00	0.58	1.18	0.50*	0.00	0.00	0.00
39.05	0.58	1.18	0.50*	0.00	0.00	0.00
39.10	0.58	1.18	0.50*	0.00	0.00	0.00
39.15	0.58	1.18	0.50*	0.00	0.00	0.00
39.20	0.58	1.18	0.50*	0.00	0.00	0.00
39.25	0.58	1.18	0.50*	0.00	0.00	0.00
39.30	0.58	1.18	0.50*	0.00	0.00	0.00
39.35	0.58	1.18	0.50*	0.00	0.00	0.00
39.40	0.58	1.18	0.50*	0.00	0.00	0.00
39.45	0.58	1.18	0.50*	0.00	0.00	0.00
39.50	0.58	1.17	0.50*	0.00	0.00	0.00
39.55	0.58	1.17	0.50*	0.00	0.00	0.00
39.60	0.58	1.17	0.50*	0.00	0.00	0.00
39.65	0.58	1.17	0.50*	0.00	0.00	0.00
39.70	0.58	1.17	0.50*	0.00	0.00	0.00
39.75	0.58	1.17	0.50*	0.00	0.00	0.00
39.80	0.58	1.17	0.50*	0.00	0.00	0.00
39.85	0.58	1.17	0.50*	0.00	0.00	0.00
39.90	0.58	1.17	0.50*	0.00	0.00	0.00
39.95	0.58	1.17	0.50*	0.00	0.00	0.00
40.00	0.58	1.17	0.50*	0.00	0.00	0.00
40.05	0.58	1.17	0.50*	0.00	0.00	0.00
40.10	0.58	1.17	0.50*	0.00	0.00	0.00
40.15	0.58	1.17	0.50*	0.00	0.00	0.00
40.20	0.58	1.17	0.50*	0.00	0.00	0.00
40.25	0.58	1.17	0.50*	0.00	0.00	0.00
40.30	0.58	1.17	0.50*	0.00	0.00	0.00
40.35	0.58	1.17	0.50*	0.00	0.00	0.00
40.40	0.58	1.17	0.50*	0.00	0.00	0.00
40.45	0.58	1.17	0.50*	0.00	0.00	0.00
40.50	0.58	1.17	0.50*	0.00	0.00	0.00
40.55	0.58	1.17	0.50*	0.00	0.00	0.00
40.60	0.58	1.17	0.50*	0.00	0.00	0.00
40.65	0.58	1.17	0.50*	0.00	0.00	0.00
40.70	0.58	1.17	0.50*	0.00	0.00	0.00
40.75	0.58	1.16	0.50*	0.00	0.00	0.00
40.80	0.58	1.16	0.50*	0.00	0.00	0.00
40.85	0.58	1.16	0.50*	0.00	0.00	0.00
40.90	0.58	1.16	0.50*	0.00	0.00	0.00
40.95	0.58	1.16	0.50*	0.00	0.00	0.00
41.00	0.58	1.16	0.50*	0.00	0.00	0.00
41.05	0.58	1.16	0.50*	0.00	0.00	0.00
41.10	0.58	1.16	0.50*	0.00	0.00	0.00
41.15	0.58	1.16	0.50*	0.00	0.00	0.00
41.20	0.58	1.16	0.50*	0.00	0.00	0.00
41.25	0.58	1.16	0.50*	0.00	0.00	0.00

41.30	0.58	1.16	0.50*	0.00	0.00	0.00
41.35	0.58	1.16	0.50*	0.00	0.00	0.00
41.40	0.58	1.16	0.50*	0.00	0.00	0.00
41.45	0.58	1.16	0.50*	0.00	0.00	0.00
41.50	0.58	1.16	0.50*	0.00	0.00	0.00
41.55	0.58	1.16	0.50*	0.00	0.00	0.00
41.60	0.58	1.16	0.50*	0.00	0.00	0.00
41.65	0.58	1.16	0.50*	0.00	0.00	0.00
41.70	0.58	1.16	0.50*	0.00	0.00	0.00
41.75	0.58	1.16	0.50*	0.00	0.00	0.00
41.80	0.58	1.16	0.50*	0.00	0.00	0.00
41.85	0.58	1.16	0.50*	0.00	0.00	0.00
41.90	0.58	1.16	0.50*	0.00	0.00	0.00
41.95	0.58	1.16	0.50*	0.00	0.00	0.00
42.00	0.58	1.15	0.50*	0.00	0.00	0.00
42.05	0.58	1.15	0.50*	0.00	0.00	0.00
42.10	0.58	1.15	0.50*	0.00	0.00	0.00
42.15	0.57	1.15	0.50*	0.00	0.00	0.00
42.20	0.57	1.15	0.50*	0.00	0.00	0.00
42.25	0.57	1.15	0.50*	0.00	0.00	0.00
42.30	0.57	1.15	0.50*	0.00	0.00	0.00
42.35	0.57	1.15	0.50*	0.00	0.00	0.00
42.40	0.57	1.15	0.50*	0.00	0.00	0.00
42.45	0.57	1.15	0.50*	0.00	0.00	0.00
42.50	0.57	1.15	0.50*	0.00	0.00	0.00
42.55	0.57	1.15	0.50*	0.00	0.00	0.00
42.60	0.57	1.15	0.50*	0.00	0.00	0.00
42.65	0.57	1.15	0.50*	0.00	0.00	0.00
42.70	0.57	1.15	0.50*	0.00	0.00	0.00
42.75	0.57	1.15	0.50*	0.00	0.00	0.00
42.80	0.57	1.15	0.50*	0.00	0.00	0.00
42.85	0.57	1.15	0.50*	0.00	0.00	0.00
42.90	0.57	1.15	0.50*	0.00	0.00	0.00
42.95	0.57	1.15	0.50*	0.00	0.00	0.00
43.00	0.57	1.15	0.50*	0.00	0.00	0.00
43.05	0.57	1.15	0.50*	0.00	0.00	0.00
43.10	0.57	1.15	0.50*	0.00	0.00	0.00
43.15	0.57	1.15	0.50*	0.00	0.00	0.00
43.20	0.57	1.15	0.50*	0.00	0.00	0.00
43.25	0.57	1.14	0.50*	0.00	0.00	0.00
43.30	0.57	1.14	0.50*	0.00	0.00	0.00
43.35	0.57	1.14	0.50*	0.00	0.00	0.00
43.40	0.57	1.14	0.50*	0.00	0.00	0.00
43.45	0.57	1.14	0.50*	0.00	0.00	0.00
43.50	0.57	1.14	0.50*	0.00	0.00	0.00
43.55	0.57	1.14	0.50*	0.00	0.00	0.00
43.60	0.57	1.14	0.50*	0.00	0.00	0.00
43.65	0.57	1.14	0.50*	0.00	0.00	0.00
43.70	0.57	1.14	0.50*	0.00	0.00	0.00
43.75	0.57	1.14	0.50*	0.00	0.00	0.00

43.80	0.57	1.14	0.50*	0.00	0.00	0.00
43.85	0.57	1.14	0.50*	0.00	0.00	0.00
43.90	0.57	1.14	0.50*	0.00	0.00	0.00
43.95	0.57	1.14	0.50*	0.00	0.00	0.00
44.00	0.57	1.14	0.50*	0.00	0.00	0.00
44.05	0.57	1.14	0.50*	0.00	0.00	0.00
44.10	0.57	1.14	0.50*	0.00	0.00	0.00
44.15	0.57	1.14	0.50*	0.00	0.00	0.00
44.20	0.57	1.14	0.50*	0.00	0.00	0.00
44.25	0.57	1.14	0.50*	0.00	0.00	0.00
44.30	0.57	1.14	0.50*	0.00	0.00	0.00
44.35	0.57	1.14	0.50*	0.00	0.00	0.00
44.40	0.57	1.13	0.50*	0.00	0.00	0.00
44.45	0.57	1.13	0.50*	0.00	0.00	0.00
44.50	0.57	1.13	0.50*	0.00	0.00	0.00
44.55	0.57	1.13	0.50*	0.00	0.00	0.00
44.60	0.57	1.13	0.50*	0.00	0.00	0.00
44.65	0.57	1.13	0.50*	0.00	0.00	0.00
44.70	0.57	1.13	0.50*	0.00	0.00	0.00
44.75	0.57	1.13	0.50*	0.00	0.00	0.00
44.80	0.57	1.13	0.50*	0.00	0.00	0.00
44.85	0.57	1.13	0.50*	0.00	0.00	0.00
44.90	0.57	1.13	0.50*	0.00	0.00	0.00
44.95	0.57	1.13	0.50*	0.00	0.00	0.00
45.00	0.57	1.13	0.50*	0.00	0.00	0.00
45.05	0.57	1.13	0.50*	0.00	0.00	0.00
45.10	0.57	1.13	0.50*	0.00	0.00	0.00
45.15	0.57	1.13	0.50*	0.00	0.00	0.00
45.20	0.57	1.13	0.50*	0.00	0.00	0.00
45.25	0.57	1.13	0.50*	0.00	0.00	0.00
45.30	0.57	1.13	0.50*	0.00	0.00	0.00
45.35	0.57	1.13	0.50*	0.00	0.00	0.00
45.40	0.57	1.13	0.50*	0.00	0.00	0.00
45.45	0.57	1.13	0.50*	0.00	0.00	0.00
45.50	0.57	1.13	0.50*	0.00	0.00	0.00
45.55	0.56	1.12	0.50*	0.00	0.00	0.00
45.60	0.56	1.12	0.50*	0.00	0.00	0.00
45.65	0.56	1.12	0.50*	0.00	0.00	0.00
45.70	0.56	1.12	0.50*	0.00	0.00	0.00
45.75	0.56	1.12	0.50*	0.00	0.00	0.00
45.80	0.56	1.12	0.50*	0.00	0.00	0.00
45.85	0.56	1.12	0.50*	0.00	0.00	0.00
45.90	0.56	1.12	0.50*	0.00	0.00	0.00
45.95	0.56	1.12	0.50*	0.00	0.00	0.00
46.00	0.56	1.12	0.50*	0.00	0.00	0.00
46.05	0.56	1.12	0.50*	0.00	0.00	0.00
46.10	0.56	1.12	0.50*	0.00	0.00	0.00
46.15	0.56	1.12	0.50*	0.00	0.00	0.00
46.20	0.56	1.12	0.50*	0.00	0.00	0.00
46.25	0.56	1.12	0.50*	0.00	0.00	0.00

46.30	0.56	1.12	0.50*	0.00	0.00	0.00
46.35	0.56	1.12	0.50*	0.00	0.00	0.00
46.40	0.56	1.12	0.50*	0.00	0.00	0.00
46.45	0.56	1.12	0.50*	0.00	0.00	0.00
46.50	0.56	1.12	0.50*	0.00	0.00	0.00
46.55	0.56	1.12	0.50*	0.00	0.00	0.00
46.60	0.56	1.12	0.50*	0.00	0.00	0.00
46.65	0.56	1.12	0.50*	0.00	0.00	0.00
46.70	0.56	1.11	0.50*	0.00	0.00	0.00
46.75	0.56	1.11	0.50*	0.00	0.00	0.00
46.80	0.56	1.11	0.50*	0.00	0.00	0.00
46.85	0.56	1.11	0.50*	0.00	0.00	0.00
46.90	0.56	1.11	0.50*	0.00	0.00	0.00
46.95	0.56	1.11	0.50*	0.00	0.00	0.00
47.00	0.56	1.11	0.50*	0.00	0.00	0.00
47.05	0.56	1.11	0.50*	0.00	0.00	0.00
47.10	0.56	1.11	0.50*	0.00	0.00	0.00
47.15	0.56	1.11	0.50*	0.00	0.00	0.00
47.20	0.56	1.11	0.50*	0.00	0.00	0.00
47.25	0.56	1.11	0.50*	0.00	0.00	0.00
47.30	0.56	1.11	0.50*	0.00	0.00	0.00
47.35	0.56	1.11	0.50*	0.00	0.00	0.00
47.40	0.56	1.11	0.50*	0.00	0.00	0.00
47.45	0.56	1.11	0.51*	0.00	0.00	0.00
47.50	0.56	1.11	0.51*	0.00	0.00	0.00
47.55	0.56	1.11	0.51*	0.00	0.00	0.00
47.60	0.56	1.11	0.51*	0.00	0.00	0.00
47.65	0.56	1.11	0.51*	0.00	0.00	0.00
47.70	0.56	1.11	0.51*	0.00	0.00	0.00
47.75	0.56	1.11	0.51*	0.00	0.00	0.00
47.80	0.56	1.10	0.51*	0.00	0.00	0.00
47.85	0.56	1.10	0.51*	0.00	0.00	0.00
47.90	0.56	1.10	0.51*	0.00	0.00	0.00
47.95	0.56	1.10	0.51*	0.00	0.00	0.00
48.00	0.56	1.10	0.51*	0.00	0.00	0.00
48.05	0.56	1.10	0.51*	0.00	0.00	0.00
48.10	0.56	1.10	0.51*	0.00	0.00	0.00
48.15	0.56	1.10	0.51*	0.00	0.00	0.00
48.20	0.56	1.10	0.51*	0.00	0.00	0.00
48.25	0.56	1.10	0.51*	0.00	0.00	0.00
48.30	0.56	1.10	0.51*	0.00	0.00	0.00
48.35	0.56	1.10	0.51*	0.00	0.00	0.00
48.40	0.56	1.10	0.51*	0.00	0.00	0.00
48.45	0.56	1.10	0.51*	0.00	0.00	0.00
48.50	0.56	1.10	0.51*	0.00	0.00	0.00
48.55	0.56	1.10	0.51*	0.00	0.00	0.00
48.60	0.56	1.10	0.51*	0.00	0.00	0.00
48.65	0.56	1.10	0.51*	0.00	0.00	0.00
48.70	0.56	1.10	0.51*	0.00	0.00	0.00
48.75	0.56	1.10	0.51*	0.00	0.00	0.00

48.80	0.56	1.10	0.51*	0.00	0.00	0.00
48.85	0.56	1.10	0.51*	0.00	0.00	0.00
48.90	0.56	1.09	0.51*	0.00	0.00	0.00
48.95	0.56	1.09	0.51*	0.00	0.00	0.00
49.00	0.56	1.09	0.51*	0.00	0.00	0.00
49.05	0.56	1.09	0.51*	0.00	0.00	0.00
49.10	0.56	1.09	0.51*	0.00	0.00	0.00
49.15	0.56	1.09	0.51*	0.00	0.00	0.00
49.20	0.56	1.09	0.51*	0.00	0.00	0.00
49.25	0.56	1.09	0.51*	0.00	0.00	0.00
49.30	0.56	1.09	0.51*	0.00	0.00	0.00
49.35	0.56	1.09	0.51*	0.00	0.00	0.00
49.40	0.56	1.09	0.51*	0.00	0.00	0.00
49.45	0.56	1.09	0.51*	0.00	0.00	0.00
49.50	0.56	1.09	0.51*	0.00	0.00	0.00
49.55	0.56	1.09	0.51*	0.00	0.00	0.00
49.60	0.56	1.09	0.51*	0.00	0.00	0.00
49.65	0.56	1.09	0.51*	0.00	0.00	0.00
49.70	0.56	1.09	0.51*	0.00	0.00	0.00
49.75	0.56	1.09	0.51*	0.00	0.00	0.00
49.80	0.56	1.09	0.51*	0.00	0.00	0.00
49.85	0.56	1.09	0.51*	0.00	0.00	0.00
49.90	0.56	1.09	0.51*	0.00	0.00	0.00
49.95	0.56	1.08	0.51*	0.00	0.00	0.00
50.00	0.56	1.08	0.51*	0.00	0.00	0.00
50.05	0.56	1.08	0.51*	0.00	0.00	0.00
50.10	0.56	1.08	0.51*	0.00	0.00	0.00
50.15	0.56	1.08	0.51*	0.00	0.00	0.00
50.20	0.56	1.08	0.51*	0.00	0.00	0.00
50.25	0.55	1.08	0.51*	0.00	0.00	0.00
50.30	0.55	1.08	0.51*	0.00	0.00	0.00
50.35	0.55	1.08	0.51*	0.00	0.00	0.00
50.40	0.55	1.08	0.51*	0.00	0.00	0.00
50.45	0.55	1.08	0.51*	0.00	0.00	0.00
50.50	0.55	1.08	0.51*	0.00	0.00	0.00
50.55	0.55	1.08	0.51*	0.00	0.00	0.00
50.60	0.55	1.08	0.51*	0.00	0.00	0.00
50.65	0.55	1.08	0.51*	0.00	0.00	0.00
50.70	0.55	1.08	0.51*	0.00	0.00	0.00
50.75	0.55	1.08	0.51*	0.00	0.00	0.00
50.80	0.55	1.08	0.51*	0.00	0.00	0.00
50.85	0.55	1.08	0.51*	0.00	0.00	0.00
50.90	0.55	1.08	0.52*	0.00	0.00	0.00
50.95	0.55	1.08	0.52*	0.00	0.00	0.00
51.00	0.55	1.07	0.52*	0.00	0.00	0.00
51.05	0.55	1.07	0.52*	0.00	0.00	0.00
51.10	0.55	1.07	0.52*	0.00	0.00	0.00
51.15	0.55	1.07	0.52*	0.00	0.00	0.00
51.20	0.55	1.07	0.52*	0.00	0.00	0.00
51.25	0.55	1.07	0.52*	0.00	0.00	0.00

51.30	0.55	1.07	0.52*	0.00	0.00	0.00
51.35	0.55	1.07	0.52*	0.00	0.00	0.00
51.40	0.55	1.07	0.52*	0.00	0.00	0.00
51.45	0.55	1.07	0.52*	0.00	0.00	0.00
51.50	0.55	1.07	0.52*	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

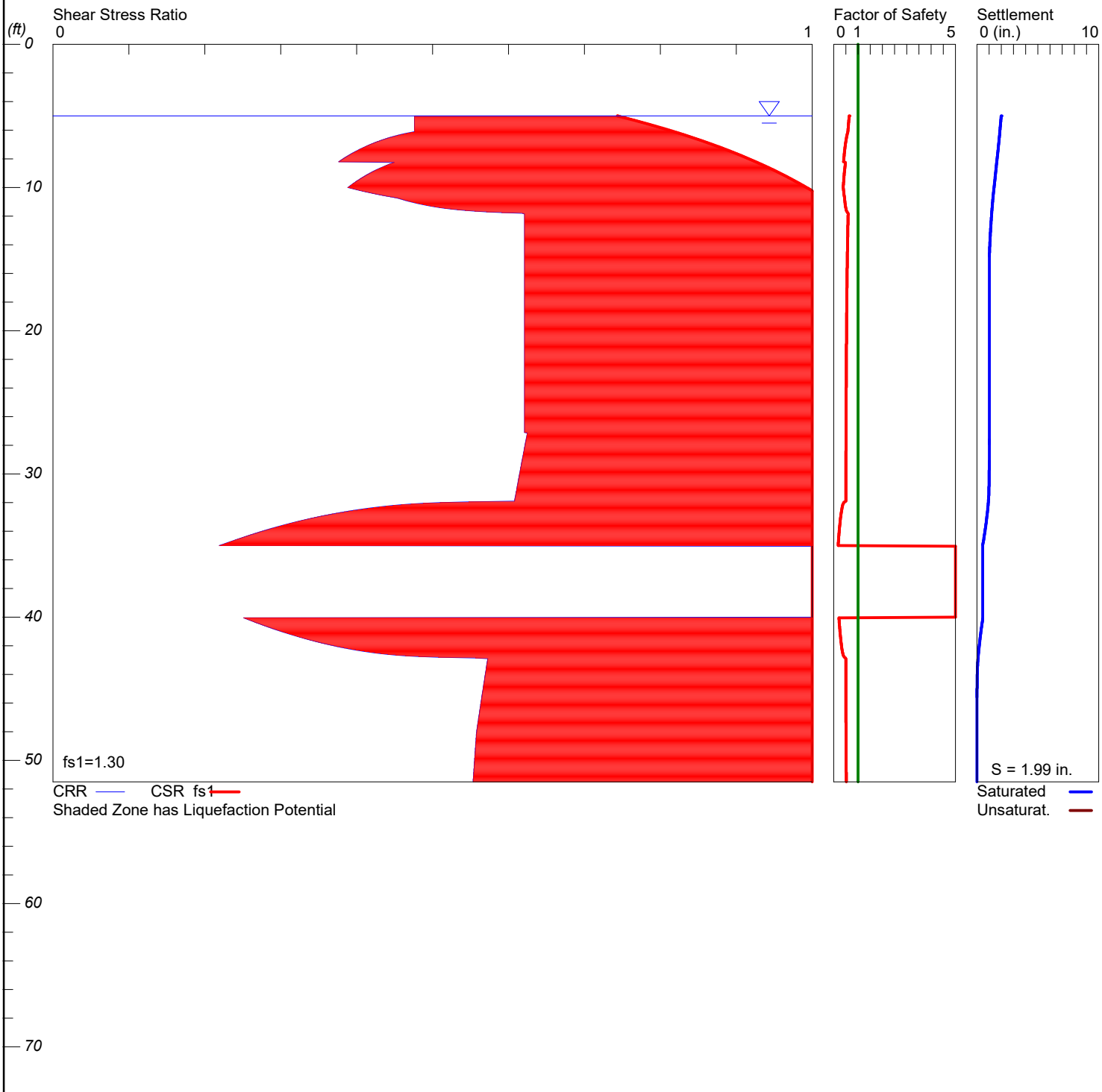
1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils

LIQUEFACTION ANALYSIS

2200 Rosemead Boulevard, South El Monte

Hole No.=B-7 Water Depth=5 ft

Magnitude=6.89
Acceleration=0.89g



****
LIQUEFACTION ANALYSIS SUMMARY

****
Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 12/11/2020 3:00:04 PM

Input File Name: P:\2020 Projects\20-7107 XBC, 9427 Rush St., South El Monte\Report\Liquify\B-7.liq
Title: 2200 Rosemead Boulevard, South El Monte
Subtitle: 20-7106

Surface Elev.=
Hole No.=B-7
Depth of Hole= 51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration= 0.89 g
Earthquake Magnitude= 6.89

Input Data:
Surface Elev.=
Hole No.=B-7
Depth of Hole=51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration=0.89 g
Earthquake Magnitude=6.89
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	10.00	120.00	58.80
10.00	10.00	120.00	39.10
15.00	20.00	120.00	10.90
20.00	25.00	120.00	6.40
25.00	29.00	120.00	5.00
30.00	24.00	120.00	21.00
35.00	8.00	120.00	NoLiq
40.00	11.00	120.00	NoLiq
45.00	28.00	120.00	23.20
50.00	50.00	120.00	5.00

Output Results:

Settlement of Saturated Sands=1.99 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=1.99 in.
Differential Settlement=0.996 to 1.315 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
5.00	0.48	0.74	0.64*	1.99	0.00	1.99
5.05	0.48	0.75	0.64*	1.99	0.00	1.99
5.10	0.48	0.75	0.63*	1.98	0.00	1.98
5.15	0.48	0.75	0.63*	1.98	0.00	1.98
5.20	0.48	0.76	0.63*	1.97	0.00	1.97
5.25	0.48	0.76	0.63*	1.97	0.00	1.97
5.30	0.48	0.77	0.62*	1.96	0.00	1.96
5.35	0.48	0.77	0.62*	1.96	0.00	1.96
5.40	0.48	0.77	0.62*	1.95	0.00	1.95
5.45	0.48	0.78	0.61*	1.95	0.00	1.95
5.50	0.48	0.78	0.61*	1.94	0.00	1.94
5.55	0.48	0.78	0.61*	1.94	0.00	1.94
5.60	0.48	0.79	0.61*	1.93	0.00	1.93
5.65	0.48	0.79	0.60*	1.93	0.00	1.93
5.70	0.48	0.79	0.60*	1.92	0.00	1.92
5.75	0.48	0.80	0.60*	1.92	0.00	1.92
5.80	0.48	0.80	0.60*	1.91	0.00	1.91
5.85	0.48	0.80	0.59*	1.91	0.00	1.91
5.90	0.48	0.81	0.59*	1.90	0.00	1.90
5.95	0.48	0.81	0.59*	1.90	0.00	1.90
6.00	0.48	0.81	0.59*	1.89	0.00	1.89
6.05	0.48	0.81	0.58*	1.89	0.00	1.89
6.10	0.48	0.82	0.58*	1.88	0.00	1.88
6.15	0.47	0.82	0.57*	1.88	0.00	1.88
6.20	0.47	0.82	0.57*	1.87	0.00	1.87
6.25	0.46	0.83	0.56*	1.86	0.00	1.86

6.30	0.46	0.83	0.55*	1.86	0.00	1.86
6.35	0.45	0.83	0.55*	1.85	0.00	1.85
6.40	0.45	0.84	0.54*	1.85	0.00	1.85
6.45	0.45	0.84	0.53*	1.84	0.00	1.84
6.50	0.44	0.84	0.53*	1.84	0.00	1.84
6.55	0.44	0.84	0.52*	1.83	0.00	1.83
6.60	0.44	0.85	0.52*	1.83	0.00	1.83
6.65	0.44	0.85	0.51*	1.82	0.00	1.82
6.70	0.43	0.85	0.51*	1.81	0.00	1.81
6.75	0.43	0.86	0.50*	1.81	0.00	1.81
6.80	0.43	0.86	0.50*	1.80	0.00	1.80
6.85	0.42	0.86	0.49*	1.80	0.00	1.80
6.90	0.42	0.86	0.49*	1.79	0.00	1.79
6.95	0.42	0.87	0.48*	1.78	0.00	1.78
7.00	0.42	0.87	0.48*	1.78	0.00	1.78
7.05	0.42	0.87	0.48*	1.77	0.00	1.77
7.10	0.41	0.87	0.47*	1.77	0.00	1.77
7.15	0.41	0.88	0.47*	1.76	0.00	1.76
7.20	0.41	0.88	0.47*	1.75	0.00	1.75
7.25	0.41	0.88	0.46*	1.75	0.00	1.75
7.30	0.41	0.88	0.46*	1.74	0.00	1.74
7.35	0.40	0.89	0.45*	1.74	0.00	1.74
7.40	0.40	0.89	0.45*	1.73	0.00	1.73
7.45	0.40	0.89	0.45*	1.72	0.00	1.72
7.50	0.40	0.89	0.45*	1.72	0.00	1.72
7.55	0.40	0.90	0.44*	1.71	0.00	1.71
7.60	0.39	0.90	0.44*	1.70	0.00	1.70
7.65	0.39	0.90	0.44*	1.70	0.00	1.70
7.70	0.39	0.90	0.43*	1.69	0.00	1.69
7.75	0.39	0.91	0.43*	1.68	0.00	1.68
7.80	0.39	0.91	0.43*	1.68	0.00	1.68
7.85	0.39	0.91	0.42*	1.67	0.00	1.67
7.90	0.38	0.91	0.42*	1.66	0.00	1.66
7.95	0.38	0.91	0.42*	1.66	0.00	1.66
8.00	0.38	0.92	0.42*	1.65	0.00	1.65
8.05	0.38	0.92	0.41*	1.64	0.00	1.64
8.10	0.38	0.92	0.41*	1.64	0.00	1.64
8.15	0.38	0.92	0.41*	1.63	0.00	1.63
8.20	0.38	0.93	0.41*	1.63	0.00	1.63
8.25	0.45	0.93	0.48*	1.62	0.00	1.62
8.30	0.45	0.93	0.48*	1.61	0.00	1.61
8.35	0.44	0.93	0.48*	1.61	0.00	1.61
8.40	0.44	0.93	0.47*	1.60	0.00	1.60
8.45	0.44	0.94	0.47*	1.60	0.00	1.60
8.50	0.44	0.94	0.47*	1.59	0.00	1.59
8.55	0.43	0.94	0.46*	1.58	0.00	1.58
8.60	0.43	0.94	0.46*	1.58	0.00	1.58
8.65	0.43	0.94	0.46*	1.57	0.00	1.57
8.70	0.43	0.95	0.45*	1.57	0.00	1.57
8.75	0.43	0.95	0.45*	1.56	0.00	1.56

8.80	0.42	0.95	0.45*	1.55	0.00	1.55
8.85	0.42	0.95	0.44*	1.55	0.00	1.55
8.90	0.42	0.95	0.44*	1.54	0.00	1.54
8.95	0.42	0.96	0.44*	1.54	0.00	1.54
9.00	0.42	0.96	0.44*	1.53	0.00	1.53
9.05	0.42	0.96	0.43*	1.52	0.00	1.52
9.10	0.41	0.96	0.43*	1.52	0.00	1.52
9.15	0.41	0.96	0.43*	1.51	0.00	1.51
9.20	0.41	0.97	0.43*	1.51	0.00	1.51
9.25	0.41	0.97	0.42*	1.50	0.00	1.50
9.30	0.41	0.97	0.42*	1.49	0.00	1.49
9.35	0.41	0.97	0.42*	1.49	0.00	1.49
9.40	0.40	0.97	0.42*	1.48	0.00	1.48
9.45	0.40	0.97	0.41*	1.47	0.00	1.47
9.50	0.40	0.98	0.41*	1.47	0.00	1.47
9.55	0.40	0.98	0.41*	1.46	0.00	1.46
9.60	0.40	0.98	0.41*	1.46	0.00	1.46
9.65	0.40	0.98	0.41*	1.45	0.00	1.45
9.70	0.40	0.98	0.40*	1.44	0.00	1.44
9.75	0.39	0.98	0.40*	1.44	0.00	1.44
9.80	0.39	0.99	0.40*	1.43	0.00	1.43
9.85	0.39	0.99	0.40*	1.42	0.00	1.42
9.90	0.39	0.99	0.40*	1.42	0.00	1.42
9.95	0.39	0.99	0.39*	1.41	0.00	1.41
10.00	0.39	0.99	0.39*	1.40	0.00	1.40
10.05	0.39	0.99	0.39*	1.40	0.00	1.40
10.10	0.40	1.00	0.40*	1.39	0.00	1.39
10.15	0.40	1.00	0.40*	1.38	0.00	1.38
10.20	0.40	1.00	0.40*	1.38	0.00	1.38
10.25	0.41	1.00	0.41*	1.37	0.00	1.37
10.30	0.41	1.00	0.41*	1.37	0.00	1.37
10.35	0.42	1.00	0.41*	1.36	0.00	1.36
10.40	0.42	1.01	0.42*	1.35	0.00	1.35
10.45	0.42	1.01	0.42*	1.35	0.00	1.35
10.50	0.43	1.01	0.43*	1.34	0.00	1.34
10.55	0.43	1.01	0.43*	1.34	0.00	1.34
10.60	0.44	1.01	0.43*	1.33	0.00	1.33
10.65	0.44	1.01	0.44*	1.32	0.00	1.32
10.70	0.45	1.01	0.44*	1.32	0.00	1.32
10.75	0.45	1.02	0.45*	1.31	0.00	1.31
10.80	0.46	1.02	0.45*	1.31	0.00	1.31
10.85	0.46	1.02	0.45*	1.30	0.00	1.30
10.90	0.46	1.02	0.46*	1.30	0.00	1.30
10.95	0.47	1.02	0.46*	1.29	0.00	1.29
11.00	0.47	1.02	0.46*	1.29	0.00	1.29
11.05	0.48	1.02	0.46*	1.28	0.00	1.28
11.10	0.48	1.03	0.47*	1.28	0.00	1.28
11.15	0.48	1.03	0.47*	1.27	0.00	1.27
11.20	0.49	1.03	0.47*	1.27	0.00	1.27
11.25	0.49	1.03	0.48*	1.26	0.00	1.26

11.30	0.50	1.03	0.48*	1.26	0.00	1.26
11.35	0.50	1.03	0.49*	1.25	0.00	1.25
11.40	0.51	1.03	0.49*	1.25	0.00	1.25
11.45	0.52	1.04	0.50*	1.24	0.00	1.24
11.50	0.52	1.04	0.51*	1.24	0.00	1.24
11.55	0.53	1.04	0.51*	1.23	0.00	1.23
11.60	0.54	1.04	0.52*	1.23	0.00	1.23
11.65	0.56	1.04	0.53*	1.22	0.00	1.22
11.70	0.57	1.04	0.55*	1.22	0.00	1.22
11.75	0.59	1.04	0.57*	1.21	0.00	1.21
11.80	0.62	1.04	0.59*	1.21	0.00	1.21
11.85	0.62	1.05	0.59*	1.20	0.00	1.20
11.90	0.62	1.05	0.59*	1.20	0.00	1.20
11.95	0.62	1.05	0.59*	1.20	0.00	1.20
12.00	0.62	1.05	0.59*	1.19	0.00	1.19
12.05	0.62	1.05	0.59*	1.19	0.00	1.19
12.10	0.62	1.05	0.59*	1.18	0.00	1.18
12.15	0.62	1.05	0.59*	1.18	0.00	1.18
12.20	0.62	1.05	0.59*	1.18	0.00	1.18
12.25	0.62	1.06	0.59*	1.17	0.00	1.17
12.30	0.62	1.06	0.59*	1.17	0.00	1.17
12.35	0.62	1.06	0.59*	1.16	0.00	1.16
12.40	0.62	1.06	0.59*	1.16	0.00	1.16
12.45	0.62	1.06	0.59*	1.16	0.00	1.16
12.50	0.62	1.06	0.59*	1.15	0.00	1.15
12.55	0.62	1.06	0.58*	1.15	0.00	1.15
12.60	0.62	1.06	0.58*	1.14	0.00	1.14
12.65	0.62	1.06	0.58*	1.14	0.00	1.14
12.70	0.62	1.07	0.58*	1.14	0.00	1.14
12.75	0.62	1.07	0.58*	1.13	0.00	1.13
12.80	0.62	1.07	0.58*	1.13	0.00	1.13
12.85	0.62	1.07	0.58*	1.13	0.00	1.13
12.90	0.62	1.07	0.58*	1.12	0.00	1.12
12.95	0.62	1.07	0.58*	1.12	0.00	1.12
13.00	0.62	1.07	0.58*	1.12	0.00	1.12
13.05	0.62	1.07	0.58*	1.11	0.00	1.11
13.10	0.62	1.07	0.58*	1.11	0.00	1.11
13.15	0.62	1.08	0.58*	1.11	0.00	1.11
13.20	0.62	1.08	0.58*	1.10	0.00	1.10
13.25	0.62	1.08	0.58*	1.10	0.00	1.10
13.30	0.62	1.08	0.58*	1.10	0.00	1.10
13.35	0.62	1.08	0.58*	1.09	0.00	1.09
13.40	0.62	1.08	0.57*	1.09	0.00	1.09
13.45	0.62	1.08	0.57*	1.09	0.00	1.09
13.50	0.62	1.08	0.57*	1.08	0.00	1.08
13.55	0.62	1.08	0.57*	1.08	0.00	1.08
13.60	0.62	1.08	0.57*	1.08	0.00	1.08
13.65	0.62	1.09	0.57*	1.07	0.00	1.07
13.70	0.62	1.09	0.57*	1.07	0.00	1.07
13.75	0.62	1.09	0.57*	1.07	0.00	1.07

13.80	0.62	1.09	0.57*	1.07	0.00	1.07
13.85	0.62	1.09	0.57*	1.06	0.00	1.06
13.90	0.62	1.09	0.57*	1.06	0.00	1.06
13.95	0.62	1.09	0.57*	1.06	0.00	1.06
14.00	0.62	1.09	0.57*	1.06	0.00	1.06
14.05	0.62	1.09	0.57*	1.05	0.00	1.05
14.10	0.62	1.09	0.57*	1.05	0.00	1.05
14.15	0.62	1.10	0.57*	1.05	0.00	1.05
14.20	0.62	1.10	0.57*	1.05	0.00	1.05
14.25	0.62	1.10	0.57*	1.04	0.00	1.04
14.30	0.62	1.10	0.57*	1.04	0.00	1.04
14.35	0.62	1.10	0.56*	1.04	0.00	1.04
14.40	0.62	1.10	0.56*	1.04	0.00	1.04
14.45	0.62	1.10	0.56*	1.04	0.00	1.04
14.50	0.62	1.10	0.56*	1.03	0.00	1.03
14.55	0.62	1.10	0.56*	1.03	0.00	1.03
14.60	0.62	1.10	0.56*	1.03	0.00	1.03
14.65	0.62	1.10	0.56*	1.03	0.00	1.03
14.70	0.62	1.11	0.56*	1.03	0.00	1.03
14.75	0.62	1.11	0.56*	1.02	0.00	1.02
14.80	0.62	1.11	0.56*	1.02	0.00	1.02
14.85	0.62	1.11	0.56*	1.02	0.00	1.02
14.90	0.62	1.11	0.56*	1.02	0.00	1.02
14.95	0.62	1.11	0.56*	1.02	0.00	1.02
15.00	0.62	1.11	0.56*	1.02	0.00	1.02
15.05	0.62	1.11	0.56*	1.02	0.00	1.02
15.10	0.62	1.11	0.56*	1.02	0.00	1.02
15.15	0.62	1.11	0.56*	1.02	0.00	1.02
15.20	0.62	1.11	0.56*	1.02	0.00	1.02
15.25	0.62	1.12	0.56*	1.02	0.00	1.02
15.30	0.62	1.12	0.56*	1.02	0.00	1.02
15.35	0.62	1.12	0.56*	1.02	0.00	1.02
15.40	0.62	1.12	0.56*	1.02	0.00	1.02
15.45	0.62	1.12	0.56*	1.02	0.00	1.02
15.50	0.62	1.12	0.55*	1.02	0.00	1.02
15.55	0.62	1.12	0.55*	1.02	0.00	1.02
15.60	0.62	1.12	0.55*	1.02	0.00	1.02
15.65	0.62	1.12	0.55*	1.02	0.00	1.02
15.70	0.62	1.12	0.55*	1.02	0.00	1.02
15.75	0.62	1.12	0.55*	1.02	0.00	1.02
15.80	0.62	1.12	0.55*	1.02	0.00	1.02
15.85	0.62	1.12	0.55*	1.02	0.00	1.02
15.90	0.62	1.13	0.55*	1.02	0.00	1.02
15.95	0.62	1.13	0.55*	1.02	0.00	1.02
16.00	0.62	1.13	0.55*	1.02	0.00	1.02
16.05	0.62	1.13	0.55*	1.02	0.00	1.02
16.10	0.62	1.13	0.55*	1.02	0.00	1.02
16.15	0.62	1.13	0.55*	1.02	0.00	1.02
16.20	0.62	1.13	0.55*	1.02	0.00	1.02
16.25	0.62	1.13	0.55*	1.02	0.00	1.02

16.30	0.62	1.13	0.55*	1.02	0.00	1.02
16.35	0.62	1.13	0.55*	1.02	0.00	1.02
16.40	0.62	1.13	0.55*	1.02	0.00	1.02
16.45	0.62	1.13	0.55*	1.02	0.00	1.02
16.50	0.62	1.13	0.55*	1.02	0.00	1.02
16.55	0.62	1.13	0.55*	1.02	0.00	1.02
16.60	0.62	1.14	0.55*	1.02	0.00	1.02
16.65	0.62	1.14	0.55*	1.02	0.00	1.02
16.70	0.62	1.14	0.55*	1.02	0.00	1.02
16.75	0.62	1.14	0.55*	1.02	0.00	1.02
16.80	0.62	1.14	0.55*	1.02	0.00	1.02
16.85	0.62	1.14	0.55*	1.02	0.00	1.02
16.90	0.62	1.14	0.54*	1.02	0.00	1.02
16.95	0.62	1.14	0.54*	1.02	0.00	1.02
17.00	0.62	1.14	0.54*	1.02	0.00	1.02
17.05	0.62	1.14	0.54*	1.02	0.00	1.02
17.10	0.62	1.14	0.54*	1.02	0.00	1.02
17.15	0.62	1.14	0.54*	1.02	0.00	1.02
17.20	0.62	1.14	0.54*	1.02	0.00	1.02
17.25	0.62	1.14	0.54*	1.02	0.00	1.02
17.30	0.62	1.15	0.54*	1.02	0.00	1.02
17.35	0.62	1.15	0.54*	1.02	0.00	1.02
17.40	0.62	1.15	0.54*	1.02	0.00	1.02
17.45	0.62	1.15	0.54*	1.02	0.00	1.02
17.50	0.62	1.15	0.54*	1.02	0.00	1.02
17.55	0.62	1.15	0.54*	1.02	0.00	1.02
17.60	0.62	1.15	0.54*	1.02	0.00	1.02
17.65	0.62	1.15	0.54*	1.02	0.00	1.02
17.70	0.62	1.15	0.54*	1.02	0.00	1.02
17.75	0.62	1.15	0.54*	1.02	0.00	1.02
17.80	0.62	1.15	0.54*	1.02	0.00	1.02
17.85	0.62	1.15	0.54*	1.02	0.00	1.02
17.90	0.62	1.15	0.54*	1.02	0.00	1.02
17.95	0.62	1.15	0.54*	1.02	0.00	1.02
18.00	0.62	1.15	0.54*	1.02	0.00	1.02
18.05	0.62	1.15	0.54*	1.02	0.00	1.02
18.10	0.62	1.15	0.54*	1.02	0.00	1.02
18.15	0.62	1.16	0.54*	1.02	0.00	1.02
18.20	0.62	1.16	0.54*	1.02	0.00	1.02
18.25	0.62	1.16	0.54*	1.02	0.00	1.02
18.30	0.62	1.16	0.54*	1.02	0.00	1.02
18.35	0.62	1.16	0.54*	1.02	0.00	1.02
18.40	0.62	1.16	0.54*	1.02	0.00	1.02
18.45	0.62	1.16	0.54*	1.02	0.00	1.02
18.50	0.62	1.16	0.54*	1.02	0.00	1.02
18.55	0.62	1.16	0.54*	1.02	0.00	1.02
18.60	0.62	1.16	0.54*	1.02	0.00	1.02
18.65	0.62	1.16	0.53*	1.02	0.00	1.02
18.70	0.62	1.16	0.53*	1.02	0.00	1.02
18.75	0.62	1.16	0.53*	1.02	0.00	1.02

18.80	0.62	1.16	0.53*	1.02	0.00	1.02
18.85	0.62	1.16	0.53*	1.02	0.00	1.02
18.90	0.62	1.16	0.53*	1.02	0.00	1.02
18.95	0.62	1.16	0.53*	1.02	0.00	1.02
19.00	0.62	1.17	0.53*	1.02	0.00	1.02
19.05	0.62	1.17	0.53*	1.02	0.00	1.02
19.10	0.62	1.17	0.53*	1.02	0.00	1.02
19.15	0.62	1.17	0.53*	1.02	0.00	1.02
19.20	0.62	1.17	0.53*	1.02	0.00	1.02
19.25	0.62	1.17	0.53*	1.02	0.00	1.02
19.30	0.62	1.17	0.53*	1.02	0.00	1.02
19.35	0.62	1.17	0.53*	1.02	0.00	1.02
19.40	0.62	1.17	0.53*	1.02	0.00	1.02
19.45	0.62	1.17	0.53*	1.02	0.00	1.02
19.50	0.62	1.17	0.53*	1.02	0.00	1.02
19.55	0.62	1.17	0.53*	1.02	0.00	1.02
19.60	0.62	1.17	0.53*	1.02	0.00	1.02
19.65	0.62	1.17	0.53*	1.02	0.00	1.02
19.70	0.62	1.17	0.53*	1.02	0.00	1.02
19.75	0.62	1.17	0.53*	1.02	0.00	1.02
19.80	0.62	1.17	0.53*	1.02	0.00	1.02
19.85	0.62	1.17	0.53*	1.02	0.00	1.02
19.90	0.62	1.17	0.53*	1.02	0.00	1.02
19.95	0.62	1.17	0.53*	1.02	0.00	1.02
20.00	0.62	1.18	0.53*	1.02	0.00	1.02
20.05	0.62	1.18	0.53*	1.02	0.00	1.02
20.10	0.62	1.18	0.53*	1.02	0.00	1.02
20.15	0.62	1.18	0.53*	1.02	0.00	1.02
20.20	0.62	1.18	0.53*	1.02	0.00	1.02
20.25	0.62	1.18	0.53*	1.02	0.00	1.02
20.30	0.62	1.18	0.53*	1.02	0.00	1.02
20.35	0.62	1.18	0.53*	1.02	0.00	1.02
20.40	0.62	1.18	0.53*	1.02	0.00	1.02
20.45	0.62	1.18	0.53*	1.02	0.00	1.02
20.50	0.62	1.18	0.53*	1.02	0.00	1.02
20.55	0.62	1.18	0.53*	1.02	0.00	1.02
20.60	0.62	1.18	0.53*	1.02	0.00	1.02
20.65	0.62	1.18	0.53*	1.02	0.00	1.02
20.70	0.62	1.18	0.53*	1.02	0.00	1.02
20.75	0.62	1.18	0.53*	1.02	0.00	1.02
20.80	0.62	1.18	0.53*	1.02	0.00	1.02
20.85	0.62	1.18	0.52*	1.02	0.00	1.02
20.90	0.62	1.18	0.52*	1.02	0.00	1.02
20.95	0.62	1.18	0.52*	1.02	0.00	1.02
21.00	0.62	1.18	0.52*	1.02	0.00	1.02
21.05	0.62	1.18	0.52*	1.02	0.00	1.02
21.10	0.62	1.19	0.52*	1.02	0.00	1.02
21.15	0.62	1.19	0.52*	1.02	0.00	1.02
21.20	0.62	1.19	0.52*	1.02	0.00	1.02
21.25	0.62	1.19	0.52*	1.02	0.00	1.02

21.30	0.62	1.19	0.52*	1.02	0.00	1.02
21.35	0.62	1.19	0.52*	1.02	0.00	1.02
21.40	0.62	1.19	0.52*	1.02	0.00	1.02
21.45	0.62	1.19	0.52*	1.02	0.00	1.02
21.50	0.62	1.19	0.52*	1.02	0.00	1.02
21.55	0.62	1.19	0.52*	1.02	0.00	1.02
21.60	0.62	1.19	0.52*	1.02	0.00	1.02
21.65	0.62	1.19	0.52*	1.02	0.00	1.02
21.70	0.62	1.19	0.52*	1.02	0.00	1.02
21.75	0.62	1.19	0.52*	1.02	0.00	1.02
21.80	0.62	1.19	0.52*	1.02	0.00	1.02
21.85	0.62	1.19	0.52*	1.02	0.00	1.02
21.90	0.62	1.19	0.52*	1.02	0.00	1.02
21.95	0.62	1.19	0.52*	1.02	0.00	1.02
22.00	0.62	1.19	0.52*	1.02	0.00	1.02
22.05	0.62	1.19	0.52*	1.02	0.00	1.02
22.10	0.62	1.19	0.52*	1.02	0.00	1.02
22.15	0.62	1.19	0.52*	1.02	0.00	1.02
22.20	0.62	1.19	0.52*	1.02	0.00	1.02
22.25	0.62	1.19	0.52*	1.02	0.00	1.02
22.30	0.62	1.20	0.52*	1.02	0.00	1.02
22.35	0.62	1.20	0.52*	1.02	0.00	1.02
22.40	0.62	1.20	0.52*	1.02	0.00	1.02
22.45	0.62	1.20	0.52*	1.02	0.00	1.02
22.50	0.62	1.20	0.52*	1.02	0.00	1.02
22.55	0.62	1.20	0.52*	1.02	0.00	1.02
22.60	0.62	1.20	0.52*	1.02	0.00	1.02
22.65	0.62	1.20	0.52*	1.02	0.00	1.02
22.70	0.62	1.20	0.52*	1.02	0.00	1.02
22.75	0.62	1.20	0.52*	1.02	0.00	1.02
22.80	0.62	1.20	0.52*	1.02	0.00	1.02
22.85	0.62	1.20	0.52*	1.02	0.00	1.02
22.90	0.62	1.20	0.52*	1.02	0.00	1.02
22.95	0.62	1.20	0.52*	1.02	0.00	1.02
23.00	0.62	1.20	0.52*	1.02	0.00	1.02
23.05	0.62	1.20	0.52*	1.02	0.00	1.02
23.10	0.62	1.20	0.52*	1.02	0.00	1.02
23.15	0.62	1.20	0.52*	1.02	0.00	1.02
23.20	0.62	1.20	0.52*	1.02	0.00	1.02
23.25	0.62	1.20	0.52*	1.02	0.00	1.02
23.30	0.62	1.20	0.52*	1.02	0.00	1.02
23.35	0.62	1.20	0.52*	1.02	0.00	1.02
23.40	0.62	1.20	0.52*	1.02	0.00	1.02
23.45	0.62	1.20	0.52*	1.02	0.00	1.02
23.50	0.62	1.20	0.52*	1.02	0.00	1.02
23.55	0.62	1.20	0.52*	1.02	0.00	1.02
23.60	0.62	1.20	0.52*	1.02	0.00	1.02
23.65	0.62	1.20	0.52*	1.02	0.00	1.02
23.70	0.62	1.20	0.52*	1.02	0.00	1.02
23.75	0.62	1.21	0.52*	1.02	0.00	1.02

23.80	0.62	1.21	0.52*	1.02	0.00	1.02
23.85	0.62	1.21	0.52*	1.02	0.00	1.02
23.90	0.62	1.21	0.51*	1.02	0.00	1.02
23.95	0.62	1.21	0.51*	1.02	0.00	1.02
24.00	0.62	1.21	0.51*	1.02	0.00	1.02
24.05	0.62	1.21	0.51*	1.02	0.00	1.02
24.10	0.62	1.21	0.51*	1.02	0.00	1.02
24.15	0.62	1.21	0.51*	1.02	0.00	1.02
24.20	0.62	1.21	0.51*	1.02	0.00	1.02
24.25	0.62	1.21	0.51*	1.02	0.00	1.02
24.30	0.62	1.21	0.51*	1.02	0.00	1.02
24.35	0.62	1.21	0.51*	1.02	0.00	1.02
24.40	0.62	1.21	0.51*	1.02	0.00	1.02
24.45	0.62	1.21	0.51*	1.02	0.00	1.02
24.50	0.62	1.21	0.51*	1.02	0.00	1.02
24.55	0.62	1.21	0.51*	1.02	0.00	1.02
24.60	0.62	1.21	0.51*	1.02	0.00	1.02
24.65	0.62	1.21	0.51*	1.02	0.00	1.02
24.70	0.62	1.21	0.51*	1.02	0.00	1.02
24.75	0.62	1.21	0.51*	1.02	0.00	1.02
24.80	0.62	1.21	0.51*	1.02	0.00	1.02
24.85	0.62	1.21	0.51*	1.02	0.00	1.02
24.90	0.62	1.21	0.51*	1.02	0.00	1.02
24.95	0.62	1.21	0.51*	1.02	0.00	1.02
25.00	0.62	1.21	0.51*	1.02	0.00	1.02
25.05	0.62	1.21	0.51*	1.02	0.00	1.02
25.10	0.62	1.21	0.51*	1.02	0.00	1.02
25.15	0.62	1.21	0.51*	1.02	0.00	1.02
25.20	0.62	1.21	0.51*	1.02	0.00	1.02
25.25	0.62	1.21	0.51*	1.02	0.00	1.02
25.30	0.62	1.21	0.51*	1.02	0.00	1.02
25.35	0.62	1.21	0.51*	1.02	0.00	1.02
25.40	0.62	1.21	0.51*	1.02	0.00	1.02
25.45	0.62	1.22	0.51*	1.02	0.00	1.02
25.50	0.62	1.22	0.51*	1.02	0.00	1.02
25.55	0.62	1.22	0.51*	1.02	0.00	1.02
25.60	0.62	1.22	0.51*	1.02	0.00	1.02
25.65	0.62	1.22	0.51*	1.02	0.00	1.02
25.70	0.62	1.22	0.51*	1.02	0.00	1.02
25.75	0.62	1.22	0.51*	1.02	0.00	1.02
25.80	0.62	1.22	0.51*	1.02	0.00	1.02
25.85	0.62	1.22	0.51*	1.02	0.00	1.02
25.90	0.62	1.22	0.51*	1.02	0.00	1.02
25.95	0.62	1.22	0.51*	1.02	0.00	1.02
26.00	0.62	1.22	0.51*	1.02	0.00	1.02
26.05	0.62	1.22	0.51*	1.02	0.00	1.02
26.10	0.62	1.22	0.51*	1.02	0.00	1.02
26.15	0.62	1.22	0.51*	1.02	0.00	1.02
26.20	0.62	1.22	0.51*	1.02	0.00	1.02
26.25	0.62	1.22	0.51*	1.02	0.00	1.02

26.30	0.62	1.22	0.51*	1.02	0.00	1.02
26.35	0.62	1.22	0.51*	1.02	0.00	1.02
26.40	0.62	1.22	0.51*	1.02	0.00	1.02
26.45	0.62	1.22	0.51*	1.02	0.00	1.02
26.50	0.62	1.22	0.51*	1.02	0.00	1.02
26.55	0.62	1.22	0.51*	1.02	0.00	1.02
26.60	0.62	1.22	0.51*	1.02	0.00	1.02
26.65	0.62	1.22	0.51*	1.02	0.00	1.02
26.70	0.62	1.22	0.51*	1.02	0.00	1.02
26.75	0.62	1.22	0.51*	1.02	0.00	1.02
26.80	0.62	1.22	0.51*	1.02	0.00	1.02
26.85	0.62	1.22	0.51*	1.02	0.00	1.02
26.90	0.62	1.22	0.51*	1.02	0.00	1.02
26.95	0.62	1.22	0.51*	1.02	0.00	1.02
27.00	0.62	1.22	0.51*	1.02	0.00	1.02
27.05	0.62	1.22	0.51*	1.02	0.00	1.02
27.10	0.62	1.22	0.51*	1.02	0.00	1.02
27.15	0.62	1.22	0.51*	1.02	0.00	1.02
27.20	0.62	1.22	0.51*	1.02	0.00	1.02
27.25	0.62	1.22	0.51*	1.02	0.00	1.02
27.30	0.62	1.22	0.51*	1.02	0.00	1.02
27.35	0.62	1.22	0.51*	1.02	0.00	1.02
27.40	0.62	1.22	0.51*	1.02	0.00	1.02
27.45	0.62	1.22	0.51*	1.02	0.00	1.02
27.50	0.62	1.23	0.51*	1.02	0.00	1.02
27.55	0.62	1.23	0.51*	1.02	0.00	1.02
27.60	0.62	1.23	0.51*	1.02	0.00	1.02
27.65	0.62	1.23	0.51*	1.02	0.00	1.02
27.70	0.62	1.23	0.51*	1.02	0.00	1.02
27.75	0.62	1.23	0.51*	1.02	0.00	1.02
27.80	0.62	1.23	0.51*	1.02	0.00	1.02
27.85	0.62	1.23	0.51*	1.02	0.00	1.02
27.90	0.62	1.23	0.51*	1.02	0.00	1.02
27.95	0.62	1.23	0.51*	1.02	0.00	1.02
28.00	0.62	1.23	0.51*	1.02	0.00	1.02
28.05	0.62	1.23	0.51*	1.02	0.00	1.02
28.10	0.62	1.23	0.51*	1.02	0.00	1.02
28.15	0.62	1.23	0.51*	1.02	0.00	1.02
28.20	0.62	1.23	0.51*	1.02	0.00	1.02
28.25	0.62	1.23	0.51*	1.02	0.00	1.02
28.30	0.62	1.23	0.51*	1.02	0.00	1.02
28.35	0.62	1.23	0.51*	1.02	0.00	1.02
28.40	0.62	1.23	0.50*	1.02	0.00	1.02
28.45	0.62	1.23	0.50*	1.02	0.00	1.02
28.50	0.62	1.23	0.50*	1.02	0.00	1.02
28.55	0.62	1.23	0.50*	1.02	0.00	1.02
28.60	0.62	1.23	0.50*	1.02	0.00	1.02
28.65	0.62	1.23	0.50*	1.02	0.00	1.02
28.70	0.62	1.23	0.50*	1.02	0.00	1.02
28.75	0.62	1.23	0.50*	1.02	0.00	1.02

28.80	0.62	1.23	0.50*	1.02	0.00	1.02
28.85	0.62	1.23	0.50*	1.02	0.00	1.02
28.90	0.62	1.23	0.50*	1.02	0.00	1.02
28.95	0.62	1.23	0.50*	1.02	0.00	1.02
29.00	0.62	1.23	0.50*	1.02	0.00	1.02
29.05	0.62	1.23	0.50*	1.02	0.00	1.02
29.10	0.62	1.23	0.50*	1.02	0.00	1.02
29.15	0.62	1.23	0.50*	1.02	0.00	1.02
29.20	0.62	1.23	0.50*	1.02	0.00	1.02
29.25	0.62	1.23	0.50*	1.02	0.00	1.02
29.30	0.62	1.23	0.50*	1.02	0.00	1.02
29.35	0.62	1.23	0.50*	1.01	0.00	1.01
29.40	0.62	1.23	0.50*	1.01	0.00	1.01
29.45	0.62	1.23	0.50*	1.01	0.00	1.01
29.50	0.62	1.23	0.50*	1.01	0.00	1.01
29.55	0.62	1.23	0.50*	1.01	0.00	1.01
29.60	0.62	1.23	0.50*	1.01	0.00	1.01
29.65	0.62	1.23	0.50*	1.01	0.00	1.01
29.70	0.62	1.23	0.50*	1.01	0.00	1.01
29.75	0.62	1.23	0.50*	1.01	0.00	1.01
29.80	0.62	1.23	0.50*	1.01	0.00	1.01
29.85	0.62	1.23	0.50*	1.01	0.00	1.01
29.90	0.61	1.23	0.50*	1.01	0.00	1.01
29.95	0.61	1.23	0.50*	1.01	0.00	1.01
30.00	0.61	1.23	0.50*	1.01	0.00	1.01
30.05	0.61	1.23	0.50*	1.00	0.00	1.00
30.10	0.61	1.23	0.50*	1.00	0.00	1.00
30.15	0.61	1.23	0.50*	1.00	0.00	1.00
30.20	0.61	1.23	0.50*	1.00	0.00	1.00
30.25	0.61	1.23	0.50*	1.00	0.00	1.00
30.30	0.61	1.23	0.50*	1.00	0.00	1.00
30.35	0.61	1.23	0.50*	1.00	0.00	1.00
30.40	0.61	1.23	0.50*	1.00	0.00	1.00
30.45	0.61	1.23	0.50*	1.00	0.00	1.00
30.50	0.61	1.23	0.50*	1.00	0.00	1.00
30.55	0.61	1.23	0.50*	1.00	0.00	1.00
30.60	0.61	1.23	0.50*	1.00	0.00	1.00
30.65	0.61	1.23	0.50*	0.99	0.00	0.99
30.70	0.61	1.23	0.50*	0.99	0.00	0.99
30.75	0.61	1.23	0.50*	0.99	0.00	0.99
30.80	0.61	1.23	0.50*	0.99	0.00	0.99
30.85	0.61	1.23	0.50*	0.99	0.00	0.99
30.90	0.61	1.23	0.50*	0.99	0.00	0.99
30.95	0.61	1.23	0.50*	0.99	0.00	0.99
31.00	0.61	1.23	0.50*	0.99	0.00	0.99
31.05	0.61	1.23	0.50*	0.99	0.00	0.99
31.10	0.61	1.23	0.50*	0.99	0.00	0.99
31.15	0.61	1.23	0.50*	0.98	0.00	0.98
31.20	0.61	1.23	0.50*	0.98	0.00	0.98
31.25	0.61	1.23	0.50*	0.98	0.00	0.98

31.30	0.61	1.23	0.50*	0.98	0.00	0.98
31.35	0.61	1.23	0.50*	0.98	0.00	0.98
31.40	0.61	1.23	0.50*	0.98	0.00	0.98
31.45	0.61	1.23	0.50*	0.97	0.00	0.97
31.50	0.61	1.23	0.50*	0.97	0.00	0.97
31.55	0.61	1.23	0.50*	0.97	0.00	0.97
31.60	0.61	1.23	0.50*	0.96	0.00	0.96
31.65	0.61	1.23	0.50*	0.96	0.00	0.96
31.70	0.61	1.23	0.50*	0.96	0.00	0.96
31.75	0.61	1.23	0.50*	0.95	0.00	0.95
31.80	0.61	1.23	0.50*	0.95	0.00	0.95
31.85	0.61	1.22	0.50*	0.95	0.00	0.95
31.90	0.61	1.22	0.50*	0.94	0.00	0.94
31.95	0.55	1.22	0.45*	0.94	0.00	0.94
32.00	0.51	1.22	0.42*	0.93	0.00	0.93
32.05	0.49	1.22	0.40*	0.93	0.00	0.93
32.10	0.47	1.22	0.39*	0.92	0.00	0.92
32.15	0.46	1.22	0.38*	0.92	0.00	0.92
32.20	0.45	1.22	0.37*	0.91	0.00	0.91
32.25	0.44	1.22	0.36*	0.91	0.00	0.91
32.30	0.43	1.22	0.35*	0.90	0.00	0.90
32.35	0.42	1.22	0.35*	0.90	0.00	0.90
32.40	0.41	1.22	0.34*	0.89	0.00	0.89
32.45	0.41	1.22	0.33*	0.89	0.00	0.89
32.50	0.40	1.22	0.33*	0.88	0.00	0.88
32.55	0.40	1.22	0.32*	0.87	0.00	0.87
32.60	0.39	1.22	0.32*	0.87	0.00	0.87
32.65	0.38	1.22	0.31*	0.86	0.00	0.86
32.70	0.38	1.22	0.31*	0.85	0.00	0.85
32.75	0.37	1.22	0.31*	0.85	0.00	0.85
32.80	0.37	1.22	0.30*	0.84	0.00	0.84
32.85	0.36	1.22	0.30*	0.83	0.00	0.83
32.90	0.36	1.22	0.29*	0.83	0.00	0.83
32.95	0.35	1.22	0.29*	0.82	0.00	0.82
33.00	0.35	1.22	0.29*	0.81	0.00	0.81
33.05	0.34	1.22	0.28*	0.81	0.00	0.81
33.10	0.34	1.22	0.28*	0.80	0.00	0.80
33.15	0.34	1.22	0.28*	0.79	0.00	0.79
33.20	0.33	1.22	0.27*	0.79	0.00	0.79
33.25	0.33	1.22	0.27*	0.78	0.00	0.78
33.30	0.32	1.22	0.27*	0.77	0.00	0.77
33.35	0.32	1.22	0.26*	0.76	0.00	0.76
33.40	0.32	1.22	0.26*	0.76	0.00	0.76
33.45	0.31	1.22	0.26*	0.75	0.00	0.75
33.50	0.31	1.22	0.25*	0.74	0.00	0.74
33.55	0.31	1.22	0.25*	0.73	0.00	0.73
33.60	0.30	1.22	0.25*	0.72	0.00	0.72
33.65	0.30	1.21	0.25*	0.72	0.00	0.72
33.70	0.29	1.21	0.24*	0.71	0.00	0.71
33.75	0.29	1.21	0.24*	0.70	0.00	0.70

33.80	0.29	1.21	0.24*	0.69	0.00	0.69
33.85	0.28	1.21	0.23*	0.68	0.00	0.68
33.90	0.28	1.21	0.23*	0.68	0.00	0.68
33.95	0.28	1.21	0.23*	0.67	0.00	0.67
34.00	0.28	1.21	0.23*	0.66	0.00	0.66
34.05	0.27	1.21	0.22*	0.65	0.00	0.65
34.10	0.27	1.21	0.22*	0.64	0.00	0.64
34.15	0.27	1.21	0.22*	0.63	0.00	0.63
34.20	0.26	1.21	0.22*	0.62	0.00	0.62
34.25	0.26	1.21	0.22*	0.61	0.00	0.61
34.30	0.26	1.21	0.21*	0.61	0.00	0.61
34.35	0.25	1.21	0.21*	0.60	0.00	0.60
34.40	0.25	1.21	0.21*	0.59	0.00	0.59
34.45	0.25	1.21	0.21*	0.58	0.00	0.58
34.50	0.25	1.21	0.20*	0.57	0.00	0.57
34.55	0.24	1.21	0.20*	0.56	0.00	0.56
34.60	0.24	1.21	0.20*	0.55	0.00	0.55
34.65	0.24	1.21	0.20*	0.54	0.00	0.54
34.70	0.24	1.21	0.19*	0.53	0.00	0.53
34.75	0.23	1.21	0.19*	0.52	0.00	0.52
34.80	0.23	1.21	0.19*	0.51	0.00	0.51
34.85	0.23	1.21	0.19*	0.50	0.00	0.50
34.90	0.22	1.21	0.19*	0.49	0.00	0.49
34.95	0.22	1.21	0.18*	0.48	0.00	0.48
35.00	0.22	1.21	0.18*	0.48	0.00	0.48
35.05	2.00	1.21	5.00	0.48	0.00	0.48
35.10	2.00	1.21	5.00	0.48	0.00	0.48
35.15	2.00	1.21	5.00	0.48	0.00	0.48
35.20	2.00	1.21	5.00	0.48	0.00	0.48
35.25	2.00	1.20	5.00	0.48	0.00	0.48
35.30	2.00	1.20	5.00	0.48	0.00	0.48
35.35	2.00	1.20	5.00	0.48	0.00	0.48
35.40	2.00	1.20	5.00	0.48	0.00	0.48
35.45	2.00	1.20	5.00	0.48	0.00	0.48
35.50	2.00	1.20	5.00	0.48	0.00	0.48
35.55	2.00	1.20	5.00	0.48	0.00	0.48
35.60	2.00	1.20	5.00	0.48	0.00	0.48
35.65	2.00	1.20	5.00	0.48	0.00	0.48
35.70	2.00	1.20	5.00	0.48	0.00	0.48
35.75	2.00	1.20	5.00	0.48	0.00	0.48
35.80	2.00	1.20	5.00	0.48	0.00	0.48
35.85	2.00	1.20	5.00	0.48	0.00	0.48
35.90	2.00	1.20	5.00	0.48	0.00	0.48
35.95	2.00	1.20	5.00	0.48	0.00	0.48
36.00	2.00	1.20	5.00	0.48	0.00	0.48
36.05	2.00	1.20	5.00	0.48	0.00	0.48
36.10	2.00	1.20	5.00	0.48	0.00	0.48
36.15	2.00	1.20	5.00	0.48	0.00	0.48
36.20	2.00	1.20	5.00	0.48	0.00	0.48
36.25	2.00	1.20	5.00	0.48	0.00	0.48

36.30	2.00	1.20	5.00	0.48	0.00	0.48
36.35	2.00	1.20	5.00	0.48	0.00	0.48
36.40	2.00	1.20	5.00	0.48	0.00	0.48
36.45	2.00	1.20	5.00	0.48	0.00	0.48
36.50	2.00	1.20	5.00	0.48	0.00	0.48
36.55	2.00	1.20	5.00	0.48	0.00	0.48
36.60	2.00	1.20	5.00	0.48	0.00	0.48
36.65	2.00	1.20	5.00	0.48	0.00	0.48
36.70	2.00	1.20	5.00	0.48	0.00	0.48
36.75	2.00	1.19	5.00	0.48	0.00	0.48
36.80	2.00	1.19	5.00	0.48	0.00	0.48
36.85	2.00	1.19	5.00	0.48	0.00	0.48
36.90	2.00	1.19	5.00	0.48	0.00	0.48
36.95	2.00	1.19	5.00	0.48	0.00	0.48
37.00	2.00	1.19	5.00	0.48	0.00	0.48
37.05	2.00	1.19	5.00	0.48	0.00	0.48
37.10	2.00	1.19	5.00	0.48	0.00	0.48
37.15	2.00	1.19	5.00	0.48	0.00	0.48
37.20	2.00	1.19	5.00	0.48	0.00	0.48
37.25	2.00	1.19	5.00	0.48	0.00	0.48
37.30	2.00	1.19	5.00	0.48	0.00	0.48
37.35	2.00	1.19	5.00	0.48	0.00	0.48
37.40	2.00	1.19	5.00	0.48	0.00	0.48
37.45	2.00	1.19	5.00	0.48	0.00	0.48
37.50	2.00	1.19	5.00	0.48	0.00	0.48
37.55	2.00	1.19	5.00	0.48	0.00	0.48
37.60	2.00	1.19	5.00	0.48	0.00	0.48
37.65	2.00	1.19	5.00	0.48	0.00	0.48
37.70	2.00	1.19	5.00	0.48	0.00	0.48
37.75	2.00	1.19	5.00	0.48	0.00	0.48
37.80	2.00	1.19	5.00	0.48	0.00	0.48
37.85	2.00	1.19	5.00	0.48	0.00	0.48
37.90	2.00	1.19	5.00	0.48	0.00	0.48
37.95	2.00	1.19	5.00	0.48	0.00	0.48
38.00	2.00	1.19	5.00	0.48	0.00	0.48
38.05	2.00	1.19	5.00	0.48	0.00	0.48
38.10	2.00	1.19	5.00	0.48	0.00	0.48
38.15	2.00	1.18	5.00	0.48	0.00	0.48
38.20	2.00	1.18	5.00	0.48	0.00	0.48
38.25	2.00	1.18	5.00	0.48	0.00	0.48
38.30	2.00	1.18	5.00	0.48	0.00	0.48
38.35	2.00	1.18	5.00	0.48	0.00	0.48
38.40	2.00	1.18	5.00	0.48	0.00	0.48
38.45	2.00	1.18	5.00	0.48	0.00	0.48
38.50	2.00	1.18	5.00	0.48	0.00	0.48
38.55	2.00	1.18	5.00	0.48	0.00	0.48
38.60	2.00	1.18	5.00	0.48	0.00	0.48
38.65	2.00	1.18	5.00	0.48	0.00	0.48
38.70	2.00	1.18	5.00	0.48	0.00	0.48
38.75	2.00	1.18	5.00	0.48	0.00	0.48

38.80	2.00	1.18	5.00	0.48	0.00	0.48
38.85	2.00	1.18	5.00	0.48	0.00	0.48
38.90	2.00	1.18	5.00	0.48	0.00	0.48
38.95	2.00	1.18	5.00	0.48	0.00	0.48
39.00	2.00	1.18	5.00	0.48	0.00	0.48
39.05	2.00	1.18	5.00	0.48	0.00	0.48
39.10	2.00	1.18	5.00	0.48	0.00	0.48
39.15	2.00	1.18	5.00	0.48	0.00	0.48
39.20	2.00	1.18	5.00	0.48	0.00	0.48
39.25	2.00	1.18	5.00	0.48	0.00	0.48
39.30	2.00	1.18	5.00	0.48	0.00	0.48
39.35	2.00	1.18	5.00	0.48	0.00	0.48
39.40	2.00	1.18	5.00	0.48	0.00	0.48
39.45	2.00	1.18	5.00	0.48	0.00	0.48
39.50	2.00	1.17	5.00	0.48	0.00	0.48
39.55	2.00	1.17	5.00	0.48	0.00	0.48
39.60	2.00	1.17	5.00	0.48	0.00	0.48
39.65	2.00	1.17	5.00	0.48	0.00	0.48
39.70	2.00	1.17	5.00	0.48	0.00	0.48
39.75	2.00	1.17	5.00	0.48	0.00	0.48
39.80	2.00	1.17	5.00	0.48	0.00	0.48
39.85	2.00	1.17	5.00	0.48	0.00	0.48
39.90	2.00	1.17	5.00	0.48	0.00	0.48
39.95	2.00	1.17	5.00	0.48	0.00	0.48
40.00	2.00	1.17	5.00	0.48	0.00	0.48
40.05	0.25	1.17	0.21*	0.48	0.00	0.48
40.10	0.25	1.17	0.22*	0.48	0.00	0.48
40.15	0.26	1.17	0.22*	0.47	0.00	0.47
40.20	0.26	1.17	0.22*	0.46	0.00	0.46
40.25	0.26	1.17	0.22*	0.45	0.00	0.45
40.30	0.26	1.17	0.23*	0.44	0.00	0.44
40.35	0.27	1.17	0.23*	0.44	0.00	0.44
40.40	0.27	1.17	0.23*	0.43	0.00	0.43
40.45	0.27	1.17	0.23*	0.42	0.00	0.42
40.50	0.27	1.17	0.23*	0.41	0.00	0.41
40.55	0.28	1.17	0.24*	0.40	0.00	0.40
40.60	0.28	1.17	0.24*	0.39	0.00	0.39
40.65	0.28	1.17	0.24*	0.38	0.00	0.38
40.70	0.28	1.17	0.24*	0.38	0.00	0.38
40.75	0.29	1.16	0.25*	0.37	0.00	0.37
40.80	0.29	1.16	0.25*	0.36	0.00	0.36
40.85	0.29	1.16	0.25*	0.35	0.00	0.35
40.90	0.29	1.16	0.25*	0.34	0.00	0.34
40.95	0.30	1.16	0.26*	0.34	0.00	0.34
41.00	0.30	1.16	0.26*	0.33	0.00	0.33
41.05	0.30	1.16	0.26*	0.32	0.00	0.32
41.10	0.31	1.16	0.26*	0.31	0.00	0.31
41.15	0.31	1.16	0.27*	0.31	0.00	0.31
41.20	0.31	1.16	0.27*	0.30	0.00	0.30
41.25	0.32	1.16	0.27*	0.29	0.00	0.29

41.30	0.32	1.16	0.27*	0.28	0.00	0.28
41.35	0.32	1.16	0.28*	0.28	0.00	0.28
41.40	0.33	1.16	0.28*	0.27	0.00	0.27
41.45	0.33	1.16	0.28*	0.26	0.00	0.26
41.50	0.33	1.16	0.29*	0.26	0.00	0.26
41.55	0.34	1.16	0.29*	0.25	0.00	0.25
41.60	0.34	1.16	0.29*	0.24	0.00	0.24
41.65	0.34	1.16	0.30*	0.23	0.00	0.23
41.70	0.35	1.16	0.30*	0.23	0.00	0.23
41.75	0.35	1.16	0.30*	0.22	0.00	0.22
41.80	0.35	1.16	0.31*	0.21	0.00	0.21
41.85	0.36	1.16	0.31*	0.21	0.00	0.21
41.90	0.36	1.16	0.31*	0.20	0.00	0.20
41.95	0.37	1.16	0.32*	0.19	0.00	0.19
42.00	0.37	1.15	0.32*	0.19	0.00	0.19
42.05	0.37	1.15	0.32*	0.18	0.00	0.18
42.10	0.38	1.15	0.33*	0.18	0.00	0.18
42.15	0.38	1.15	0.33*	0.17	0.00	0.17
42.20	0.39	1.15	0.34*	0.16	0.00	0.16
42.25	0.39	1.15	0.34*	0.16	0.00	0.16
42.30	0.40	1.15	0.35*	0.15	0.00	0.15
42.35	0.40	1.15	0.35*	0.14	0.00	0.14
42.40	0.41	1.15	0.36*	0.14	0.00	0.14
42.45	0.42	1.15	0.36*	0.13	0.00	0.13
42.50	0.42	1.15	0.37*	0.13	0.00	0.13
42.55	0.43	1.15	0.38*	0.12	0.00	0.12
42.60	0.44	1.15	0.38*	0.12	0.00	0.12
42.65	0.45	1.15	0.39*	0.11	0.00	0.11
42.70	0.46	1.15	0.40*	0.11	0.00	0.11
42.75	0.48	1.15	0.42*	0.10	0.00	0.10
42.80	0.51	1.15	0.44*	0.10	0.00	0.10
42.85	0.56	1.15	0.48*	0.09	0.00	0.09
42.90	0.57	1.15	0.50*	0.09	0.00	0.09
42.95	0.57	1.15	0.50*	0.08	0.00	0.08
43.00	0.57	1.15	0.50*	0.08	0.00	0.08
43.05	0.57	1.15	0.50*	0.08	0.00	0.08
43.10	0.57	1.15	0.50*	0.07	0.00	0.07
43.15	0.57	1.15	0.50*	0.07	0.00	0.07
43.20	0.57	1.15	0.50*	0.06	0.00	0.06
43.25	0.57	1.14	0.50*	0.06	0.00	0.06
43.30	0.57	1.14	0.50*	0.06	0.00	0.06
43.35	0.57	1.14	0.50*	0.05	0.00	0.05
43.40	0.57	1.14	0.50*	0.05	0.00	0.05
43.45	0.57	1.14	0.50*	0.05	0.00	0.05
43.50	0.57	1.14	0.50*	0.05	0.00	0.05
43.55	0.57	1.14	0.50*	0.04	0.00	0.04
43.60	0.57	1.14	0.50*	0.04	0.00	0.04
43.65	0.57	1.14	0.50*	0.04	0.00	0.04
43.70	0.57	1.14	0.50*	0.04	0.00	0.04
43.75	0.57	1.14	0.50*	0.04	0.00	0.04

43.80	0.57	1.14	0.50*	0.03	0.00	0.03
43.85	0.57	1.14	0.50*	0.03	0.00	0.03
43.90	0.57	1.14	0.50*	0.03	0.00	0.03
43.95	0.57	1.14	0.50*	0.03	0.00	0.03
44.00	0.57	1.14	0.50*	0.03	0.00	0.03
44.05	0.57	1.14	0.50*	0.03	0.00	0.03
44.10	0.57	1.14	0.50*	0.03	0.00	0.03
44.15	0.57	1.14	0.50*	0.03	0.00	0.03
44.20	0.57	1.14	0.50*	0.02	0.00	0.02
44.25	0.57	1.14	0.50*	0.02	0.00	0.02
44.30	0.57	1.14	0.50*	0.02	0.00	0.02
44.35	0.57	1.14	0.50*	0.02	0.00	0.02
44.40	0.57	1.13	0.50*	0.02	0.00	0.02
44.45	0.57	1.13	0.50*	0.02	0.00	0.02
44.50	0.57	1.13	0.50*	0.02	0.00	0.02
44.55	0.57	1.13	0.50*	0.02	0.00	0.02
44.60	0.57	1.13	0.50*	0.02	0.00	0.02
44.65	0.57	1.13	0.50*	0.02	0.00	0.02
44.70	0.57	1.13	0.50*	0.02	0.00	0.02
44.75	0.57	1.13	0.50*	0.01	0.00	0.01
44.80	0.57	1.13	0.50*	0.01	0.00	0.01
44.85	0.57	1.13	0.50*	0.01	0.00	0.01
44.90	0.57	1.13	0.50*	0.01	0.00	0.01
44.95	0.57	1.13	0.50*	0.01	0.00	0.01
45.00	0.57	1.13	0.50*	0.01	0.00	0.01
45.05	0.57	1.13	0.50*	0.01	0.00	0.01
45.10	0.57	1.13	0.50*	0.01	0.00	0.01
45.15	0.57	1.13	0.50*	0.01	0.00	0.01
45.20	0.57	1.13	0.50*	0.01	0.00	0.01
45.25	0.57	1.13	0.50*	0.00	0.00	0.00
45.30	0.57	1.13	0.50*	0.00	0.00	0.00
45.35	0.57	1.13	0.50*	0.00	0.00	0.00
45.40	0.57	1.13	0.50*	0.00	0.00	0.00
45.45	0.57	1.13	0.50*	0.00	0.00	0.00
45.50	0.57	1.13	0.50*	0.00	0.00	0.00
45.55	0.56	1.12	0.50*	0.00	0.00	0.00
45.60	0.56	1.12	0.50*	0.00	0.00	0.00
45.65	0.56	1.12	0.50*	0.00	0.00	0.00
45.70	0.56	1.12	0.50*	0.00	0.00	0.00
45.75	0.56	1.12	0.50*	0.00	0.00	0.00
45.80	0.56	1.12	0.50*	0.00	0.00	0.00
45.85	0.56	1.12	0.50*	0.00	0.00	0.00
45.90	0.56	1.12	0.50*	0.00	0.00	0.00
45.95	0.56	1.12	0.50*	0.00	0.00	0.00
46.00	0.56	1.12	0.50*	0.00	0.00	0.00
46.05	0.56	1.12	0.50*	0.00	0.00	0.00
46.10	0.56	1.12	0.50*	0.00	0.00	0.00
46.15	0.56	1.12	0.50*	0.00	0.00	0.00
46.20	0.56	1.12	0.50*	0.00	0.00	0.00
46.25	0.56	1.12	0.50*	0.00	0.00	0.00

46.30	0.56	1.12	0.50*	0.00	0.00	0.00
46.35	0.56	1.12	0.50*	0.00	0.00	0.00
46.40	0.56	1.12	0.50*	0.00	0.00	0.00
46.45	0.56	1.12	0.50*	0.00	0.00	0.00
46.50	0.56	1.12	0.50*	0.00	0.00	0.00
46.55	0.56	1.12	0.50*	0.00	0.00	0.00
46.60	0.56	1.12	0.50*	0.00	0.00	0.00
46.65	0.56	1.12	0.50*	0.00	0.00	0.00
46.70	0.56	1.11	0.50*	0.00	0.00	0.00
46.75	0.56	1.11	0.50*	0.00	0.00	0.00
46.80	0.56	1.11	0.50*	0.00	0.00	0.00
46.85	0.56	1.11	0.50*	0.00	0.00	0.00
46.90	0.56	1.11	0.50*	0.00	0.00	0.00
46.95	0.56	1.11	0.50*	0.00	0.00	0.00
47.00	0.56	1.11	0.50*	0.00	0.00	0.00
47.05	0.56	1.11	0.50*	0.00	0.00	0.00
47.10	0.56	1.11	0.50*	0.00	0.00	0.00
47.15	0.56	1.11	0.50*	0.00	0.00	0.00
47.20	0.56	1.11	0.50*	0.00	0.00	0.00
47.25	0.56	1.11	0.50*	0.00	0.00	0.00
47.30	0.56	1.11	0.50*	0.00	0.00	0.00
47.35	0.56	1.11	0.50*	0.00	0.00	0.00
47.40	0.56	1.11	0.50*	0.00	0.00	0.00
47.45	0.56	1.11	0.51*	0.00	0.00	0.00
47.50	0.56	1.11	0.51*	0.00	0.00	0.00
47.55	0.56	1.11	0.51*	0.00	0.00	0.00
47.60	0.56	1.11	0.51*	0.00	0.00	0.00
47.65	0.56	1.11	0.51*	0.00	0.00	0.00
47.70	0.56	1.11	0.51*	0.00	0.00	0.00
47.75	0.56	1.11	0.51*	0.00	0.00	0.00
47.80	0.56	1.10	0.51*	0.00	0.00	0.00
47.85	0.56	1.10	0.51*	0.00	0.00	0.00
47.90	0.56	1.10	0.51*	0.00	0.00	0.00
47.95	0.56	1.10	0.51*	0.00	0.00	0.00
48.00	0.56	1.10	0.51*	0.00	0.00	0.00
48.05	0.56	1.10	0.51*	0.00	0.00	0.00
48.10	0.56	1.10	0.51*	0.00	0.00	0.00
48.15	0.56	1.10	0.51*	0.00	0.00	0.00
48.20	0.56	1.10	0.51*	0.00	0.00	0.00
48.25	0.56	1.10	0.51*	0.00	0.00	0.00
48.30	0.56	1.10	0.51*	0.00	0.00	0.00
48.35	0.56	1.10	0.51*	0.00	0.00	0.00
48.40	0.56	1.10	0.51*	0.00	0.00	0.00
48.45	0.56	1.10	0.51*	0.00	0.00	0.00
48.50	0.56	1.10	0.51*	0.00	0.00	0.00
48.55	0.56	1.10	0.51*	0.00	0.00	0.00
48.60	0.56	1.10	0.51*	0.00	0.00	0.00
48.65	0.56	1.10	0.51*	0.00	0.00	0.00
48.70	0.56	1.10	0.51*	0.00	0.00	0.00
48.75	0.56	1.10	0.51*	0.00	0.00	0.00

48.80	0.56	1.10	0.51*	0.00	0.00	0.00
48.85	0.56	1.10	0.51*	0.00	0.00	0.00
48.90	0.56	1.09	0.51*	0.00	0.00	0.00
48.95	0.56	1.09	0.51*	0.00	0.00	0.00
49.00	0.56	1.09	0.51*	0.00	0.00	0.00
49.05	0.56	1.09	0.51*	0.00	0.00	0.00
49.10	0.56	1.09	0.51*	0.00	0.00	0.00
49.15	0.56	1.09	0.51*	0.00	0.00	0.00
49.20	0.56	1.09	0.51*	0.00	0.00	0.00
49.25	0.56	1.09	0.51*	0.00	0.00	0.00
49.30	0.56	1.09	0.51*	0.00	0.00	0.00
49.35	0.56	1.09	0.51*	0.00	0.00	0.00
49.40	0.56	1.09	0.51*	0.00	0.00	0.00
49.45	0.56	1.09	0.51*	0.00	0.00	0.00
49.50	0.56	1.09	0.51*	0.00	0.00	0.00
49.55	0.56	1.09	0.51*	0.00	0.00	0.00
49.60	0.56	1.09	0.51*	0.00	0.00	0.00
49.65	0.56	1.09	0.51*	0.00	0.00	0.00
49.70	0.56	1.09	0.51*	0.00	0.00	0.00
49.75	0.56	1.09	0.51*	0.00	0.00	0.00
49.80	0.56	1.09	0.51*	0.00	0.00	0.00
49.85	0.56	1.09	0.51*	0.00	0.00	0.00
49.90	0.56	1.09	0.51*	0.00	0.00	0.00
49.95	0.56	1.08	0.51*	0.00	0.00	0.00
50.00	0.56	1.08	0.51*	0.00	0.00	0.00
50.05	0.56	1.08	0.51*	0.00	0.00	0.00
50.10	0.56	1.08	0.51*	0.00	0.00	0.00
50.15	0.56	1.08	0.51*	0.00	0.00	0.00
50.20	0.56	1.08	0.51*	0.00	0.00	0.00
50.25	0.55	1.08	0.51*	0.00	0.00	0.00
50.30	0.55	1.08	0.51*	0.00	0.00	0.00
50.35	0.55	1.08	0.51*	0.00	0.00	0.00
50.40	0.55	1.08	0.51*	0.00	0.00	0.00
50.45	0.55	1.08	0.51*	0.00	0.00	0.00
50.50	0.55	1.08	0.51*	0.00	0.00	0.00
50.55	0.55	1.08	0.51*	0.00	0.00	0.00
50.60	0.55	1.08	0.51*	0.00	0.00	0.00
50.65	0.55	1.08	0.51*	0.00	0.00	0.00
50.70	0.55	1.08	0.51*	0.00	0.00	0.00
50.75	0.55	1.08	0.51*	0.00	0.00	0.00
50.80	0.55	1.08	0.51*	0.00	0.00	0.00
50.85	0.55	1.08	0.51*	0.00	0.00	0.00
50.90	0.55	1.08	0.52*	0.00	0.00	0.00
50.95	0.55	1.08	0.52*	0.00	0.00	0.00
51.00	0.55	1.07	0.52*	0.00	0.00	0.00
51.05	0.55	1.07	0.52*	0.00	0.00	0.00
51.10	0.55	1.07	0.52*	0.00	0.00	0.00
51.15	0.55	1.07	0.52*	0.00	0.00	0.00
51.20	0.55	1.07	0.52*	0.00	0.00	0.00
51.25	0.55	1.07	0.52*	0.00	0.00	0.00

51.30	0.55	1.07	0.52*	0.00	0.00	0.00
51.35	0.55	1.07	0.52*	0.00	0.00	0.00
51.40	0.55	1.07	0.52*	0.00	0.00	0.00
51.45	0.55	1.07	0.52*	0.00	0.00	0.00
51.50	0.55	1.07	0.52*	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils

APPENDIX F
STANDARD GRADING GUIDELINES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

STANDARD GRADING SPECIFICATIONS

These specifications present the usual and minimum requirements for grading operations performed under the observation and testing of TGR Geotechnical, Inc.

No deviation from these specifications will be allowed, except where specifically superseded in the Preliminary Geotechnical Investigation report, or in other written communication signed by the Soils Engineer or Engineering Geologist.

1.0 GENERAL

- The Soils Engineer and Engineering Geologist are the Owner's or Builder's representatives on the project. For the purpose of these specifications, observation and testing by the Soils Engineer includes that observation and testing performed by any person or persons employed by, and responsible to, the licensed Geotechnical Engineer or Geologist signing the grading report.

- All clearing, site preparation or earthwork performed on the project shall be conducted by the Contractor under the observation of the Geotechnical Engineer.

- It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Geotechnical Engineer and to place, spread, mix, water and compact the fill in accordance with the specifications of the Geotechnical Engineer. The Contractor shall also remove all material considered unsatisfactory by the Geotechnical Engineer.

- It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of Compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement and time of year.

- A final report will be issued by the Geotechnical Engineer and Engineering Geologist attesting to the Contractor's conformance with these specifications.

2.0 SITE PREPARATION

- All vegetation and deleterious material such as rubbish shall be disposed of off-site. The removal must be concluded prior to placing fill.

- The Civil Engineer shall locate all houses, sheds, sewage disposal systems, large trees or structures on the site, or on the grading plan to the best of his knowledge prior to preparing the ground surface.

- Soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Any material incorporated as part of a compacted fill must be approved by the Geotechnical Engineer.

- After the ground surface to receive fill has been cleared, it shall be scarified, disced or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks or other uneven features which may prevent uniform compaction.

  The scarified ground surface shall then be brought to optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts restricted to six inches. Prior to placing fill, the ground surface to receive fill shall be inspected, tested and approved by the Geotechnical Engineer.

- Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines or others not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer.

3.0 COMPACTED FILLS

- Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Engineer. Roots, tree branches and other matter missed during clearing shall be removed from the fill as directed by the Geotechnical Engineer.
- Rock fragments less than six inches in diameter may be utilized in the fill, provided:

- They are not placed in concentrated pockets.
- There is a sufficient percentage of fine-grained material to surround the rocks.
- The distribution of the rocks is observed by the Geotechnical Engineer.

- Rocks greater than six inches in diameter shall be taken off-site, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal. Details for rock disposal such as location, moisture control, percentage of the rock placed, etc., will be referred to in the "Conclusions and Recommendations" section of the Geotechnical Report, if applicable.

  If rocks greater than six inches in diameter were not anticipated in the Preliminary Geotechnical report, rock disposal recommendations may not have been made in the "Conclusions and Recommendations" section. In this case, the Contractor shall notify the Geotechnical Engineer if rocks greater than six inches in diameter are encountered. The Geotechnical Engineer will then prepare a rock disposal recommendation or request that such rocks be taken off-site.

- Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

- Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the Geotechnical Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Engineer as soon as possible.

- Material used in the compacting process shall be evenly spread, watered or dried, processed and compacted in thin lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.

- If the moisture content or relative compaction varies from that required by the Geotechnical Engineer, the Contractor shall rework the fill until it is approved by the Geotechnical Engineer.

- Each layer shall be compacted to 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency; (in general, ASTM D1557 will be used.)

  If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use of expansive soil conditions, the area to receive fill compacted to less than 90 percent shall either be delineated on the grading plan or appropriate reference made to the area in the grading report.

- All fill shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the Geotechnical Engineer.

- The key for side hill fills shall be a minimum of 15 feet within bedrock or firm materials, unless otherwise specified in the Preliminary report. (See details)

- Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendation of the Geotechnical Engineer and Engineer Geologist.

- The Contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses and stabilization fills. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

The Contractor shall prepare a written detailed description of the method or methods he will employ to obtain the required slope compaction. Such documents shall be submitted to the Geotechnical Engineer for review and comments prior to the start of grading.

If a method other than overbuilding and cutting back to the compacted core is to be employed, slope tests will be made by the Geotechnical Engineer during construction of the slopes to determine if the required compaction is being achieved. Where failing tests occur or other field problems arise, the contractor will be notified by the Geotechnical Engineer.

If the method of achieving the required slope compaction selected by the Contractor fails to produce the necessary results, the Contractor shall rework or rebuild such slopes until the required degree of compaction is obtained, at no additional cost to the Owner or Geotechnical Engineer.

- All fill slopes should be planted or protected from erosion by methods specified in the preliminary report or by means approved by the governing authorities.

- Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials; and the transition shall be stripped of all soil prior to placing fill. (See detail)

4.0 CUT SLOPES

- The Engineering Geologist shall inspect all cut slopes excavated in rock, lithified or formation material at vertical intervals not exceeding ten feet.

- If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these

conditions shall be analyzed by the Engineering Geologist and Geotechnical Engineer; and recommendations shall be made to treat these problems.

- Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.

- Unless otherwise specified in the soils and geological report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

- Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies, or with the recommendations of the Geotechnical Engineer or Engineering Geologist.

5.0 GRADING CONTROL

- Inspection of the fill placement shall be provided by the Geotechnical Engineer during the progress of grading.

- In general, density tests should be made at intervals not exceeding two feet of fill height or every 500 cubic yards of fill placed. This criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction of being achieved.
- Density tests should be made on the surface material to receive fill as required by the Geotechnical Engineer.

- All cleanout, processed ground to receive fill, key excavations, subdrains and rock disposal must be inspected and approved by the Geotechnical Engineer (and often by the governing authorities) prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Engineer and governing authorities when such areas are ready for inspection.

6.0 CONSTRUCTION CONSIDERATIONS

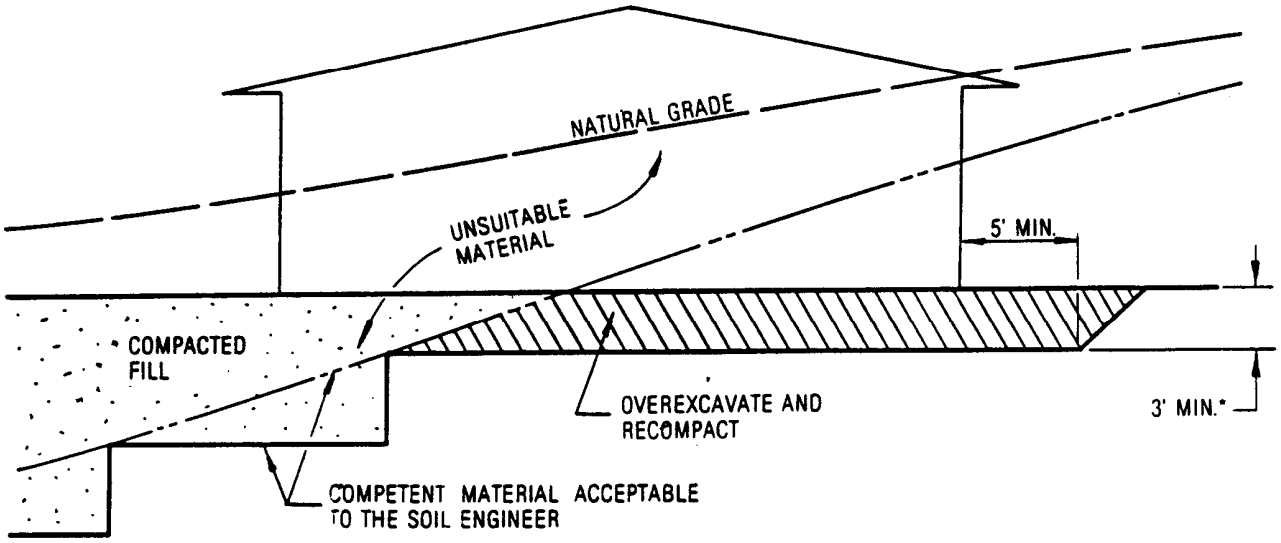
- Erosion control measures, when necessary, shall be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.

- Upon completion of grading and termination of observations by the Geotechnical Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Engineer or Engineering Geologist.

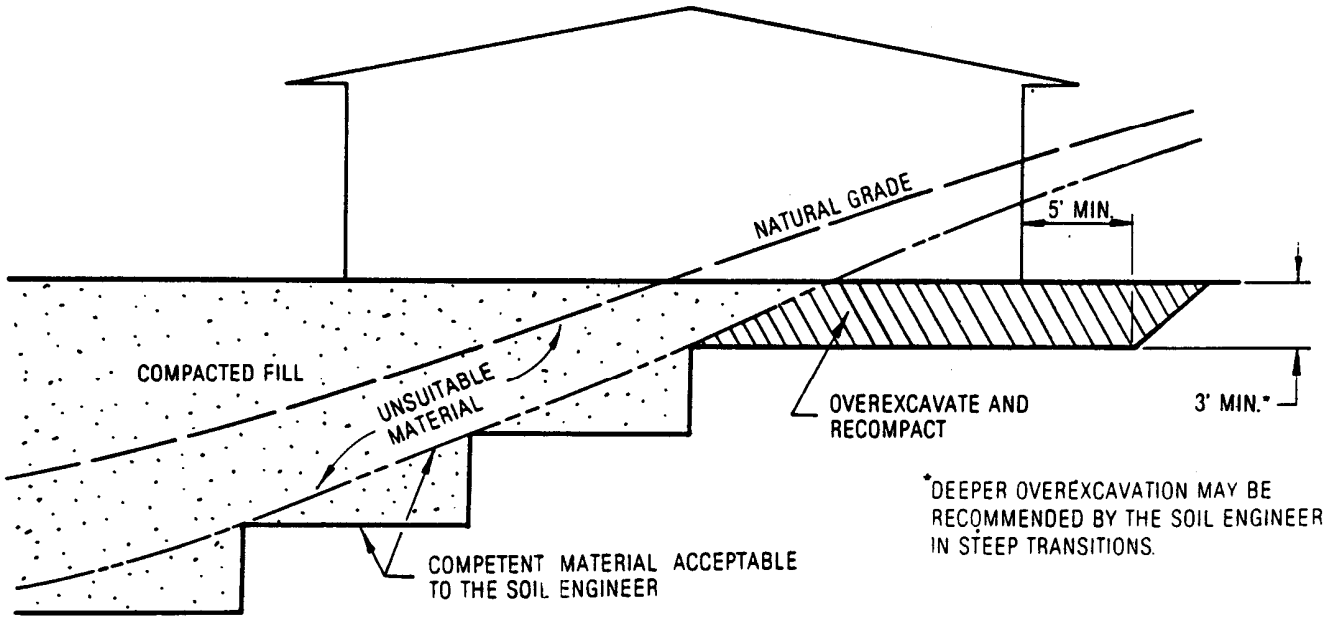
- Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE

CUT LOT

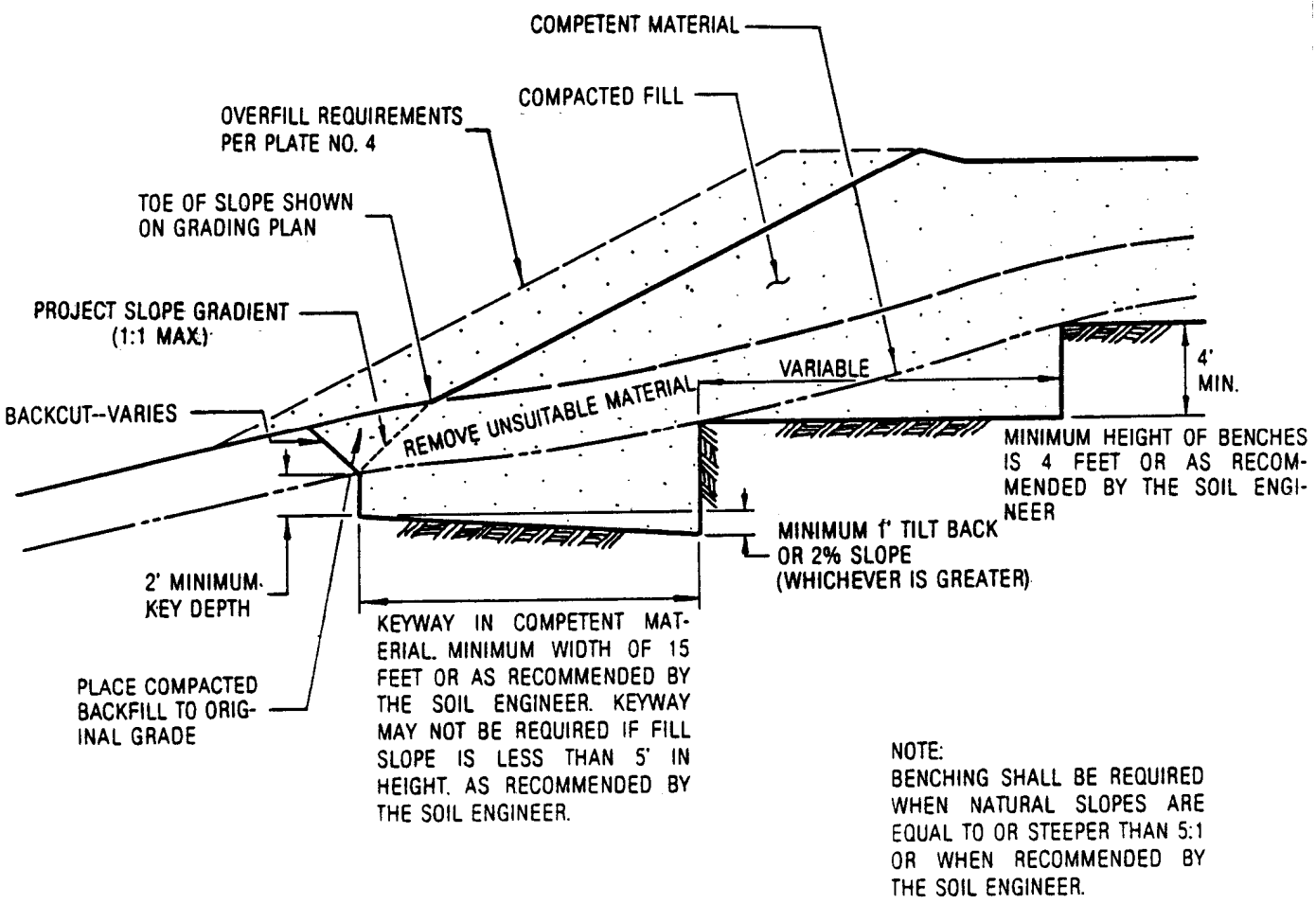


CUT FILL LOT (TRANSITION)

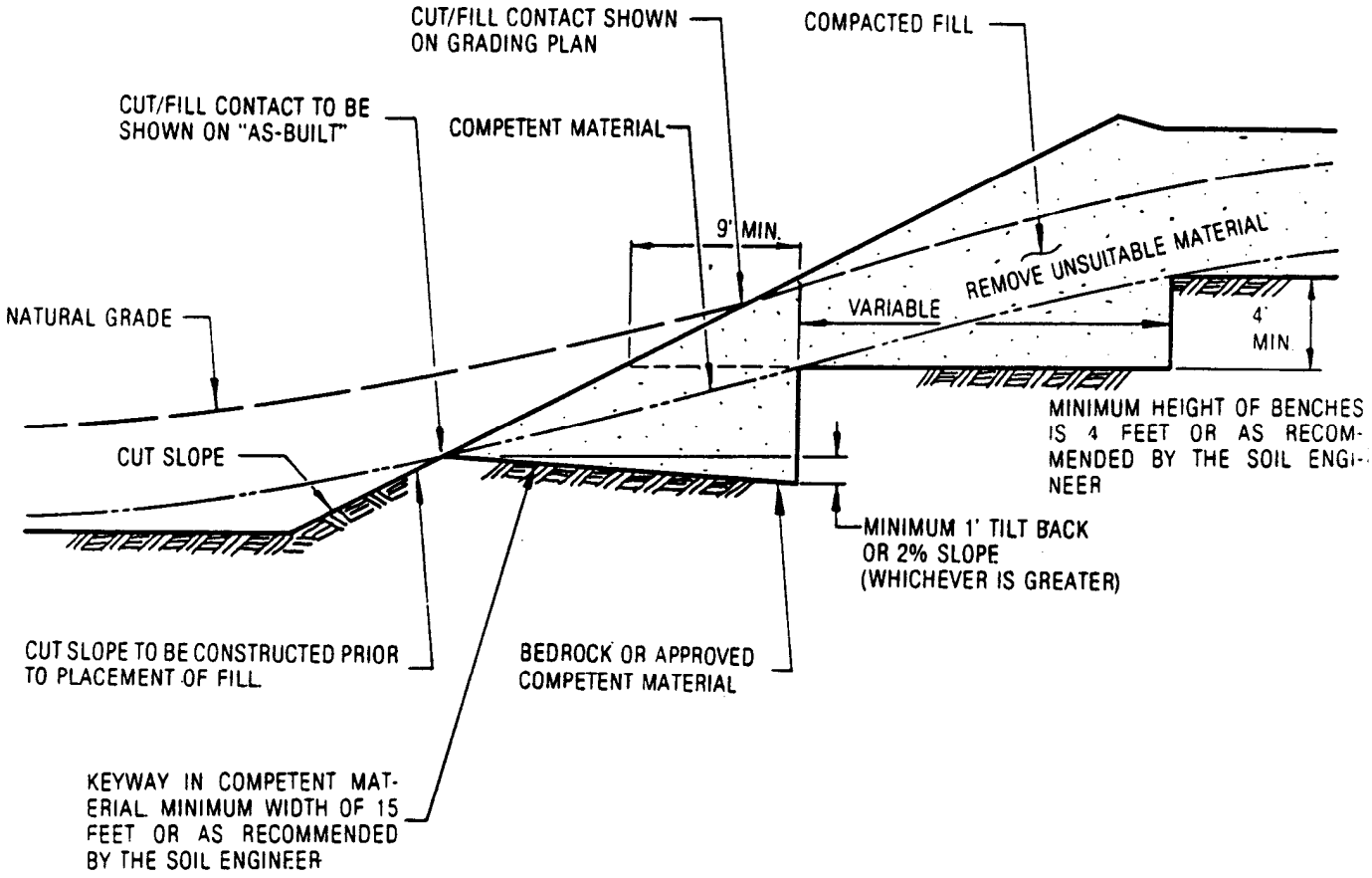


*DEEPER OVEREXCAVATION MAY BE RECOMMENDED BY THE SOIL ENGINEER IN STEEP TRANSITIONS.

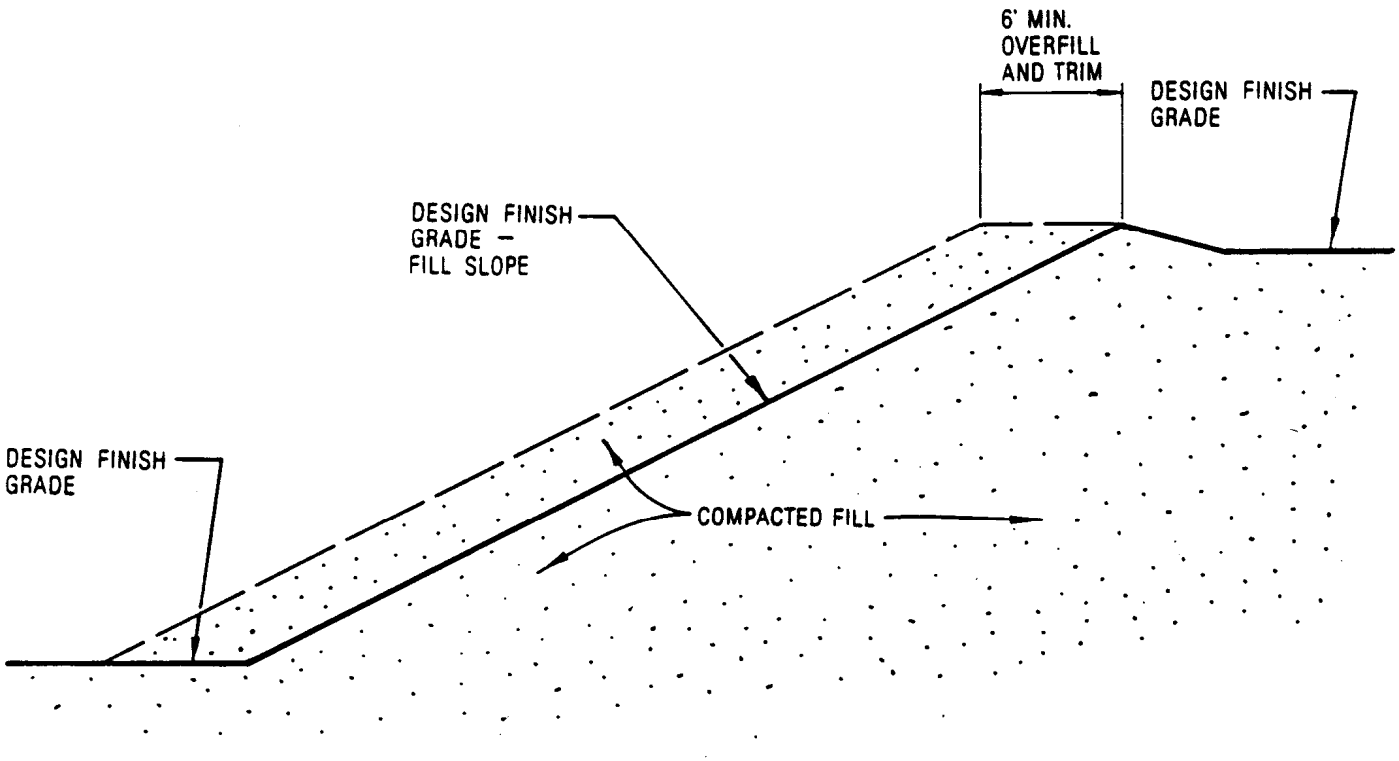
TYPICAL FILL OVER NATURAL SLOPE



TYPICAL FILL-OVER-CUT SLOPE



TYPICAL FILL SLOPE CONSTRUCTION



NOTES:

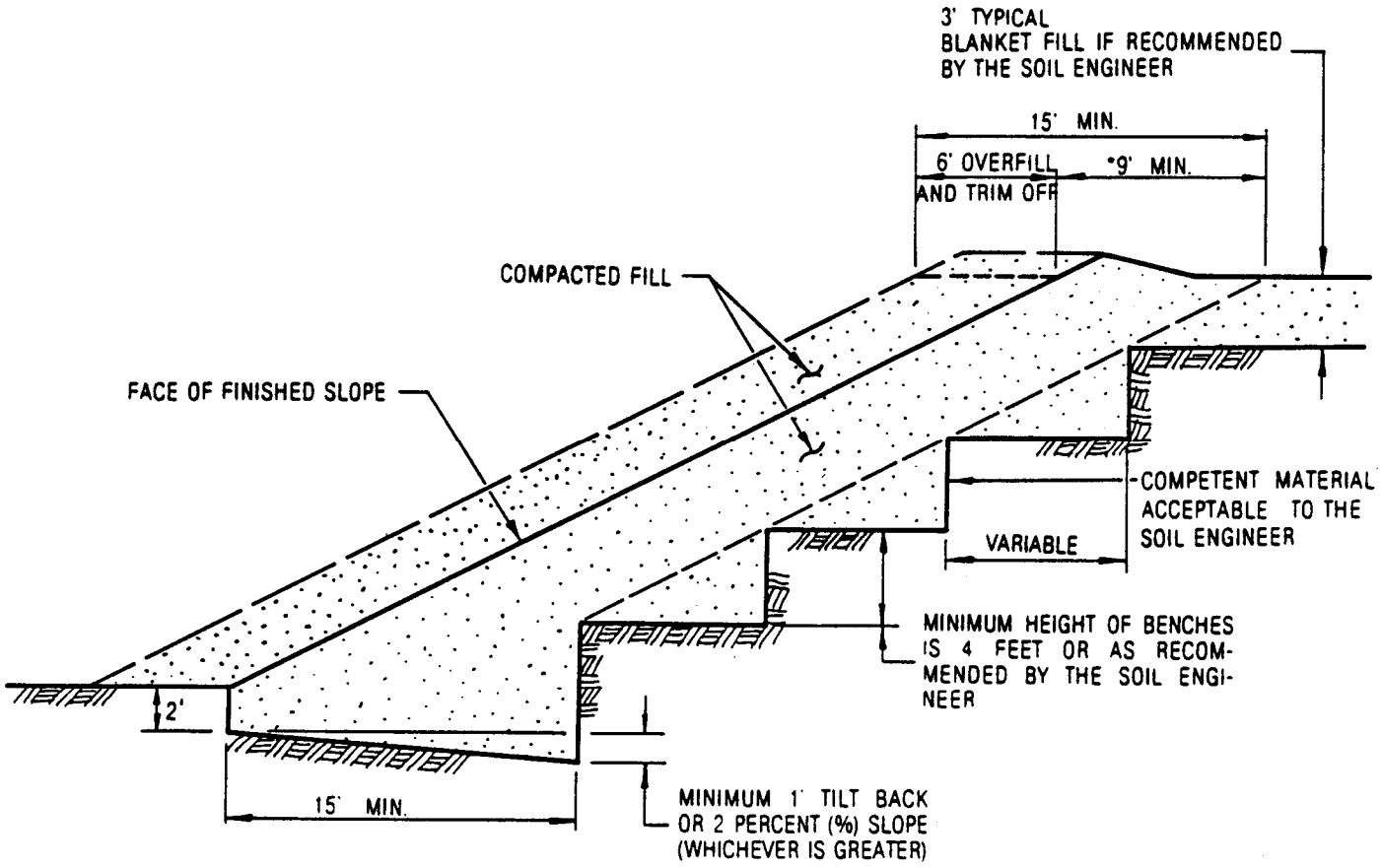
1. ALL FILL SLOPES, INCLUDING BUTTRESS AND STABILIZATION FILLS, SHALL BE OVERFILLED A MINIMUM OF SIX FEET HORIZONTALLY WITH COMPACTED FILL AND TRIMMED TO THE DESIGN FINISH GRADE.

   EXCEPTIONS:

   A. FILL SLOPE OVER CUT SLOPE.
   B. FILL SLOPE ADJACENT TO EXISTING IMPROVEMENTS.

2. THE EXCEPTIONS ABOVE WHICH DO NOT HAVE THE 6 FOOT SLOPE OVERFILL AND TRIM SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

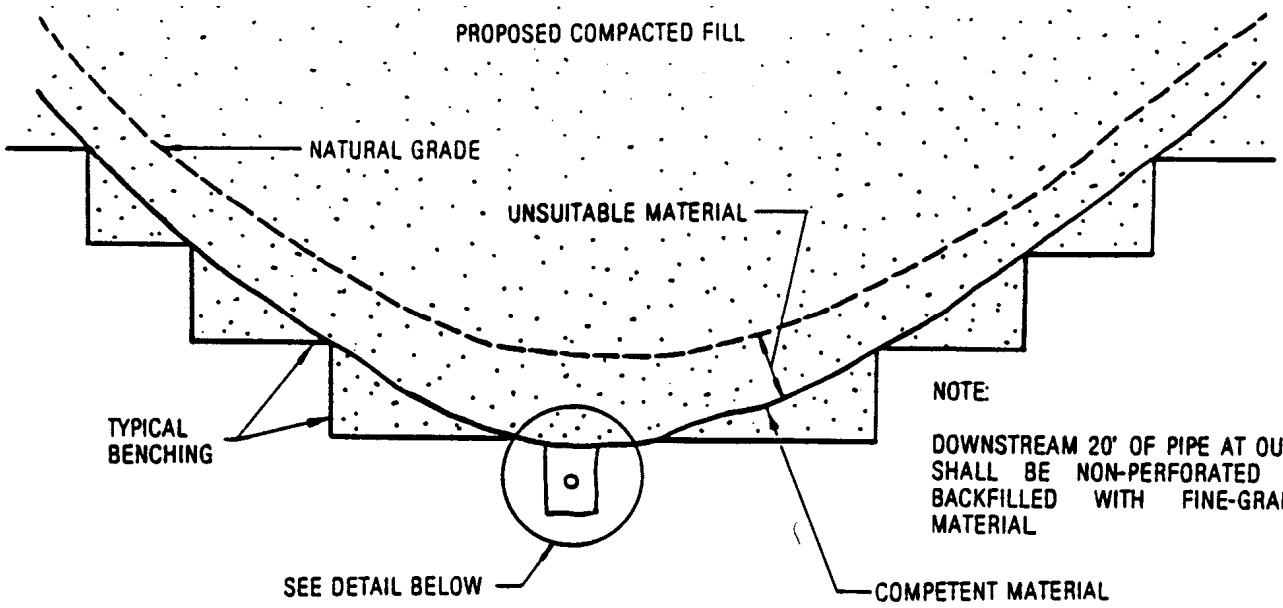
TYPICAL STABILIZATION FILL



NOTE:
SEE PLATE 6 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS. IF RECOMMENDED BY THE SOIL ENGINEER.

*GREATER THAN 9' IF RECOMMENDED BY THE SOIL ENGINEER: 15' WHERE NO 6' OVERFILL

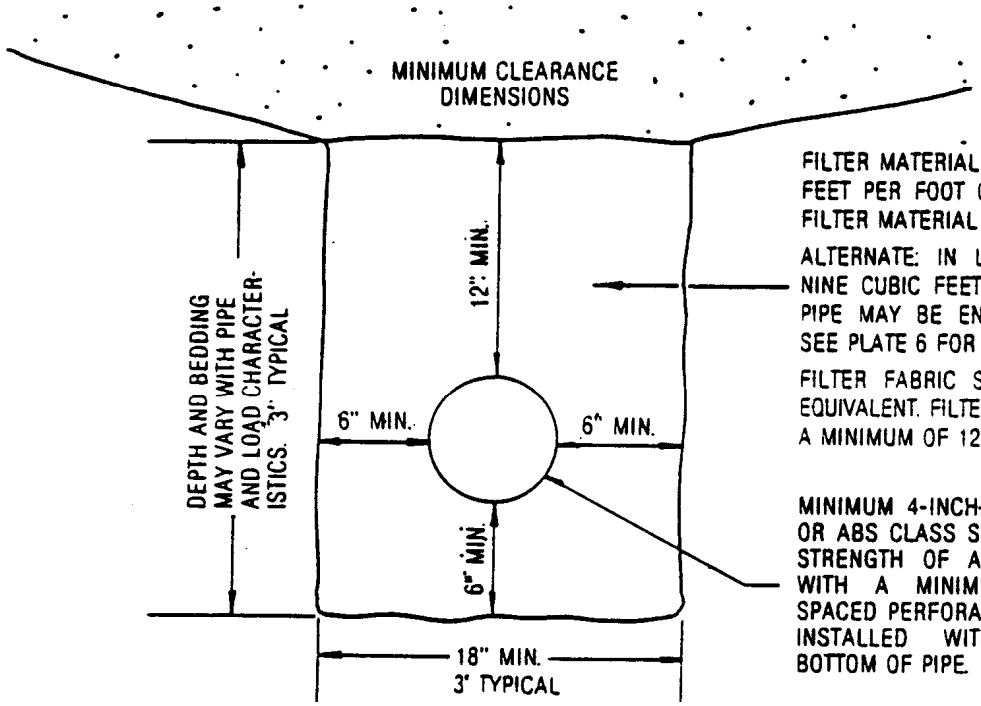
TYPICAL CANYON SUBDRAIN



NOTE:

DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

NOTES:
PIPE SHALL BE A MINIMUM OF 4 INCHES DIAMETER AND RUNS OF 500 FEET OR MORE USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE SOIL ENGINEER



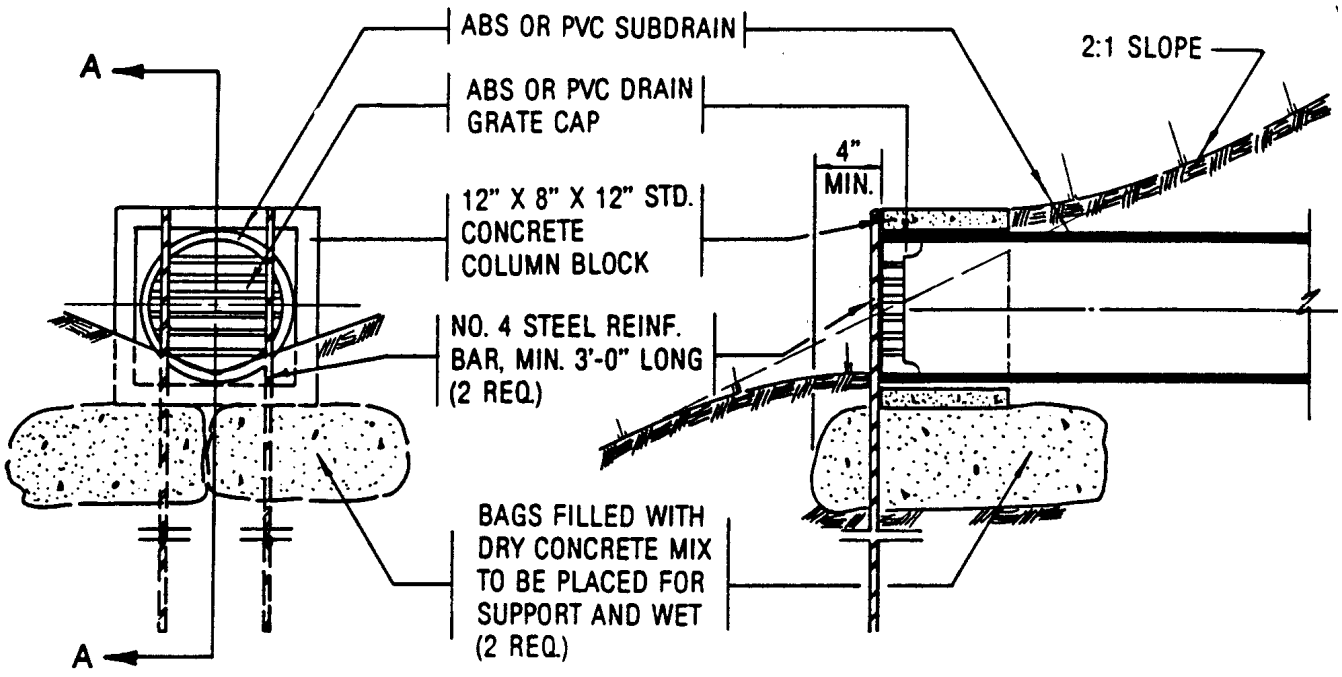
FILTER MATERIAL – MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE PLATE 6 FOR FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL NINE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE PLATE 6 FOR GRAVEL SPECIFICATIONS.

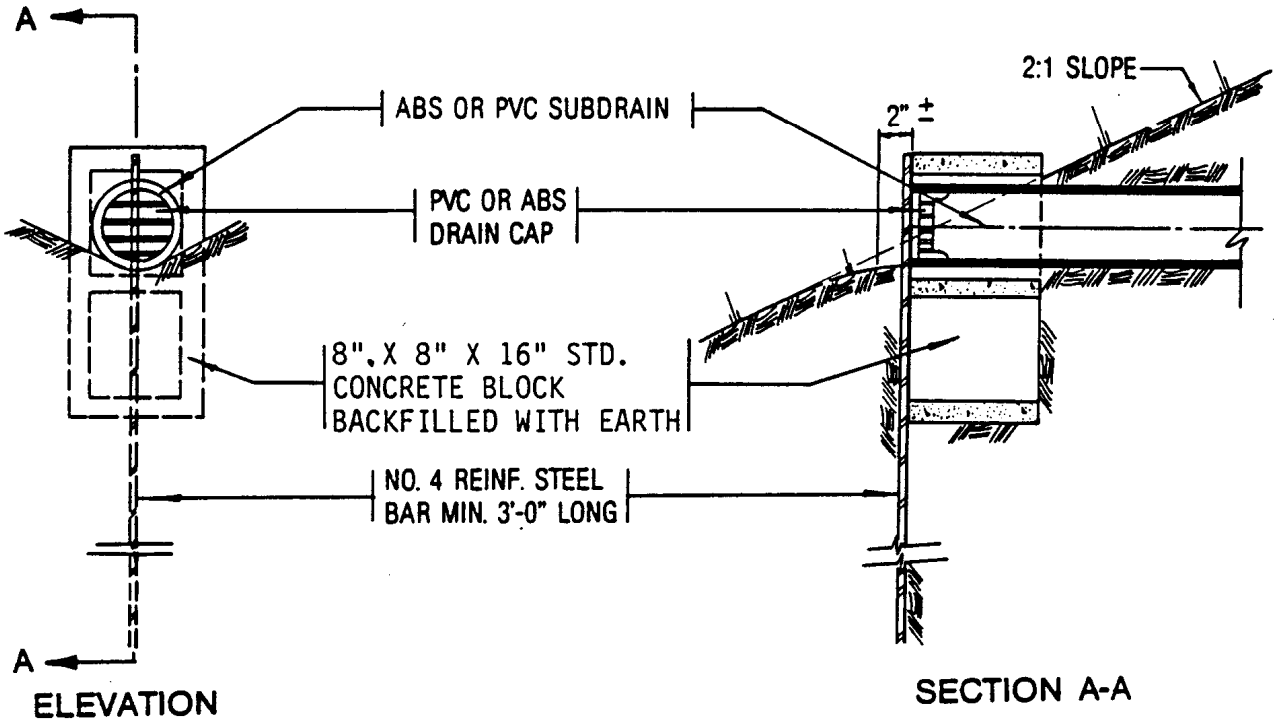
FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4-INCH-DIAMETER, PVC SCH. 40 OR ABS CLASS SDR-35 WITH A CRUSHING STRENGTH OF AT LEAST 1000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE, INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

SUBDRAIN OUTLET MARKER

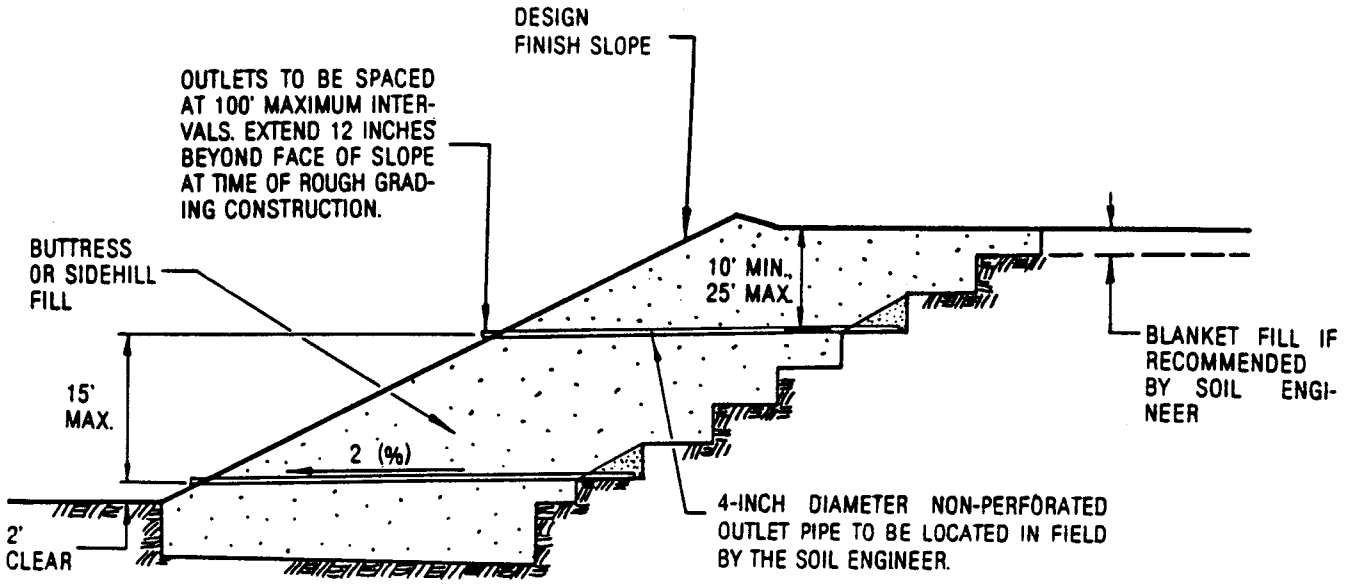


SUBDRAIN OUTLET MARKER FOR 6" AND 8" PIPES



SUBDRAIN OUTLET MARKER – 4" PIPE

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAIN



FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO MA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1½"	100
NO. 4	50
NO. 200	8

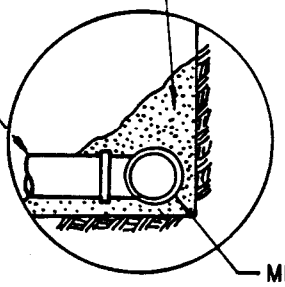
SAND EQUIVALENT = MINIMUM OF 50

FILTER MATERIAL – MINIMUM OF FIVE CUBIC FEET PER FOOT OF PIPE. SEE ABOVE FOR FILTER MATERIAL SPECIFICATION.

ALTERNATIVE: IN LIEU OF FILTER MATERIAL, FIVE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE ABOVE FOR GRAVEL SPECIFICATION.

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW



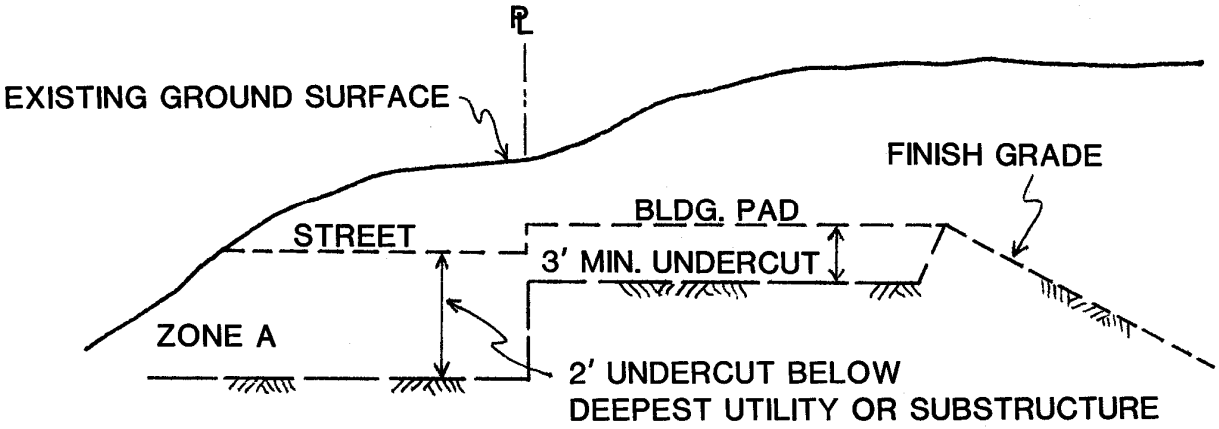
MINIMUM 4-INCH DIAMETER PVC SCH 40 OR ABS CLASS SDR 35 WITH A CRUSHING STRENGTH OF AT LEASE 1,000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

NOTES:

1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

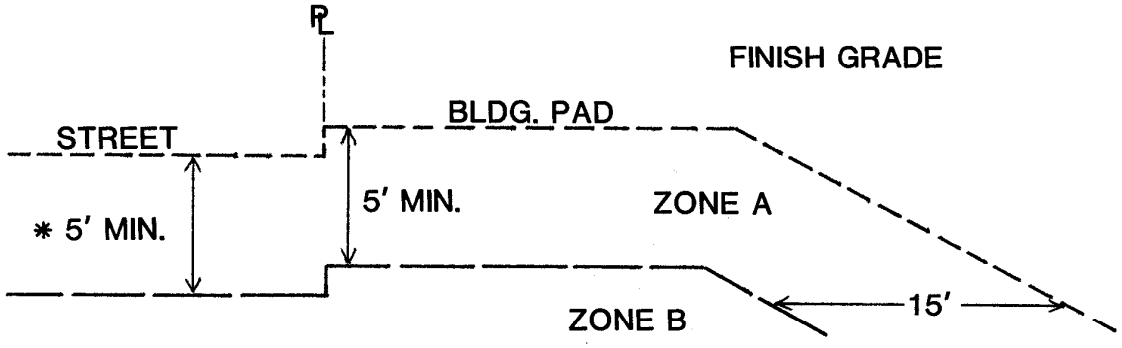
TYPICAL CUT AND FILL GRADING DETAILS

TYPICAL GRADING WITHIN PROPOSED DEEP BEDROCK CUT AREAS



NO SCALE

TYPICAL GRADING WITHIN PROPOSED FILL AREAS



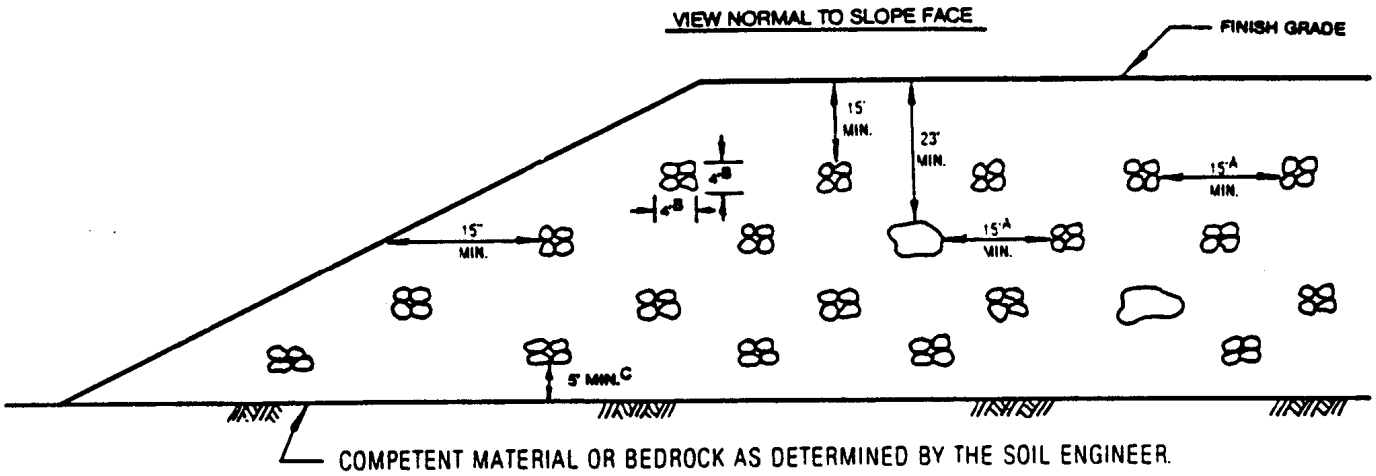
LEGEND

ZONE A ....."SOIL" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

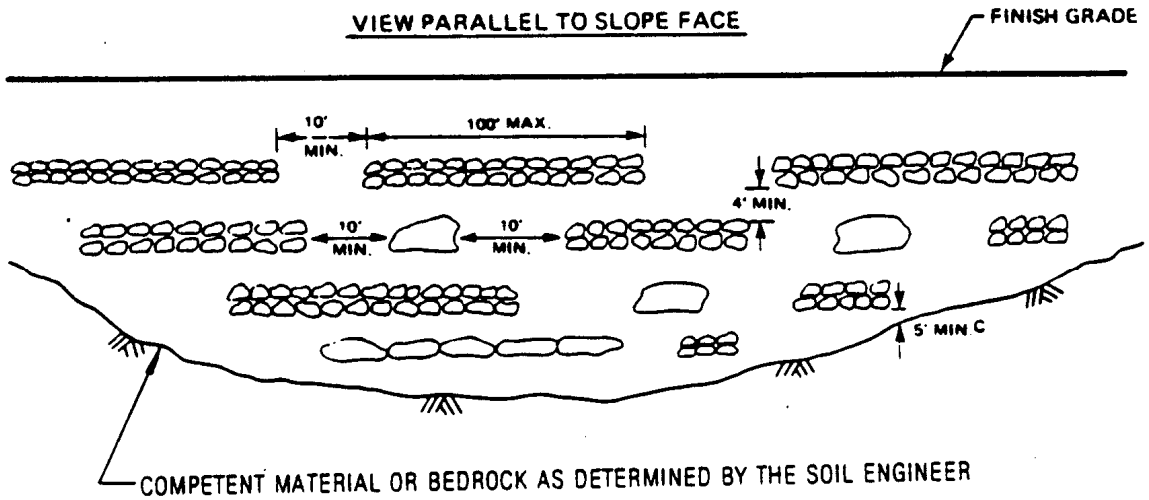
ZONE B ....."SOIL-ROCK" AND/OR "ROCK" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

* 5' OR 1' BELOW DEEPEST UTILITY, WHICHEVER IS GREATER

TYPICAL OVERSIZE ROCK DISPOSAL – "SOIL-ROCK" FILL



NOTE:
ORIENTATION OF WINDROWS MAY VARY BUT SHALL BE AS RECOMMENDED BY SOIL ENGINEER.



NOTES:

A. ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.
B. HEIGHT AND WIDTH MAY VARY DEPENDING ON ROCK SIZE AND TYPE OF EQUIPMENT.
C. IF APPROVED BY THE SOIL ENGINEER, WINDROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK PROVIDING ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.
D. VOIDS IN WINDROW TO BE FILLED BY FLOODING GRANULAR SOIL INTO PLACE. GRANULAR SOIL SHALL MEAN ANY SOIL WHICH HAS A UNIFIED SOIL CLASSIFICATION SYSTEM (UBC 29-1) DESIGNATION OF SM, SP, SW, GM, GP, OR GW.
E. AFTER FILL BETWEEN WINDROWS IS PLACED AND COMPACTED WITH THE LIFT OF FILL COVERING WINDROW, WINDROW SHALL BE PROOF-ROLLED WITH D-9 DOZER OR EQUIVALENT.
F. OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE.

Appendix D – Existing Condition Hydrology Data Calculations

Peak Flow Hydrologic Analysis

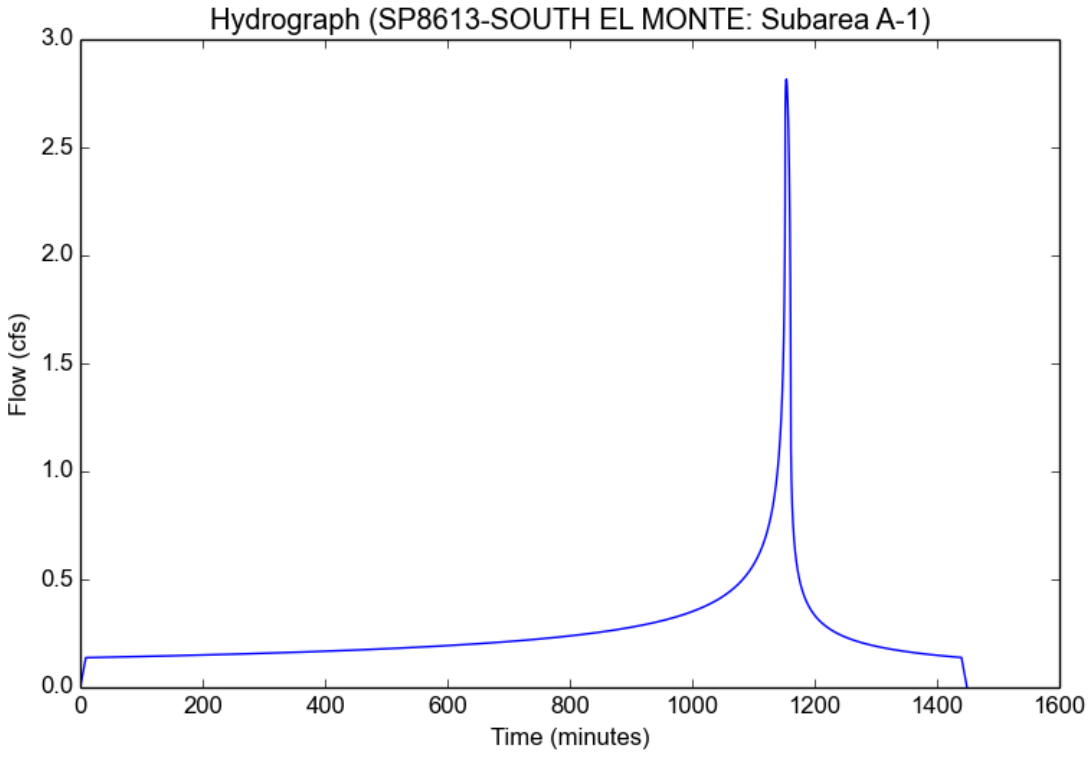
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-1 006 10 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-1
Area (ac)	1.6
Flow Path Length (ft)	605.7
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3197
Peak Intensity (in/hr)	1.9551
Undeveloped Runoff Coefficient (Cu)	0.7274
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	2.8154
Burned Peak Flow Rate (cfs)	2.8154
24-Hr Clear Runoff Volume (ac-ft)	0.5141
24-Hr Clear Runoff Volume (cu-ft)	22393.3476



Peak Flow Hydrologic Analysis

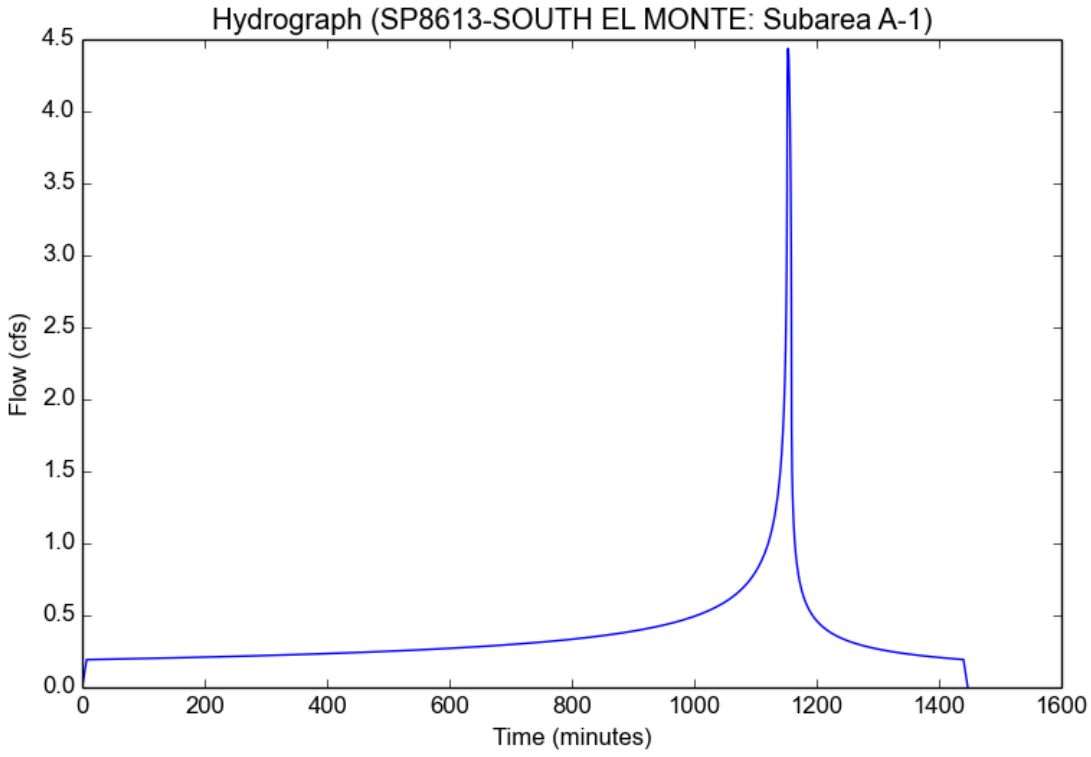
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-1 006 50 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-1
Area (ac)	1.6
Flow Path Length (ft)	605.7
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.05
Peak Intensity (in/hr)	3.0816
Undeveloped Runoff Coefficient (Cu)	0.828
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.4375
Burned Peak Flow Rate (cfs)	4.4375
24-Hr Clear Runoff Volume (ac-ft)	0.72
24-Hr Clear Runoff Volume (cu-ft)	31363.2193



Peak Flow Hydrologic Analysis

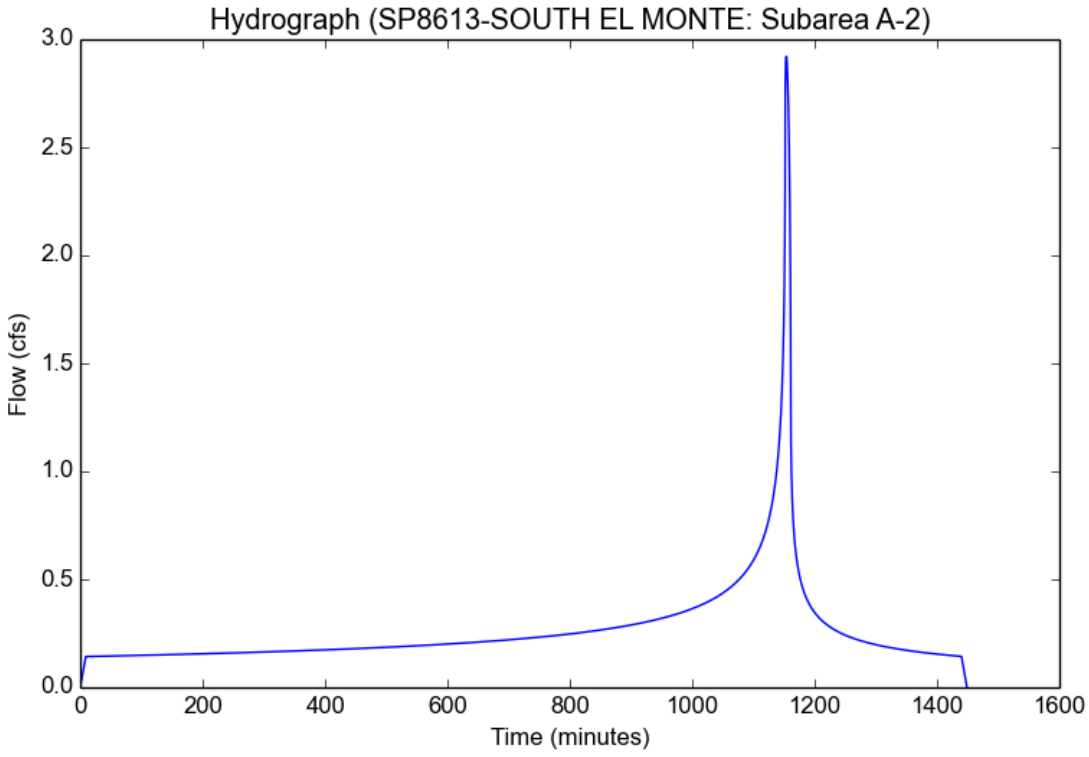
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-2 006 10 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-2
Area (ac)	1.66
Flow Path Length (ft)	687.0
Flow Path Slope (vft/hft)	0.026
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3197
Peak Intensity (in/hr)	1.9551
Undeveloped Runoff Coefficient (Cu)	0.7274
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	2.921
Burned Peak Flow Rate (cfs)	2.921
24-Hr Clear Runoff Volume (ac-ft)	0.5334
24-Hr Clear Runoff Volume (cu-ft)	23233.0982



Peak Flow Hydrologic Analysis

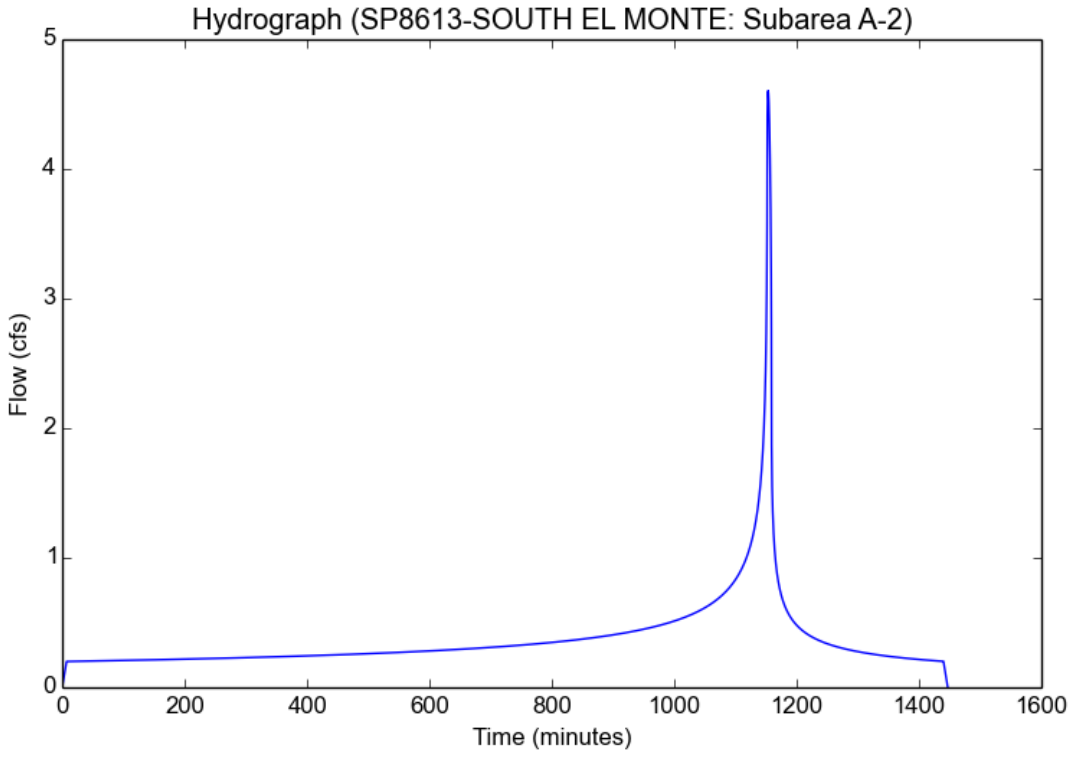
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-2 006 50 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-2
Area (ac)	1.66
Flow Path Length (ft)	687.0
Flow Path Slope (vft/hft)	0.026
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.05
Peak Intensity (in/hr)	3.0816
Undeveloped Runoff Coefficient (Cu)	0.828
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.6039
Burned Peak Flow Rate (cfs)	4.6039
24-Hr Clear Runoff Volume (ac-ft)	0.747
24-Hr Clear Runoff Volume (cu-ft)	32539.34



Peak Flow Hydrologic Analysis

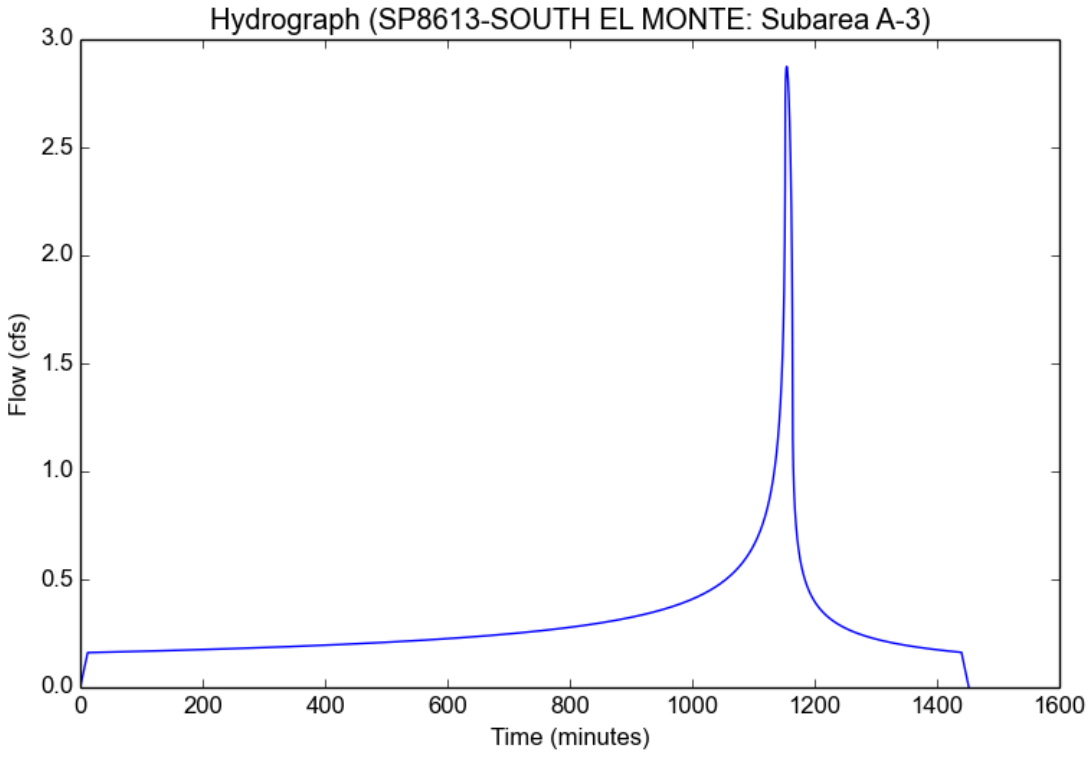
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-3 006 10 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-3
Area (ac)	1.87
Flow Path Length (ft)	626.6
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3197
Peak Intensity (in/hr)	1.7079
Undeveloped Runoff Coefficient (Cu)	0.7002
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	2.8744
Burned Peak Flow Rate (cfs)	2.8744
24-Hr Clear Runoff Volume (ac-ft)	0.6008
24-Hr Clear Runoff Volume (cu-ft)	26172.2459



Peak Flow Hydrologic Analysis

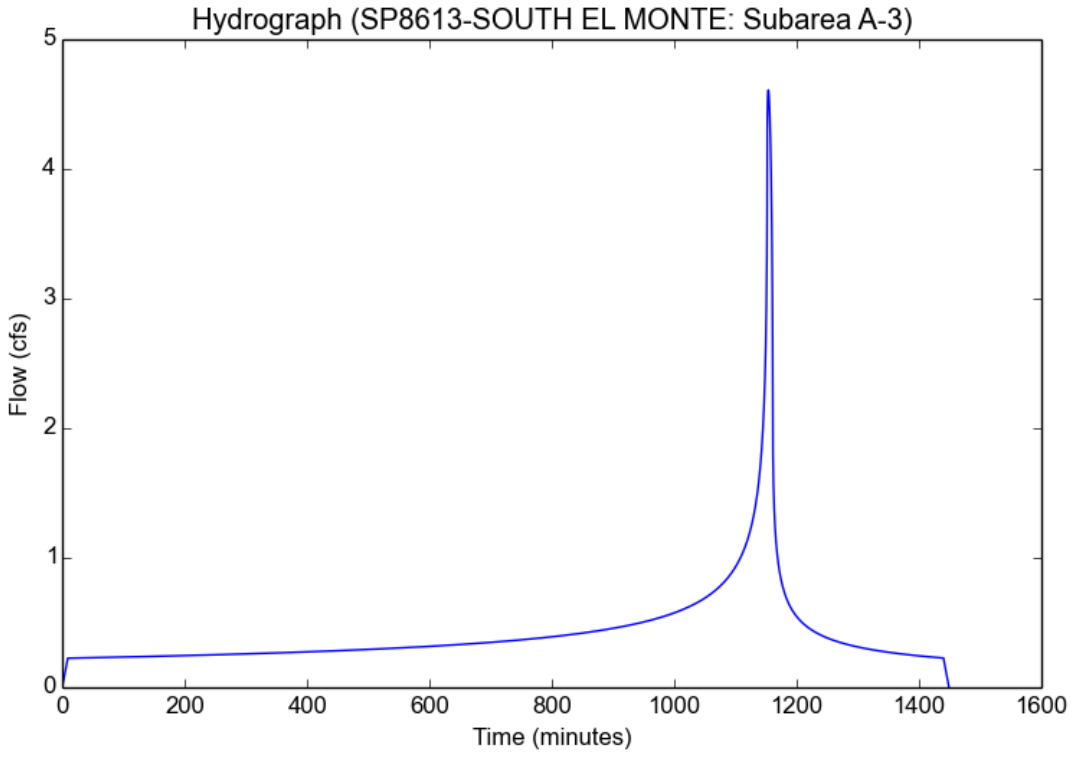
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/SP-8613 SOUTH EL MONTE - Subarea A-3 006 50 YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-SOUTH EL MONTE
Subarea ID	Subarea A-3
Area (ac)	1.87
Flow Path Length (ft)	626.6
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.05
Peak Intensity (in/hr)	2.7383
Undeveloped Runoff Coefficient (Cu)	0.8039
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	4.6086
Burned Peak Flow Rate (cfs)	4.6086
24-Hr Clear Runoff Volume (ac-ft)	0.8415
24-Hr Clear Runoff Volume (cu-ft)	36655.7774



Appendix E – Proposed Condition Hydrology Calculations

Peak Flow Hydrologic Analysis

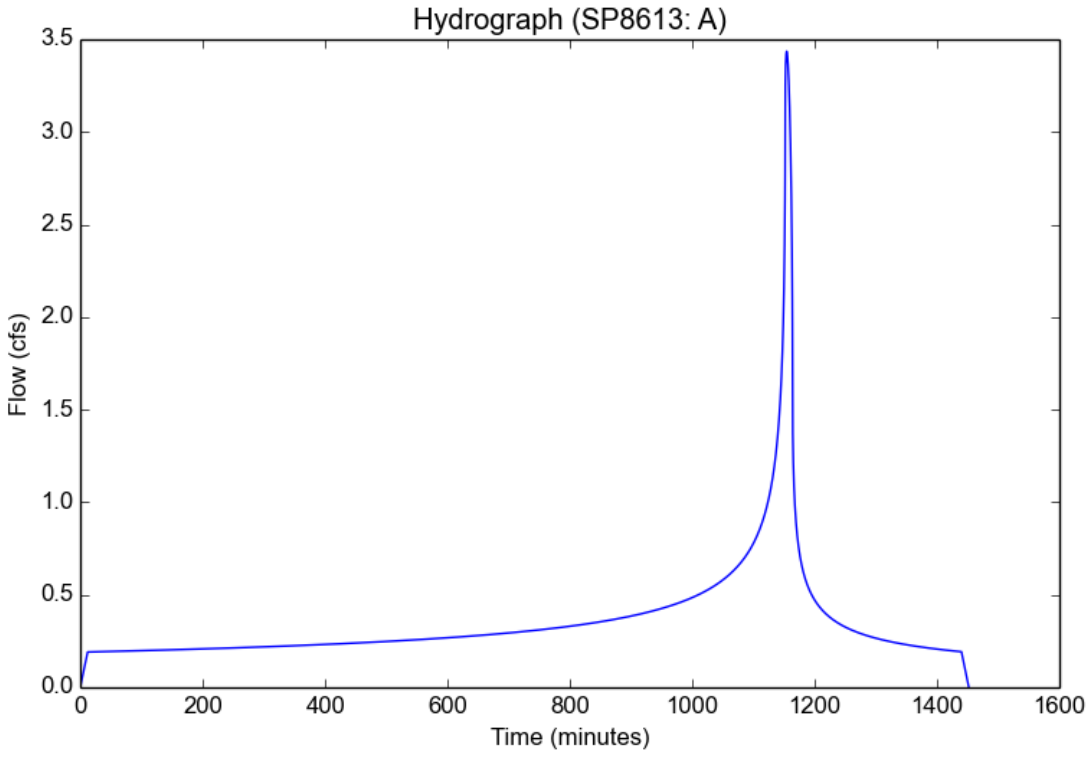
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-10
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A
Area (ac)	2.24
Flow Path Length (ft)	902.9
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3197
Peak Intensity (in/hr)	1.7079
Undeveloped Runoff Coefficient (Cu)	0.7002
Developed Runoff Coefficient (Cd)	0.898
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	3.4354
Burned Peak Flow Rate (cfs)	3.4354
24-Hr Clear Runoff Volume (ac-ft)	0.7139
24-Hr Clear Runoff Volume (cu-ft)	31099.2534



Peak Flow Hydrologic Analysis

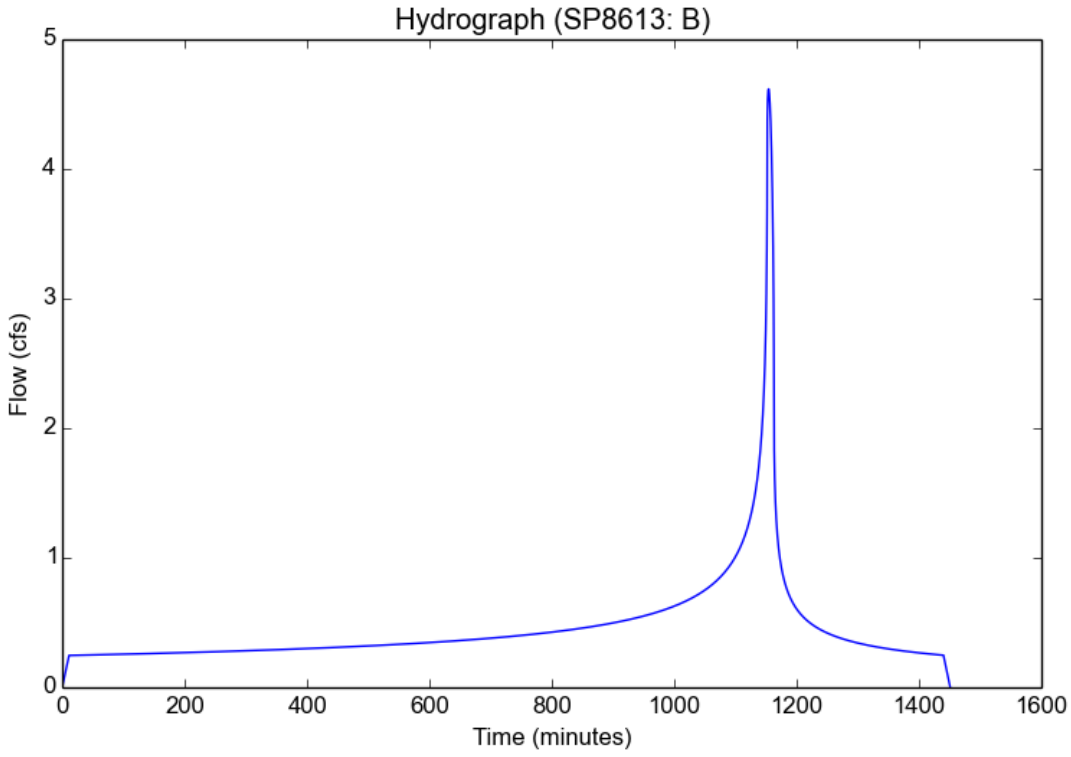
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-10
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B
Area (ac)	2.89
Flow Path Length (ft)	832.7
Flow Path Slope (vft/hft)	0.0168
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.3197
Peak Intensity (in/hr)	1.7792
Undeveloped Runoff Coefficient (Cu)	0.7081
Developed Runoff Coefficient (Cd)	0.8981
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.6178
Burned Peak Flow Rate (cfs)	4.6178
24-Hr Clear Runoff Volume (ac-ft)	0.9211
24-Hr Clear Runoff Volume (cu-ft)	40123.6198



Peak Flow Hydrologic Analysis

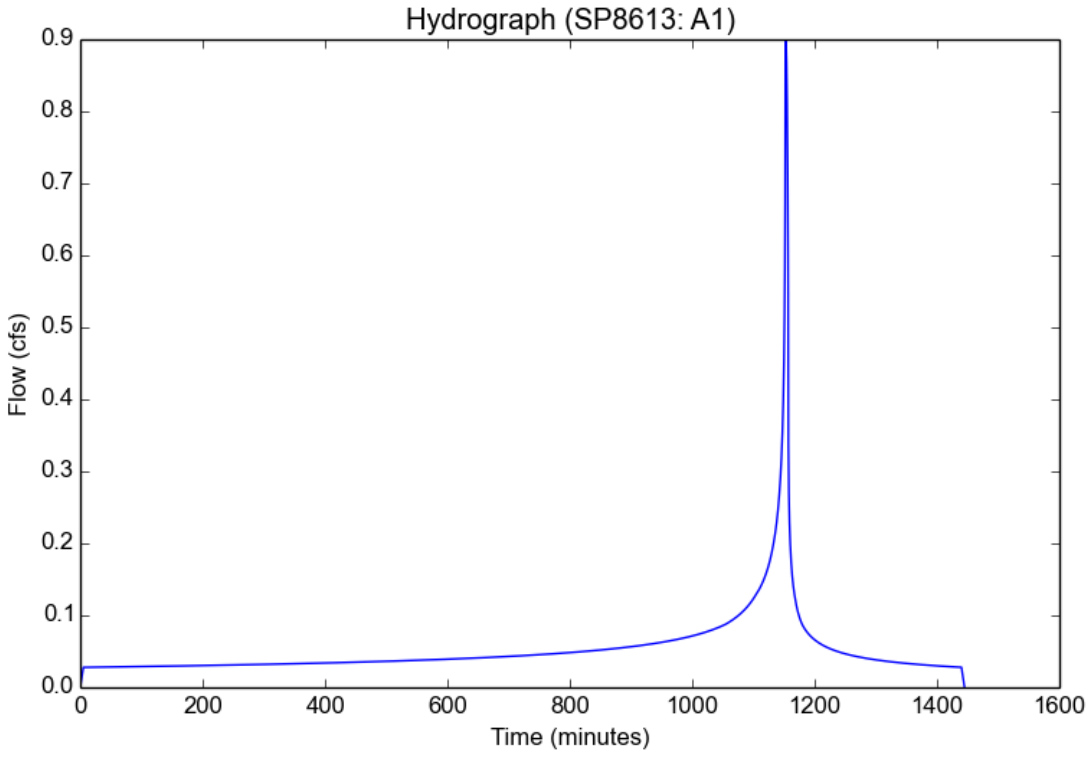
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A1
Area (ac)	0.32
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.8
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.8868
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.8994
Burned Peak Flow Rate (cfs)	0.8994
24-Hr Clear Runoff Volume (ac-ft)	0.1068
24-Hr Clear Runoff Volume (cu-ft)	4652.1965



Peak Flow Hydrologic Analysis

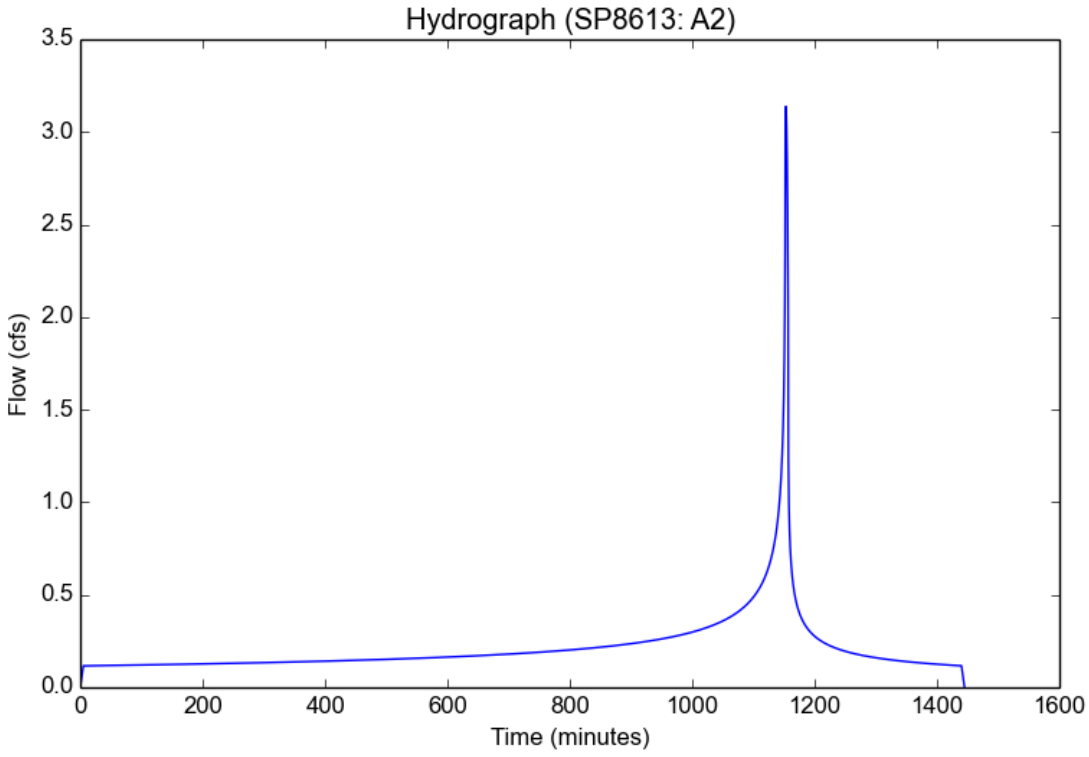
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A2
Area (ac)	1.1
Flow Path Length (ft)	177.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.1375
Burned Peak Flow Rate (cfs)	3.1375
24-Hr Clear Runoff Volume (ac-ft)	0.4346
24-Hr Clear Runoff Volume (cu-ft)	18931.6175



Peak Flow Hydrologic Analysis

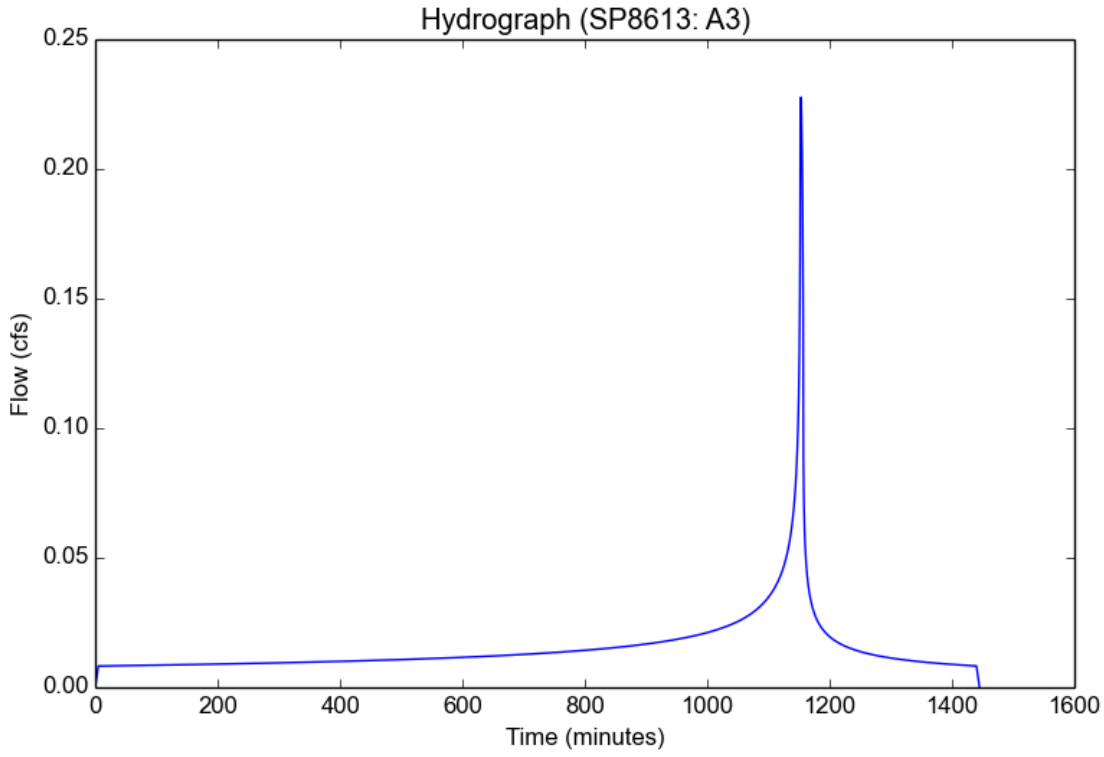
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A3
Area (ac)	0.08
Flow Path Length (ft)	81.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.97
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.898
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.2277
Burned Peak Flow Rate (cfs)	0.2277
24-Hr Clear Runoff Volume (ac-ft)	0.0309
24-Hr Clear Runoff Volume (cu-ft)	1344.7755



Peak Flow Hydrologic Analysis

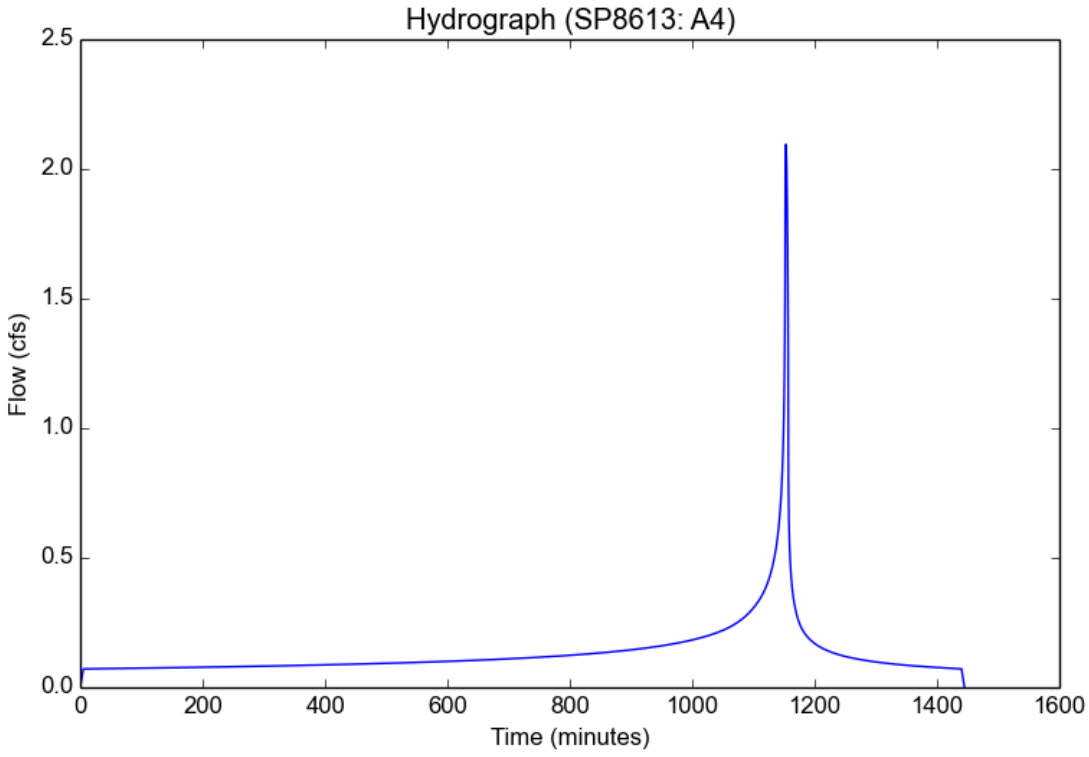
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A4
Area (ac)	0.74
Flow Path Length (ft)	275.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.9
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.8934
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.0953
Burned Peak Flow Rate (cfs)	2.0953
24-Hr Clear Runoff Volume (ac-ft)	0.2697
24-Hr Clear Runoff Volume (cu-ft)	11747.0099



Peak Flow Hydrologic Analysis

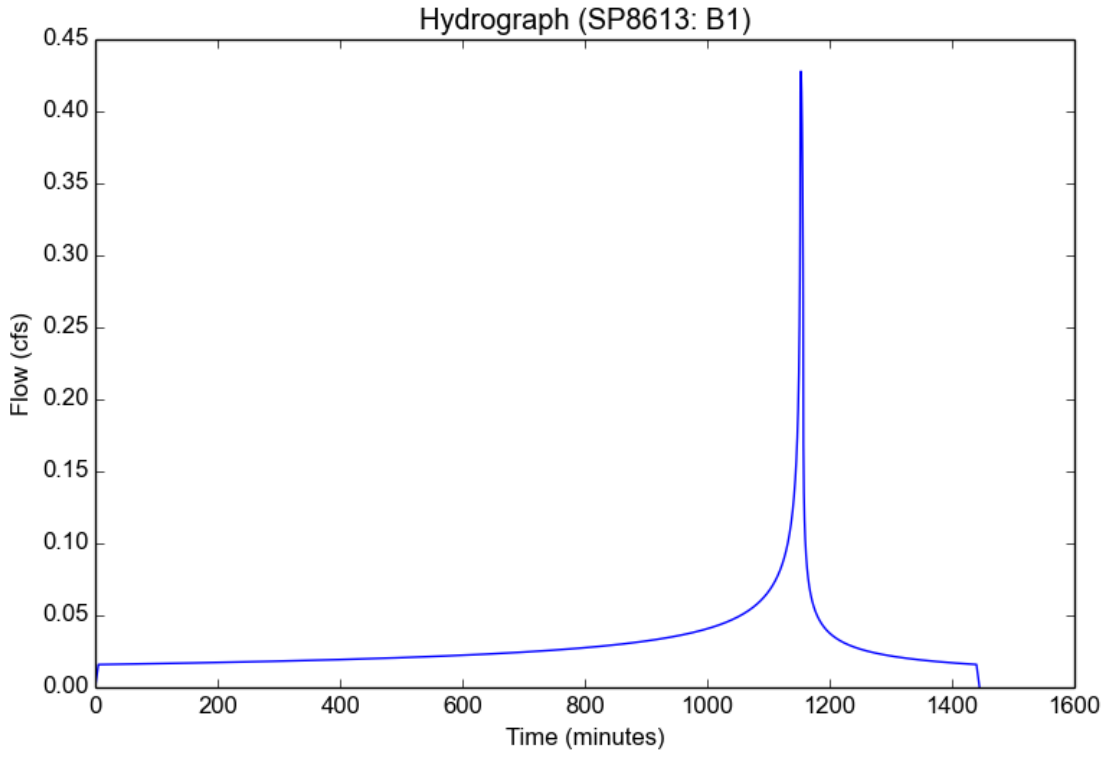
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B1
Area (ac)	0.15
Flow Path Length (ft)	157.0
Flow Path Slope (vft/hft)	0.022
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.4278
Burned Peak Flow Rate (cfs)	0.4278
24-Hr Clear Runoff Volume (ac-ft)	0.0593
24-Hr Clear Runoff Volume (cu-ft)	2581.5842



Peak Flow Hydrologic Analysis

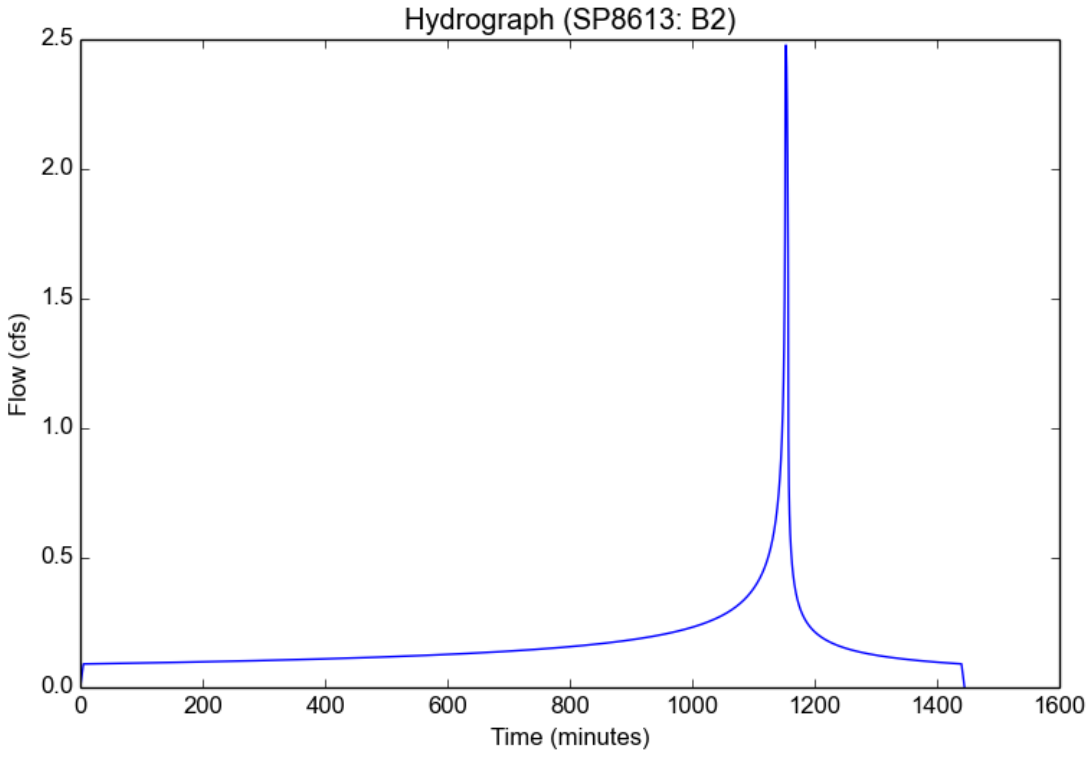
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B2
Area (ac)	0.87
Flow Path Length (ft)	333.0
Flow Path Slope (vft/hft)	0.014
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.8987
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4779
Burned Peak Flow Rate (cfs)	2.4779
24-Hr Clear Runoff Volume (ac-ft)	0.3384
24-Hr Clear Runoff Volume (cu-ft)	14740.6855



Peak Flow Hydrologic Analysis

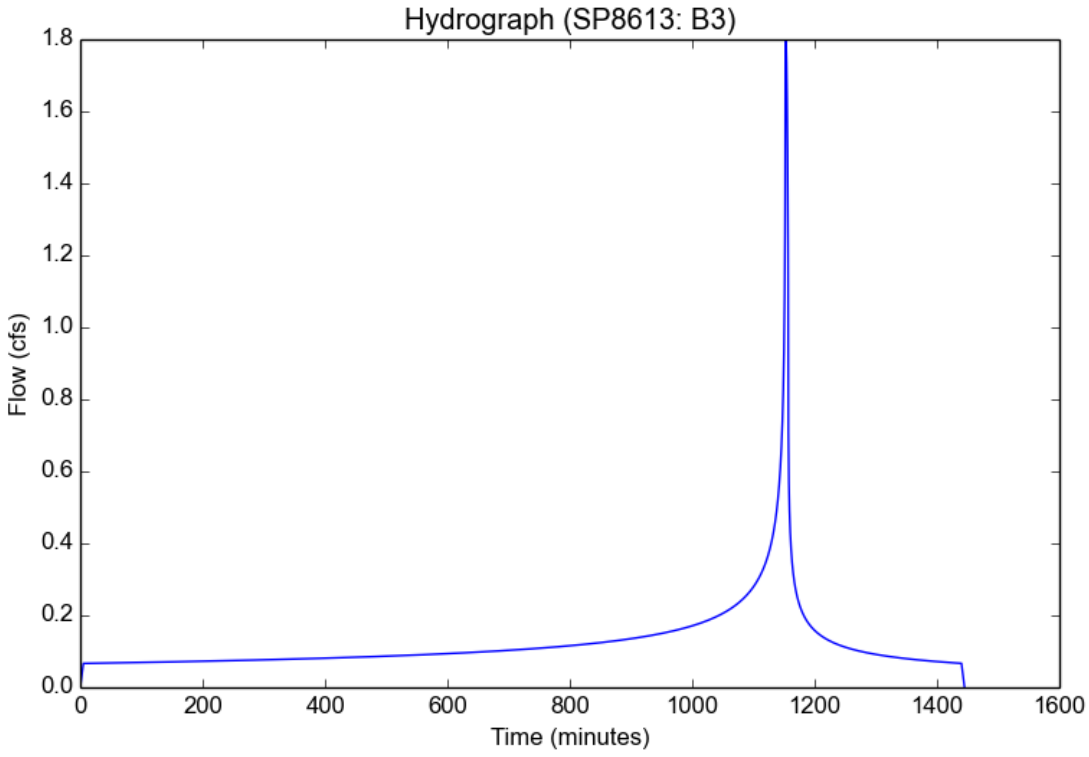
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B3
Area (ac)	0.63
Flow Path Length (ft)	165.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.05
Percent Impervious	1.0
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.797
Burned Peak Flow Rate (cfs)	1.797
24-Hr Clear Runoff Volume (ac-ft)	0.2489
24-Hr Clear Runoff Volume (cu-ft)	10842.6537



Peak Flow Hydrologic Analysis

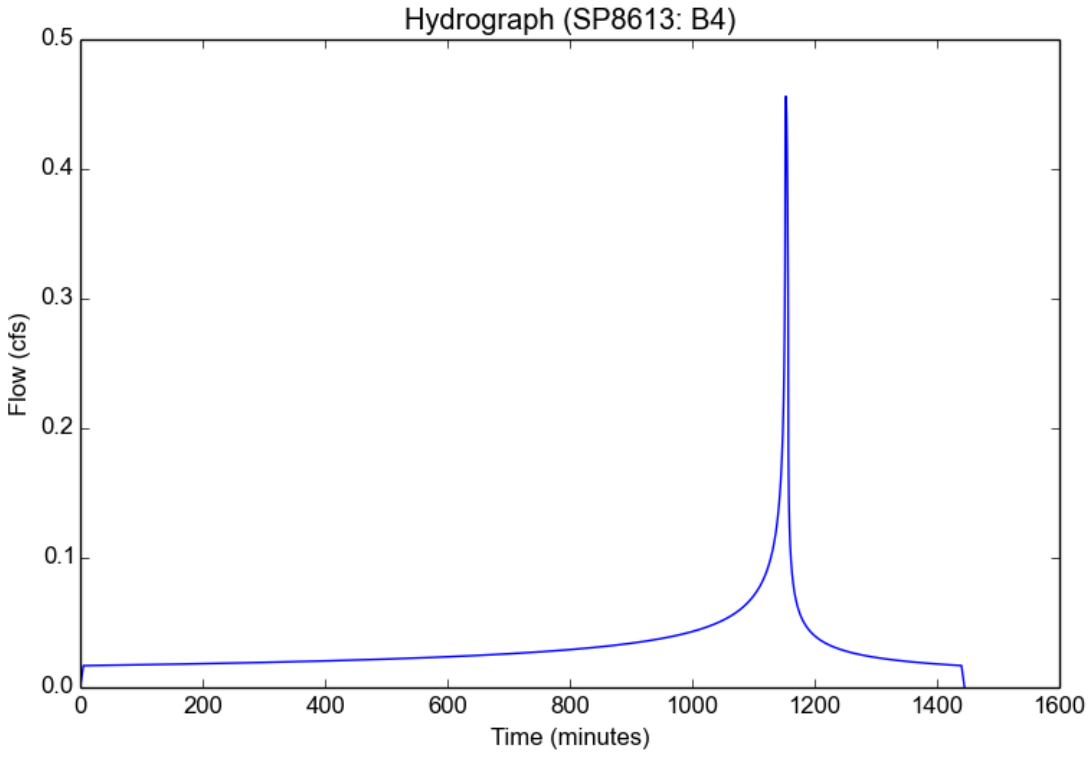
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B4
Area (ac)	0.16
Flow Path Length (ft)	130.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	3.1692
Undeveloped Runoff Coefficient (Cu)	0.8342
Developed Runoff Coefficient (Cd)	0.8993
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.456
Burned Peak Flow Rate (cfs)	0.456
24-Hr Clear Runoff Volume (ac-ft)	0.0627
24-Hr Clear Runoff Volume (cu-ft)	2732.3102



Peak Flow Hydrologic Analysis

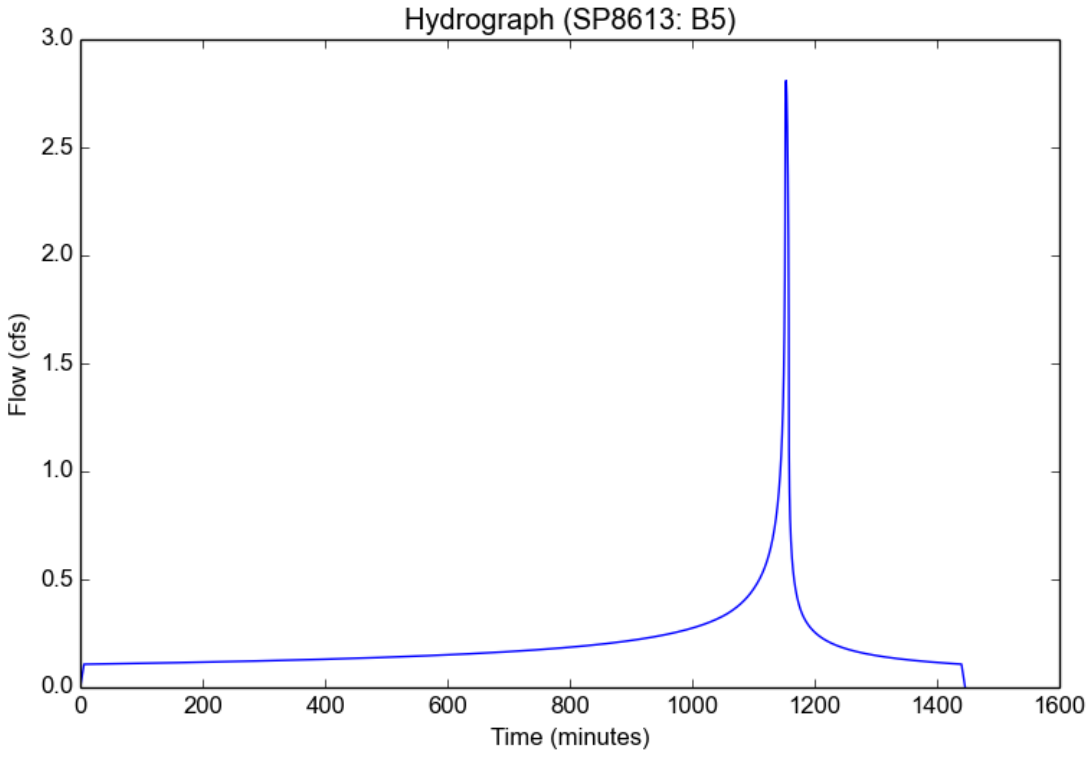
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-25
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B5
Area (ac)	1.08
Flow Path Length (ft)	379.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.93
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.3119
Peak Intensity (in/hr)	2.909
Undeveloped Runoff Coefficient (Cu)	0.8159
Developed Runoff Coefficient (Cd)	0.8941
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	2.809
Burned Peak Flow Rate (cfs)	2.809
24-Hr Clear Runoff Volume (ac-ft)	0.4035
24-Hr Clear Runoff Volume (cu-ft)	17576.7922



Peak Flow Hydrologic Analysis

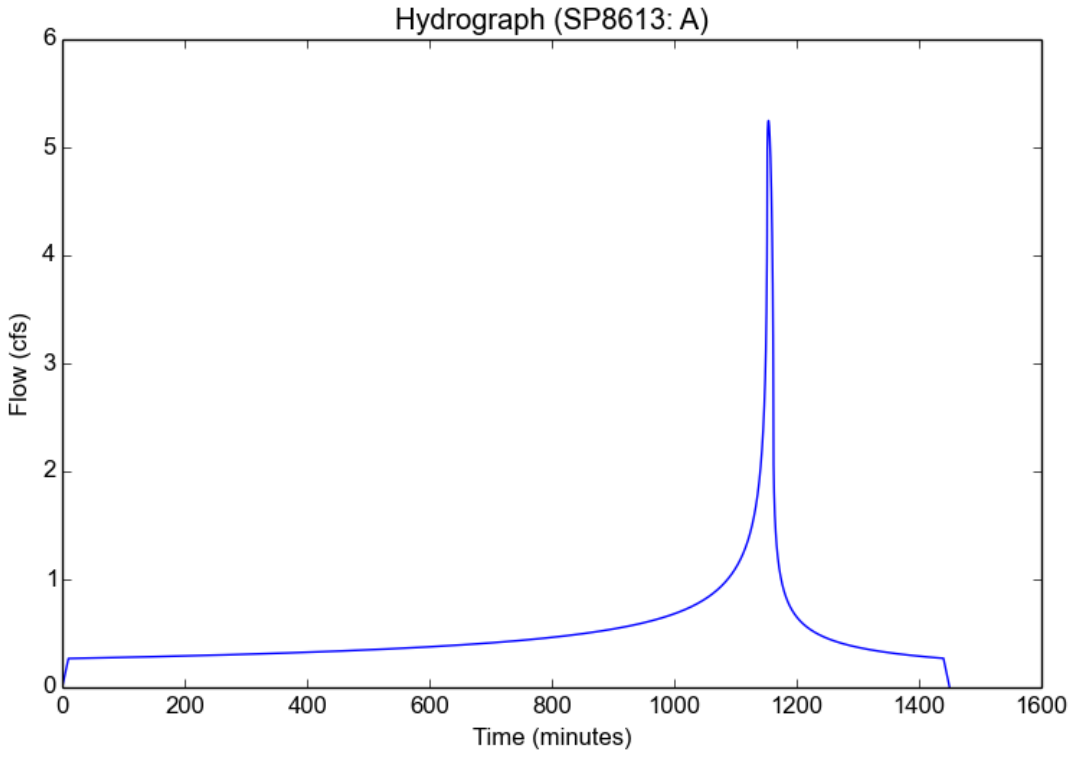
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-50
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	A
Area (ac)	2.24
Flow Path Length (ft)	902.9
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.05
Peak Intensity (in/hr)	2.606
Undeveloped Runoff Coefficient (Cu)	0.7946
Developed Runoff Coefficient (Cd)	0.8989
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	5.2475
Burned Peak Flow Rate (cfs)	5.2475
24-Hr Clear Runoff Volume (ac-ft)	1.0003
24-Hr Clear Runoff Volume (cu-ft)	43575.0516



Peak Flow Hydrologic Analysis

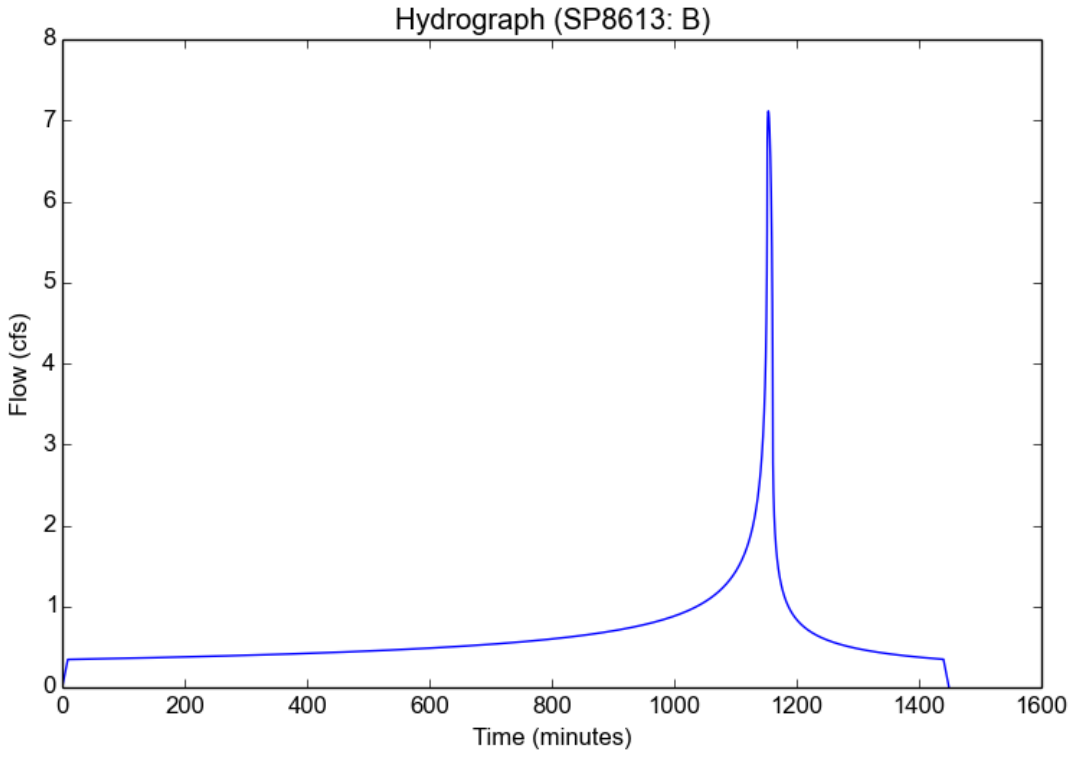
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/Hydrology/Appendix/Appendix E Proposed Condition Hydrology/SP8613 Report-50
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613
Subarea ID	B
Area (ac)	2.89
Flow Path Length (ft)	832.7
Flow Path Slope (vft/hft)	0.0168
50-yr Rainfall Depth (in)	6.05
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.05
Peak Intensity (in/hr)	2.7383
Undeveloped Runoff Coefficient (Cu)	0.8039
Developed Runoff Coefficient (Cd)	0.899
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	7.1147
Burned Peak Flow Rate (cfs)	7.1147
24-Hr Clear Runoff Volume (ac-ft)	1.2906
24-Hr Clear Runoff Volume (cu-ft)	56219.7135



Appendix F –On-site Hydraulics Calculations

MTD138

7-25-67

364-1115-F8.3

PROFILE

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

Whittier '39 S.G. 1532 EL. 232.45 R.D.L.B. 492-329
Fd. Spk. in L top conc. Hdwl. @ N.E. Cor. Rosemead Blvd. & Rush St. 2.1' from N'ly end of Hdwl. & 44' N. of Rush St. & 44' E. of ℄ Rosemead Blvd. Hdwl. N.E. 1.15'

B.M. #4 EL. 233.59 ('Whittier '39) R.D. L.B. 492-349
Fd. Spk. & L. E. conc. ch. of island Rosemead Blvd. Hdwl. 1/4 E. 340' ± 17' E. & ± 660' N/O ℄ int. Rosemead Blvd. & Rush St.

60" R. C. PIPE

54" R. C. PIPE

CROSS SECTION

STA. 1+00 NO SCALE

ROSEMEAD BLVD.

RUSH ST.

(State Hwy.)

PLAN

SCALE: 1" = 40'

Note:
Resurface the trenches within the paved areas of Rosemead Blvd. with 5" A.C. pvmt. & 8" aggregate base material in accordance with Sec. 19 of the specifications & Std. Dwg. No. T-0181

PIQ

REVISIONS		
MARK	DATE	DESCRIPTION

County of L.A. CHECKED BY
County of L.A. SUBMITTED BY

PREPARED BY
JOHN A. LAMBIE
COUNTY ENGINEER

RECOMMENDED BY

DRAWN BY R. GAETAS. DESIGNED BY E. CHAVEZ
TRACED BY M. NISHI SUBMITTED BY E. CHAVEZ
CHECKED BY T.C. DATE 6-15-66

364-1115-F 8.3

LOS ANGELES COUNTY
ROAD DEPARTMENT

TRANSFER DRAIN No. 138

ROSEMEAD BOULEVARD LATERAL

STA. 1+00 TO STA. 12+00

PLAN AND PROFILE

APPROVED BY Chief Engineer

SCALE	DATE	DWG. NO.
AS SHOWN		SHEET 3 OF 8

MTD138

7-25-67

364-1115-F8.3

PF517064

National Flood Hazard Layer FIRMette

FEMA

118°4'14"W 34°3'25"N

118°3'36"W 34°2'55"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/16/2024 at 12:51 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Monday, May 1, 2023

Project Units: U.S. Customary Units

Notes:

Curb and Gutter Analysis: CB-A1

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0280 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 6.1624 ft

Gutter Result Parameters

Design Flow: 0.8700 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.5317 ft^2

Eo (Gutter Flow to Total Flow): 0.6492

Gutter Depth at Curb: 2.0706 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.1540 ft

Computed Width of Spread at Sag: 6.4990 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-A2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0300 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 9.5053 ft

Gutter Result Parameters

Design Flow: 3.1000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 1.3553 ft^2

Eo (Gutter Flow to Total Flow): 0.4678

Gutter Depth at Curb: 3.4219 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 4.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 8.0000 ft

Effective Perimeter: 6.4000 ft

Area: 7.2000 ft^2

Effective Area: 5.7600 ft^2

Depth at center of grate: 0.2965 ft

Computed Width of Spread at Sag: 10.8837 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-A3

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0210 ft/ft

Cross-Slope of Pavement: 0.0350 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 2.4458 ft

Gutter Result Parameters

Design Flow: 0.2200 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.1047 ft^2

Eo (Gutter Flow to Total Flow): 0.9894

Gutter Depth at Curb: 1.0272 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 4.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 8.0000 ft

Effective Perimeter: 6.4000 ft

Area: 7.2000 ft^2

Effective Area: 5.7600 ft^2

Depth at center of grate: 0.0508 ft

Computed Width of Spread at Sag: 2.4522 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-A4

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0050 ft/ft

Cross-Slope of Pavement: 0.0250 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 9.1886 ft

Gutter Result Parameters

Design Flow: 2.0900 cfs

Gutter Depression: 0.0000 in

Area of Flow: 1.0554 ft^2

Eo (Gutter Flow to Total Flow): 0.4808

Gutter Depth at Curb: 2.7566 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.2762 ft

Computed Width of Spread at Sag: 12.0471 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-B1

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0190 ft/ft

Cross-Slope of Pavement: 0.0180 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 4.8552 ft

Gutter Result Parameters

Design Flow: 0.4300 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.2122 ft^2

Eo (Gutter Flow to Total Flow): 0.7577

Gutter Depth at Curb: 1.0487 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.0963 ft

Computed Width of Spread at Sag: 6.3473 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-B2

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0070 ft/ft

Cross-Slope of Pavement: 0.0380 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 7.0805 ft

Gutter Result Parameters

Design Flow: 2.4800 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.9525 ft^2

Eo (Gutter Flow to Total Flow): 0.5878

Gutter Depth at Curb: 3.2287 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.3095 ft

Computed Width of Spread at Sag: 9.1460 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-B3

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0010 ft/ft

Cross-Slope of Pavement: 0.0150 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 16.1334 ft

Gutter Result Parameters

Design Flow: 1.7900 cfs

Gutter Depression: 0.0000 in

Area of Flow: 1.9522 ft^2

Eo (Gutter Flow to Total Flow): 0.2977

Gutter Depth at Curb: 2.9040 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Slotted Drain

Length of Inlet: 180.0000 ft

Slot width: 6.0000 in

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 180.0000 ft

Effective Perimeter: 144.0000 ft

Area: 90.0000 ft^2

Effective Area: 72.0000 ft^2

Depth at curb face (upstream of local depression): 0.0293 ft

Computed Width of Spread at Sag: 1.9525 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-B4

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0040 ft/ft

Cross-Slope of Pavement: 0.0430 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 3.8572 ft

Gutter Result Parameters

Design Flow: 0.4560 cfs

Gutter Depression: 0.0000 in

Area of Flow: 0.3199 ft^2

Eo (Gutter Flow to Total Flow): 0.8579

Gutter Depth at Curb: 1.9903 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.1001 ft

Computed Width of Spread at Sag: 3.3277 ft

Flow type: Weir Flow

Efficiency: 1.0000

Curb and Gutter Analysis: CB-B5

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0030 ft/ft

Cross-Slope of Pavement: 0.0220 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 12.6831 ft

Gutter Result Parameters

Design Flow: 3.0900 cfs

Gutter Depression: 0.0000 in

Area of Flow: 1.7695 ft^2

Eo (Gutter Flow to Total Flow): 0.3676

Gutter Depth at Curb: 3.3483 in

Inlet Input Parameters

Inlet Location: Inlet in Sag

Percent Clogging: 20.0000 %

Inlet Type: Grate

Grate Type: P - 1-7/8

Grate Width: 2.0000 ft

Grate Length: 2.0000 ft

Local Depression: 0.0000 in

Inlet Result Parameters

Perimeter: 6.0000 ft

Effective Perimeter: 4.8000 ft

Area: 3.6000 ft^2

Effective Area: 2.8800 ft^2

Depth at center of grate: 0.3584 ft

Computed Width of Spread at Sag: 17.2920 ft

Flow type: Weir Flow

Efficiency: 1.0000

Channel Analysis: SD-A1

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0190 ft/ft

Manning's n: 0.0150

Flow: 0.8700 cfs

Result Parameters

Depth: 0.3067 ft

Area of Flow: 0.2044 ft^2

Wetted Perimeter: 1.1739 ft

Hydraulic Radius: 0.1741 ft

Average Velocity: 4.2572 ft/s

Top Width: 0.9223 ft

Froude Number: 1.5938

Critical Depth: 0.3906 ft

Critical Velocity: 3.0612 ft/s

Critical Slope: 0.0076 ft/ft

Critical Top Width: 0.98 ft

Calculated Max Shear Stress: 0.3637 lb/ft^2

Calculated Avg Shear Stress: 0.2064 lb/ft^2

Channel Analysis: SD-A2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.1250 ft/ft

Manning's n: 0.0150

Flow: 3.1000 cfs

Result Parameters

Depth: 0.3647 ft

Area of Flow: 0.2590 ft^2

Wetted Perimeter: 1.2967 ft

Hydraulic Radius: 0.1998 ft

Average Velocity: 11.9679 ft/s

Top Width: 0.9627 ft

Froude Number: 4.0659

Critical Depth: 0.7544 ft

Critical Velocity: 4.8769 ft/s

Critical Slope: 0.0120 ft/ft

Critical Top Width: 0.86 ft

Calculated Max Shear Stress: 2.8443 lb/ft^2

Calculated Avg Shear Stress: 1.5581 lb/ft^2

Channel Analysis: SD-A3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.5000 ft

Longitudinal Slope: 0.0570 ft/ft

Manning's n: 0.0150

Flow: 0.2200 cfs

Result Parameters

Depth: 0.1475 ft

Area of Flow: 0.0484 ft^2

Wetted Perimeter: 0.5741 ft

Hydraulic Radius: 0.0843 ft

Average Velocity: 4.5463 ft/s

Top Width: 0.4560 ft

Froude Number: 2.4595

Critical Depth: 0.2354 ft

Critical Velocity: 2.4214 ft/s

Critical Slope: 0.0101 ft/ft

Critical Top Width: 0.50 ft

Calculated Max Shear Stress: 0.5246 lb/ft^2

Calculated Avg Shear Stress: 0.2998 lb/ft^2

Channel Analysis: SD-A4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 2.0900 cfs

Result Parameters

Depth: 0.7837 ft

Area of Flow: 0.6603 ft^2

Wetted Perimeter: 2.1740 ft

Hydraulic Radius: 0.3037 ft

Average Velocity: 3.1652 ft/s

Top Width: 0.8235 ft

Froude Number: 0.6229

Critical Depth: 0.6172 ft

Critical Velocity: 4.1077 ft/s

Critical Slope: 0.0093 ft/ft

Critical Top Width: 0.97 ft

Calculated Max Shear Stress: 0.2445 lb/ft^2

Calculated Avg Shear Stress: 0.0948 lb/ft^2

Channel Analysis: SD-A1+A2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.0150

Flow: 3.9700 cfs

Result Parameters

Depth: 0.6580 ft

Area of Flow: 0.7459 ft^2

Wetted Perimeter: 2.1717 ft

Hydraulic Radius: 0.3435 ft

Average Velocity: 5.3224 ft/s

Top Width: 1.4887 ft

Froude Number: 1.3250

Critical Depth: 0.7625 ft

Critical Velocity: 4.4001 ft/s

Critical Slope: 0.0072 ft/ft

Critical Top Width: 1.50 ft

Calculated Max Shear Stress: 0.4927 lb/ft^2

Calculated Avg Shear Stress: 0.2572 lb/ft^2

Channel Analysis: SD-A3+A4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 2.3100 cfs

Result Parameters

Depth: 0.8859 ft

Area of Flow: 0.7358 ft^2

Wetted Perimeter: 2.4524 ft

Hydraulic Radius: 0.3000 ft

Average Velocity: 3.1395 ft/s

Top Width: 0.6359 ft

Froude Number: 0.5143

Critical Depth: 0.6504 ft

Critical Velocity: 4.2715 ft/s

Critical Slope: 0.0098 ft/ft

Critical Top Width: 0.95 ft

Calculated Max Shear Stress: 0.2764 lb/ft^2

Calculated Avg Shear Stress: 0.0936 lb/ft^2

Channel Analysis: SD-A1+A2+A3+A4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 6.2800 cfs

Result Parameters

Depth: 1.1976 ft

Area of Flow: 1.5127 ft^2

Wetted Perimeter: 3.3155 ft

Hydraulic Radius: 0.4562 ft

Average Velocity: 4.1516 ft/s

Top Width: 1.2036 ft

Froude Number: 0.6526

Critical Depth: 0.9683 ft

Critical Velocity: 5.2061 ft/s

Critical Slope: 0.0085 ft/ft

Critical Top Width: 1.44 ft

Calculated Max Shear Stress: 0.3737 lb/ft^2

Calculated Avg Shear Stress: 0.1423 lb/ft^2

Channel Analysis: SD-B1

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.5000 ft

Longitudinal Slope: 0.0170 ft/ft

Manning's n: 0.0150

Flow: 0.4280 cfs

Result Parameters

Depth: 0.3009 ft

Area of Flow: 0.1235 ft^2

Wetted Perimeter: 0.8880 ft

Hydraulic Radius: 0.1390 ft

Average Velocity: 3.4667 ft/s

Top Width: 0.4895 ft

Froude Number: 1.2165

Critical Depth: 0.3330 ft

Critical Velocity: 3.0813 ft/s

Critical Slope: 0.0126 ft/ft

Critical Top Width: 0.47 ft

Calculated Max Shear Stress: 0.3192 lb/ft^2

Calculated Avg Shear Stress: 0.1475 lb/ft^2

Channel Analysis: SD-B2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0420 ft/ft

Manning's n: 0.0150

Flow: 2.4500 cfs

Result Parameters

Depth: 0.4319 ft

Area of Flow: 0.3248 ft^2

Wetted Perimeter: 1.4341 ft

Hydraulic Radius: 0.2265 ft

Average Velocity: 7.5432 ft/s

Top Width: 0.9907 ft

Froude Number: 2.3216

Critical Depth: 0.6704 ft

Critical Velocity: 4.3770 ft/s

Critical Slope: 0.0101 ft/ft

Critical Top Width: 0.94 ft

Calculated Max Shear Stress: 1.1319 lb/ft^2

Calculated Avg Shear Stress: 0.5935 lb/ft^2

Channel Analysis: SD-B3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0370 ft/ft

Manning's n: 0.0150

Flow: 1.7900 cfs

Result Parameters

Depth: 0.3765 ft

Area of Flow: 0.2705 ft^2

Wetted Perimeter: 1.3212 ft

Hydraulic Radius: 0.2047 ft

Average Velocity: 6.6185 ft/s

Top Width: 0.9690 ft

Froude Number: 2.2078

Critical Depth: 0.5693 ft

Critical Velocity: 3.8760 ft/s

Critical Slope: 0.0088 ft/ft

Critical Top Width: 0.99 ft

Calculated Max Shear Stress: 0.8692 lb/ft^2

Calculated Avg Shear Stress: 0.4726 lb/ft^2

Channel Analysis: SD-B4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 0.5000 ft

Longitudinal Slope: 0.0870 ft/ft

Manning's n: 0.0150

Flow: 0.4560 cfs

Result Parameters

Depth: 0.1938 ft

Area of Flow: 0.0703 ft^2

Wetted Perimeter: 0.6719 ft

Hydraulic Radius: 0.1046 ft

Average Velocity: 6.4875 ft/s

Top Width: 0.4872 ft

Froude Number: 3.0099

Critical Depth: 0.3442 ft

Critical Velocity: 3.1633 ft/s

Critical Slope: 0.0131 ft/ft

Critical Top Width: 0.46 ft

Calculated Max Shear Stress: 1.0518 lb/ft^2

Calculated Avg Shear Stress: 0.5679 lb/ft^2

Channel Analysis: SD-B5

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0150

Flow: 3.0900 cfs

Result Parameters

Depth: 0.6872 ft

Area of Flow: 0.5755 ft^2

Wetted Perimeter: 1.9546 ft

Hydraulic Radius: 0.2944 ft

Average Velocity: 5.3697 ft/s

Top Width: 0.9272 ft

Froude Number: 1.2012

Critical Depth: 0.7529 ft

Critical Velocity: 4.8709 ft/s

Critical Slope: 0.0119 ft/ft

Critical Top Width: 0.86 ft

Calculated Max Shear Stress: 0.6432 lb/ft^2

Calculated Avg Shear Stress: 0.2756 lb/ft^2

Channel Analysis: SD-B1+B2+B3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0170 ft/ft

Manning's n: 0.0150

Flow: 4.6600 cfs

Result Parameters

Depth: 0.6529 ft

Area of Flow: 0.7383 ft^2

Wetted Perimeter: 2.1614 ft

Hydraulic Radius: 0.3416 ft

Average Velocity: 6.3115 ft/s

Top Width: 1.4874 ft

Froude Number: 1.5787

Critical Depth: 0.8291 ft

Critical Velocity: 4.6507 ft/s

Critical Slope: 0.0075 ft/ft

Critical Top Width: 1.49 ft

Calculated Max Shear Stress: 0.6926 lb/ft^2

Calculated Avg Shear Stress: 0.3624 lb/ft^2

Channel Analysis: SD-B1+B2+B3+B4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0170 ft/ft

Manning's n: 0.0150

Flow: 5.1200 cfs

Result Parameters

Depth: 0.6885 ft

Area of Flow: 0.7915 ft^2

Wetted Perimeter: 2.2331 ft

Hydraulic Radius: 0.3544 ft

Average Velocity: 6.4691 ft/s

Top Width: 1.4950 ft

Froude Number: 1.5668

Critical Depth: 0.8708 ft

Critical Velocity: 4.8118 ft/s

Critical Slope: 0.0078 ft/ft

Critical Top Width: 1.48 ft

Calculated Max Shear Stress: 0.7304 lb/ft^2

Calculated Avg Shear Stress: 0.3760 lb/ft^2

Channel Analysis: SD-B1+B2+B3+B4+B5

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 8.2100 cfs

Result Parameters

Depth: 1.1075 ft

Area of Flow: 1.7854 ft^2

Wetted Perimeter: 3.3570 ft

Hydraulic Radius: 0.5318 ft

Average Velocity: 4.5984 ft/s

Top Width: 1.9884 ft

Froude Number: 0.8552

Critical Depth: 1.0205 ft

Critical Velocity: 5.0937 ft/s

Critical Slope: 0.0065 ft/ft

Critical Top Width: 2.00 ft

Calculated Max Shear Stress: 0.3455 lb/ft^2

Calculated Avg Shear Stress: 0.1659 lb/ft^2

Low Impact Development Plan (LID)

Project Name:

Rockland Business Park

2222 Rosemead Boulevard

South El Monte, CA 91733

Prepared for:

Owner's Information

Rosemead Holding LLC
221 N Orange Ave.
City of Industry, CA
91744

Submitted to:

City of South El Monte

Prepared by:

Tait & Associates, Inc.

Engineer: Jacob Vandervis, P.E. Registration No.: C46301
701 N. Parkcenter Drive
Santa Ana , CA. 92705
(714)560-8200

Date: 10/7/2022
Revised Date: Click here to enter a date.

OWNER'S CERTIFICATION

Owner Certification			
Owner's Name: Click here to enter text.			
Company	Rosemead Holding LLC		
Address	221 N. Orange Ave City Of Industry CA 91744		
Email	Click here to enter text.		
Telephone	Click here to enter text.		

This Low Impact Development (LID) Plan is intended to comply with the requirements of County of Los Angeles for CAS004001, ORDER NO R4-2012-0175 which includes the requirement for the preparation and implementation of a LID Plan.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this LID Plan and will ensure that this LID Plan is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This LID Plan will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this LID. At least one copy of this LID Plan will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this LID Plan. The undersigned is aware that implementation of this LID Plan is enforceable under County of Los Angeles Water Quality Ordinance (Municipal Code Section CAS004001, ORDER NO R4-2012-0175).

"I, the undersigned, certify under penalty of law that the provisions of this LID have been reviewed and accepted and that the LID will be transferred to future successors in interest."

Owner's Signature		Date	Click here to enter a date.

PREPARER'S CERTIFICATION

Preparer (Engineer) Certification			
Preparer (Engineer): Jacob Vandervis			
Title	Chief Operating Officer	RCE #:	C46301
Company	Tait & Associates		
Address	701 N. Parkcenter Drive, Santa Ana, CA 92705		
Email	jvandervis@tait.com		
Telephone	714-560-8200		

I hereby certify that this Low Impact Development (LID) Plan is in compliance with, and meets the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit for stormwater and non-stormwater discharges from the MS4 within the coastal watersheds of Los Angeles County (CAS004001, Order No R4-2012-0175).

I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Preparer Signature		Date	Click here to enter a date.
Place Stamp Here			

Table of Contents

A. LID REQUIREMENTS

A.1 LID Background

In 1987, The Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA] was amended to provide that the discharge of pollutants to waters of the United States from stormwater is effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit. The 1987 amendments to the CWA added Section 402 (p), which established a framework for regulating municipal, industrial and construction stormwater discharges under the NPDES program. In California, these permits are issued through the State Water Resources Control Board - (SWRCB) and the nine Regional Water Quality Control Boards.

On November 8, 2012, the Regional Water Quality Control Board, Los Angeles Region (RWQCB), adopted Order No.R4-2012-0175. This Order is the NPDES Permit (NPDES No. CAS004001) for municipal stormwater and urban runoff discharges within the County of Los Angeles.

As adopted in November 2012, the requirements of Order No. R4-2012-0175 (the "Permit') cover 84 cities and the unincorporated areas of Los Angeles County. Under the Permit, the Los Angeles County Flood Control District is designated as the Principal Permittee; the County of Los Angeles along with the 84 incorporated cities is designated as Permittees.

In compliance with the Permit, the Permittees have implemented a stormwater quality management program (SQMP) with the ultimate goal of accomplishing the requirements of the Permit and reducing the amount of pollutants in stormwater and urban runoff wherein new development/redevelopment projects are required to prepare a Low Impact Development (LID) report.

A.2 Designated Priority Project Categories

The project is classified as category item(s) Redevelopment Project as listed in Table 1 below and is therefore classified as a Designated Project.

TABLE 1 PROJECT PRIORITY CATEGORIES		
ITEM	APPLICABLE	DESCRIPTION
1		All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.
2		Industrial parks 10,000 square feet or more of surface area.
3		Commercial malls 10,000 square feet or more of surface area.
4		Retail gasoline outlets with 5,000 square feet or more of surface area.
5		Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 Square feet or more of surface area.
6		Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.
7		Streets and roads construction of 10,000 square feet or more of impervious surface area. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects.
8		Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.
9		Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:
		a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and
		b. Create 2,500 square feet or more of impervious surface area
10		Single-family hillside homes.
11		Redevelopment Projects:
	X	a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.
		b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.
		c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

		d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
		e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add or replace 1,000 square feet of impervious surface area.

B. PROJECT AND SITE INFORMATION

B.1 Project Site Summary

Table B.1

PROJECT INFORMATION		
Type of Project:	Commercial	
Planning Area:	N/A	
Community Name:	N/A	
Development Name:	Rockland Business Park	
PROJECT LOCATION		
Latitude & Longitude (DMS): 34.05397003750858, -118.06343668044408		
Project Watershed and Sub-Watershed: Los Angeles River		
APN(s): 8102-039-031, 8102-039-030, 8102-039-029, 8102-039-035, 8102-040-011		
Map Book and Page No.: Click here to enter text.		
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)		Commercial Development
Area of Impervious Project Footprint (SF)		2,234,563 SF (5.13 Ac)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement		2,225,954 SF
Does the project consist of offsite road improvements?		☐ Y ☒ N
Does the project propose to construct unpaved roads?		☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?		☐ Y ☒ N
EXISTING SITE CHARACTERISTICS		
Total area of existing Impervious Surfaces within the project limits (SF)		2,234,954 SF
Are there any natural hydrologic features on the project site?		☐ Y ☒ N

B.2 Receiving Waters

Table B.2 below lists the stormwater runoff discharge points from the project site, classified as either a storm drain system or receiving waters. The table lists the receiving waters in order of travel, starting with the most upstream discharge point.

Table B.2

STORM DRAIN SYSTEM OR RECEIVING WATER	EPA APPROVED 303(D) LIST IMPAIRMENTS	DESIGNATED BENEFICIAL USES
Rosemead Blvd LAFCSD	N/A	N/A
Rush Blvd LAFCSD	N/A	N/A
Rio Hondo	Iron, Dissolved Oxygen, Indicator Bacteria. Ph, Toxicity, Lead, Trash, Copper, Zinc,	WARM FRESHWATER HABITAT
Los Angeles River	Trash, Nutrients, Ammonia, Indicator Bacteria, Oil, Copper, Lead	WARM FRESHWATER HABITAT
San Pedor Bay/Pacific Ocean	DDT, PCB, Toxicity, chordane	MARINE HABITAT

Additional refer to Appendix 10 for receiving waters maps.

B.3 Geotechnical Conditions

a. Topography

Existing Drainage Condition:

In the existing condition, the project site is divided into three Drainage Areas A-1, A-2 and A-3 that discharge to Outfalls 1, 2 and 3 respectively. The site generally drains from west to east towards Rosemead Boulevard with flat slopes ranging from 0.2%-0.4%. Drainage Area A has a total area of 1.60 acres that discharge to the Northwest corner of the property into Rosemead Boulevard This drainage area is entirely impervious. Drainage Area A-2 encompasses about 1.66 acres of buildings and parking that sheet flows towards Rosemead Boulevard on the Western side of the project site. Drainage Area A-3 discharges to Rosemead Boulevard at the Southwest corner of the property. It consists of approximately 1.87 acres of land.

Proposed Drainage Condition:

In the Proposed Condition, the project site was divided into 2 Drainage Areas A and B, as shown on the Proposed Condition Hydrology Exhibit on *Appendix A*. Drainage Areas A and B will discharge to Rosemead Blvd storm drain with a total tributary area of about 5.13 acres, following the existing condition patterns. Drainage Areas A and B consist of a commercial building, parking lot and the driveways. Drainage area A is 1.99 acers. The building and parking areas sheet flow generally north to various catch basins located along the perimeter of the site. Water will be conveyed via underground storm drainpipe to a detention system that is sized for the water quality volume. Low flows will enter through a diversion structure to a Modular Wetland System(MWS) for treatment before discharging to an existing catch basin on Rosemead Boulevard. High flows will bypass the MWS via the diversion manhole structure and discharge directly to the catch basin. Drainage area B is 3.14 acres picking up flows draining to the south of the property. Stormwater will sheet flow to various catch basin located along the permitter of the parking area. There water will be conveyed via underground storm drain to a detention system sized for the water quality volume. Low flows will enter through a diversion structure to a Modular Wetland System(MWS) for treatment before discharging to an existing catch basin on Rosemead Boulevard. High flows will bypass the MWS via the diversion manhole structure and discharge directly to the catch basin.

b. Soil Type:

In accordance with Los Angeles County Public Works Soil Classification Maps, the project site is designated as soil classification 006/003. The referenced map is provided in Appendix 3.

In addition to the soil classification listed above, a project specific Geotechnical Report has been prepared by TRG Geotechnical, INC. , dated December 11, 2020. To summarize the Geotechnical findings, the soil type is classified as Alluvial deposits comprised of sand, silty sand, and sandy silty clay.

Geotechnical Report is included in Appendix 3 for reference.

c. Groundwater:

Per the project specific Geotechnical Report prepared by TGR Geotechnical, INC, dated December 11, 2020 the groundwater level was determined to be at a depth of 48'. A percolation test was performed and found infiltration rates of 0.0 in/hr, 0.4 in/hr, and 0.1 in/hr.

As determined through the State Water Board Geotracker database, this project site. does not have any known groundwater contamination/ does have groundwater contamination and is listed by the Regional Water Board's Leaking Underground Storage Tank (LUST) Program and Site Cleanup Program (SCP)

Per geotechnical conditions listed above, stormwater infiltration for the site is infeasible. *Refer to attached Geotechnical Report in Appendix 3 to further explain infiltration feasibility/infeasibility studies.*

d. Other Geotechnical Issues:

To summarize the other site Geotechnical issues listed in the Geotechnical Report prepared by TGR Geotechnical, INC., dated December 11 2020, refer to Table d.1 below.

Table B.3.d

OTHER GEOTECHNICAL ISSUES	
Collapsible Soil	☐ Y ☒ N
Expansive Soil	☐ Y ☒ N
Liquefaction	☒ Y ☐ N

B.4 Other Site Considerations

a. Off-site Drainage:

The project site does not anticipate any off-site run-on.

b. Significant Ecological Areas (SEAs)

The project's Significant Ecological Areas (SEAs) are listed in Table B.4.b below and require a separate regulatory permit.

Table B.4.b

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N

C. BEST MANAGEMENT PRACTICES

C.1 Site Design Principles

a. Natural Areas:

Table c.1.a

Natural Area Design Criteria	Implemented		
Preserve historically undisturbed areas.	☐ Y	☐ N	☒ N/A
Maintain surface flow patterns of undeveloped sites, including water body alignments, sizes and shapes	☐ Y	☐ N	☒ N/A
Reserve areas with high permeability soils for either open space or retention based stormwater quality control measures.	☐ Y	☐ N	☒ N/A
Incorporate existing trees into site layout	☐ Y	☐ N	☒ N/A
Identify areas that may be restored or revegetated either during or post-construction	☐ Y	☐ N	☒ N/A
Identify and avoid areas susceptible to erosion and sediment loss.	☐ Y	☐ N	☒ N/A
Concentrate or cluster development on less sensitive areas of the project site, while leaving the remaining land in a natural, undisturbed state. Less sensitive areas may include, but are not limited to, areas that are not adjacent to receiving waters or areas where erosion may be an issue.	☐ Y	☐ N	☐ N/A
Protect slopes from erosion by safely conveying stormwater runoff from the tops of slopes.	☐ Y	☐ N	☒ N/A
Limit clearing and grading of native vegetation at the project site to minimum amount needed to build lots, allow access, and provide fire protection.	☐ Y	☐ N	☒ N/A
Maintain existing topography and existing drainage divides to encourage dispersed flow.	☐ Y	☐ N	☒ N/A
Maximize trees and other vegetation at the project site by planting additional vegetation, clustering tree areas, and promoting use of native and/or droughttolerant plants.	☐ Y	☐ N	☒ N/A
Promote natural vegetation by using parking lot islands and other landscaped areas. Integrate vegetation-based stormwater quality control measures within parking lot islands and landscaped areas.	☐ Y	☐ N	☒ N/A

b. Minimize Land Disturbance:

To maintain the native soil compaction and infiltration rates, the following measures shall be applied where practical on the construction site. These measures are not to supersede compaction requirements associated with the applicable building codes.

- Delineate and mark the development envelope for the project site on the site plan and physically demarcate the development envelope at the project site using temporary orange construction fencing or flagging. The development envelope is established by identifying the minimum area

needed to build lots, allow access, provide fire protection, and protect and buffer sensitive features such as streams, floodplains, steep slopes, and wetlands. Concentrate building and paved areas on the least permeable soils, with the least intact habitat.

- Restrict equipment access and construction equipment storage to the development envelope.
- Consider soil amendments to restore permeability and organic content.

c. Minimize Impervious Area:

The project will comply with all applicable building and fire codes and ordinances. Additional consideration was given to minimize the project site impervious area by implementing the following site designs where applicable and site feasible:

- Use minimum allowable roadway and sidewalk cross sections, driveway lengths, and parking stall sizes.
- Use two-track/ribbon alleyways/driveways or shared driveways.
- Include landscape islands in cul-de-sacs streets (where approved). Consider alternatives to cul-de-sacs to increase connectivity.
- Reduce building and parking lot footprints. Building footprints may be reduced by building taller.
- Use pervious pavement material, such as modular paving blocks, turf blocks, porous concrete and asphalt, brick, and gravel or cobble, to accommodate overflow parking, if feasible.
- Cluster buildings and paved areas to maximize pervious area.
- Maximize tree preservation or tree planting.
- Avoid compacting or paving over soils with high infiltration rates (see Minimize Land Disturbance section).
- Use vegetated swales to convey stormwater runoff instead of paved gutters.
- Build compactly at redevelopment sites to avoid disturbing natural and agricultural lands and to reduce per capita impacts.

d. Protect and Restore Natural Areas:

If feasible, and consistent with applicable General Plan or Local Area Plan policies, for the project site, the following design features or elements must be included:

- Preserve historically undisturbed areas. Identify and cordon off streams and their buffers, floodplains, wetlands, and steep slopes.
- Maintain surface flow patterns of undeveloped sites, including water body alignments, sizes, and shapes.
- Reserve areas with high permeability soils for either open space or retention-based stormwater quality control measures.
- Incorporate existing tree into site layout.
- Identify areas that may be restored or revegetated either during or post-construction.
- Identify and avoid areas susceptible to erosion and sediment loss.
- Concentrate or cluster development on less sensitive areas of the project site, while leaving the remaining land in a natural state, undisturbed state. Less sensitive areas may include, but are not limited to, areas that are not adjacent to receiving waters or areas where erosion may be an issue.

- Protect slopes from erosion by safely conveying stormwater runoff from the tops of slopes.
    - Vegetate slopes with native or drought-tolerant species.
    - Ensure slope protection practices conform to the applicable local erosion and sediment control standards and design standards. The design criteria described in this section are intended to enhance and be consistent with these local standards.
- Limit clearing and grading of native vegetation at the project site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maintain existing topography and existing drainage divides to encourage dispersed flow.
- Maximize trees and other vegetation at the project site by planting additional vegetation, clustering tree areas, and promoting use of native and/or drought-tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas. Integrate vegetation-based stormwater quality control measures within parking lot islands and landscaped areas.

C.2 Source Control Measures

Per the Los Angeles County Public Works Low Impact Development Manual, the following source control measures shall be implemented in the project design and as listed per LID Manual Table 5-1, also referenced in Appendix 9.

Fact sheets for each of the source control measures listed in Table C.2 below can be found in Appendix 9. The source controls shall be designed and implemented in accordance with these fact sheets.

Table C.2

Source Control Measures	Implemented		
Storm drain message and signage (S-1)	☒ Y	☐ N	☐ N/A
Outdoor Material Storage Areas (S-2)	☐ Y	☐ N	☒ N/A
Outdoor Trash Storage/Waste Handling Areas (S-3)	☒ Y	☐ N	☐ N/A
Outdoor Loading/Unloading Dock Areas (S-4)	☒ Y	☐ N	☐ N/A
Outdoor Vehicle/Equipment Repair/Maintenance Areas (S-5)	☐ Y	☐ N	☒ N/A
Outdoor Vehicle/Equipment/Accessory Wash Areas (S-6)	☐ Y	☐ N	☒ N/A
Fuel & Maintenance Areas (S-7)	☐ Y	☐ N	☒ N/A
Landscape Irrigation Practices (S-8)	☒ Y	☐ N	☐ N/A
Building Materials (S-9)	☐ Y	☐ N	☒ N/A
Animal Care and Handling Facilities (S-10)	☐ Y	☐ N	☒ N/A
Outdoor Horticulture Areas (S-11)	☐ Y	☐ N	☒ N/A

D. STORMWATER QUALITY DESIGN VOLUME CALCULATION

The design storm, from which the Stormwater Quality Design Volume (SWQDv) is calculated, is defined as the **greater of**:

The 0.75-inch, 24 hour storm rain event, or
The 85th percentile, 24 hour rain event as determined from Los Angeles County 85th percentile precipitation isoheytal map, as provided in Appendix 5.

D.1 Project Rainfall Depth:

85th Percentile, 24 Hour Rain Event = **0.92** Inches.
The 85th percentile, 24 hour storm event is greater and therefore a rainfall depth of 0.92 inches is used to calculate the SWQDv.

D.2 Project Calculated SWQDv:

Per County of Los Angeles HydroCalc Program, the input and output values as calculated for the site SWQDv is provided in Appendix 5.

Below is a provided summary of the SWQDv calculated.
Table D.2

DMA NAME OR ID	AREA (AC)	SOIL TYPE	FLOW PATH	PERCENT IMPERVIOUS	SWQDv	t_c
A	1.99	006	839	0.93	8818.5	42
B	3.14	006	932	0.99	13959	46
				TOTAL SWQDv=	22777	

E. STORMWATER QUALITY CONTROL MEASURES –LID BMPs

Stormwater Quailty Control Measures must be designed and implemented to detain the calculated SWQDv in the following order:

1) **Infiltration (On-site Retention**)
2) **Runoff Harvest and Use**
3) **On-site biofiltration**, off-site groundwater replenishment, off-site infiltration and/or biorenteion, and off-site retrofit.

Additionally, pretreatment must be provided for stormwater quality control measures whose function may be adversely affected by sediment or other pollutants as described in Section Click here to enter text..

E.1 Infiltration (On-Site Retention):

The project site was analyzed for Infiltration feasibility.

Table E.1

Infiltration Infeasibility		
The corrected in-situ infiltration rate is less than 0.3 inches per hour, as determined according to the most recent GMED Policy GS 200.1, and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable	☒ Y	☐ N
Locations where the seasonal high groundwater level is within 10 feet of the surface, as determined according to the most recent GMED Policy GS 200.1;	☐ Y	☒ N
Locations within 100 feet of a groundwater well used for drinking water;	☐ Y	☒ N
Brownfield development sites where infiltration poses a risk of pollutant mobilization;	☐ Y	☒ N
Other locations where pollutant mobilization is a documented concern (e.g., at or near properties that are contaminated or store hazardous substances underground);	☐ Y	☒ N
Locations with potential geotechnical hazards;	☐ Y	☒ N
Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite retention requirement;	☐ Y	☒ N
Locations where infiltration may adversely impact biological resources; or	☐ Y	☒ N
Locations where infiltration may cause health and safety concerns.	☐ Y	☒ N
Other:_____	☐ Y	☐ N

If yes has been checked for any of the above questions, then infiltration BMPs will not be used for the site and Harvest and Use will be assessed next for site feasibility. Additional Infiltration Infeasibility narrative is provided below.

If no has been checked for all above questions, then site infiltration is feasible and Table E.2 below lists the implemented Infiltration based BMPs.

Additional Infiltration Infeasibility Narrative:

The corrected in-situ infiltration rate is less than 0.3 inches per hour.
Per the infiltration testing performed by TGR geotechnical in December 2020, the site infiltration tests ranged from 0-0.4 in/hr with no safety factor. This does not meet the County requirements of a factored infiltration rate of greater than 0.3 in/hr to utilize an infiltration BMP on site.
Refer to Appendix 4 for BMP infeasibility supporting documentation.

Implemented Infiltration BMPs

Table E.1

Infiltration based BMPs	Implemented	
Bioretention (RET-1)	☐ Y	☒ N

Infiltration Basin (RET-2)	☐ Y	☒ N
Infiltration Trench (RET-3)	☐ Y	☒ N
Dry Well (RET-4)	☐ Y	☒ N
Permeable Pavement without an Underdrain (RET-5)	☐ Y	☒ N
Other:_____	☐ Y	☒ N

Infiltration BMP Narrative:

Describe any special BMP constraints or designs. Describe locations and how they are being implemented to meet LID requirements.

E.2 Runoff Harvest and Reuse Assessment:

Does the site capture 100% of the SWQDv through Infiltration based BMPs as listed above? ☐ **Y** ☒ **N**

If yes has been checked, Harvest and Reuse BMP assessment is not required.

If no has been checked, Harvest and Reuse assessment is required. See feasibility analysis provided in Appendix 4. The following Harvest and Use BMPs have been implemented on-site.

A. Harvest and Reuse- Indoor Use

Per the 2014 California Department of Public Health Regulations Related to Recycled Water- Article 5. Dual Plumbed Recycled Water Systems 60313 (a), no person other than a recycled water agency shall deliver recycled water to a dual plumbed facility. In conclusion, the reuse of water for internal plumbing use is considered infeasible per the CDPH Regulations.

B. Harvest and Reuse- Outdoor Use (Irrigation)

Table E.2B

Capture and Use Infeasibility		
Projects that would not provide sufficient irrigation or (where permitted) domestic grey water demand for use of stored stormwater runoff due to limited landscaping or extensive use of low water use plant palettes in landscaped areas; (See calculations provided in Appendix 4) _____0.2 Acres or 0.03% of the site provided Landscape Area	☒ Y	☐ N
Projects that are required to use recycled water for landscape irrigation;	☐ Y	☒ N
Projects in which the harvest and use of stormwater runoff would conflict with local, state, or federal ordinances or building codes;	☐ Y	☒ N
Locations where storage facilities may cause potential geotechnical hazards as outlined in the geotechnical report; or	☐ Y	☒ N
Locations where storage facilities may cause health and safety concerns.	☐ Y	☒ N

If yes has been checked for any of the above questions, then Harvest and Use BMPs will not be used for the site and Alternative Compliance is required.

Implemented Capture and Use BMPs

Table E. 2.B

Harvest & Use BMPs	Implemented	
Rain Barrel/Cistern (RET-6)	☐ Y	☒ N
Green Roof (RET-7)	☐ Y	☒ N
Other: _____	☐ Y	☒ N

Additional Capture and Use Narrative:

(Expand on reasons checked/not checked above and provide additional information if necessary)

E.3 Alternative Compliance:

Does the site capture 100% of the SWQDv through Infiltration and/or Runoff Harvest and Use based BMPs as listed above? ☐ **Y** ☒ **N**

If yes has been checked, Alternative Compliance is not required.
If no has been checked, Alternative Compliance is required.

A. Implemented Alternative Compliance Measures:

Table E.3.A

Alternative Compliance Measures	Implemented	
On-site biofiltration of 1.5 times the volume of the SWQDv that is not reliably retained on-site; _____15185(1.5) = 22777 Calculated SWQDv (See Appendix 5 for Calculations)	☒ Y	☐ N
On-site treatment and off-site infiltration/bioretnetion for the volume of the SWQDv that is not reliably retained on-site	☐ Y	☒ N
Replenishment of groundwater supplies that have a designated beneficial use in the Water Quality Control Plan: Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan), which was most recently adopted in June 1994 by the Regional Water Board and subsequently amended; or	☐ Y	☒ N
On-site treatment and off-site infiltration/bioretention or stormwater runoff harvest and use of the volume of SWQDv that is not reliably retained on-site through retrofit an existing development with similar land uses as the project.	☐ Y	☒ N
Other:_____	☐ Y	☒ N

Acceptable Alternative Compliance BMPs are listed and implemented on-site as listed below in Table E.3.B.

Table E.3.B

On-site Biofiltration and Vegetation based Stormwater Quality Control Measures	Implemented	
Biofiltration (BIO-1)	☒ Y	☐ N
Stormwater Planter (VEG-1)	☐ Y	☒ N
Tree-well Filter (VEG-2)	☐ Y	☒ N
Vegetated Filter Strips (VEG-3)	☐ Y	☒ N
Vegetated Swales (VEG-4)	☐ Y	☒ N
Other:_____	☐ Y	☒ N

Additional Alternative Compliance Narrative:
(Expand on reasons checked/not checked above and provide additional information if necessary)

E.4 Pretreatment BMPs:

Is pretreatment required for the project site? ☒ **Y** ☐ **N**

If yes has been checked, the following Pretreatment BMPs will be implemented on-site.

Table E.4

Treatment-based Stormwater Quality Control Measures		
Sand Filters (T-1)	☐ Y	☒ N
Constructed Wetlands (T-2)	☐ Y	☒ N
Extended Detention Basins (T-3)	☐ Y	☒ N
Wet Pond (T-4)	☐ Y	☒ N
Permeable Pavement with an Underdrain (T-5)	☐ Y	☒ N
Proprietary Devices (T-6)	☒ Y	☐ N
Other:_____	☐ Y	☐ N

F. HYDROMODIFICATION

Projects may be exempt from implementation of hydromodication control measures where assessment of downstream channel conditions and proposed discharge hydrology indicate the adverse hydromodiciation effects to beneficial uses of natural drainage systems are unlikely.

Table F.1

Exemptions		
The replacement, maintenance, or repair of an existing permitted publicly-maintained flood control facility, storm drain, or transportation network	☐ Y	☒ N
Redevelopment of a previously developed site in an urbanized area that does not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions ____100_____% Pre Development Imperviousness _____96____% Post Development Imperviousness	☒ Y	☐ N
Projects that have any increased discharge directly or through a storm drain to a sump, lake, area under tidal influence, into a waterway that has an estimated hundred year peak flow of 25,000 cfs or more, or other receiving water that is not susceptible to hydrmodification impacts	☐ Y	☒ N
Projects that discharge directly or through a storm drain into concrete or otherwise engineered channel (channelized or armored with rip-rap, shotcrete), which in turn, discharge into receiving water that is not susceptible to hydromodification impacts. ___Roesmead BLVD LAFCSD_____ Receiving water _____Rush ST LAFCSD___ Receiving water __Rio Hondo_____ Receiving water Los Angeles River Receiving water (Reference Appendix 10 for map showing receiving waters)	☒ Y	☐ N
Non-designated project disturbing less than 1 acre or creating less than 10,000 square feet of new impervious area; or	☐ Y	☒ N
Single-family homes that incorporate LID BMPs in accordance with the LID Standards Manual	☐ Y	☒ N

If yes has been checked, Hydromodification control measures are not required. Refer to additional Hydromodification exemption narrative given below.

If no has been checked, Hydromodification control measures are required and must meet the design criteria set forth by the Los Angeles County LID Manual and as given below.

Additional Hydromodification Exemption Narrative:

(Provide additional information such as total impervious area for pre to post project, description of downstream channel that is concrete lined, etc.)

G. STORMWATER BMP MAINTENANCE

Maintenance Plan Requirements

A Maintenance Plan is provided in Appendix X for each individual stormwater BMP.
The Maintenance plan includes the following items:

Table G.1

Maintenance Plan		
Operation plan and schedule, including a site map	☐ Y	☐ N
Maintenance and cleaning activities and schedule	☐ Y	☐ N
Equipment and resource requirements necessary to operate and maintain stormwater quality control measure	☐ Y	☐ N
Responsible party for operation and maintenance.	☐ Y	☐ N

Table G.2

Site Map		
Provide a site map showing boundaries of the site, acreage, and drainage patterns/contour lines. Show each discharge location from the project site and any drainage flowing onto the site. Distinguish between pervious and impervious surfaces on the map.	☒ Y	☐ N
Identify locations of existing and proposed storm drain facilities, private sanitary sewer systems, and grade breaks for purposes of pollution preventions.	☐ Y	☐ N
With a legend, identify locations of expected sources of pollution generation (e.g. outdoor work and storage areas, heavy traffic areas, delivery areas, trash enclosures, fueling areas, industrial clarifies, and wash-racks). Identify any areas having contaminated soil or where pollutants are stored or have been stored/disposed of in the past.	☐ Y	☐ N
With a legend, indicate types and locations of stormwater quality control measures that will be built to permanently control stormwater pollution, including Global Positioning System X and Y coordinates. Distinguish between pollution prevention, treatment, sewer diversion, and contaminated devices.	☐ Y	☐ N

Table G.3

Baseline Descriptions		
List property owners and persons responsible for operation and maintenance of the on-site stormwater quality control measures. Include phone numbers and addresses.	☐ Y	☐ N
Identify the intended method of funding (i.e., homeowners association fees) for operation, inspection, routine maintenance, and upkeep of stormwater quality control measures.	☐ Y	☐ N
List all permanent stormwater quality control measures. Provide a brief description of each stormwater quality control measure and, if appropriate, fact sheets or additional	☐ Y	☐ N

information.		
A written description and checklist of all maintenance and waste disposal activities that will be performed. Distinguish between the maintenance appropriate for a 2-year establishment period and expected long-term maintenance. For example, maintenance requirements for vegetation in a constructed wetland may be more intensive during the first few years until the vegetation is established. The post-establishment maintenance plan must address maintenance needs (e.g., pruning, irrigation, weeding) for a larger, more stable system. Include maintenance performance procedures for facility components that require relatively unique maintenance knowledge, such as specific plant removal/replacement, landscape features, or constructed wetland maintenance. These procedures must provide sufficient detail to a person unfamiliar with maintenance to perform the activity or identify the specific skills or knowledge to perform and document the maintenance.	☐ Y	☐ N
A description of site inspection procedures and documentation system, including recordkeeping and retention requirements.	☐ Y	☐ N
An inspection and maintenance schedule, preferably in the form of a table or matrix, for each activity for all facility components. The schedule must show how it will satisfy the specified level of performance and how maintenance/inspection activities relate to storm events and seasonal issues.	☐ Y	☐ N
Identification of equipment and materials required to perform maintenance.	☐ Y	☐ N
As appropriate, list all housekeeping procedures for prohibiting illicit discharges or potential illicit discharges to the storm drain system. Identify housekeeping BMPs that reduce maintenance of stormwater quality control measures.	☐ Y	☐ N

Table G.4

Spill Plan		
Provide emergency notification procedures (phone and agency/persons to contact).	☐ Y	☐ N
As appropriate for site, provide emergency containment and cleaning procedures.	☐ Y	☐ N
Note downstream receiving waters, wetlands, or SEAs that may be affected by spills or chronic untreated discharges.	☐ Y	☐ N
As appropriate, create an emergency sampling procedure for spills. Emergency sampling can protect the property owner from erroneous liability for downstream receiving area cleanups.	☐ Y	☐ N

Identify appropriate persons to be properly trained and assure documentation of training. Training should include:

Table G.5

Training		
Good housekeeping procedures defined in the Maintenance Plan;	☐ Y	☐ N
Proper maintenance of all pollution mitigation devices	☐ Y	☐ N

Identification and cleanup procedures for spills and overflows	☐ Y	☐ N
Large-scale spill or hazardous material response; and	☐ Y	☐ N
Safety concerns when maintain devices and cleaning spills.	☐ Y	☐ N

Table G.5

Basic Inspection and Maintenance Activities		
Create and maintain on-site, a log for inspector names, dates, and stormwater quality control measure to be inspected and maintained. Provide a checklist for each inspection and maintenance category.	☐ Y	☐ N
Perform and document annual testing of any mechanical or electrical devices prior to wet weather.	☐ Y	☐ N
Report any significant changes in stormwater quality control measures to the site management. As appropriate, assure mechanical devices are working properly and/or landscaped plants are irrigated and nurtured to promote thick growth.	☐ Y	☐ N
Note any significant maintenance requirements due to spills or unexpected discharges.	☐ Y	☐ N
As appropriate, perform maintenance and replacement as scheduled or as needed in a timely manner to assure stormwater quality control measures are performing as designed and approved.	☐ Y	☐ N
Assure unauthorized low-flow discharges from the property do not bypass stormwater quality control measures.	☐ Y	☐ N
Perform an annual assessment of each pollution-generating operation and its associated stormwater quality control measures to determine if any part of the pollution reduction train can be improved. Annual assessment reports must be submitted to LACDPW.	☐ Y	☐ N

Operational or facility conditions or changes that significantly affect the character or quantity of pollutants discharging into the stormwater quality control measures may require modifications to the Maintenance Plan and/or additional stormwater quality control measures.

If future correction or modification of past stormwater quality control measures or procedures is required, the owner must obtain approval from LACDPW prior to commencing any work. Corrective measures or modifications must not cause discharges to bypass or otherwise impede existing stormwater quality control measures.

Maintenance Agreement:

Verification of maintenance provisions is required for all stormwater quality control measures. If required, verification, at a minimum, must include:

Table xx.xx

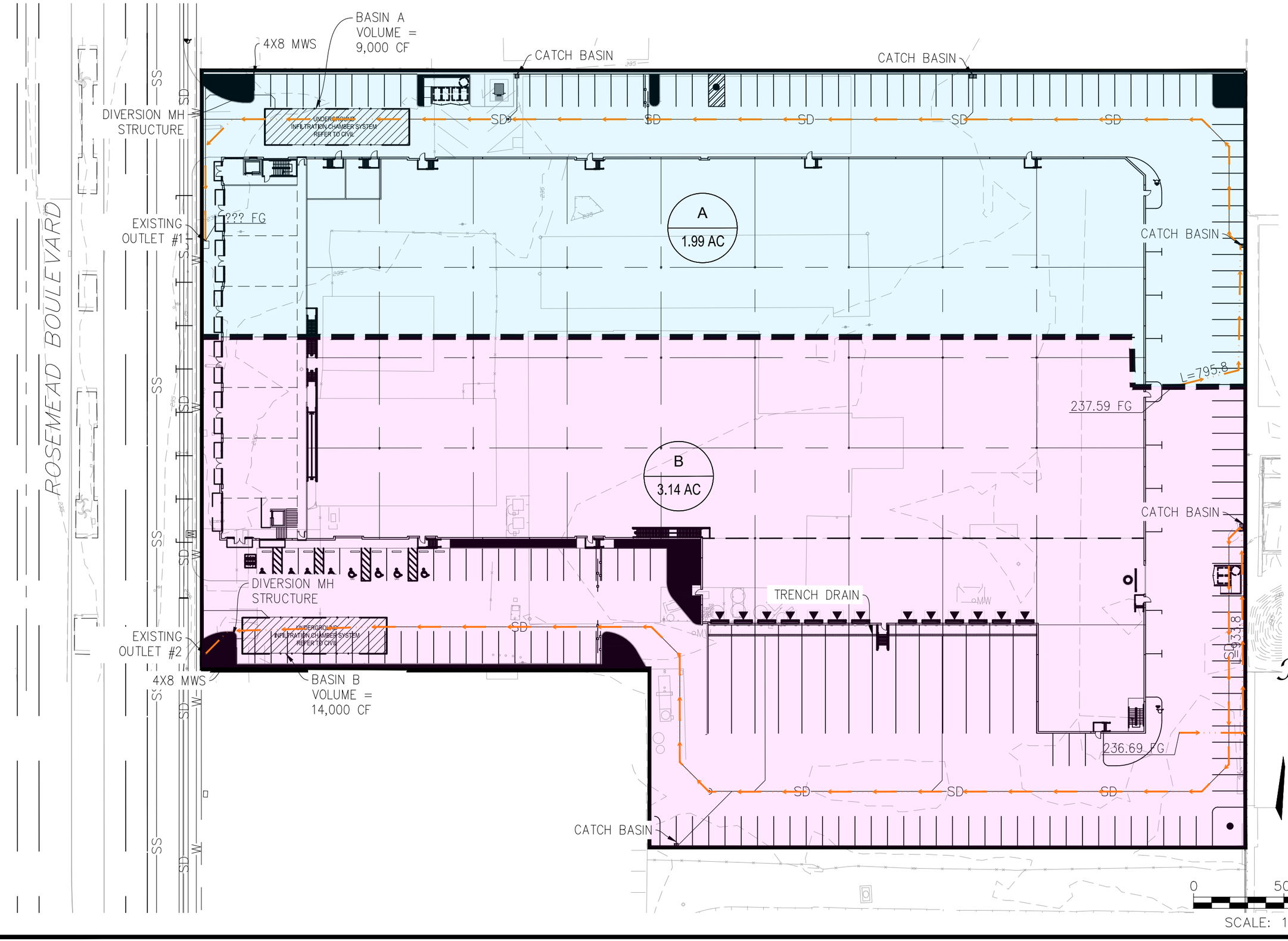
Verification of Maintenance Provisions		
The owner/developer's signed statement accepting responsibility for inspection and maintenance until the responsibility is legally transferred. An example Owners Certification Statement is provided in Appendix G; and either	☐ Y	☐ N
A signed statement from the public entity assuming responsibility for	☐ Y	☐ N

stormwater quality control measure inspection and maintenance and certifying that it meets all design standards; or		
Written conditions in the sales or lease agreement that require the recipient to assume responsibility for inspection and maintenance activities and to conduct a maintenance inspection at least once a year; or	☐ Y	☐ N
Written text in project conditions, covenants, and restrictions for residential properties that assign maintenance responsibilities to a Home Owners Association for inspection and maintenance of stormwater quality control measures; or	☐ Y	☐ N
A legally enforceable maintenance agreement that assigns responsibility for inspection and maintenance of stormwater quality control measures to the owner/operator. A Maintenance Agreement with LACDPW must be executed by the owner/operator before occupancy of the project is approved.	☐ Y	☐ N

APPENDICES

APPENDIX 1

MAPS AND SITE PLANS



DRAWN: DE
DATE: 02/17/2020
CHECKED: PM
DATE: 12/12/2020
JOB NO: AB1234

TAIT & ASSOCIATES
Since 1944
ENGINEERING ENVIRONMENTAL BUILDING LAND
Orange County Sacramento Denver Dallas
San Luis Obispo Riverside Boise Atlanta
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

LID EXHIBIT

PROJECT TITLE
CLIENT NAME
ADDRESS / LOCATION
ADDITIONAL INFORMATION

Jan 19, 2023 - 2:25pm by sshire K:\Drawings\SP\SP8613 - South El Monte\ENG\LID\SP8613_cLID.dwg

5/15/2019 Exhibit XX

LEGEND

180	PROPOSED CONTOUR
	FLOW LINE
	SURFACE DIRECTION OF FLOW
	EXISTING STORM DRAIN
SD	PROPOSED STORM DRAIN ≤ 12"
	AREA BOUNDARY
X-# / #.##AC	AREA ID / AREA (AC)
	LANDSCAPE AREA

ABBREVIATIONS

FG	FINISHED GRADE
INV	INVERT
FFE	FINISHED FLOOR ELEVATION
PE	PAD ELEVATION
CF	CUBIC FEET
MWS	MODULAR WETLAND SYSTEM

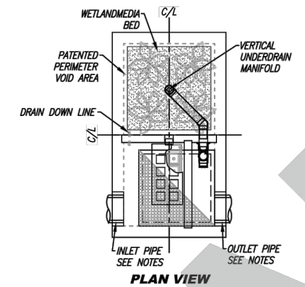
SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.115	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			9.97
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1		PVC	
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE		PVC	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	36" X 36"	OPEN PLANTER	N/A
WETLANDMEDIA VOLUME (CY)			2.66
ORIFICE SIZE (DIA. INCHES)			ø1.53"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

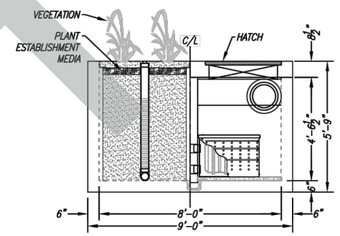
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. 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 PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

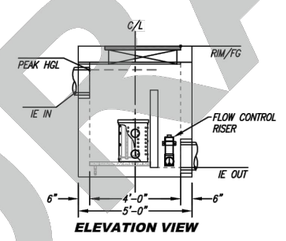
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



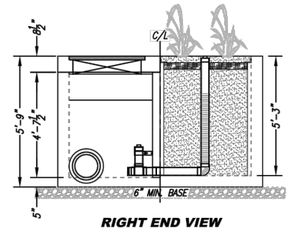
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-8-5'-3"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DRAFT

TAIT & ASSOCIATES
Since 1944
ENGINEERING ENVIRONMENTAL BUILDING LAND
Orange County Sacramento Denver Dallas
San Luis Obispo Riverside Boise Atlanta
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

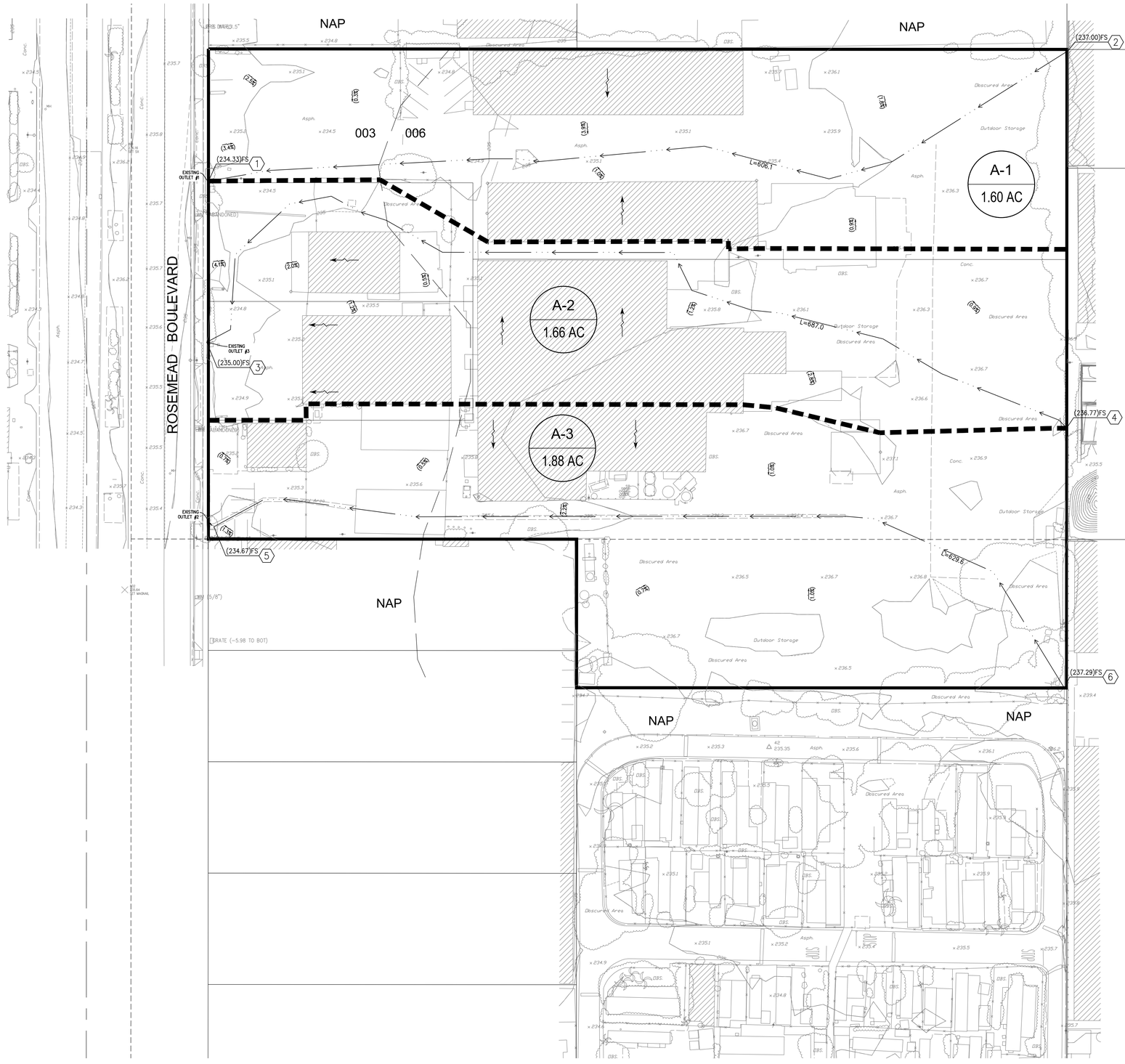
DRAWN: DE
DATE: 02/17/2020
CHECKED: PM
DATE: 12/12/2020
JOB NO: AB1234

LID EXHIBIT

PROJECT TITLE
CLIENT NAME
ADDRESS / LOCATION
ADDITIONAL INFORMATION

Jan 19, 2023 – 2:25pm by sshire K:\Drawings\SP\SP8613 – South El Monte\ENG\LID\SP8613_cLID.dwg

5/15/2019 Exhibit XX



LEGEND

- EXISTING CONTOUR
- FLOW LINE
- (0.5%) EXISTING SLOPE
- EXISTING STORM DRAIN
- AREA BOUNDARY
- SUB-AREA BOUNDARY
- NODE
- SOIL BOUNDARY
- X-# / #.##AC AREA ID / AREA (AC)

ABBREVIATIONS

EX	EXISTING
FS	FINISHED SURFACE
FG	FINISHED GRADE
INV	INVERT

* ASSUMES ROOF RUNOFF IS 2% FOR HYDROLOGY MODELING PURPOSES

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

811 Know what's below Call before you dig.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE
	REVISIONS		

TAIT & ASSOCIATES
Since 1944
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com
ENGINEERING ENVIRONMENTAL PLANNING LAND SURVEYING
Orange County Sacramento Denver Dallas
San Diego Riverside Boise Atlanta

DEMOLITION PLAN
ROCKLAND BUSINESS PARK
2222 ROSEMEAD BLVD.
SOUTH EL MONTE, CALIFORNIA

N

0 30' 60'
SCALE: 1" = 30'

FOR REVIEW ONLY NOT FOR CONSTRUCTION

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER JACOB VANDERVIS No. C46301 EXP. 12-31-24 CIVIL STATE OF CALIFORNIA

EXISTING HYDROLOGY MAP

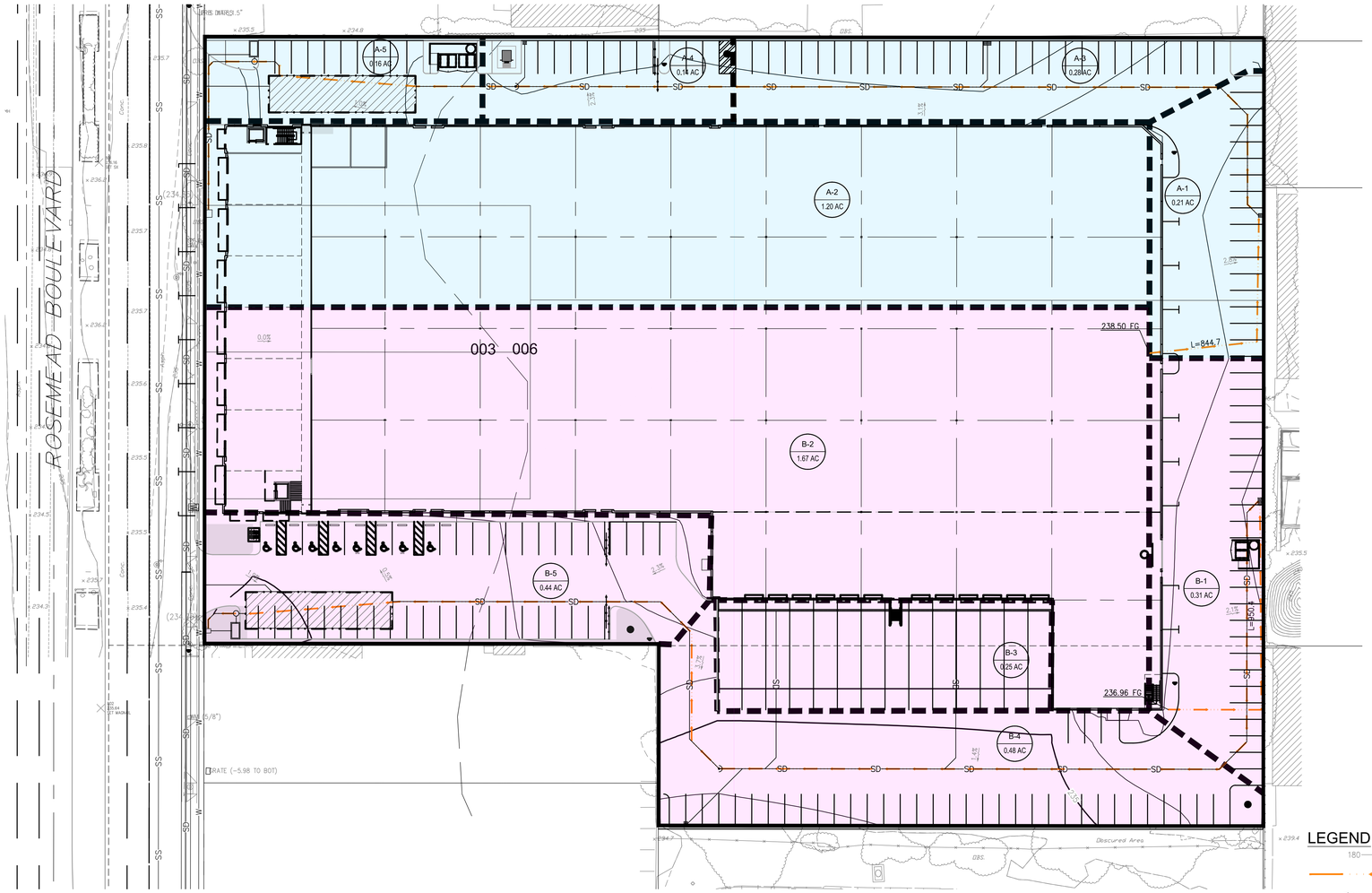
JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

DRAWN:
DATE:
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO: SP8613

1 OF 3

11/23/2020 Design Development

Jan 18, 2023 - 11:06am by ashlie K:\Drawings\SP\SP8613 - South El Monte\DNG\Hydrology\SP8613-EX HYDRO.dwg



LEGEND

- PROPOSED CONTOUR (180)
- FLOW LINE
- SURFACE DIRECTION OF FLOW
- EXISTING STORM DRAIN (SD)
- PROPOSED STORM DRAIN ≤ 12" (SD)
- PROPOSED STORM DRAIN > 12"
- STORM DRAIN PIPE FLOW
- AREA BOUNDARY
- SUB-AREA BOUNDARY
- SOIL BOUNDARY
- NODE (#)
- AREA ID (X-#) / AREA (AC) (#.##AC)
- LANDSCAPE AREA
- DRAINAGE AREA A
- DRAINAGE AREA B

ABBREVIATIONS

FG	FINISHED GRADE
INV	INVERT
FFE	FINISHED FLOOR ELEVATION
PE	PAD ELEVATION
CF	CUBIC FEET
MWS	MODULAR WETLAND SYSTEM

N

0' 30' 60'
SCALE: 1" = 30'

FOR REVIEW ONLY NOT FOR CONSTRUCTION

Know what's below Call before you dig.

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER JACOB VANDERVIS No. C46301 EXP. 12-31-24 CIVIL STATE OF CALIFORNIA

JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

NO.	DESCRIPTION	BY	DATE

REVISIONS

TAIT & ASSOCIATES
Since 1964

701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

ENGINEERING ENVIRONMENTAL BUILDING LAND
Orange County Sacramento Denver
San Diego Riverside Boise
Dallas
Atlanta

PROPOSED HYDROLOGY MAP
ROCKLAND BUSINESS PARK
2222 ROSEMEAD BLVD.
SOUTH EL MONTE, CALIFORNIA

DRAWN:
DATE:
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO: SP9813

1 OF 4

11/23/2020 Design Development

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

Jan 18, 2021 - 3:05pm by zahra K:\Drawings\SP\SP9813 - South El Monte\DWG\Hydrology\SP9813-PR HYDRO.dwg

APPENDIX 2

CONSTRUCTION PLANS

ROSEMEAD BOULEVARD

PROPOSED BUILDING

1ST FLOOR

238.50FF

BEG. RETAINING CURB

BEGIN RETAINING WALL END RETAINING CURB

BEGIN RETAINING WALL

235.50FF

LEGEND:

- UNDERGROUND DETENTION SYSTEM
- SD — PROPOSED STORM DRAIN
- ADA PATH OF TRAVEL
- PROPERTY LINE
- RH — RETAINING HEIGHT

EARTHWORK:

STATEMENT OF QUANTITIES:

CUT: 9,150 CY
FILL: 13,050 CY
STORMWATER DETENTION: ±2,500 CY (CUT)
NET: ±1,400 CY (IMPORT)

CONCEPTUAL GRADING NOTES:

1. CONSTRUCT 6" CURB PER SPPWC STD. NO. 120-2, TYPE A1-6.
2. CONSTRUCT 6" CURB AND GUTTER PER SPPWC STD. NO. 120-2, TYPE A2-6.
3. CONSTRUCT STANDARD DUTY AC PAVEMENT (3" AC OVER 6"AB).
4. CONSTRUCT HEAVY DUTY AC PAVEMENT (4" AC OVER 10"AB).
5. CONSTRUCT 4" PCC SIDEWALK PER LA COUNTY STD. NO. 1130-1.
6. CONSTRUCT RETAINING WALL PER SPPWC STD. NO. 603 (2' MAX. HEIGHT, RH PER PLAN).
7. CONSTRUCT RETAINING CURB PER DETAIL HEREON (3' MAX. HEIGHT, RH PER PLAN).
8. LANDSCAPE PER SEPARATE PLANS.

N

0 20' 40'

SCALE: 1" = 20'

811 Know what's below Call before you dig.

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

NO.	DESCRIPTION	BY	DATE
	REVISIONS		

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

TAIT & ASSOCIATES
Since 1964
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com
ENGINEERING ENVIRONMENTAL PLANNING LAND SURVEYING
Orange County Sacramento Denver
San Diego Riverside Boise
Dallas Atlanta

CONCEPTUAL GRADING PLAN
ROCKLAND BUSINESS PARK
2222 ROSEMEAD BLVD.
SOUTH EL MONTE, CALIFORNIA

FOR REVIEW ONLY NOT FOR CONSTRUCTION

DRAWN: TLP
DATE: 6/22/2021
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO. SP9813

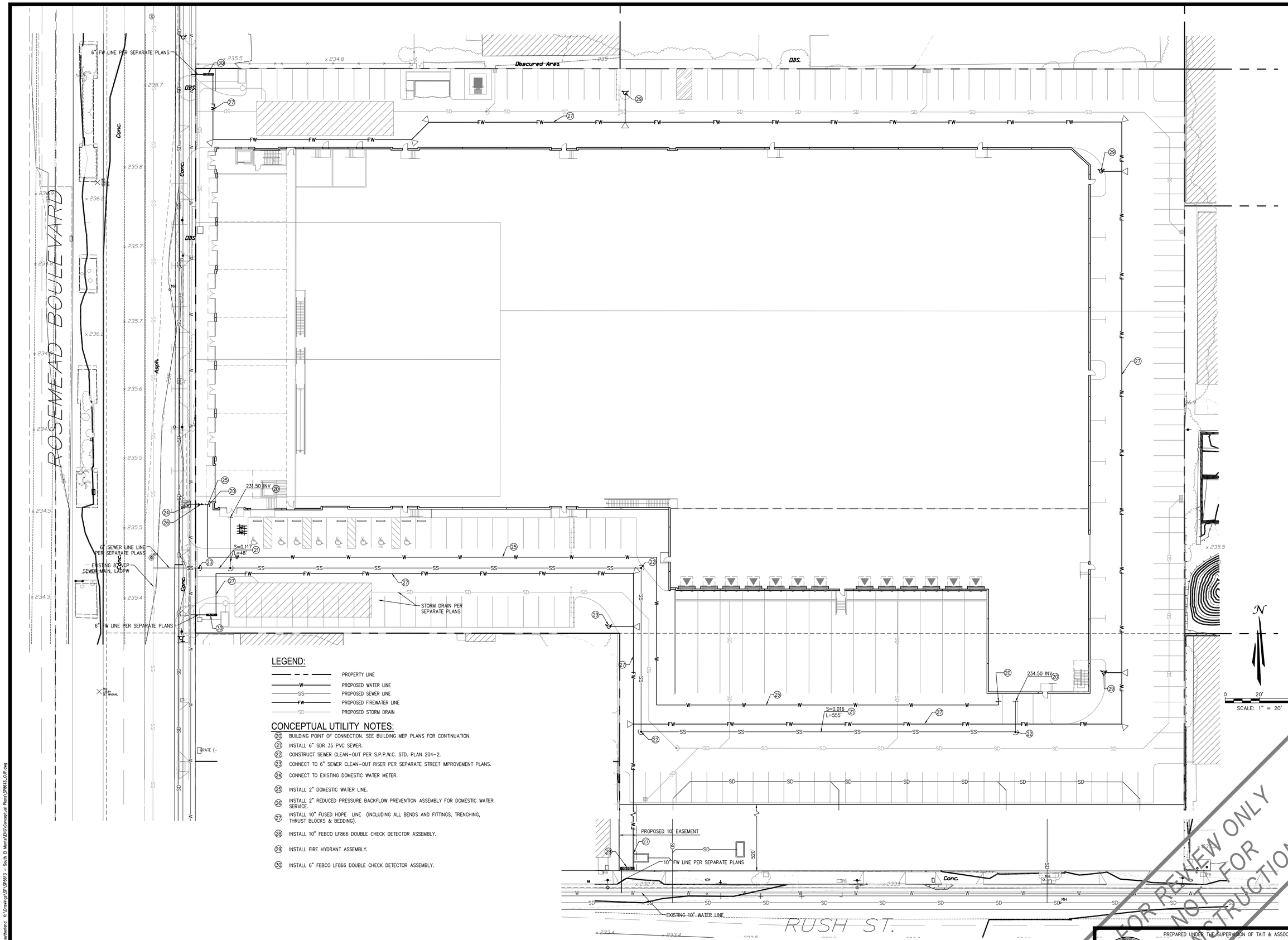
PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

11/23/2020 Design Development

1 OF 3

Jan 19, 2023 - 3:08pm by crutherford K:\Drawings\SP\SP9813 - South El Monte\ENG\Conceptual Plan\SP9813_CGP.dwg



LEGEND:

- PROPERTY LINE
- PROPOSED WATER LINE
- PROPOSED SEWER LINE
- PROPOSED FIREWATER LINE
- PROPOSED STORM DRAIN

CONCEPTUAL UTILITY NOTES:

20. BUILDING POINT OF CONNECTION. SEE BUILDING MEP PLANS FOR CONTINUATION.
21. INSTALL 6" SDR 35 PVC SEWER.
22. CONSTRUCT SEWER CLEAN-OUT PER S.P.P.W.C. STD. PLAN 204-2.
23. CONNECT TO 6" SEWER CLEAN-OUT RISER PER SEPARATE STREET IMPROVEMENT PLANS.
24. CONNECT TO EXISTING DOMESTIC WATER METER.
25. INSTALL 2" DOMESTIC WATER LINE.
26. INSTALL 2" REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY FOR DOMESTIC WATER SERVICE.
27. INSTALL 10" FUSED HDPE LINE (INCLUDING ALL BENDS AND FITTINGS, TRENCHING, THRUST BLOCKS & BEDDING).
28. INSTALL 10" FEBCO LF866 DOUBLE CHECK DETECTOR ASSEMBLY.
29. INSTALL FIRE HYDRANT ASSEMBLY.
30. INSTALL 6" FEBCO LF866 DOUBLE CHECK DETECTOR ASSEMBLY.

Know what's below Call before you dig. 811

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THERE MAYBE EXISTING UTILITIES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED PRIOR TO CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

BASIS OF BEARINGS: THE BEARING NORTH 89°58'20" WEST ON THE CENTERLINE OF RUSH STREET AS SHOWN ON RECORD OF SURVEY BOOK 273, PAGE 82, IN THE CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, WAS USED AS THE BASIS OF BEARINGS.

BENCH MARK: LACO PUBLIC WORKS BENCHMARK NO. SG4009

L & T IN CURB RETURN, 2 FOOT EAST OF BCR AT THE SOUTHWEST CORNER OF ROSEMEAD BOULEVARD AND KLINGERMAN STREET.

ELEVATION: 235.307' (2005)

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER JACOB VANDERVIS No. C46301 EXP. 12-31-24 CIVIL STATE OF CALIFORNIA

JACOB VANDERVIS, P.E. R.C.E. #46301 DATE

FOR REVIEW ONLY NOT FOR CONSTRUCTION

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE
	REVISIONS		

TAIT & ASSOCIATES
Since 1964
ENGINEERING ENVIRONMENTAL BUILDING LAND
Orange County Sacramento Denver Dallas
San Diego Riverside Boise Atlanta
701 North Parkcenter Drive
Santa Ana, CA 92705
p: 714.560.8200
www.tait.com

CONCEPTUAL WET UTILITY PLAN

ROCKLAND BUSINESS PARK
2222 ROSEMEAD BLVD.
SOUTH EL MONTE, CALIFORNIA

DRAWN:
DATE:
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO. SP8613

11/23/2020 Design Development

3 OF 3

Jan 19, 2023 - 3:07pm by zsutherland K:\Drawings\SP\SP8613 - South El Monte\DWG\Conceptual Plans\SP8613_CUP.dwg

APPENDIX 3

SOILS INFORMATION/REPORT

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

December 11, 2020 Project No. 20-7106

Xebec Building Company
3010 Old Ranch Parkway, Suite 480
Seal Beach, CA 90740

Attention: Sylvia Tran, Business Development and Project Manager

Subject: Geotechnical Investigation, Proposed Industrial Building, 2200 Rosemead Blvd., South El Monte, California

Sylvia,

In accordance with your request and authorization, TGR Geotechnical, Inc. (TGR) has performed a geotechnical investigation for the proposed development at the subject site in the City of South El Monte, California. This report presents the findings of our geotechnical investigation, including site seismicity and seismic settlement and provides geotechnical design recommendations for the proposed improvements. The work was performed in general accordance with our proposal dated October 29, 2020.

Based on our investigation the proposed development is feasible from a geotechnical viewpoint provided the recommendations presented in this report are implemented during design and construction.

If you have any questions regarding this report, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

TGR GEOTECHNICAL, INC.

Sanjay Govil, PhD, PE, GE 2382
Principal Geotechnical Engineer

Edward L. Burrows, M.S, PG, CEG 1750
Principal Engineering Geologist

Distribution: (4) Addressee

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

Attachments:

Plate 1 – Boring Location Map

Figure 1 – Site Location Map
Figure 2 – Regional Geology Map
Figure 3 – Historic High Groundwater Map
Figure 4 – Regional Fault Map
Figure 5 – Seismic Hazard Zone Map

Appendix A – References
Appendix B – Log of Borings
Appendix C – Laboratory Testing Procedures and Results
Appendix D – Site Seismic Design and De-Aggregated Parameters
Appendix E – Liquefaction Analysis
Appendix F – Standard Grading Specifications

EXECUTIVE SUMMARY

Presented below are significant elements of our findings from a geotechnical viewpoint. These findings are based on our field exploration, laboratory testing, and geologic and engineering analysis.

Geotechnical/Geologic Concerns

- The site is underlain by undocumented fill 5 to 13 feet thick underlain by various thickness of alluvial deposits comprised of sand, silty sand, sandy silt and clay. The sands are generally loose to medium dense. At the greater depth, the sands are medium dense to dense. The undocumented fill is unsuitable for support of structures and shall be removed and replaced as engineered fill.
- There are no known faults passing through or adjacent to the subject site. The subject site is not located within an Alquist-Priolo Earthquake Fault Zone. The closest faults to the subject site are the East Montebello Fault mapped approximately 1.15 miles to the southwest of the site, Whittier Fault located 3.5 miles southeast of the site, the Raymond Fault mapped approximately 5.45 miles northwest of the site, the Walnut Creek Fault mapped approximately 6.10 miles east of the site and the Sierra Madre Fault mapped 7.9 miles north of the subject site.
- The expansion potential is considered to be very low.
- At the time of our drilling, groundwater was encountered at a depth of 48 feet below ground surface. The depth to historic high groundwater is approximately 5 feet below existing ground surface. Groundwater is not expected to impact the proposed development.
- The subject site is located within an area having a potential for liquefaction. Liquefaction analysis was performed using the data from borings B-2 and B-7 and a historic high groundwater of 5 feet below existing grade. The total seismic settlement is estimated to range from 1.44 to 1.99 inches.
- All depressions resulting from demolition activities shall be properly backfilled with engineered fill (minimum 90 percent) under the direction of the geotechnical consultant.

Foundations

- The proposed light weight buildings may be supported on conventional shallow pad or continuous footing foundation systems.
- An allowable bearing capacity of 2,000 psf may be utilized for foundation design for footings supported on minimum 90 percent compacted engineered fill.
- The minimum recommended footing width is eighteen (18) inches for continuous footing and twenty-four (24) inches for pad footing.
- All shallow foundations should extend a minimum of twenty-four (24) inches below the lowest adjacent grade.
- All shallow foundations shall be supported on three (3) feet or half the width of the footing (whichever is greater) of engineered fill with minimum ninety (90) percent relative compaction.

- Laboratory test results indicate that concrete in contact with onsite soils should be designed for exposure class S0 (minimum 2,500 psi concrete).

Slab-on-Grade

- Slab-on-grade should be a minimum of 5-inches thick.
- Slab-on-grade shall be reinforced with a minimum of No. 4 reinforcing bar on 18-inch centers in two horizontally perpendicular directions.
- The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of three (3) feet.
- Areas requiring moisture sensitive flooring shall be underlain by a minimum 15-mil visqueen (Stego Wrap or equivalent).

Pavement Design

ASPHALT PAVEMENT SECTION					PCC PAVEMENT SECTION		
Pavement Utilization	Traffic Index	Asphalt (Inch)	Aggregate Base (Inch)	Total (Inch)	PCC	Aggregate Base (Inch)	Total (Inch)
Parking Stalls	4.5	3.0	4.0	7.0	--	--	--
Auto Driveways	5.0	3.0	4.0	7.0	--	--	--
Truck Aisles/ Driveways	6.0	4.0	4.0	8.0	**7	--	7
Loading Dock	7.0	4.0	6.0	10.0	**7	--	7

**Minimum concrete compressive strength of 3,500 psi.

INTRODUCTION

Site Descriptions and Proposed Project Development

The subject site is located at 2200 Rosemead Boulevard (Figure 1) in the City of South Elmonte, California. It is our understanding that site is approximately 4.38 acres. Based on our review of the Conceptual Site Plan, we understand that the proposed development will consist of a new 93,490 sq. ft. building with associated truck docks on the north side of the building and drive aisles and vehicle parking on the north, south and west sides of the building.

Scope of Work

The scope of work for this geotechnical investigation included the following:

- Site reconnaissance to assess current site conditions, mark borings and review of readily available previous geotechnical and/or environmental reports for the subject and/or adjacent properties.
- Sampling and logging seven (7) hollow stem auger borings utilizing a hollow stem drill rig to an approximate maximum depth of 51.5 feet at the subject site to evaluate subsurface soil conditions. The borings were backfilled with bentonite and concrete patched, as necessary.
- Percolation testing of the near surface soils (upper 5 feet) at three locations. The testing procedures followed the County of Los Angeles guidelines.
- Laboratory testing of selected samples to include in-situ moisture density, corrosion, shear, consolidation, passing No. 200 sieve, R-value, maximum density and optimum moisture content.
- Engineering analysis including site seismicity, foundation design, liquefaction analysis and settlement.
- Preparation of this report summarizing subsurface soil conditions, site seismicity, results of liquefaction analysis, seismic settlement, hydro-collapse potential and provide pertinent geotechnical/geologic information that may influence the proposed development.

Field Investigation

Field exploration was performed on November 13 and November 14, 2020 by an engineer from our firm who logged the borings and obtained representative samples, which were subsequently transported to the laboratory for further review and testing. The approximate locations of the borings are indicated on the enclosed Boring Location Map (Plate 1).

The subsurface conditions were explored by drilling, sampling, and logging six borings with a truck mounted hollow stem drill rig. Borings B-2, B-6 and B-7 were advanced to an approximate depth of fifty-one and a half (51.5) feet below existing grade, Boring B-5 was advanced to an approximate depth of twenty-six and a half (26.5) feet, Borings B-1 and B-4 were advanced to an approximate depth of sixteen and a half (6.5) feet and Boring B-3 was advanced to an approximate depth of eleven and a half (11.5) feet. Subsequent to drilling, all borings were backfilled with bentonite and the surface was repaired with concrete as necessary. The logs of borings presenting soil conditions and descriptions are presented in Appendix B.

The drill rig was equipped with a sampling apparatus to allow for recovery of driven modified California Ring Sampler (CRS), 3-inch outside diameter, and 2.42-inch inside diameter and SPT samples.

The samples were driven using an automatic 140-pound hammer falling freely from a height of 30 inches. The blow counts for CRS were converted to equivalent SPT blow counts. Soil descriptions were entered on the logs in general accordance with the Unified Soil Classification System (USCS). Driven samples and bulk samples of the earth materials encountered at selected intervals were recovered from the borings. The locations and depths of the soil samples recovered are indicated on the logs in Appendix B.

Percolation Testing

Percolation testing was performed at the subject site. Presented below are the infiltration rates from the percolation tests performed within the upper 5 feet. These do not include any factor of safety.

- P-1 at 0-5 feet 0.0 inches per hour
- P-2 at 0-5 feet 0.4 inches per hour
- P-3 at 0-5 feet 0.1 inches per hour

The infiltration test rates were generally determined utilizing the County of Los Angeles guidelines. Based on the percolation test results the site is generally considered **not suitable** for stormwater infiltration.

Laboratory Testing

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to evaluate the geotechnical properties of the subsurface soils. The following tests were performed:

- In-situ moisture content (ASTM D2216) and dry density (ASTM D7263);
- Maximum Dry Density and Optimum Moisture Content (ASTM D1557);
- Soluble Sulfates (CAL 417A);
- Consolidation (ASTM D2435);
- Direct Shear Strength (ASTM D3080);
- R-Value (CAL 301); and
- Passing No. 200 sieve (ASTM 1140).

Laboratory tests for geotechnical characteristics were performed in general accordance with the ASTM procedures. The results of the in-situ moisture content and density tests are shown on the borings logs. The results of the laboratory tests are presented in Appendix C.

GEOTECHNICAL FINDINGS

Geology

Regional Geologic Setting

The project site is located in the central portion of the El Monte and Baldwin Park quadrangles, Los Angeles County, California. Per the Geologic Map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California (Dibblee, 1999), the subject site is underlain by Quaternary alluvial deposits comprised of gravel, sand and silt of valleys and floodplains. Figure 2 presents the Regional Geology Map.

Earth Units

Based on our subsurface investigation, the subject area is underlain by 5 to 13 feet of undocumented fill consisting of silty sand, sandy clay and sandy silt underlain by Quaternary age alluvial deposits, consisting of sand, silty sand, sandy silt and sandy clay interbedded to the total depth explored of 51.5 feet below grade. The undocumented fill is not considered suitable for support of structures and shall be removed and replaced as engineered fill. Detailed descriptions of the earth units encountered in our borings are presented in the log of the borings. (Appendix B)

Groundwater

Subsurface water was encountered during the exploration at approximately 48 feet below existing ground surface. Based on our review of available historical groundwater information (CDMG, 1998) regional groundwater has been mapped in the general site area at approximately 5 feet below site grade (Figure 3). Seasonal and long-term fluctuations in the groundwater may occur as a result of variations in subsurface conditions, rainfall, run-off conditions and other factors. Therefore, variations from our observations may occur. Static groundwater is not anticipated to impact the proposed development.

Seismic Review

Faulting and Seismicity

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional faults such as the San Andreas, San Jacinto and Elsinore fault zones. These fault systems produce approximately 5 to 35 millimeters per year of slip between the plates.

By definition of the State Mining and Geology Board, an active fault is one which has had surface displacement within the Holocene Epoch (roughly the last 11,000 years). The State Mining and Geology Board has defined a potentially active fault as any fault which has been active during the Quaternary Period (approximately the last 1,600,000 years). These definitions are used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Geologic Hazard Zones Act of 1972 and as subsequently revised in 1994 (Hart, 1997) as the Alquist-Priolo Geologic Hazard Zoning Act and Earthquake Fault Zones.

The intent of the act is to require fault investigations on sites located within Special Studies Zones to preclude new construction of certain inhabited structures across the trace of active faults.

The subject site is not included within any Earthquake Fault Zones as created by the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1997). Our review of geologic literature pertaining to the site area indicates that there are no known active or potentially active faults located within or immediately adjacent to the subject property.

The nearest fault to the subject site is the East Montebello Fault mapped approximately 1.15 miles to the southwest of the site. Other faults nearby include the Whittier Fault located 3.5 miles southeast of the site, the Raymond Fault mapped approximately 5.45 miles northwest of the site, the Walnut Creek Fault mapped approximately 6.10 miles east of the site and the Sierra Madre Fault mapped 7.9 miles north of the subject site. The regional fault map, Figure 4, shows the location of the subject site in respect to the regional faults.

Secondary Seismic Hazards

Surface Fault Rupture and Ground Shaking

Since no known faults are located within the site, surface fault rupture is not anticipated. However, due to the close proximity of known active and potentially active faults, severe ground shaking should be expected during the life of the proposed structures.

Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when these ground conditions exist: 1) Shallow groundwater; 2) Low density, fine, clean sandy soils; and 3) High-intensity ground motion. Effects of liquefaction can include sand boils, settlement, and bearing capacity failures below foundations.

A review of the Seismic Hazard Zone Map, El Monte Quadrangle indicates that the project site is located in an area identified as having a potential for soil liquefaction. During our exploration groundwater was not encountered to a depth of approximately 51.5 feet below existing ground surface. The analysis utilized peak ground acceleration (PGA_M) of 0.899g and a moment magnitude of 6.89 (based on de-aggregation). Although groundwater was encountered to a depth of 48 feet, a historic depth to groundwater of 5 feet below existing grade was utilized in the calculations. The results are presented in Appendix E.

Seismically Induced Settlement

Ground accelerations generated from a seismic event can produce settlements in sands or in granular earth materials both above and below the groundwater table. This phenomenon is often referred to as seismic settlement and is most common in relatively clean sands, although it can also occur in other soil materials. The total seismic settlement of granular soils is estimated to range from 1.44 to 1.99 inches with a differential settlement of 0.25 inches over 60 feet. The calculations are presented in Appendix E.

Lateral Spreading

Seismically induced lateral spreading involves primarily movement of earth materials due to earth shaking. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. The topography in the vicinity of the subject site is relatively flat. Therefore, the potential for lateral spreading at the subject site is considered very low.

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

DISCUSSIONS AND CONCLUSIONS

General

Based on our field exploration, laboratory testing and engineering analysis, it is our opinion that the proposed structure and proposed grading will be safe against hazard from landslide, settlement, or slippage and the proposed construction will have no adverse effect on the geologic stability of the adjacent properties provided our recommendations presented in this report are followed.

Conclusions

Based on our findings and analyses, the subject site is likely to be subjected to moderate to severe ground shaking due to the proximity of known active and potentially active faults. This may reasonably be expected during the life of the structure and should be designed accordingly.

The primary conditions affecting the proposed project site development are as follows:

- Presence of 5 to 13 feet of undocumented fill.
- Liquefaction induced seismic settlement of granular soils.

The engineering evaluation performed concerning site preparation and the recommendations presented are based on information provided to us and obtained by us during our office and fieldwork. This report is prepared for the development of the new 93,490 sq. ft. building with associated truck docks, drive aisles and vehicle parking on the subject property. In the event that any significant changes are made to the proposed development, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the recommendations of this report are verified or modified in writing by TGR.

RECOMMENDATIONS

Seismic Design Parameters

When reviewing the 2019 California Building Code the following data should be incorporated into the design.

Parameter	Value
Latitude (degree)	34.05368
Longitude (degree)	-118.06368
Site Class	D
Site Coefficient, F_a	1.0
Site Coefficient, F_v	null
Mapped Spectral Acceleration at 0.2-sec Period, S_s	1.897 g
Mapped Spectral Acceleration at 1.0-sec Period, S_1	0.682 g
Spectral Acceleration at 0.2-sec Period Adjusted for Site Class, S_{MS}	1.897 g
Spectral Acceleration at 1.0-sec Period Adjusted for Site Class, S_{M1}	null
Design Spectral Acceleration at 0.2-sec Period, S_{DS}	1.265 g
Design Spectral Acceleration at 1.0-sec Period, S_{D1}	null

Site Specific Response Spectra

The USGS Unified Hazard tool, the USGS RTGM Calculator and the USGS App for Deterministic Spectra Acceleration were utilized to develop site specific ground motion spectra. The analysis was performed utilizing the following attenuation relationships that are part of NGA as required by 2019 CBC code requirements.

- Campbell & Bozorgnia (2014)
- Boore, Stewart, Seyhan & Atkinson (2014)
- Chiou & Youngs (2014)
- Abrahamson, Silva & Kamal (2014)

The results of the Site Specific Response Spectra are incorporated in Table 1 and on Figure 1 in Appendix D. The results include deterministic spectra at 5% damping, maximum rotated component at 0.84 fractile and the probabilistic spectra, maximum rotated component at 5% damping for a return period of 2475 year and subsequently multiplied by risk coefficient to obtain the MCER probabilistic spectral acceleration. The Vs30 utilized was 260 m/s.

The above generated spectral accelerations were compared against the minimum code requirements in ASCE7-16 (Chapters 11 and 21) resulting in the final design response spectra which is presented in Table 1 and on Figure 1 in Appendix D.

Based on Table 1 and Figure 1, the recommended Site Specific S_{DS} and S_{D1} are as follows:

S_{DS} = 1.115
S_{D1} = 0.958

The structural consultant should review the above parameters and the 2019 California Building Code to evaluate the seismic design.

Conformance to the criteria presented in the above table for seismic design does not constitute any type of guarantee or assurance that significant structural damage or ground failure will not occur during a large earthquake event. The intent of the code is “life safety” and not to completely prevent damage of the structure, since such design may be economically prohibitive.

Foundation Design Recommendations

The proposed buildings may be supported on continuous and/or spread footings. Bearing capacity recommendations for shallow foundations are presented below. These recommendations assume that the footings will be supported on a minimum of three (3) feet or half the width of the footing (whichever is greater) of engineered fill. All existing undocumented fill is considered unsuitable for the support of structures and shall be removed and replaced as engineered fill.

For foundations supported on three (3) feet or half the width of the footing (whichever is greater) of engineered fill with minimum ninety (90) percent relative compaction an allowable bearing pressure of 2000 pounds per square foot may be used in design.

All shallow foundations should extend a minimum of twenty-four (24) inches below the lowest adjacent grade. The minimum recommended footing width is eighteen (18) inches for continuous footing and twenty-four (24) inches for pad footing. A minimum reinforcement of two (2) No. 4 steel bar top and two (2) No. 4 steel bar bottom is required for continuous footings from a geotechnical viewpoint. Foundation design details such as concrete strength, reinforcements, etc should be established by the Structural Engineer.

A one-third (1/3) increase on the aforementioned bearing pressure may be used in design for short-term wind or seismic loads.

The total and differential static settlement is anticipated to be 1 inch and 0.5 inches over 60 feet or less. The total and differential seismic settlement is 1.99 inches and 0.25 inches over 60 feet or less.

Resistance to lateral loads including wind and seismic forces may be provided by frictional resistance between the bottom of concrete and the underlying fill soils and by passive pressure against the sides of the foundations. A coefficient of friction of 0.40 may be used between concrete foundation and underlying soil. The recommended passive pressure of the engineered fill may be taken as an equivalent fluid pressure of 250 pounds per cubic foot (2,500 psf max).

Footings located near property lines where the lateral removal cannot be achieved shall be designed for a reduced bearing capacity of 1,500 pounds per square foot and the passive resistance shall be ignored.

Retaining Wall Recommendations

The following soil parameters may be used for the design of the retaining wall with level backfill and a maximum height of six (6) feet:

Conditions	Parameters
Active (Level)	40 psf/ft
Passive	250 (maximum 2,500 psf)
Friction Coefficient	0.40

- The passive pressure in the upper 6 inches of soil not confined by slabs or pavement should be neglected.
- All footings should meet the setback requirements presented in 2019 CBC.
- The retaining wall should be provided with a drainage system (Miradrain or equivalent) to prevent buildup of hydrostatic pressure behind the walls. We do not recommend omitting the drains behind walls.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall shall be considered as lateral surcharge. For lateral surcharge conditions, we recommend utilizing a horizontal load equal to 50 percent of the vertical load, as a minimum. This horizontal load should be applied below the 1:1 projection plane. To minimize the surcharge load from an adjacent footing, deepened footings may be considered.

Slab-On-Grade

Slab-on-grade should be a minimum of 5-inches thick and reinforced with a minimum of No. 4 reinforcing bar on 18-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The slab should not be structurally connected to the buildings. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of three (3) feet. Prior to placement of concrete, the subgrade soils should be moistened to near optimum moisture content and verified by our field representative.

The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition and the anticipated use of the building. For moisture sensitive flooring, the floor slab should be underlain by minimum 15-mil impermeable polyethylene membrane (Stego Wrap, Moistop Plus, or any equivalent meeting the requirements of ASTM E1745, Class A rating) as a capillary break. Sand may be placed above

and below the impermeable polyethylene membrane at the discretion of the project structural engineer/concrete contractor for proper curing and finish of the concrete slab-on-grade and protection of the membrane and is considered outside the scope of geotechnical engineering.

Flatwork

Flatwork should be a minimum of 4-inches thick should be reinforced with a minimum of No. 3 reinforcing bar on 24-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM D1557) to a minimum depth of one (1) foot. Prior to placement of concrete, the subgrade soils should be moistened to near optimum moisture content and verified by our field representative. The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition.

Modulus of Subgrade Reaction

The modulus of subgrade reaction may be taken as 125 pci (K_1) for one (1) square foot footing/slab founded on site soils. This value should be reduced for change in size per the following formula:

$$K = K_1 \left(\frac{B+1}{2B} \right)^2$$

Where B = Width of Mat;
K = Coefficient of Subgrade Reaction of Footings Measuring B(ft) x B(ft).

Cement Type and Corrosion

Based on laboratory testing concrete used should be designed in accordance with the provisions of ACI 318-14, Chapter 19 for Exposure Class S0 with a minimum confined compressive strength of 2,500 psi and for Exposure Class C1 (Moderate) – Concrete in contact with site soils exposed to moisture but not to significant external source of chloride per ACI 318-14 Table 19.3.1.1. Corrosion tests indicate a moderate corrosion potential for ferrous metals exposed to site soils.

Corrosion tests indicate corrosive potential for ferrous metals exposed to site soils.

TGR does not practice corrosion engineering. If needed, a qualified specialist should review the site conditions and evaluate the corrosion potential of the site soil to the proposed improvements and to provide the appropriate corrosion mitigations for the project.

Expansive Soil

Onsite silty clay soils and sandstone/siltstone bedrock have an expansion index of 8, correlating to a “Very Low” expansion potential.

Shrinkage/Subsidence

Removal and recompaction of the near surface soils is estimated to result in shrinkage ranging from 5 to 10 percent. Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be between one and two tenths of a foot.

Site Development Recommendations

General

During earthwork construction, all site preparation and the general procedures of the contractor should be observed, and the fill selectively tested by a representative of TGR. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and/or additional recommendations will be offered. During demolition of the existing building and associated site work, voids created from removal of buried elements (footings, pipelines, septic pits etc) shall be backfilled with engineered fill (min 90% relative compaction per ASTM D1557) under the observation of TGR.

Grading

All grading should conform to the guidelines presented in the California Building Code (2019 edition), except where specifically superseded in the text of this report. Prior to grading, TGR's representative should be present at the pre-construction meeting to provide grading guidelines, if needed, and review any earthwork.

All undocumented fill within the building footprint and 5 feet or depth of fill outside laterally and under retaining/site walls should be removed and replaced with engineered fill. The site is underlain by approximately 3 to 13 feet of undocumented fill. This fill is considered unsuitable for the support of structures and shall be removed and replaced with engineered fill. Oversize particles may be encountered during grading. All particles greater than 4-inches shall be removed and disposed offsite.

To support the foundation a minimum three (3) feet or half the width of the footing (whichever is greater) of approved engineered fill should be placed under the footings. A minimum of three (3) feet of engineered fill is recommended under slab-on-grade, and a minimum of two (2) feet of engineered fill is recommended under flatwork and pavement. Site soils could be reused as engineered fill provided, they are free of oversized particles and the recommendations presented in this report are implemented. Exposed bottoms should be scarified a minimum of 6-inches, moisture conditioned and compacted to a minimum 90 percent relative compaction. Subsequently, site fill soils should be re-compacted to a minimum of ninety (90) percent relative compaction at near optimum moisture content. The lateral extent of removals beyond the building/structure/footing limits should be equal to at least the depth of fill or 5 feet, whichever is greater.

The depth of over-excavation should be reviewed by the Geotechnical Consultant during the actual construction. Any subsurface obstruction buried structural elements, and unsuitable material encountered during grading, should be immediately brought to the attention of the Geotechnical Consultant for proper exposure, removal and processing, as recommended.

Fill Placement

Prior to any fill placement TGR should observe the exposed surface soils. The site soils may be re-used as engineered fill provided, they are free of organic content and particle size greater than 4-inches. All particles greater than 4-inches shall be removed and disposed offsite. Fill shall be moisture-conditioned near optimum and compacted to a minimum relative compaction of 90 percent in accordance with ASTM D1557. Any import soils shall be non-expansive and approved by TGR Geotechnical Inc.

Compaction

Prior to fill placement, the exposed surface should be scarified to a minimum depth of six (6) inches, fill placed in six (6) inch loose lifts moisture conditioned to near optimum and compacted to a minimum relative compaction of ninety (90) percent in accordance with ASTM D 1557.

Trenching

All excavations should conform to CAL-OSHA and local safety codes.

Temporary Excavation and Shoring

Temporary construction excavations in sandy soils may be anticipated during the proposed development. Sandy soils may be cut vertically without shoring to a depth of approximately four (4) feet below adjacent surrounding grade. For deeper cuts, the slopes should be properly shored or sloped back to at least 1.5H:1V (Horizontal: Vertical) or flatter. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. No surcharge loads should be permitted within a horizontal distance equal to the height of cut from the toe of excavation unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any nearby adjacent existing site facilities should be properly shored to maintain foundation support at the adjacent structures.

Drainage

Positive site drainage should be maintained at all times. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. Pad drainage should be directed towards street/parking or other approved area.

Utility Trench Backfill

All utility trench backfills in structural areas and beneath hardscape features should be brought to near optimum moisture content and compacted to a minimum relative compaction of 90 percent of the laboratory standard. Flooding/jetting is not recommended.

Sand backfill, (unless trench excavation material), should not be allowed in parallel exterior trenches adjacent to and within an area extending below a 1:1 plane projected from the outside bottom edge of the footing. All trench excavations should minimally conform to CAL-OSHA and

local safety codes. Soils generated from utility trench excavations may be used provided it is moisture conditioned and compacted to 90 percent minimum relative compaction.

Preliminary Pavement Design

The Caltrans method of design was utilized to develop the following asphalt pavement section. The section was developed based on a tested "R-Value" for compacted site subgrade soils of 59.

Traffic indices of 4.5, 5, 6, and 7 were assumed for use in the evaluation of automobile parking stalls and driveways, and medium and heavy truck driveways, respectively. The traffic indices are subject to approval by controlling authorities and shall be approved by the project civil engineer.

ASPHALT PAVEMENT SECTION					PCC PAVEMENT SECTION		
Pavement Utilization	Traffic Index	Asphalt (Inch)	Aggregate Base (Inch)	Total (Inch)	PCC	Aggregate Base (Inch)	Total (Inch)
Parking Stalls	4.5	3.0	4.0	7.0	--	--	--
Auto Driveways	5.0	3.0	4.0	7.0	--	--	--
Truck Aisles/ Driveways	6.0	4.0	4.0	8.0	**7	--	7
Loading Dock	7.0	4.0	6.0	10.0	**7	--	7

**Minimum concrete compressive strength of 3,500 psi.

Aggregate base material should consist of CAB/CMB complying with the specifications in Section 200.2.2 of the current "Standard Specifications for Public Works Construction" and should be compacted to at least ninety-five (95) percent of the maximum dry density (ASTM D1557). The surface of the aggregate base should exhibit a firm and unyielding condition just prior to the placement of asphalt concrete paving.

The pavement subgrade should be constructed in accordance with the recommendations presented in the grading section of this report.

The R-value and the associated pavement section should be confirmed at the completion of site grading.

An increase in the PCC pavement slab thickness, placement of steel reinforcement (or other alternatives such as Fibermesh) and joint spacing due to loading conditions including shrinkage and thermal effects may be necessary and should be incorporated by the structural engineer as necessary to prevent adverse impact on pavement performance and maintenance.

Geotechnical Review of Plans

All grading and foundation plans should be reviewed and accepted by the geotechnical consultant prior to construction. If significant time elapses since preparation of this report, the geotechnical consultant should verify the current site conditions, and provide any additional recommendations (if necessary) prior to construction.

Geotechnical Observation/Testing During Construction

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, periodic special inspection shall be performed to:

- Verify materials below shallow foundations are adequate to achieve the design bearing capacity;
- Verify excavations are extended to the proper depth and have reached proper material;
- Verify classification and test compacted materials; and
- Prior to placement of compacted fill, inspect subgrade and verify that the site has been prepared properly

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, continuous special inspection shall be performed to:

- Verify use of proper materials, densities and lift thickness during placement and compaction of compacted fill.

The geotechnical consultant should also perform observation and/or testing at the following stages:

- During any grading and fill placement;
- During utility trench excavation and backfill;
- After foundation excavation and prior to placing concrete;
- During placement of aggregate base and asphalt concrete or Portland cement concrete;
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

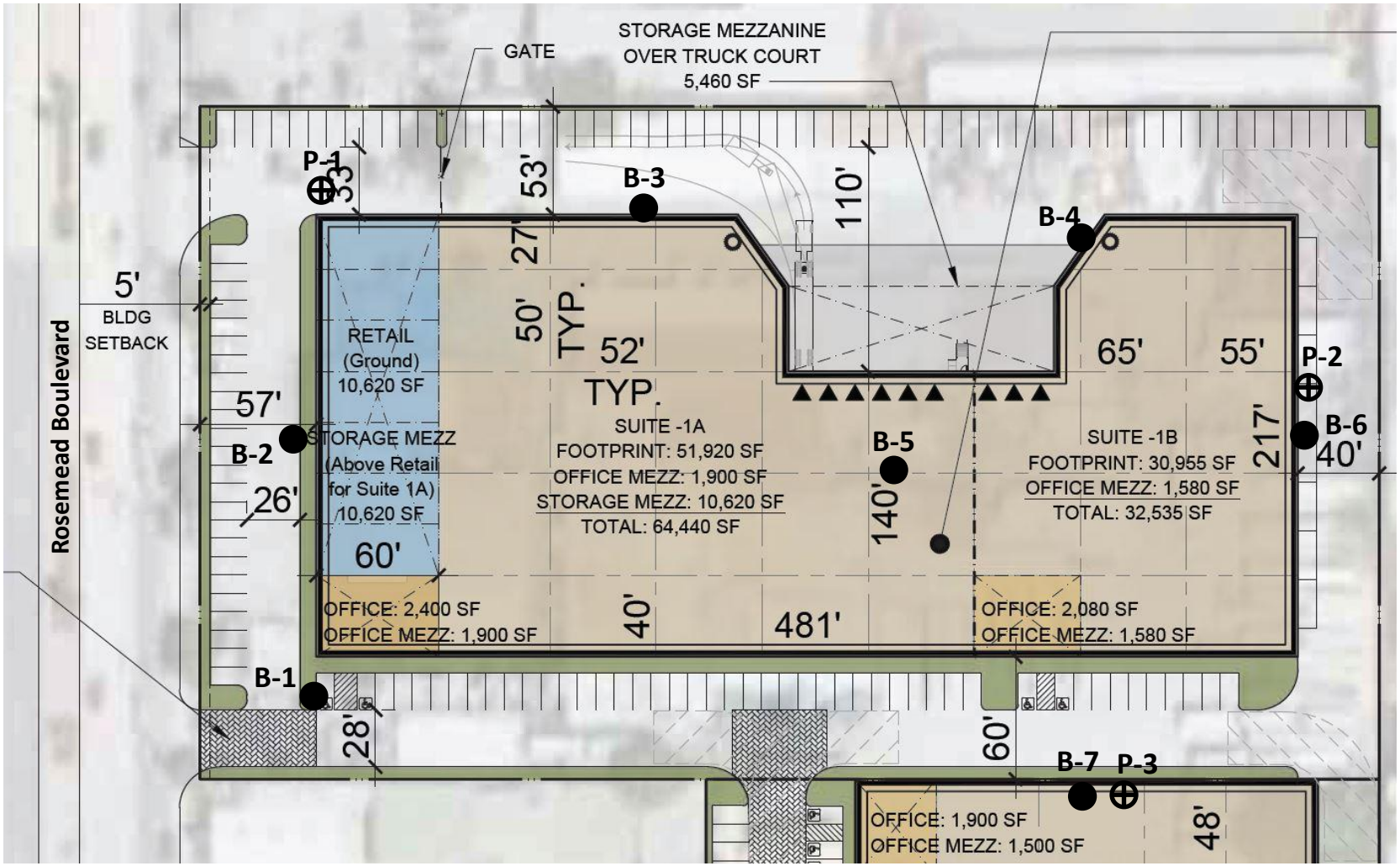
Limitations

This report was prepared for a specific client and a specific project, based on the client's needs, directions and requirements at the time.

This report was necessarily based upon data obtained from a limited number of observances, site visits, soil and/or other samples, tests, analyses, histories of occurrences, spaced subsurface exploration and limited information on historical events and observations. Such information is necessarily incomplete. Variations can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can and do occur over time.

This report is not authorized for use by, and is not to be relied upon by any party except the client with whom TGR contracted for the work. Use or reliance on this report by any other party

is that party's sole risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify TGR from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of TGR.



B-7 APPROXIMATE LOCATION OF EXPLORATORY BORING

P-3 APPROXIMATE LOCATION OF EXPLORATORY BORING

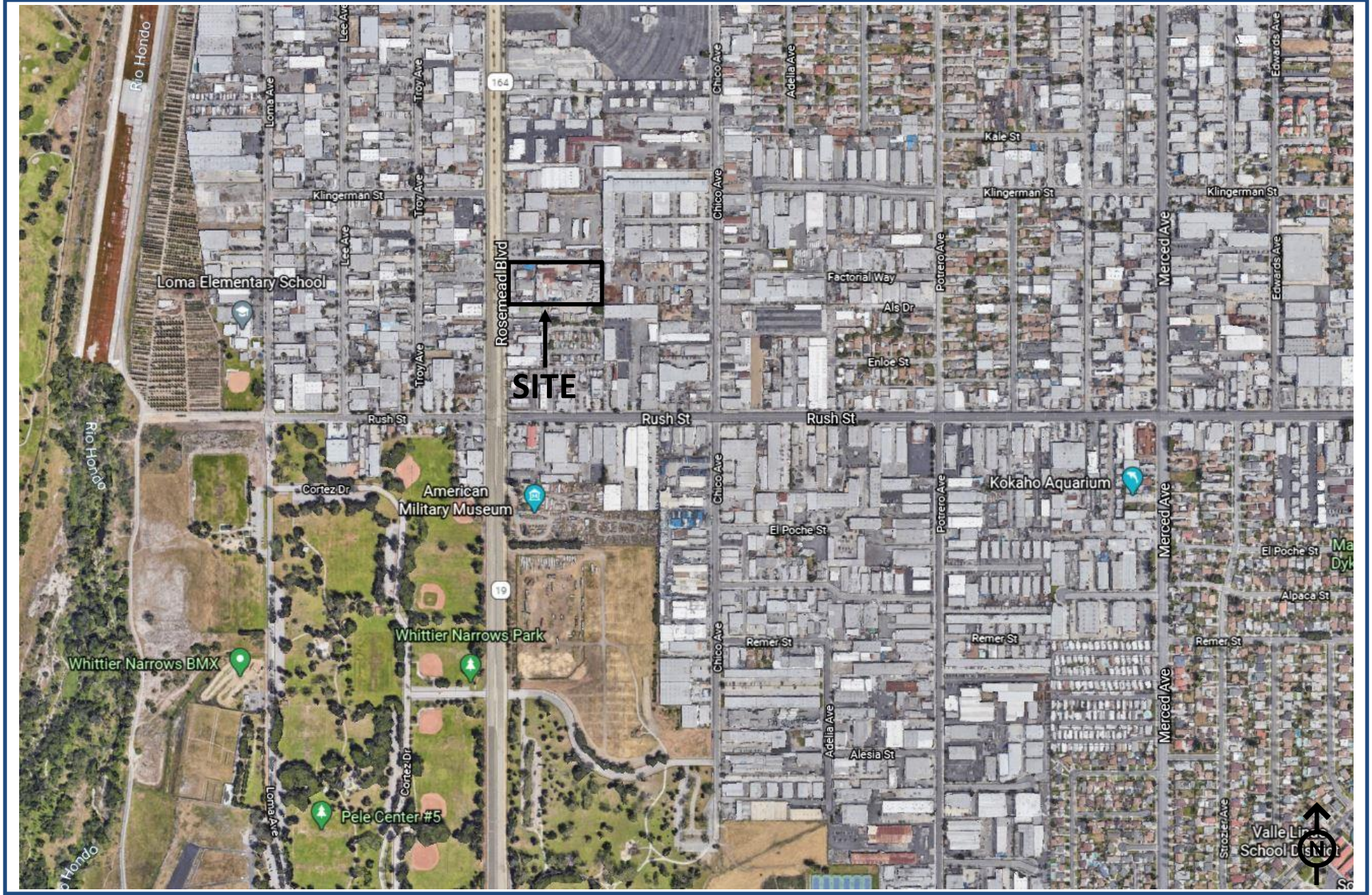
N

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

BORING LOCATION MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

PLATE 1

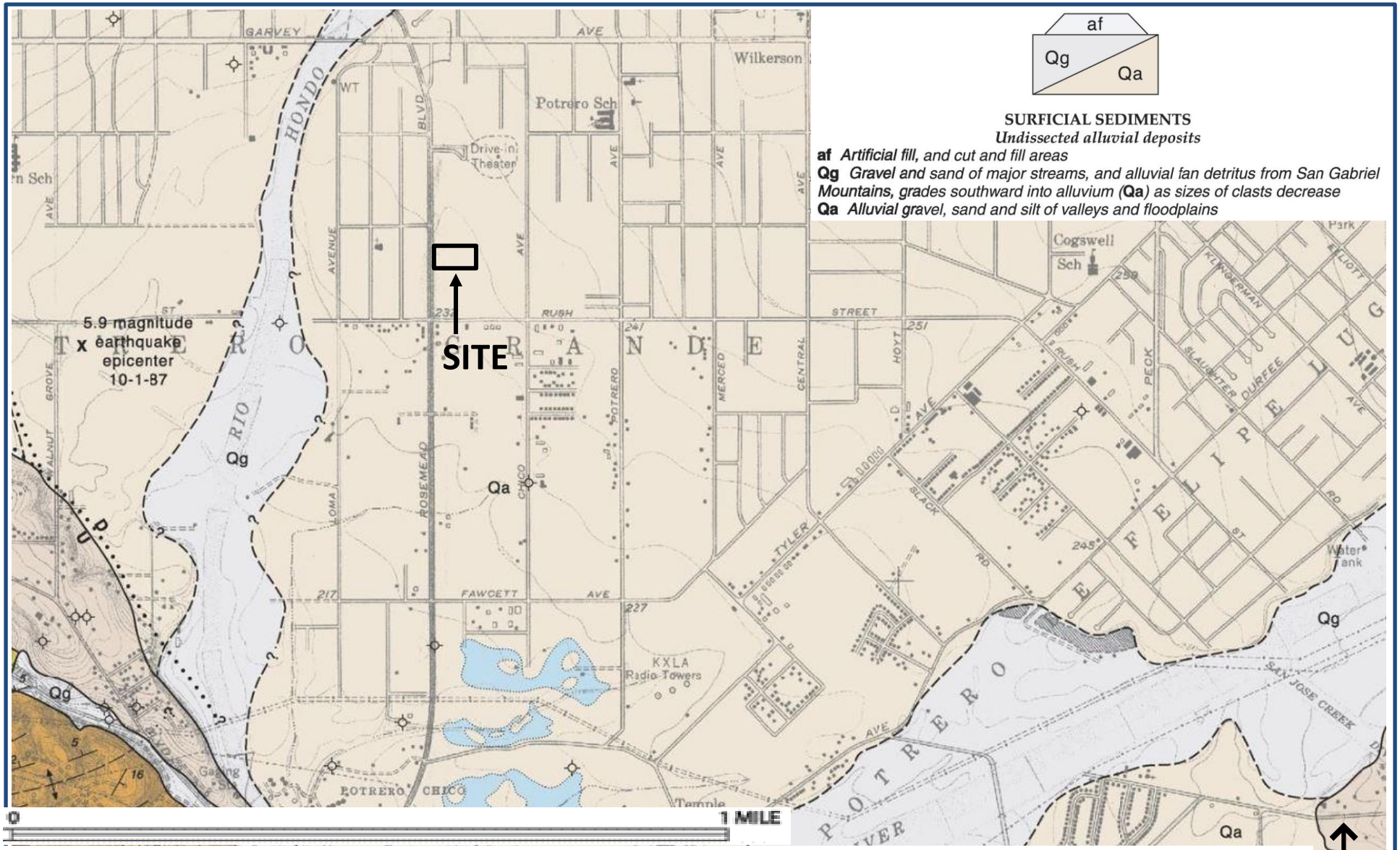


TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SITE LOCATION MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 1



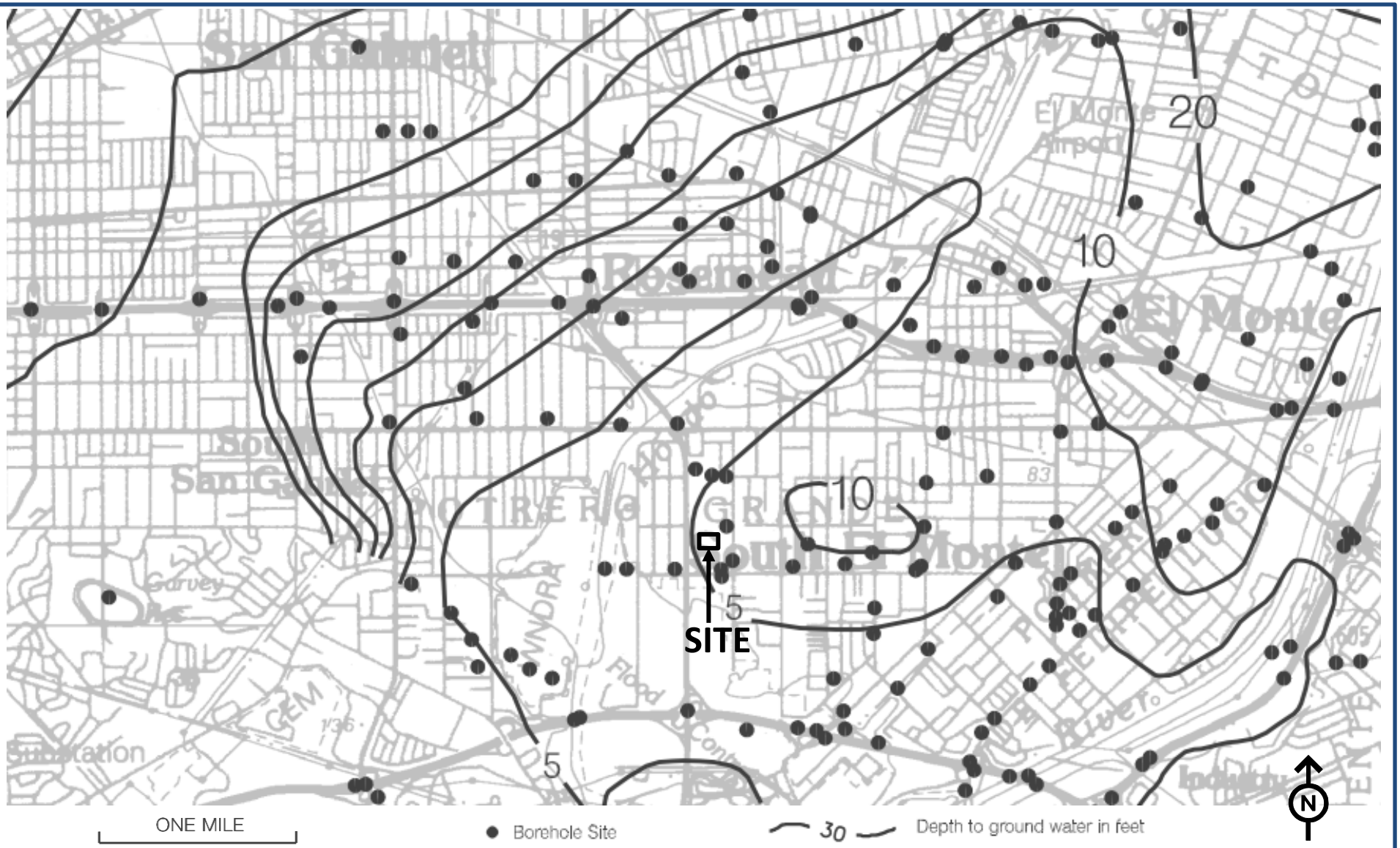
Dibblee, T.W., and Ehrenspeck, H.E., 1999, Geologic map of the El Monte and Baldwin Park quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-69, scale 1:24,000..

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

REGIONAL GEOLOGY MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 2



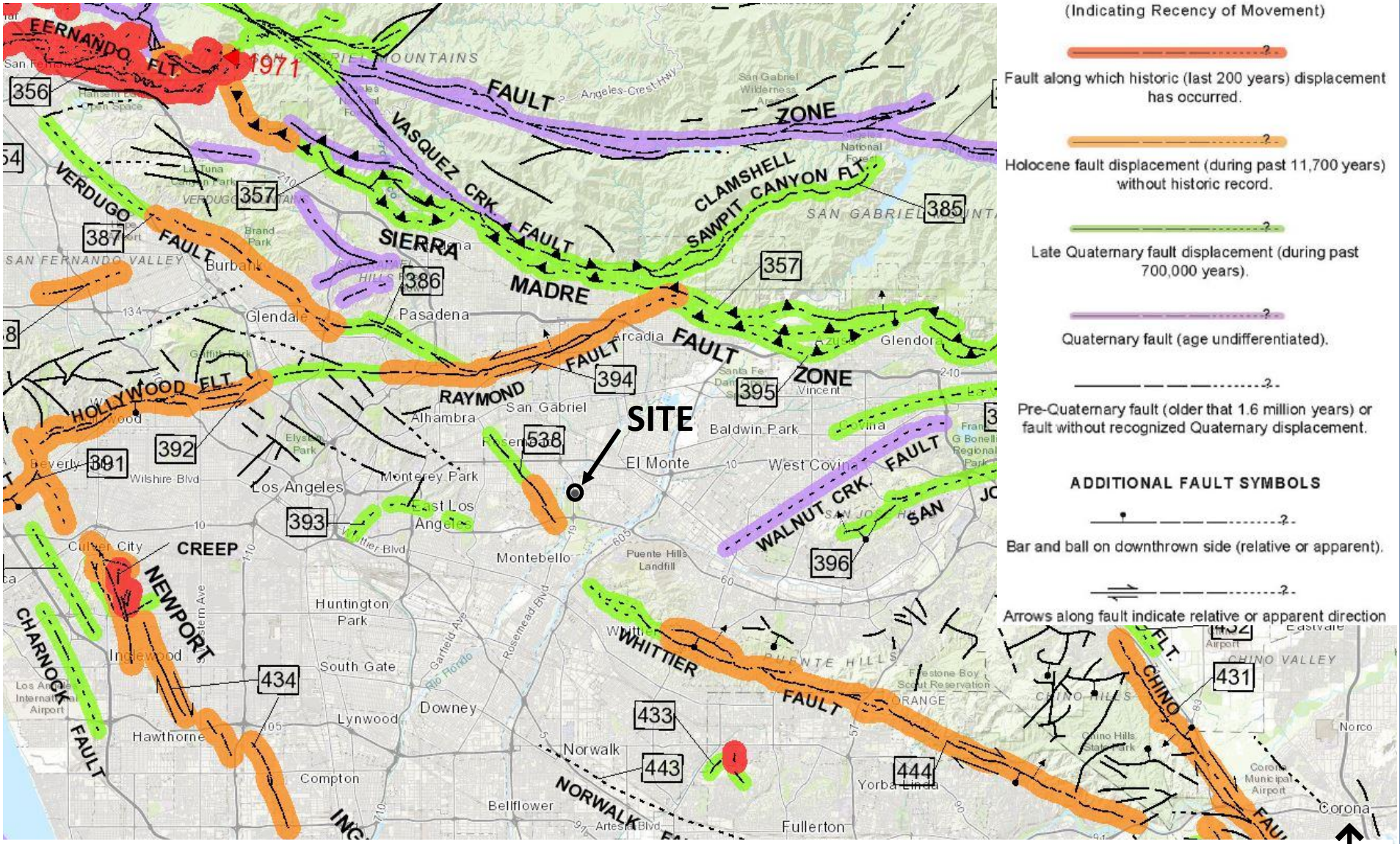
Modified From: California Department of Conservation, Division of Mines and Geology, 1998, Seismic Hazard Zone Report for the El Monte 7.5-Minute Quadrangle, Los Angeles County, California, Report 024.

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

HISTORIC HIGH GROUNDWATER MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 3



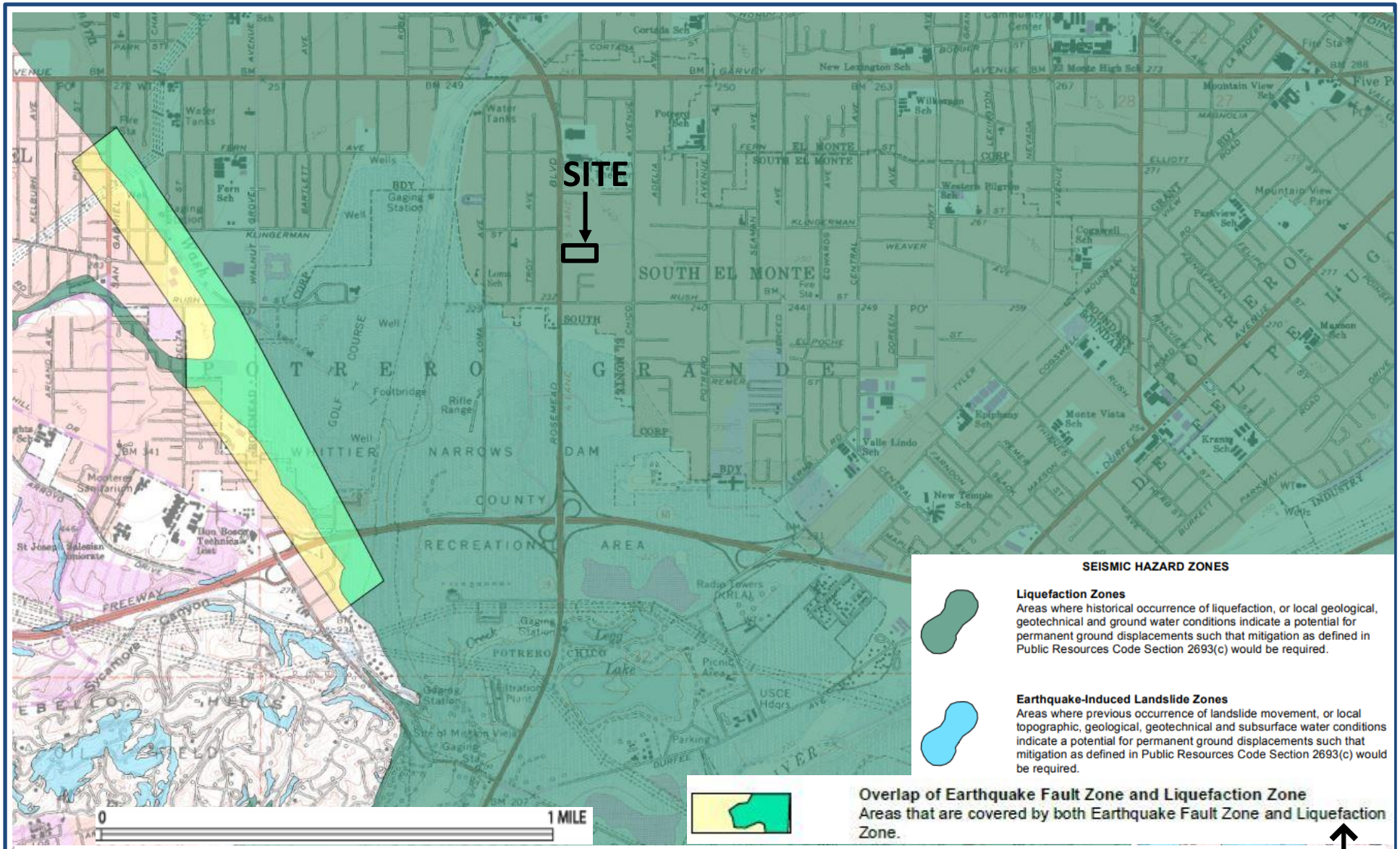
Modified From: Jennings, C. W., 2010, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

REGIONAL FAULT MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 4



Modified From: State of California Division of Mines and Geology, Earthquake Zones of Required Investigation, El Monte Quadrangle Released March 25, 1999, scale 1:24,000

TGR
Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SEISMIC HAZARD ZONE MAP
2200 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

PROJECT NO. 20-7106

FIGURE 5

Test Hole	Total Depth (in)	Initial Depth (in)	Final Depth (in)	∆Water Level (in)	Initial Time (min)	Final Time (min)	∆ Time (min)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Infiltration Rate (in/hr)
P-1	60	3	3.5	0.5	0.0	10.0	10.0	57	56.5	56.75	0.1
	60	3.5	4	0.5	10.0	20.0	10.0	56.5	56	56.25	0.1
	60	4	4.625	0.625	20.0	30.0	10.0	56	55.375	55.69	0.1
	60	4.625	6	1.375	30.0	60.0	30.0	55.375	54	54.69	0.0
	60	6	7.125	1.125	60.0	90.0	30.0	54	52.875	53.44	0.0
	60	7.125	8	0.875	90.0	120.0	30.0	52.875	52	52.44	0.0
	60	8	9	1	120.0	150.0	30.0	52	51	51.50	0.0
	60	3.875	5.25	1.375	150.0	181.0	31.0	56.125	54.75	55.44	0.0
	60	3.625	5.875	2.25	182.0	212.0	30.0	56.375	54.125	55.25	0.1
	60	3.375	4.625	1.25	215.0	245.0	30.0	56.625	55.375	56.00	0.0
P-2	60	2.625	11.125	8.5	0.0	10.0	10.0	57.375	48.875	53.13	0.4
	60	2.75	11	8.25	12.0	22.0	10.0	57.25	49	53.13	0.4
	60	3	11.5	8.5	22.0	33.0	11.0	57	48.5	52.75	0.4
	60	3.5	11.375	7.875	36.0	46.0	10.0	56.5	48.625	52.56	0.4
	60	2.375	10.75	8.375	47.0	57.0	10.0	57.625	49.25	53.44	0.4
	60	3.125	11.25	8.125	59.0	69.0	10.0	56.875	48.75	52.81	0.4
	60	2.625	11.125	8.5	70.0	80.0	10.0	57.375	48.875	53.13	0.4
	60	3	11.25	8.25	84.0	94.0	10.0	57	48.75	52.88	0.4
P-3	60	4.5	5.625	1.125	0.0	10.0	10.0	55.5	54.375	54.94	0.1
	60	4	4.75	0.75	30.0	40.0	10.0	56	55.25	55.63	0.1
	60	3.5	4.625	1.125	40.0	50.0	10.0	56.5	55.375	55.94	0.1
	60	3.5	4.5	1	50.0	64.0	14.0	56.5	55.5	56.00	0.1
	60	4	4.75	0.75	67.0	77.0	10.0	56	55.25	55.63	0.1
	60	3.5	4.75	1.25	78.0	91.0	13.0	56.5	55.25	55.88	0.1
	60	3	4	1	94.0	104.0	10.0	57	56	56.50	0.1
	60	3.5	4.375	0.875	105.0	115.0	10.0	56.5	55.625	56.06	0.1
	60	3.625	4.5	0.875	117.0	127.0	10.0	56.375	55.5	55.94	0.1
	60	3.5	4.375	0.875	128.0	138.0	10.0	56.5	55.625	56.06	0.1

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

ΔH = Change in height

Δt = Time interval

r = Radius

I_t Infiltration Rate

H_{ave} Average Head Height over the time interval

APPENDIX A
REFERENCES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX A

References

California, State of, Department of Conservation, Division of Mines and Geology, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, CDMG Special Publication 117A.

_____, 1998, Maps of Known Active Fault Near – Source Zones in California and Adjacent Portions of Nevada.

_____, 1998, Seismic Hazard Zone Report for the El Monte 7.5-Minute Quadrangle, Los Angeles County, California, Report 022.

_____, 1999, State of California Seismic Hazard Zones Map, El Monte Quadrangle, Official Map Released March 25, 1999, Revised June 15, 2017, Scale 1:24,000.

Dibblee, T.W., and Ehrenspeck, H.E., 1999, Geologic map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-69, scale 1:24,000.

Hart, E. W., 1997, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Special Study Zones Maps: Department of Conservation, Division of Mines and Geology, Special Publication 42

International Code Council (ICC), California Building Code, 2019 Edition

Jennings, C. W., 2010, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000

APPENDIX B
LOG OF BORINGS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

THE FOLLOWING DESCRIBES THE TERMS AND SYMBOLS USED ON THE LOG OF BORINGS TO SUMMARIZE THE RESULTS OBTAINED IN THE FIELD INVESTIGATION AND SUBSEQUENT LABORATORY TESTING

DENSITY AND CONSISTENCY

The consistency of fine grained soils and the density of coarse grained soils are described on the basis of the Standard Penetration Test as follows:

COARSE GRAINED SOILS		ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (Tsf)	FINE GRAINED SOILS	
Very Loose	< 4	< 0.25	Very Soft	< 2
Loose	4 – 10	0.35 – 0.50	Soft	2 – 4
Medium	10 – 30	0.50 – 1.0	Firm (Medium)	4 – 8
Dense	30 – 50	1.0 – 2.0	Stiff	8 – 15
Very Dense	> 50	2.0 – 4.0	Very Stiff	15 – 30
		> 4.0	Hard	> 30

PARTICLE SIZE DEFINITION (As per ASTM D2487 and D422)

Boulder	⇒ Larger than 12 inches	Coarse Sands	⇒ No. 10 to No. 4 sieve
Cobbles	⇒ 3 to 12 inches	Medium Sands	⇒ No. 40 to No. 10 sieve
Coarse Gravel	⇒ 3/4 to 3 inches	Fine Sands	⇒ No. 200 to 40 sieve
Fine Gravel	⇒ No. 4 to 3/4 inches	Silt	⇒ 5µm to No. 200 sieve
		Clay	⇒ Smaller than 5µm

SOIL CLASSIFICATION

Soils and bedrock are classified and described based on their engineering properties and characteristics using ASTM D2487 and D2488.

Percentage description of minor components:

Trace	1 – 10%	Some	20 – 35%
Little	10 – 20%	And or y	25 – 50%

Stratified soils description:

Parting	0 to 1/16 inch thick	Layer	½ to 12 inches thick
Seam	1/16 to ½ inch thick	Stratum	> 12 inches thick

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

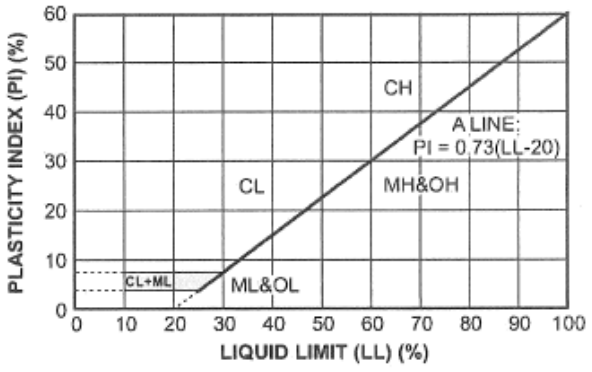
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



PARTICLE SIZE LIMITS

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	
	3"	¾"	NO. 4	NO. 10	NO. 40	NO. 200

LOG OF EXPLORATORY BORING B-1

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			R Value
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				3		SM	Native: Silty Sand- brown with orange oxidation, some clay, fine to medium sand, medium dense, moist	24	78	
10				23		SP-SM	Sand- yellowish brown, some silt, medium sand, medium dense, slightly moist	4	106	
15				27		SP-SM	.....same as above	4	103	
							Bottom of Boring at 16.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 2

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand to Clay- brown to dark brown, medium stiff, moist			EI, Max, Remolded Shear
5			■	8		SP	Native: Silty Sand- brown, fine to medium sand, medium dense, moist	14	113	Consol, -200= 31.4%
10			■	26		SP	Sand- yellowish brown, medium to coarse sand, medium dense, moist	3	110	-200= 6.5%
15			■	16		SP	.....same as above	6	116	-200= 9.8%
20			■	34		SP	.....same as above	3	113	-200= 10%
25			▨	19		SP	Sand- brown, medium sand, some clay, medium dense, moist	7		-200= 11.1%

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 3

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/14/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
			☒	16		SP	Sand- brown, medium to coarse sand, some clay, medium dense, moist	12		-200= 16.4%, LL= 31, PL= 27.2
35			☒	35		SP	Sand- brown, fine to medium sand, medium dense, slightly moist	5		
40			☒	40		SP	Sand- grayish brown, fine grained, medium dense to dense, slightly moist to moist	4		
45			☒	39		SP	Sand- brown to grayish brown, some clay, medium sand, medium dense very moist	24		-200= 19.1%
							▼			
50			☒	47		SP	....same as above, coarse sand	14		
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 4

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-3

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			
5			■	3	5	CL		42	78	
							Native: Silty Sand- brown with orange oxidation, some clay, fine to medium sand, medium dense, moist			
10			■	12	17	SP-SC	Sand- light brown, fine to medium sand, some clay, medium dense, slightly moist	5	99	
							Bottom of Boring at 11.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 5

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-4

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							2 to 3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				9		SP	Native: Sand- brown with orange oxidation, fine to medium sand, medium dense, moist	3	107	
10				20		SP-SM	Sand- yellowish brown, some silt, fine sand, medium dense, slightly moist	8	94	
15				20		SP-SC	.....same as above	16	106	
							Bottom of Boring at 16.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 6

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/8/20

LOG OF EXPLORATORY BORING B-5

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **10/12/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch concrete on top surface			
							Fill: Silty sand- dark brown, medium dense, moist			Corrosion
							Sandy Clay- brown to dark brown, medium stiff, moist			
5				8		SM	Native: Sandy Silt to Silty Sand- brown, fine sand, medium dense, moist	20	108	
10				15		SC-SM	Sand- yellowish brown, some silt, fine sand, medium dense, slightly moist	3	98	
15				41		SC-SM	.....same as above	5	104	
20				37		SC-SM	.....same as above, grayish brown, medium to coarse sand	3	114	
25				16		SM	Silty Sand- grayish brown, fine grained sand, some scattered fine gravels, medium dense, moist	20	100	
							Bottom of Boring at 26.5 feet No caving observed No groundwater encountered Boring backfilled with bentonite and patched with concrete			

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 7

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-6

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			
							Clay- dark brown, medium stiff, moist			
5			■	15		SM	Silty Sand- brown to light brown, medium sand, pieces of bricks and a cobble upto 2.5 inch diameter, medium dense, moist	13	108	
10			■	6		ML	Sandy Silt- grayish brown, fine sand, medium stiff, moist	26	93	Consol, -200= 68.3%
							NATIVE: Silty Sand, grayish brown, medium dense, slightly moist			
15			■	9		SP	Sand- grayish brown, some silt, medium to coarse sand, dense, moist	11	91	Consol, -200= 19.2%
20			■	11		SP	.....same as bove	26	84	-200= 21%
25			⊠	14		SP	Sand- grayish brown, fine to medium sand, some sand, medium dense, moist	20		-200= 8.5%, LL= 45, PL= 37.8

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 8

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B-6

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
			☒	41		SP	Sand- grayish brown, medium dense, fine to medium grained, some clay, moist	5		
35			☒	26		SC	Sand to Clayey Sand- brown to grayish brown, sandy clay at tip, medium dense, moist	15		-200= 33.2%
40			☒	29		SC	Clayey Sand- grayish brown, medium dense, moist, sandy clay at tip	14		
45			☒	21		CL	Sandy Clay/Clayey Sand- grayish brown, medium stiff/dense, moist ▼	25		-200= 48.9%, LL= 26, PL= 20.5
50			☒	25		SP	Gravelly Sand- brown, medium to coarse sand, clayey layer at tip, medium dense, wet	20		
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite slurry and capped with concrete			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 9

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-7

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Dirt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			
							Clay- dark brown, medium stiff, moist			
5				10		CL	Native: Sandy Silt- grayish brown with orange oxidation, fine grained sand, medium stiff, moist	22	103	-200= 58.8%, LL= 23%, PL= 19%
10				10		ML	Silty Sand- grayish brown, fine to medium grained sand, medium dense, moist	13	100	-200= 39.1%
15				20		SP	Sand- grayish brown, fine to medium grained sand, slightly moist, medium dense	3	98	-200= 10.9%
20				25		SP	.....same as above, yellowish brown, fine to medium grained, medium dense, moist	4	103	-200= 6.4%
25				29		SP	.....same as above, grayish brown	2		-200= 5%

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 10

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7107 XEBEC RUSH STREET.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING B-7

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
				24		SP	.....same as above, yellowish brown, fine to medium sand, slightly moist, medium dense	7		-200= 21%
35				8		CL	Sandy Clay- dark grayish brown, fine sand, medium stiff, moist	22		-200= 64.3%, LL= 29%, PL=25.8%
40				11		CL	.....same as above	23		-200= 57.4%, LL= 33.5%, PL= 30%
45				28		SP	Silty Sand- grayish brown, fine to medium sand, medium dense, moist ▼	16		-200= 23.2%
50				50		SP	GRAVELLY SAND- grayish brown, medium to coarse sand, medium to coarse gravel, wet, dense	14		-200= 5%
							Bottom of Boring at 51.5 feet No caving observed Groundwater encountered at 48 feet Boring backfilled with bentonite			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 11

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING P-1

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
							Sandy Clay- brown to dark brown, medium stiff, moist			-200= 78.8%
5							Bottom of Boring at 5 feet No Groundwater encountered No caving observed Boring backfilled with pea gravels and patched with asphalt			

Shelby Tube; Standard Split Spoon; No recovery; Modified California; Water Table ATD

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 12

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING P-2

Project Number: **20-7106**
Project Name: **2200 Rosemead Boulevard, South El Monte, CA**
Date Drilled: **11/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							3 inch asphalt on top surface Fill: Silty sand- dark brown, medium dense, moist			
										-200=46%
							Sandy Clay- brown to dark brown, medium stiff, moist			
5							Bottom of Boring at 5 feet No Groundwater encountered No caving observed Boring backfilled with pea gravels and patched with asphalt			

Shelby Tube
Standard Split Spoon
No recovery
Modified California
Water Table ATD

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 13

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7106 ROSEMEAD BLVD.GPJ TGR GEOTECH.GDT 12/11/20

LOG OF EXPLORATORY BORING P-3

Sheet **1** of **1**

Project Number: **20-7106**
Project Name: **2200 Rosemead Blvd, South El Monte, CA**
Date Drilled: **10/13/20**
Ground Elev:

Logged By: **PK**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
		■	■				Dirt on top surface Fill: Silty Sand- dark brown, fine sand, medium dense, moist			-200= 60.5%
		■	■				Clay- dark brown, medium stiff, moist			
5		■	■				Bottom of Boring at 5 feet No caving observed No groundwater encountered Boring backfilled with gravels			
10										

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 14

TGR GEOTECHNICAL, INC.

LOG OF BORING 20-7107 XEBEC RUSH STREET.GPJ TGR.GEOTECH.GDT 12/14/20

APPENDIX C
LABORATORY TEST RESULTS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX C

Laboratory Testing Procedures and Results

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM Test Method D1557. The results of these tests are presented in the test data and in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-2 @ 0-5 feet	Silty Sand with Sandy Clay	122.5	12%

Direct Shear Tests: Direct shear test was performed on selected remolded and/or undisturbed sample, which was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1-hour prior to application of shearing force. The sample was tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inches per minute (depending upon the soil type). The test result is presented in the test data and below:

Sample Location	Sample Description	Friction Angle (degrees)	Apparent Cohesion (psf)
B-2 @ 0-5 feet	Remolded Shear – Silty Sand with Sandy Clay, Ultimate	31	144

Consolidation Tests (ASTM D2435): Consolidation test were performed on selected, relatively undisturbed ring samples. Samples were placed in a consolidometer and loads were applied in geometric progression. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. The consolidation pressure curves are presented in the test data.

Wash Sieve Test: Typical materials were washed over No. 200 sieve (ASTM Test Method D1140). The test results are presented below:

Sample Location	% Passing No. 200 Sieve
B-2 @ 5 feet	31.4%

B-2 @ 10 feet	6.5%
B-2 @ 15 feet	9.8%
B-2 @ 20 feet	10.0%
B-2 @ 25 feet	11.1%
B-2 @ 30 feet	16.4%
B-2 @ 45 feet	19.1%
B-6 @ 10 feet	68.3%
B-6 @ 15 feet	19.2%
B-5 @ 20 feet	21.0%
B-6 @ 25 feet	8.5%
B-6 @ 35 feet	33.2%
B-6 @ 45 feet	48.9%
B-7 @ 5 feet	58.8%
B-7 @ 10 feet	39.1%
B-7 @ 15 feet	10.9%
B-7 @ 20 feet	6.4%
B-7 @ 30 feet	21.0%
B-7 @ 35 feet	64.3%
B-7 @ 40 feet	57.4%
B-7 @ 45 feet	23.2%
P-1 @ 0-5 feet	76.0%
P-2 @ 0-5 feet	45.6%
P-3 @ 0-5 feet	60.5%

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

Corrosivity Test: Electrical conductivity, pH, and soluble chloride tests were conducted on representative samples and the results are presented in the test data and in the table below:

Sample Location	Sample Description	Soluble Chloride (CAL.422) ppm	Electrical Resistivity (CAL.643) (ohm-cm)	PH (CAL.747)	Potential Degree of Attack on Steel
B-5 @ 0-5 feet	Silty Sand with Sandy Clay	118	2,000	9.8	Corrosive

Soluble Sulfates: The soluble sulfate content of selected sample was determined by standard geochemical methods. The test result is presented in the table below:

Sample Location	Sample Description	Water Soluble Sulfate in Soil, (% by Weight)	Sulfate Content (ppm)	Exposure Class*
B-5 @ 0-5 feet	Silty Sand with Sandy Clay	0.0641	641	S0

* Based on the current version of ACI 318-14 Building Code, Table No. 19.3.1.1; Exposure Categories and Classes.

R-Value: The resistance "R"-Value was determined by the California Materials Method No. 301 for subgrade soils. One sample was prepared and exudation pressure and "R"-Value determined. The graphically determined "R"-Value at exudation pressure of 300 psi is summarized in the table below:

Sample Location	Sample Description	R-Value
B-1 @ 0-5 feet	Silty Sand with Sandy Clay	59

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX D
SITE SEISMIC DESIGN AND DE-AGGREGATED PARAMETERS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

TABLE 1

SITE SPECIFIC GROUND MOTION ANALYSIS

2200 Rosemead Boulevard, South El Monte, CA

SA Period (sec)	Probabilistic Spectral Acceleration (g)	Risk Coefficients	Probabilistic Spectral Acceleration MCER (g)	Deterministic Spectral Acceleration (g)	Is Largest Deterministic Spectral Acceleration <1.5*Fa	Deterministic MCER	Site Specific MCER	2/3 of Spite Specific MCER	80% Code Design	Site Specific Design Response Spectrum
	Rotated Maximum		Rotated Maximum	Rotated Maximum 84th Percentile						
0	0.8789	0.896	0.7875	0.7177		0.7177	0.7177	0.4785	0.4047	0.4785
0.1	1.4839	0.896	1.3296	1.1185		1.1185	1.1185	0.7457	0.7424	0.7457
0.2	1.9855	0.896	1.7790	1.5293		1.5293	1.5293	1.0196	1.0117	1.0196
0.3	2.2658	0.896	2.0298	1.8130		1.8130	1.8130	1.2087	1.0117	1.2087
0.5	2.2631	0.896	2.0268	1.8590		1.8590	1.8590	1.2393	1.0117	1.2393
0.75	1.9330	0.895	1.7306	1.5978	No	1.5978	1.5978	1.0652	1.0117	1.0652
1	1.6796	0.895	1.5032	1.3975		1.3975	1.3975	0.9316	0.9093	0.9316
2	0.9194	0.895	0.8228	0.7187		0.7187	0.7187	0.4792	0.4547	0.4792
3	0.6006	0.895	0.5375	0.4397		0.4397	0.4547	0.3031	0.3031	0.3031
4	0.4263	0.895	0.3815	0.2811		0.2811	0.3410	0.2273	0.2273	0.2273
5	0.3270	0.895	0.2927	0.1929		0.1929	0.2728	0.1819	0.1819	0.1819

Code Sds	1.265	Crs =	0.896	Code Ss =	1.897	**Site Specific S_{DS} =**	**1.115**
Code Sd1	1.137	Cr1 =	0.895	Code S1 =	0.682	**Site Specific S_{D1} =**	**0.958**
To	0.18	Code Fa =	1	Sms =	1.897		
Ts	0.90	Code Fv =	2.5	Sm1 =	1.705		
TL	8						
Input							

FIGURE 1
Site Specific Design Response Spectra
2200 Rosemead Boulevard, South El Monte, CA

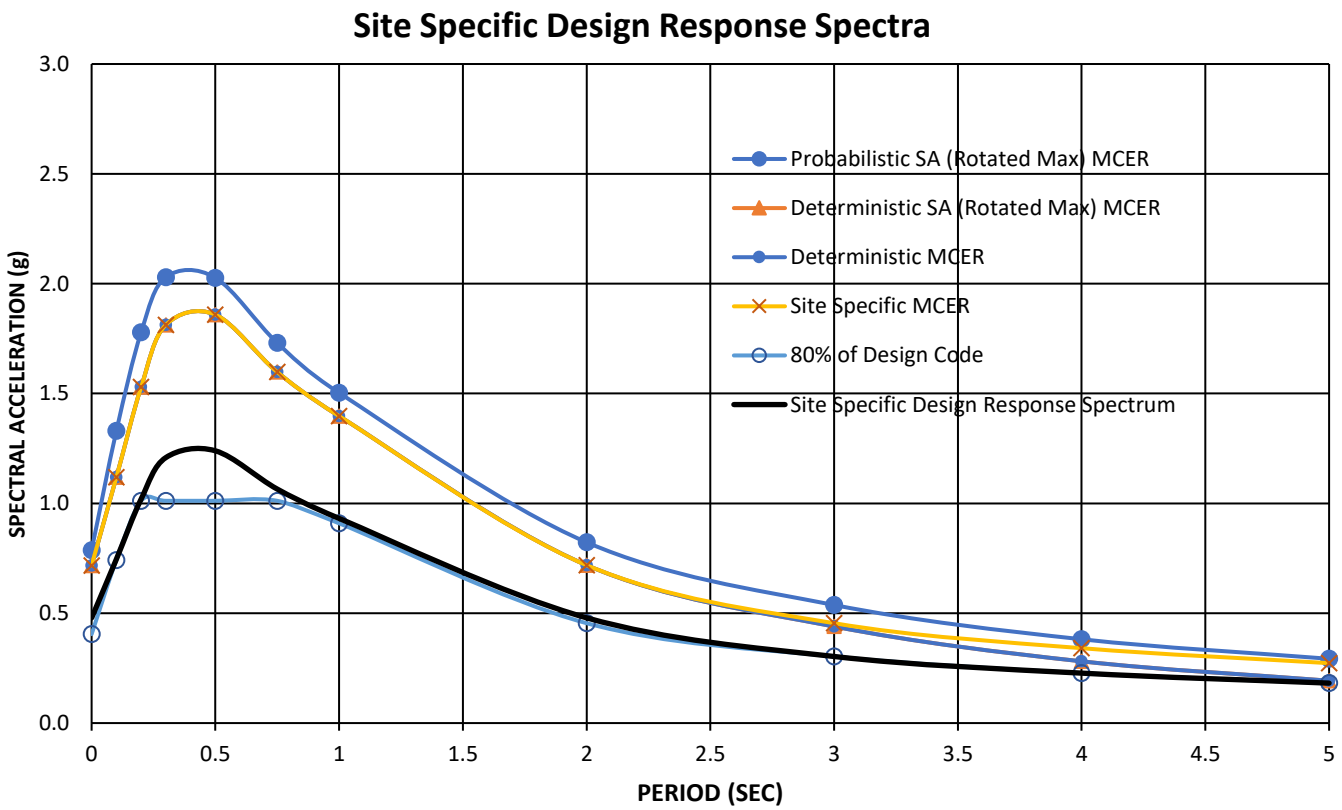


TABLE 2

Probabilistic Response Spectrum ASCE 7-16 Method 2

2200 Rosemead Boulevard, South El Monte, CA

Period (g)	UHGM (g)	RTGM (g)	Max Dir Scale factor	Max Dir RTGM (g)
0	0.842	0.799	1.1	0.879
0.1	1.396	1.349	1.1	1.484
0.2	1.854	1.805	1.1	1.986
0.3	2.143	2.014	1.125	2.266
0.5	2.098	1.926	1.175	2.263
0.75	1.713	1.562	1.2375	1.933
1	1.442	1.292	1.3	1.680
2	0.759	0.681	1.35	0.919
3	0.478	0.429	1.4	0.601
4	0.328	0.294	1.45	0.426
5	0.243	0.218	1.5	0.327

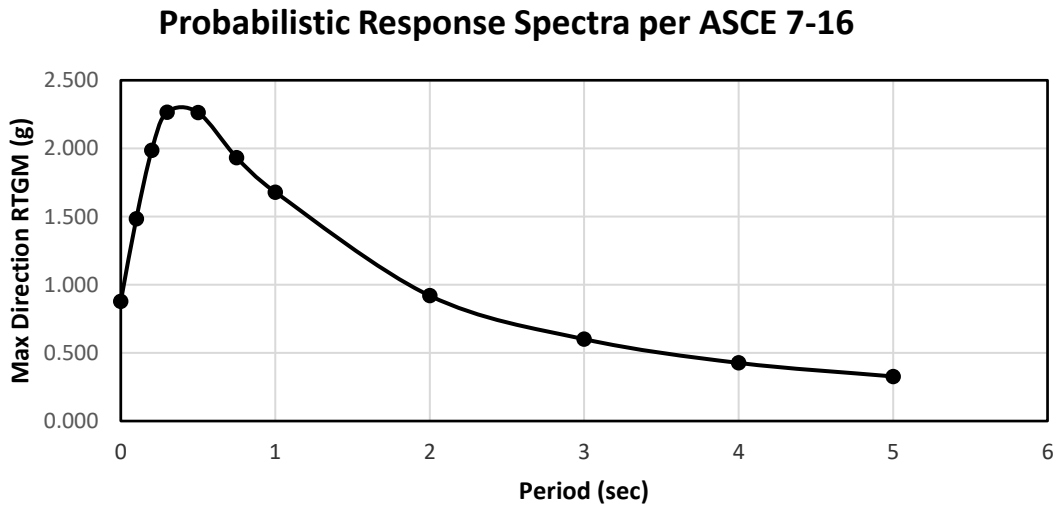
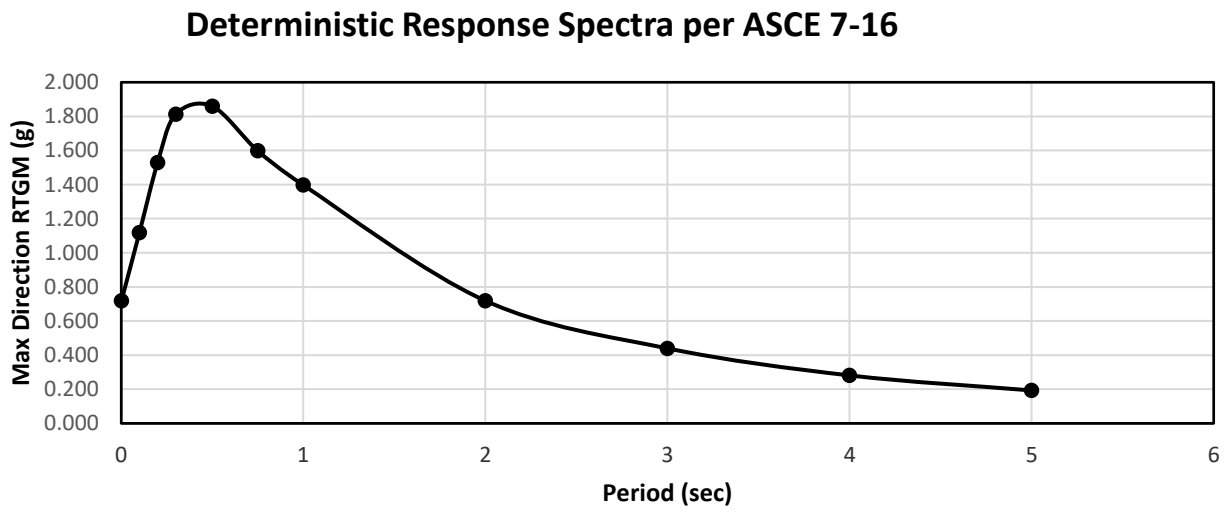


TABLE 3

Deterministic Response Spectrum ASCE 7-16

2200 Rosemead Boulevard, South El Monte, CA

Period (g)	Mean Spectra (g)	Sigma (g)	84th-Percentile Spectral Acceleration (g)	Max Dir Scale factor	Max Dir Deterministic SA (g)
0.001	0.391	0.512	0.652	1.1	0.718
0.1	0.592	0.541	1.017	1.1	1.119
0.2	0.833	0.513	1.390	1.1	1.529
0.3	0.938	0.541	1.612	1.125	1.813
0.5	0.866	0.603	1.582	1.175	1.859
0.75	0.675	0.649	1.291	1.2375	1.598
1	0.546	0.678	1.075	1.3	1.397
2	0.262	0.708	0.532	1.35	0.719
3	0.154	0.713	0.314	1.4	0.440
4	0.096	0.703	0.194	1.45	0.281
5	0.064	0.705	0.129	1.5	0.193



2200 Rosemead Blvd, South El Monte, CA 91733, USA

Latitude, Longitude: 34.0536765, -118.0636838

Date	11/11/2020, 8:37:25 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.897	MCE_R ground motion. (for 0.2 second period)
S_1	0.682	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.897	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.265	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.817	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.899	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.897	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.118	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.304	Factored deterministic acceleration value. (0.2 second)
S1RT	0.682	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.762	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.732	Factored deterministic acceleration value. (1.0 second)
PGAd	0.922	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.896	Mapped value of the risk coefficient at short periods
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

While the information presented on this website is believed to be correct, SEAOC /OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

34.054

Time Horizon

Return period in years

2475

Longitude

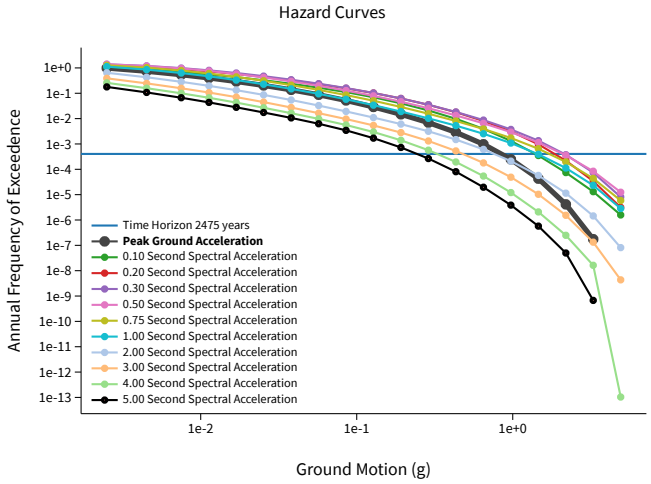
Decimal degrees, negative values for western longitudes

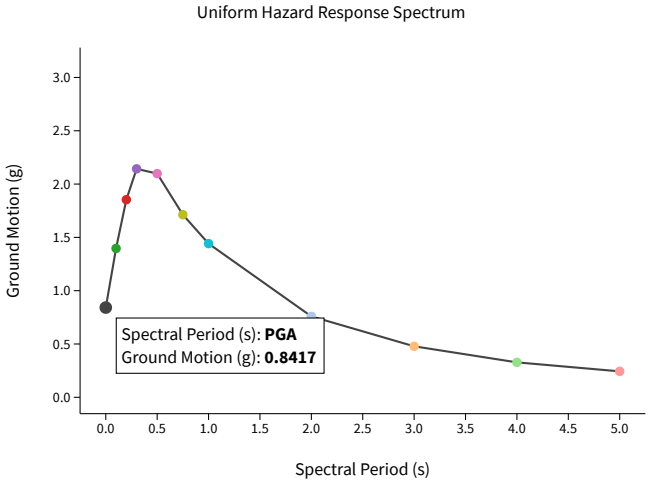
-118.063

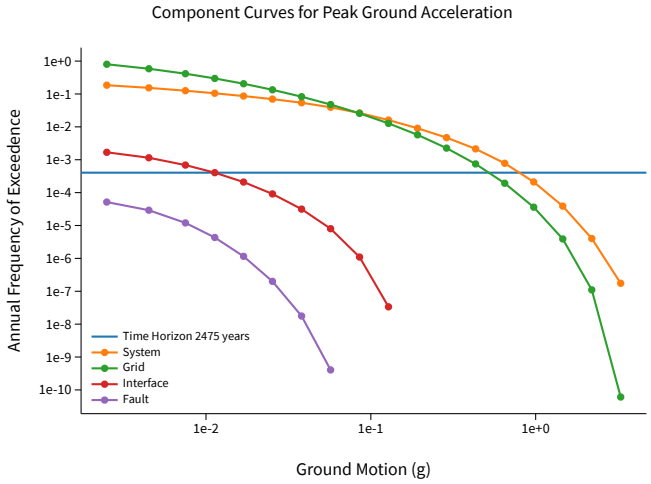
Site Class

259 m/s (Site class D)

Hazard Curve





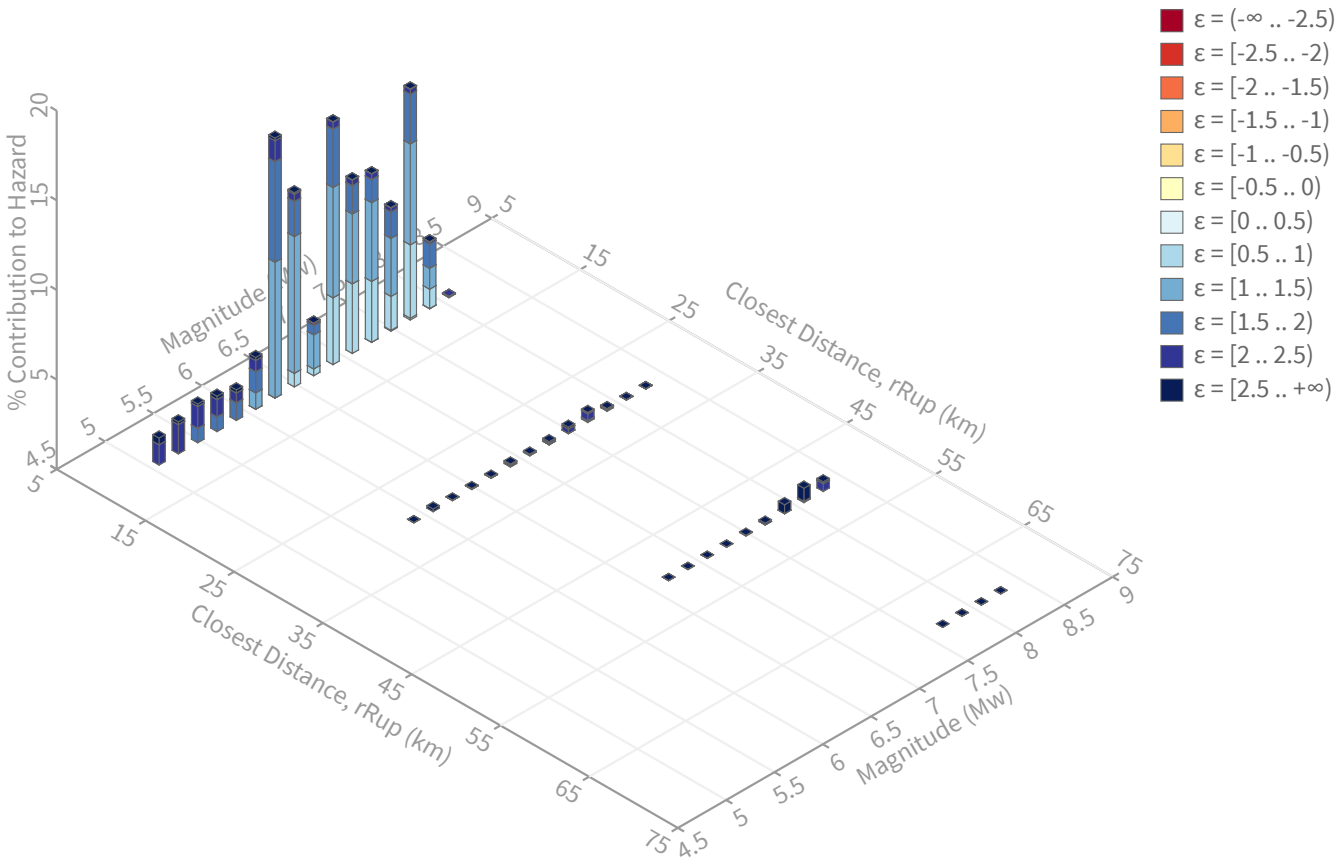


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.84165262 g

Recovered targets

Return period: 2939.5193 yrs
Exceedance rate: 0.00034019168 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.08 %

Mean (over all sources)

m: 6.89
r: 10.28 km
ε_0: 1.45 σ

Mode (largest m-r bin)

m: 6.3
r: 6.86 km
ε_0: 1.54 σ
Contribution: 14.49 %

Mode (largest m-r-ε_0 bin)

m: 6.52
r: 6.92 km
ε_0: 1.31 σ
Contribution: 7.63 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							44.04
Elysian Park (Upper) [0]		5.83	6.48	1.41	118.097°W	34.077°N	309.42	11.20
Whittier alt 1 [7]		6.46	6.71	1.36	118.046°W	33.999°N	165.72	7.38
Puente Hills [2]		9.90	7.30	0.94	118.093°W	33.959°N	194.52	7.21
Raymond [1]		9.00	7.22	1.54	118.083°W	34.132°N	347.79	4.81
Compton [1]		17.20	7.26	1.37	118.247°W	33.801°N	211.18	2.87
Puente Hills [3]		10.61	6.81	1.28	118.143°W	33.972°N	219.04	2.00
Sierra Madre [4]		14.62	7.69	1.70	118.061°W	34.185°N	0.56	1.86
Compton [2]		17.48	7.53	1.44	118.286°W	33.817°N	218.01	1.29
Puente Hills [1]		10.95	7.18	1.30	118.052°W	33.949°N	174.89	1.01
UC33brAvg_FM32	System							41.06
Elysian Park (Upper) [0]		5.83	7.06	1.17	118.097°W	34.077°N	309.42	9.98
Whittier alt 2 [6]		6.55	7.03	1.17	118.046°W	33.998°N	166.13	5.64
Puente Hills (Santa Fe Springs) [0]		9.39	6.95	1.02	118.023°W	33.950°N	162.41	5.51
Raymond [1]		9.00	7.21	1.53	118.083°W	34.132°N	347.79	5.06
Puente Hills (Coyote Hills) [1]		10.47	7.25	1.02	118.044°W	33.915°N	173.68	3.14
Compton [1]		17.20	7.32	1.35	118.247°W	33.801°N	211.18	3.06
Puente Hills (LA) [0]		7.15	7.16	0.91	118.116°W	33.990°N	214.84	2.28
Sierra Madre [4]		14.62	7.72	1.70	118.061°W	34.185°N	0.56	1.77
Compton [2]		17.48	7.50	1.45	118.286°W	33.817°N	218.01	1.10
UC33brAvg_FM32 (opt)	Grid							7.68
PointSourceFinite: -118.063, 34.112		7.99	5.73	1.90	118.063°W	34.112°N	0.00	2.08
PointSourceFinite: -118.063, 34.112		7.99	5.73	1.90	118.063°W	34.112°N	0.00	2.08
UC33brAvg_FM31 (opt)	Grid							7.22
PointSourceFinite: -118.063, 34.112		8.07	5.69	1.92	118.063°W	34.112°N	0.00	1.96
PointSourceFinite: -118.063, 34.112		8.07	5.69	1.92	118.063°W	34.112°N	0.00	1.96

APPENDIX E
LIQUEFACTION ANALYSIS

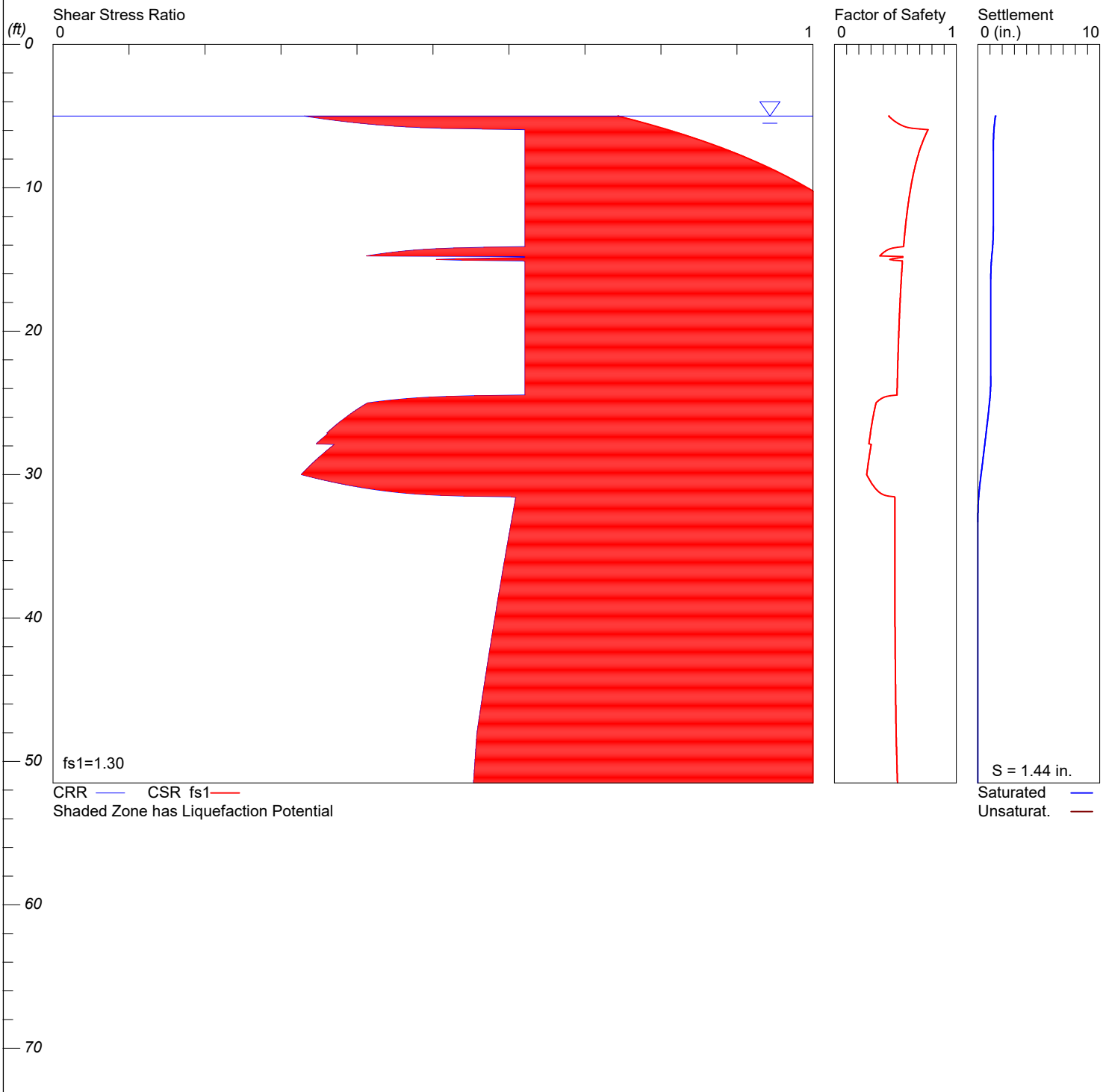
TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

LIQUEFACTION ANALYSIS

2200 Rosemead Boulevard

Hole No.=B-2 Water Depth=5 ft

Magnitude=6.89
Acceleration=0.89g



****
LIQUEFACTION ANALYSIS SUMMARY

****
Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 12/11/2020 2:41:18 PM

Input File Name: P:\2020 Projects\20-7106 XBC, 2200 Rosemead Blvd., South El Monte\Liquify2\B-2.liq
Title: 2200 Rosemead Boulevard
Subtitle: PN: 20-7106

Surface Elev.=
Hole No.=B-2
Depth of Hole= 51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration= 0.89 g
Earthquake Magnitude= 6.89

Input Data:
Surface Elev.=
Hole No.=B-2
Depth of Hole=51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration=0.89 g
Earthquake Magnitude=6.89
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	8.00	120.00	31.40
10.00	26.00	120.00	6.50
15.00	16.00	120.00	9.80
20.00	34.00	120.00	10.00
25.00	19.00	120.00	11.10
30.00	16.00	120.00	16.40
35.00	35.00	120.00	5.00
40.00	40.00	120.00	5.00
45.00	39.00	120.00	19.10
50.00	47.00	120.00	5.00

Output Results:

Settlement of Saturated Sands=1.44 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=1.44 in.
Differential Settlement=0.721 to 0.951 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
5.00	0.33	0.74	0.44*	1.44	0.00	1.44
5.05	0.34	0.75	0.45*	1.43	0.00	1.43
5.10	0.34	0.75	0.46*	1.43	0.00	1.43
5.15	0.35	0.75	0.46*	1.42	0.00	1.42
5.20	0.36	0.76	0.47*	1.41	0.00	1.41
5.25	0.36	0.76	0.48*	1.40	0.00	1.40
5.30	0.37	0.77	0.49*	1.40	0.00	1.40
5.35	0.38	0.77	0.49*	1.39	0.00	1.39
5.40	0.39	0.77	0.50*	1.38	0.00	1.38
5.45	0.40	0.78	0.51*	1.38	0.00	1.38
5.50	0.40	0.78	0.52*	1.37	0.00	1.37
5.55	0.41	0.78	0.53*	1.37	0.00	1.37
5.60	0.42	0.79	0.54*	1.36	0.00	1.36
5.65	0.44	0.79	0.55*	1.35	0.00	1.35
5.70	0.45	0.79	0.57*	1.35	0.00	1.35
5.75	0.46	0.80	0.58*	1.34	0.00	1.34
5.80	0.48	0.80	0.60*	1.34	0.00	1.34
5.85	0.51	0.80	0.64*	1.33	0.00	1.33
5.90	0.56	0.81	0.70*	1.33	0.00	1.33
5.95	0.62	0.81	0.77*	1.32	0.00	1.32
6.00	0.62	0.81	0.76*	1.32	0.00	1.32
6.05	0.62	0.81	0.76*	1.31	0.00	1.31
6.10	0.62	0.82	0.76*	1.31	0.00	1.31
6.15	0.62	0.82	0.76*	1.31	0.00	1.31
6.20	0.62	0.82	0.75*	1.30	0.00	1.30
6.25	0.62	0.83	0.75*	1.30	0.00	1.30

6.30	0.62	0.83	0.75*	1.30	0.00	1.30
6.35	0.62	0.83	0.75*	1.29	0.00	1.29
6.40	0.62	0.84	0.74*	1.29	0.00	1.29
6.45	0.62	0.84	0.74*	1.29	0.00	1.29
6.50	0.62	0.84	0.74*	1.29	0.00	1.29
6.55	0.62	0.84	0.74*	1.29	0.00	1.29
6.60	0.62	0.85	0.73*	1.28	0.00	1.28
6.65	0.62	0.85	0.73*	1.28	0.00	1.28
6.70	0.62	0.85	0.73*	1.28	0.00	1.28
6.75	0.62	0.86	0.73*	1.28	0.00	1.28
6.80	0.62	0.86	0.72*	1.28	0.00	1.28
6.85	0.62	0.86	0.72*	1.28	0.00	1.28
6.90	0.62	0.86	0.72*	1.28	0.00	1.28
6.95	0.62	0.87	0.72*	1.28	0.00	1.28
7.00	0.62	0.87	0.71*	1.28	0.00	1.28
7.05	0.62	0.87	0.71*	1.28	0.00	1.28
7.10	0.62	0.87	0.71*	1.27	0.00	1.27
7.15	0.62	0.88	0.71*	1.27	0.00	1.27
7.20	0.62	0.88	0.71*	1.27	0.00	1.27
7.25	0.62	0.88	0.70*	1.27	0.00	1.27
7.30	0.62	0.88	0.70*	1.27	0.00	1.27
7.35	0.62	0.89	0.70*	1.27	0.00	1.27
7.40	0.62	0.89	0.70*	1.27	0.00	1.27
7.45	0.62	0.89	0.70*	1.27	0.00	1.27
7.50	0.62	0.89	0.69*	1.27	0.00	1.27
7.55	0.62	0.90	0.69*	1.27	0.00	1.27
7.60	0.62	0.90	0.69*	1.27	0.00	1.27
7.65	0.62	0.90	0.69*	1.27	0.00	1.27
7.70	0.62	0.90	0.69*	1.27	0.00	1.27
7.75	0.62	0.91	0.69*	1.27	0.00	1.27
7.80	0.62	0.91	0.68*	1.27	0.00	1.27
7.85	0.62	0.91	0.68*	1.27	0.00	1.27
7.90	0.62	0.91	0.68*	1.27	0.00	1.27
7.95	0.62	0.91	0.68*	1.27	0.00	1.27
8.00	0.62	0.92	0.68*	1.27	0.00	1.27
8.05	0.62	0.92	0.68*	1.27	0.00	1.27
8.10	0.62	0.92	0.67*	1.27	0.00	1.27
8.15	0.62	0.92	0.67*	1.27	0.00	1.27
8.20	0.62	0.93	0.67*	1.27	0.00	1.27
8.25	0.62	0.93	0.67*	1.27	0.00	1.27
8.30	0.62	0.93	0.67*	1.27	0.00	1.27
8.35	0.62	0.93	0.67*	1.27	0.00	1.27
8.40	0.62	0.93	0.67*	1.27	0.00	1.27
8.45	0.62	0.94	0.66*	1.27	0.00	1.27
8.50	0.62	0.94	0.66*	1.27	0.00	1.27
8.55	0.62	0.94	0.66*	1.27	0.00	1.27
8.60	0.62	0.94	0.66*	1.27	0.00	1.27
8.65	0.62	0.94	0.66*	1.27	0.00	1.27
8.70	0.62	0.95	0.66*	1.27	0.00	1.27
8.75	0.62	0.95	0.66*	1.27	0.00	1.27

8.80	0.62	0.95	0.65*	1.27	0.00	1.27
8.85	0.62	0.95	0.65*	1.27	0.00	1.27
8.90	0.62	0.95	0.65*	1.27	0.00	1.27
8.95	0.62	0.96	0.65*	1.27	0.00	1.27
9.00	0.62	0.96	0.65*	1.27	0.00	1.27
9.05	0.62	0.96	0.65*	1.27	0.00	1.27
9.10	0.62	0.96	0.65*	1.27	0.00	1.27
9.15	0.62	0.96	0.64*	1.27	0.00	1.27
9.20	0.62	0.97	0.64*	1.27	0.00	1.27
9.25	0.62	0.97	0.64*	1.27	0.00	1.27
9.30	0.62	0.97	0.64*	1.27	0.00	1.27
9.35	0.62	0.97	0.64*	1.27	0.00	1.27
9.40	0.62	0.97	0.64*	1.27	0.00	1.27
9.45	0.62	0.97	0.64*	1.27	0.00	1.27
9.50	0.62	0.98	0.64*	1.27	0.00	1.27
9.55	0.62	0.98	0.64*	1.27	0.00	1.27
9.60	0.62	0.98	0.63*	1.27	0.00	1.27
9.65	0.62	0.98	0.63*	1.27	0.00	1.27
9.70	0.62	0.98	0.63*	1.27	0.00	1.27
9.75	0.62	0.98	0.63*	1.27	0.00	1.27
9.80	0.62	0.99	0.63*	1.27	0.00	1.27
9.85	0.62	0.99	0.63*	1.27	0.00	1.27
9.90	0.62	0.99	0.63*	1.27	0.00	1.27
9.95	0.62	0.99	0.63*	1.27	0.00	1.27
10.00	0.62	0.99	0.63*	1.27	0.00	1.27
10.05	0.62	0.99	0.62*	1.27	0.00	1.27
10.10	0.62	1.00	0.62*	1.27	0.00	1.27
10.15	0.62	1.00	0.62*	1.27	0.00	1.27
10.20	0.62	1.00	0.62*	1.27	0.00	1.27
10.25	0.62	1.00	0.62*	1.27	0.00	1.27
10.30	0.62	1.00	0.62*	1.27	0.00	1.27
10.35	0.62	1.00	0.62*	1.27	0.00	1.27
10.40	0.62	1.01	0.62*	1.27	0.00	1.27
10.45	0.62	1.01	0.62*	1.27	0.00	1.27
10.50	0.62	1.01	0.62*	1.27	0.00	1.27
10.55	0.62	1.01	0.62*	1.27	0.00	1.27
10.60	0.62	1.01	0.61*	1.27	0.00	1.27
10.65	0.62	1.01	0.61*	1.27	0.00	1.27
10.70	0.62	1.01	0.61*	1.27	0.00	1.27
10.75	0.62	1.02	0.61*	1.27	0.00	1.27
10.80	0.62	1.02	0.61*	1.27	0.00	1.27
10.85	0.62	1.02	0.61*	1.27	0.00	1.27
10.90	0.62	1.02	0.61*	1.27	0.00	1.27
10.95	0.62	1.02	0.61*	1.27	0.00	1.27
11.00	0.62	1.02	0.61*	1.27	0.00	1.27
11.05	0.62	1.02	0.61*	1.27	0.00	1.27
11.10	0.62	1.03	0.61*	1.27	0.00	1.27
11.15	0.62	1.03	0.60*	1.27	0.00	1.27
11.20	0.62	1.03	0.60*	1.27	0.00	1.27
11.25	0.62	1.03	0.60*	1.27	0.00	1.27

11.30	0.62	1.03	0.60*	1.27	0.00	1.27
11.35	0.62	1.03	0.60*	1.27	0.00	1.27
11.40	0.62	1.03	0.60*	1.27	0.00	1.27
11.45	0.62	1.04	0.60*	1.27	0.00	1.27
11.50	0.62	1.04	0.60*	1.27	0.00	1.27
11.55	0.62	1.04	0.60*	1.27	0.00	1.27
11.60	0.62	1.04	0.60*	1.27	0.00	1.27
11.65	0.62	1.04	0.60*	1.27	0.00	1.27
11.70	0.62	1.04	0.60*	1.27	0.00	1.27
11.75	0.62	1.04	0.60*	1.27	0.00	1.27
11.80	0.62	1.04	0.59*	1.27	0.00	1.27
11.85	0.62	1.05	0.59*	1.27	0.00	1.27
11.90	0.62	1.05	0.59*	1.27	0.00	1.27
11.95	0.62	1.05	0.59*	1.27	0.00	1.27
12.00	0.62	1.05	0.59*	1.27	0.00	1.27
12.05	0.62	1.05	0.59*	1.27	0.00	1.27
12.10	0.62	1.05	0.59*	1.27	0.00	1.27
12.15	0.62	1.05	0.59*	1.27	0.00	1.27
12.20	0.62	1.05	0.59*	1.27	0.00	1.27
12.25	0.62	1.06	0.59*	1.27	0.00	1.27
12.30	0.62	1.06	0.59*	1.27	0.00	1.27
12.35	0.62	1.06	0.59*	1.27	0.00	1.27
12.40	0.62	1.06	0.59*	1.27	0.00	1.27
12.45	0.62	1.06	0.59*	1.27	0.00	1.27
12.50	0.62	1.06	0.59*	1.27	0.00	1.27
12.55	0.62	1.06	0.58*	1.27	0.00	1.27
12.60	0.62	1.06	0.58*	1.27	0.00	1.27
12.65	0.62	1.06	0.58*	1.27	0.00	1.27
12.70	0.62	1.07	0.58*	1.27	0.00	1.27
12.75	0.62	1.07	0.58*	1.27	0.00	1.27
12.80	0.62	1.07	0.58*	1.27	0.00	1.27
12.85	0.62	1.07	0.58*	1.27	0.00	1.27
12.90	0.62	1.07	0.58*	1.27	0.00	1.27
12.95	0.62	1.07	0.58*	1.27	0.00	1.27
13.00	0.62	1.07	0.58*	1.27	0.00	1.27
13.05	0.62	1.07	0.58*	1.27	0.00	1.27
13.10	0.62	1.07	0.58*	1.26	0.00	1.26
13.15	0.62	1.08	0.58*	1.26	0.00	1.26
13.20	0.62	1.08	0.58*	1.26	0.00	1.26
13.25	0.62	1.08	0.58*	1.26	0.00	1.26
13.30	0.62	1.08	0.58*	1.26	0.00	1.26
13.35	0.62	1.08	0.58*	1.26	0.00	1.26
13.40	0.62	1.08	0.57*	1.26	0.00	1.26
13.45	0.62	1.08	0.57*	1.26	0.00	1.26
13.50	0.62	1.08	0.57*	1.25	0.00	1.25
13.55	0.62	1.08	0.57*	1.25	0.00	1.25
13.60	0.62	1.08	0.57*	1.25	0.00	1.25
13.65	0.62	1.09	0.57*	1.25	0.00	1.25
13.70	0.62	1.09	0.57*	1.24	0.00	1.24
13.75	0.62	1.09	0.57*	1.24	0.00	1.24

13.80	0.62	1.09	0.57*	1.24	0.00	1.24
13.85	0.62	1.09	0.57*	1.23	0.00	1.23
13.90	0.62	1.09	0.57*	1.23	0.00	1.23
13.95	0.62	1.09	0.57*	1.23	0.00	1.23
14.00	0.62	1.09	0.57*	1.22	0.00	1.22
14.05	0.62	1.09	0.57*	1.22	0.00	1.22
14.10	0.62	1.09	0.57*	1.22	0.00	1.22
14.15	0.57	1.10	0.52*	1.21	0.00	1.21
14.20	0.53	1.10	0.48*	1.21	0.00	1.21
14.25	0.50	1.10	0.46*	1.20	0.00	1.20
14.30	0.49	1.10	0.44*	1.20	0.00	1.20
14.35	0.47	1.10	0.43*	1.19	0.00	1.19
14.40	0.46	1.10	0.42*	1.19	0.00	1.19
14.45	0.45	1.10	0.41*	1.18	0.00	1.18
14.50	0.45	1.10	0.40*	1.18	0.00	1.18
14.55	0.44	1.10	0.40*	1.17	0.00	1.17
14.60	0.43	1.10	0.39*	1.16	0.00	1.16
14.65	0.42	1.10	0.38*	1.16	0.00	1.16
14.70	0.42	1.11	0.38*	1.15	0.00	1.15
14.75	0.41	1.11	0.37*	1.15	0.00	1.15
14.80	0.62	1.11	0.56*	1.14	0.00	1.14
14.85	0.62	1.11	0.56*	1.14	0.00	1.14
14.90	0.58	1.11	0.52*	1.13	0.00	1.13
14.95	0.53	1.11	0.48*	1.13	0.00	1.13
15.00	0.50	1.11	0.45*	1.12	0.00	1.12
15.05	0.54	1.11	0.48*	1.12	0.00	1.12
15.10	0.62	1.11	0.56*	1.11	0.00	1.11
15.15	0.62	1.11	0.56*	1.11	0.00	1.11
15.20	0.62	1.11	0.56*	1.10	0.00	1.10
15.25	0.62	1.12	0.56*	1.10	0.00	1.10
15.30	0.62	1.12	0.56*	1.10	0.00	1.10
15.35	0.62	1.12	0.56*	1.09	0.00	1.09
15.40	0.62	1.12	0.56*	1.09	0.00	1.09
15.45	0.62	1.12	0.56*	1.09	0.00	1.09
15.50	0.62	1.12	0.55*	1.08	0.00	1.08
15.55	0.62	1.12	0.55*	1.08	0.00	1.08
15.60	0.62	1.12	0.55*	1.08	0.00	1.08
15.65	0.62	1.12	0.55*	1.08	0.00	1.08
15.70	0.62	1.12	0.55*	1.08	0.00	1.08
15.75	0.62	1.12	0.55*	1.07	0.00	1.07
15.80	0.62	1.12	0.55*	1.07	0.00	1.07
15.85	0.62	1.12	0.55*	1.07	0.00	1.07
15.90	0.62	1.13	0.55*	1.07	0.00	1.07
15.95	0.62	1.13	0.55*	1.07	0.00	1.07
16.00	0.62	1.13	0.55*	1.07	0.00	1.07
16.05	0.62	1.13	0.55*	1.07	0.00	1.07
16.10	0.62	1.13	0.55*	1.07	0.00	1.07
16.15	0.62	1.13	0.55*	1.07	0.00	1.07
16.20	0.62	1.13	0.55*	1.07	0.00	1.07
16.25	0.62	1.13	0.55*	1.06	0.00	1.06

16.30	0.62	1.13	0.55*	1.06	0.00	1.06
16.35	0.62	1.13	0.55*	1.06	0.00	1.06
16.40	0.62	1.13	0.55*	1.06	0.00	1.06
16.45	0.62	1.13	0.55*	1.06	0.00	1.06
16.50	0.62	1.13	0.55*	1.06	0.00	1.06
16.55	0.62	1.13	0.55*	1.06	0.00	1.06
16.60	0.62	1.14	0.55*	1.06	0.00	1.06
16.65	0.62	1.14	0.55*	1.06	0.00	1.06
16.70	0.62	1.14	0.55*	1.06	0.00	1.06
16.75	0.62	1.14	0.55*	1.06	0.00	1.06
16.80	0.62	1.14	0.55*	1.06	0.00	1.06
16.85	0.62	1.14	0.55*	1.06	0.00	1.06
16.90	0.62	1.14	0.54*	1.06	0.00	1.06
16.95	0.62	1.14	0.54*	1.06	0.00	1.06
17.00	0.62	1.14	0.54*	1.06	0.00	1.06
17.05	0.62	1.14	0.54*	1.06	0.00	1.06
17.10	0.62	1.14	0.54*	1.06	0.00	1.06
17.15	0.62	1.14	0.54*	1.06	0.00	1.06
17.20	0.62	1.14	0.54*	1.06	0.00	1.06
17.25	0.62	1.14	0.54*	1.06	0.00	1.06
17.30	0.62	1.15	0.54*	1.06	0.00	1.06
17.35	0.62	1.15	0.54*	1.06	0.00	1.06
17.40	0.62	1.15	0.54*	1.06	0.00	1.06
17.45	0.62	1.15	0.54*	1.06	0.00	1.06
17.50	0.62	1.15	0.54*	1.06	0.00	1.06
17.55	0.62	1.15	0.54*	1.06	0.00	1.06
17.60	0.62	1.15	0.54*	1.06	0.00	1.06
17.65	0.62	1.15	0.54*	1.06	0.00	1.06
17.70	0.62	1.15	0.54*	1.06	0.00	1.06
17.75	0.62	1.15	0.54*	1.06	0.00	1.06
17.80	0.62	1.15	0.54*	1.06	0.00	1.06
17.85	0.62	1.15	0.54*	1.06	0.00	1.06
17.90	0.62	1.15	0.54*	1.06	0.00	1.06
17.95	0.62	1.15	0.54*	1.06	0.00	1.06
18.00	0.62	1.15	0.54*	1.06	0.00	1.06
18.05	0.62	1.15	0.54*	1.06	0.00	1.06
18.10	0.62	1.15	0.54*	1.06	0.00	1.06
18.15	0.62	1.16	0.54*	1.06	0.00	1.06
18.20	0.62	1.16	0.54*	1.06	0.00	1.06
18.25	0.62	1.16	0.54*	1.06	0.00	1.06
18.30	0.62	1.16	0.54*	1.06	0.00	1.06
18.35	0.62	1.16	0.54*	1.06	0.00	1.06
18.40	0.62	1.16	0.54*	1.06	0.00	1.06
18.45	0.62	1.16	0.54*	1.06	0.00	1.06
18.50	0.62	1.16	0.54*	1.06	0.00	1.06
18.55	0.62	1.16	0.54*	1.06	0.00	1.06
18.60	0.62	1.16	0.54*	1.06	0.00	1.06
18.65	0.62	1.16	0.53*	1.06	0.00	1.06
18.70	0.62	1.16	0.53*	1.06	0.00	1.06
18.75	0.62	1.16	0.53*	1.06	0.00	1.06

18.80	0.62	1.16	0.53*	1.06	0.00	1.06
18.85	0.62	1.16	0.53*	1.06	0.00	1.06
18.90	0.62	1.16	0.53*	1.06	0.00	1.06
18.95	0.62	1.16	0.53*	1.06	0.00	1.06
19.00	0.62	1.17	0.53*	1.06	0.00	1.06
19.05	0.62	1.17	0.53*	1.06	0.00	1.06
19.10	0.62	1.17	0.53*	1.06	0.00	1.06
19.15	0.62	1.17	0.53*	1.06	0.00	1.06
19.20	0.62	1.17	0.53*	1.06	0.00	1.06
19.25	0.62	1.17	0.53*	1.06	0.00	1.06
19.30	0.62	1.17	0.53*	1.06	0.00	1.06
19.35	0.62	1.17	0.53*	1.06	0.00	1.06
19.40	0.62	1.17	0.53*	1.06	0.00	1.06
19.45	0.62	1.17	0.53*	1.06	0.00	1.06
19.50	0.62	1.17	0.53*	1.06	0.00	1.06
19.55	0.62	1.17	0.53*	1.06	0.00	1.06
19.60	0.62	1.17	0.53*	1.06	0.00	1.06
19.65	0.62	1.17	0.53*	1.06	0.00	1.06
19.70	0.62	1.17	0.53*	1.06	0.00	1.06
19.75	0.62	1.17	0.53*	1.06	0.00	1.06
19.80	0.62	1.17	0.53*	1.06	0.00	1.06
19.85	0.62	1.17	0.53*	1.06	0.00	1.06
19.90	0.62	1.17	0.53*	1.06	0.00	1.06
19.95	0.62	1.17	0.53*	1.06	0.00	1.06
20.00	0.62	1.18	0.53*	1.06	0.00	1.06
20.05	0.62	1.18	0.53*	1.06	0.00	1.06
20.10	0.62	1.18	0.53*	1.06	0.00	1.06
20.15	0.62	1.18	0.53*	1.06	0.00	1.06
20.20	0.62	1.18	0.53*	1.06	0.00	1.06
20.25	0.62	1.18	0.53*	1.06	0.00	1.06
20.30	0.62	1.18	0.53*	1.06	0.00	1.06
20.35	0.62	1.18	0.53*	1.06	0.00	1.06
20.40	0.62	1.18	0.53*	1.06	0.00	1.06
20.45	0.62	1.18	0.53*	1.06	0.00	1.06
20.50	0.62	1.18	0.53*	1.06	0.00	1.06
20.55	0.62	1.18	0.53*	1.06	0.00	1.06
20.60	0.62	1.18	0.53*	1.06	0.00	1.06
20.65	0.62	1.18	0.53*	1.06	0.00	1.06
20.70	0.62	1.18	0.53*	1.06	0.00	1.06
20.75	0.62	1.18	0.53*	1.06	0.00	1.06
20.80	0.62	1.18	0.53*	1.06	0.00	1.06
20.85	0.62	1.18	0.52*	1.06	0.00	1.06
20.90	0.62	1.18	0.52*	1.06	0.00	1.06
20.95	0.62	1.18	0.52*	1.06	0.00	1.06
21.00	0.62	1.18	0.52*	1.06	0.00	1.06
21.05	0.62	1.18	0.52*	1.06	0.00	1.06
21.10	0.62	1.19	0.52*	1.06	0.00	1.06
21.15	0.62	1.19	0.52*	1.06	0.00	1.06
21.20	0.62	1.19	0.52*	1.06	0.00	1.06
21.25	0.62	1.19	0.52*	1.06	0.00	1.06

21.30	0.62	1.19	0.52*	1.06	0.00	1.06
21.35	0.62	1.19	0.52*	1.06	0.00	1.06
21.40	0.62	1.19	0.52*	1.06	0.00	1.06
21.45	0.62	1.19	0.52*	1.06	0.00	1.06
21.50	0.62	1.19	0.52*	1.06	0.00	1.06
21.55	0.62	1.19	0.52*	1.06	0.00	1.06
21.60	0.62	1.19	0.52*	1.06	0.00	1.06
21.65	0.62	1.19	0.52*	1.06	0.00	1.06
21.70	0.62	1.19	0.52*	1.06	0.00	1.06
21.75	0.62	1.19	0.52*	1.06	0.00	1.06
21.80	0.62	1.19	0.52*	1.06	0.00	1.06
21.85	0.62	1.19	0.52*	1.06	0.00	1.06
21.90	0.62	1.19	0.52*	1.06	0.00	1.06
21.95	0.62	1.19	0.52*	1.06	0.00	1.06
22.00	0.62	1.19	0.52*	1.06	0.00	1.06
22.05	0.62	1.19	0.52*	1.06	0.00	1.06
22.10	0.62	1.19	0.52*	1.06	0.00	1.06
22.15	0.62	1.19	0.52*	1.06	0.00	1.06
22.20	0.62	1.19	0.52*	1.06	0.00	1.06
22.25	0.62	1.19	0.52*	1.06	0.00	1.06
22.30	0.62	1.20	0.52*	1.06	0.00	1.06
22.35	0.62	1.20	0.52*	1.06	0.00	1.06
22.40	0.62	1.20	0.52*	1.06	0.00	1.06
22.45	0.62	1.20	0.52*	1.06	0.00	1.06
22.50	0.62	1.20	0.52*	1.06	0.00	1.06
22.55	0.62	1.20	0.52*	1.06	0.00	1.06
22.60	0.62	1.20	0.52*	1.06	0.00	1.06
22.65	0.62	1.20	0.52*	1.06	0.00	1.06
22.70	0.62	1.20	0.52*	1.06	0.00	1.06
22.75	0.62	1.20	0.52*	1.06	0.00	1.06
22.80	0.62	1.20	0.52*	1.06	0.00	1.06
22.85	0.62	1.20	0.52*	1.06	0.00	1.06
22.90	0.62	1.20	0.52*	1.06	0.00	1.06
22.95	0.62	1.20	0.52*	1.06	0.00	1.06
23.00	0.62	1.20	0.52*	1.06	0.00	1.06
23.05	0.62	1.20	0.52*	1.06	0.00	1.06
23.10	0.62	1.20	0.52*	1.06	0.00	1.06
23.15	0.62	1.20	0.52*	1.06	0.00	1.06
23.20	0.62	1.20	0.52*	1.06	0.00	1.06
23.25	0.62	1.20	0.52*	1.06	0.00	1.06
23.30	0.62	1.20	0.52*	1.06	0.00	1.06
23.35	0.62	1.20	0.52*	1.06	0.00	1.06
23.40	0.62	1.20	0.52*	1.06	0.00	1.06
23.45	0.62	1.20	0.52*	1.06	0.00	1.06
23.50	0.62	1.20	0.52*	1.06	0.00	1.06
23.55	0.62	1.20	0.52*	1.06	0.00	1.06
23.60	0.62	1.20	0.52*	1.06	0.00	1.06
23.65	0.62	1.20	0.52*	1.05	0.00	1.05
23.70	0.62	1.20	0.52*	1.05	0.00	1.05
23.75	0.62	1.21	0.52*	1.05	0.00	1.05

23.80	0.62	1.21	0.52*	1.05	0.00	1.05
23.85	0.62	1.21	0.52*	1.05	0.00	1.05
23.90	0.62	1.21	0.51*	1.05	0.00	1.05
23.95	0.62	1.21	0.51*	1.05	0.00	1.05
24.00	0.62	1.21	0.51*	1.04	0.00	1.04
24.05	0.62	1.21	0.51*	1.04	0.00	1.04
24.10	0.62	1.21	0.51*	1.04	0.00	1.04
24.15	0.62	1.21	0.51*	1.04	0.00	1.04
24.20	0.62	1.21	0.51*	1.03	0.00	1.03
24.25	0.62	1.21	0.51*	1.03	0.00	1.03
24.30	0.62	1.21	0.51*	1.02	0.00	1.02
24.35	0.62	1.21	0.51*	1.02	0.00	1.02
24.40	0.62	1.21	0.51*	1.02	0.00	1.02
24.45	0.62	1.21	0.51*	1.01	0.00	1.01
24.50	0.55	1.21	0.46*	1.01	0.00	1.01
24.55	0.52	1.21	0.43*	1.00	0.00	1.00
24.60	0.49	1.21	0.41*	1.00	0.00	1.00
24.65	0.48	1.21	0.40*	0.99	0.00	0.99
24.70	0.47	1.21	0.38*	0.99	0.00	0.99
24.75	0.45	1.21	0.38*	0.98	0.00	0.98
24.80	0.45	1.21	0.37*	0.98	0.00	0.98
24.85	0.44	1.21	0.36*	0.97	0.00	0.97
24.90	0.43	1.21	0.35*	0.97	0.00	0.97
24.95	0.42	1.21	0.35*	0.96	0.00	0.96
25.00	0.41	1.21	0.34*	0.96	0.00	0.96
25.05	0.41	1.21	0.34*	0.95	0.00	0.95
25.10	0.41	1.21	0.34*	0.94	0.00	0.94
25.15	0.41	1.21	0.34*	0.94	0.00	0.94
25.20	0.41	1.21	0.34*	0.93	0.00	0.93
25.25	0.41	1.21	0.33*	0.92	0.00	0.92
25.30	0.40	1.21	0.33*	0.92	0.00	0.92
25.35	0.40	1.21	0.33*	0.91	0.00	0.91
25.40	0.40	1.21	0.33*	0.91	0.00	0.91
25.45	0.40	1.22	0.33*	0.90	0.00	0.90
25.50	0.40	1.22	0.33*	0.89	0.00	0.89
25.55	0.40	1.22	0.33*	0.89	0.00	0.89
25.60	0.40	1.22	0.33*	0.88	0.00	0.88
25.65	0.39	1.22	0.32*	0.87	0.00	0.87
25.70	0.39	1.22	0.32*	0.87	0.00	0.87
25.75	0.39	1.22	0.32*	0.86	0.00	0.86
25.80	0.39	1.22	0.32*	0.85	0.00	0.85
25.85	0.39	1.22	0.32*	0.85	0.00	0.85
25.90	0.39	1.22	0.32*	0.84	0.00	0.84
25.95	0.39	1.22	0.32*	0.83	0.00	0.83
26.00	0.39	1.22	0.32*	0.83	0.00	0.83
26.05	0.38	1.22	0.32*	0.82	0.00	0.82
26.10	0.38	1.22	0.31*	0.81	0.00	0.81
26.15	0.38	1.22	0.31*	0.81	0.00	0.81
26.20	0.38	1.22	0.31*	0.80	0.00	0.80
26.25	0.38	1.22	0.31*	0.80	0.00	0.80

26.30	0.38	1.22	0.31*	0.79	0.00	0.79
26.35	0.38	1.22	0.31*	0.78	0.00	0.78
26.40	0.38	1.22	0.31*	0.78	0.00	0.78
26.45	0.37	1.22	0.31*	0.77	0.00	0.77
26.50	0.37	1.22	0.31*	0.76	0.00	0.76
26.55	0.37	1.22	0.30*	0.75	0.00	0.75
26.60	0.37	1.22	0.30*	0.75	0.00	0.75
26.65	0.37	1.22	0.30*	0.74	0.00	0.74
26.70	0.37	1.22	0.30*	0.73	0.00	0.73
26.75	0.37	1.22	0.30*	0.73	0.00	0.73
26.80	0.37	1.22	0.30*	0.72	0.00	0.72
26.85	0.37	1.22	0.30*	0.71	0.00	0.71
26.90	0.36	1.22	0.30*	0.71	0.00	0.71
26.95	0.36	1.22	0.30*	0.70	0.00	0.70
27.00	0.36	1.22	0.30*	0.69	0.00	0.69
27.05	0.36	1.22	0.30*	0.69	0.00	0.69
27.10	0.36	1.22	0.29*	0.68	0.00	0.68
27.15	0.36	1.22	0.30*	0.67	0.00	0.67
27.20	0.36	1.22	0.29*	0.67	0.00	0.67
27.25	0.36	1.22	0.29*	0.66	0.00	0.66
27.30	0.36	1.22	0.29*	0.65	0.00	0.65
27.35	0.36	1.22	0.29*	0.64	0.00	0.64
27.40	0.36	1.22	0.29*	0.64	0.00	0.64
27.45	0.35	1.22	0.29*	0.63	0.00	0.63
27.50	0.35	1.23	0.29*	0.62	0.00	0.62
27.55	0.35	1.23	0.29*	0.62	0.00	0.62
27.60	0.35	1.23	0.29*	0.61	0.00	0.61
27.65	0.35	1.23	0.29*	0.60	0.00	0.60
27.70	0.35	1.23	0.29*	0.59	0.00	0.59
27.75	0.35	1.23	0.28*	0.59	0.00	0.59
27.80	0.35	1.23	0.28*	0.58	0.00	0.58
27.85	0.35	1.23	0.28*	0.57	0.00	0.57
27.90	0.37	1.23	0.30*	0.57	0.00	0.57
27.95	0.37	1.23	0.30*	0.56	0.00	0.56
28.00	0.37	1.23	0.30*	0.55	0.00	0.55
28.05	0.37	1.23	0.30*	0.55	0.00	0.55
28.10	0.37	1.23	0.30*	0.54	0.00	0.54
28.15	0.36	1.23	0.30*	0.53	0.00	0.53
28.20	0.36	1.23	0.30*	0.52	0.00	0.52
28.25	0.36	1.23	0.29*	0.52	0.00	0.52
28.30	0.36	1.23	0.29*	0.51	0.00	0.51
28.35	0.36	1.23	0.29*	0.50	0.00	0.50
28.40	0.36	1.23	0.29*	0.50	0.00	0.50
28.45	0.36	1.23	0.29*	0.49	0.00	0.49
28.50	0.36	1.23	0.29*	0.48	0.00	0.48
28.55	0.36	1.23	0.29*	0.48	0.00	0.48
28.60	0.35	1.23	0.29*	0.47	0.00	0.47
28.65	0.35	1.23	0.29*	0.46	0.00	0.46
28.70	0.35	1.23	0.29*	0.45	0.00	0.45
28.75	0.35	1.23	0.29*	0.45	0.00	0.45

28.80	0.35	1.23	0.28*	0.44	0.00	0.44
28.85	0.35	1.23	0.28*	0.43	0.00	0.43
28.90	0.35	1.23	0.28*	0.43	0.00	0.43
28.95	0.35	1.23	0.28*	0.42	0.00	0.42
29.00	0.35	1.23	0.28*	0.41	0.00	0.41
29.05	0.34	1.23	0.28*	0.40	0.00	0.40
29.10	0.34	1.23	0.28*	0.40	0.00	0.40
29.15	0.34	1.23	0.28*	0.39	0.00	0.39
29.20	0.34	1.23	0.28*	0.38	0.00	0.38
29.25	0.34	1.23	0.28*	0.38	0.00	0.38
29.30	0.34	1.23	0.28*	0.37	0.00	0.37
29.35	0.34	1.23	0.27*	0.36	0.00	0.36
29.40	0.34	1.23	0.27*	0.35	0.00	0.35
29.45	0.34	1.23	0.27*	0.35	0.00	0.35
29.50	0.34	1.23	0.27*	0.34	0.00	0.34
29.55	0.33	1.23	0.27*	0.33	0.00	0.33
29.60	0.33	1.23	0.27*	0.32	0.00	0.32
29.65	0.33	1.23	0.27*	0.32	0.00	0.32
29.70	0.33	1.23	0.27*	0.31	0.00	0.31
29.75	0.33	1.23	0.27*	0.30	0.00	0.30
29.80	0.33	1.23	0.27*	0.29	0.00	0.29
29.85	0.33	1.23	0.27*	0.29	0.00	0.29
29.90	0.33	1.23	0.27*	0.28	0.00	0.28
29.95	0.33	1.23	0.27*	0.27	0.00	0.27
30.00	0.33	1.23	0.26*	0.26	0.00	0.26
30.05	0.33	1.23	0.27*	0.26	0.00	0.26
30.10	0.33	1.23	0.27*	0.25	0.00	0.25
30.15	0.34	1.23	0.27*	0.24	0.00	0.24
30.20	0.34	1.23	0.28*	0.23	0.00	0.23
30.25	0.35	1.23	0.28*	0.23	0.00	0.23
30.30	0.35	1.23	0.28*	0.22	0.00	0.22
30.35	0.35	1.23	0.29*	0.21	0.00	0.21
30.40	0.36	1.23	0.29*	0.21	0.00	0.21
30.45	0.36	1.23	0.29*	0.20	0.00	0.20
30.50	0.37	1.23	0.30*	0.19	0.00	0.19
30.55	0.37	1.23	0.30*	0.19	0.00	0.19
30.60	0.38	1.23	0.30*	0.18	0.00	0.18
30.65	0.38	1.23	0.31*	0.17	0.00	0.17
30.70	0.38	1.23	0.31*	0.17	0.00	0.17
30.75	0.39	1.23	0.32*	0.16	0.00	0.16
30.80	0.39	1.23	0.32*	0.15	0.00	0.15
30.85	0.40	1.23	0.33*	0.15	0.00	0.15
30.90	0.41	1.23	0.33*	0.14	0.00	0.14
30.95	0.41	1.23	0.33*	0.13	0.00	0.13
31.00	0.42	1.23	0.34*	0.13	0.00	0.13
31.05	0.42	1.23	0.34*	0.12	0.00	0.12
31.10	0.43	1.23	0.35*	0.12	0.00	0.12
31.15	0.44	1.23	0.36*	0.11	0.00	0.11
31.20	0.45	1.23	0.36*	0.10	0.00	0.10
31.25	0.45	1.23	0.37*	0.10	0.00	0.10

31.30	0.46	1.23	0.38*	0.09	0.00	0.09
31.35	0.48	1.23	0.39*	0.09	0.00	0.09
31.40	0.49	1.23	0.40*	0.08	0.00	0.08
31.45	0.51	1.23	0.42*	0.08	0.00	0.08
31.50	0.54	1.23	0.44*	0.07	0.00	0.07
31.55	0.60	1.23	0.49*	0.07	0.00	0.07
31.60	0.61	1.23	0.50*	0.07	0.00	0.07
31.65	0.61	1.23	0.50*	0.06	0.00	0.06
31.70	0.61	1.23	0.50*	0.06	0.00	0.06
31.75	0.61	1.23	0.50*	0.05	0.00	0.05
31.80	0.61	1.23	0.50*	0.05	0.00	0.05
31.85	0.61	1.22	0.50*	0.05	0.00	0.05
31.90	0.61	1.22	0.50*	0.04	0.00	0.04
31.95	0.61	1.22	0.50*	0.04	0.00	0.04
32.00	0.61	1.22	0.50*	0.04	0.00	0.04
32.05	0.61	1.22	0.50*	0.03	0.00	0.03
32.10	0.61	1.22	0.50*	0.03	0.00	0.03
32.15	0.61	1.22	0.50*	0.03	0.00	0.03
32.20	0.61	1.22	0.50*	0.02	0.00	0.02
32.25	0.61	1.22	0.50*	0.02	0.00	0.02
32.30	0.61	1.22	0.50*	0.02	0.00	0.02
32.35	0.61	1.22	0.50*	0.02	0.00	0.02
32.40	0.61	1.22	0.50*	0.02	0.00	0.02
32.45	0.61	1.22	0.50*	0.02	0.00	0.02
32.50	0.61	1.22	0.50*	0.01	0.00	0.01
32.55	0.61	1.22	0.50*	0.01	0.00	0.01
32.60	0.61	1.22	0.50*	0.01	0.00	0.01
32.65	0.61	1.22	0.50*	0.01	0.00	0.01
32.70	0.61	1.22	0.50*	0.01	0.00	0.01
32.75	0.61	1.22	0.50*	0.01	0.00	0.01
32.80	0.60	1.22	0.50*	0.01	0.00	0.01
32.85	0.60	1.22	0.50*	0.01	0.00	0.01
32.90	0.60	1.22	0.50*	0.01	0.00	0.01
32.95	0.60	1.22	0.50*	0.00	0.00	0.00
33.00	0.60	1.22	0.50*	0.00	0.00	0.00
33.05	0.60	1.22	0.50*	0.00	0.00	0.00
33.10	0.60	1.22	0.50*	0.00	0.00	0.00
33.15	0.60	1.22	0.50*	0.00	0.00	0.00
33.20	0.60	1.22	0.50*	0.00	0.00	0.00
33.25	0.60	1.22	0.50*	0.00	0.00	0.00
33.30	0.60	1.22	0.50*	0.00	0.00	0.00
33.35	0.60	1.22	0.50*	0.00	0.00	0.00
33.40	0.60	1.22	0.50*	0.00	0.00	0.00
33.45	0.60	1.22	0.50*	0.00	0.00	0.00
33.50	0.60	1.22	0.50*	0.00	0.00	0.00
33.55	0.60	1.22	0.50*	0.00	0.00	0.00
33.60	0.60	1.22	0.50*	0.00	0.00	0.00
33.65	0.60	1.21	0.50*	0.00	0.00	0.00
33.70	0.60	1.21	0.50*	0.00	0.00	0.00
33.75	0.60	1.21	0.50*	0.00	0.00	0.00

33.80	0.60	1.21	0.50*	0.00	0.00	0.00
33.85	0.60	1.21	0.50*	0.00	0.00	0.00
33.90	0.60	1.21	0.50*	0.00	0.00	0.00
33.95	0.60	1.21	0.50*	0.00	0.00	0.00
34.00	0.60	1.21	0.50*	0.00	0.00	0.00
34.05	0.60	1.21	0.50*	0.00	0.00	0.00
34.10	0.60	1.21	0.50*	0.00	0.00	0.00
34.15	0.60	1.21	0.50*	0.00	0.00	0.00
34.20	0.60	1.21	0.50*	0.00	0.00	0.00
34.25	0.60	1.21	0.50*	0.00	0.00	0.00
34.30	0.60	1.21	0.50*	0.00	0.00	0.00
34.35	0.60	1.21	0.50*	0.00	0.00	0.00
34.40	0.60	1.21	0.50*	0.00	0.00	0.00
34.45	0.60	1.21	0.50*	0.00	0.00	0.00
34.50	0.60	1.21	0.50*	0.00	0.00	0.00
34.55	0.60	1.21	0.50*	0.00	0.00	0.00
34.60	0.60	1.21	0.50*	0.00	0.00	0.00
34.65	0.60	1.21	0.50*	0.00	0.00	0.00
34.70	0.60	1.21	0.50*	0.00	0.00	0.00
34.75	0.60	1.21	0.50*	0.00	0.00	0.00
34.80	0.60	1.21	0.50*	0.00	0.00	0.00
34.85	0.60	1.21	0.50*	0.00	0.00	0.00
34.90	0.60	1.21	0.50*	0.00	0.00	0.00
34.95	0.60	1.21	0.50*	0.00	0.00	0.00
35.00	0.60	1.21	0.50*	0.00	0.00	0.00
35.05	0.60	1.21	0.50*	0.00	0.00	0.00
35.10	0.60	1.21	0.50*	0.00	0.00	0.00
35.15	0.60	1.21	0.50*	0.00	0.00	0.00
35.20	0.60	1.21	0.50*	0.00	0.00	0.00
35.25	0.60	1.20	0.50*	0.00	0.00	0.00
35.30	0.60	1.20	0.50*	0.00	0.00	0.00
35.35	0.60	1.20	0.50*	0.00	0.00	0.00
35.40	0.60	1.20	0.50*	0.00	0.00	0.00
35.45	0.60	1.20	0.50*	0.00	0.00	0.00
35.50	0.60	1.20	0.50*	0.00	0.00	0.00
35.55	0.60	1.20	0.50*	0.00	0.00	0.00
35.60	0.60	1.20	0.50*	0.00	0.00	0.00
35.65	0.60	1.20	0.50*	0.00	0.00	0.00
35.70	0.60	1.20	0.50*	0.00	0.00	0.00
35.75	0.60	1.20	0.50*	0.00	0.00	0.00
35.80	0.59	1.20	0.50*	0.00	0.00	0.00
35.85	0.59	1.20	0.50*	0.00	0.00	0.00
35.90	0.59	1.20	0.50*	0.00	0.00	0.00
35.95	0.59	1.20	0.50*	0.00	0.00	0.00
36.00	0.59	1.20	0.50*	0.00	0.00	0.00
36.05	0.59	1.20	0.50*	0.00	0.00	0.00
36.10	0.59	1.20	0.50*	0.00	0.00	0.00
36.15	0.59	1.20	0.50*	0.00	0.00	0.00
36.20	0.59	1.20	0.50*	0.00	0.00	0.00
36.25	0.59	1.20	0.50*	0.00	0.00	0.00

36.30	0.59	1.20	0.50*	0.00	0.00	0.00
36.35	0.59	1.20	0.50*	0.00	0.00	0.00
36.40	0.59	1.20	0.50*	0.00	0.00	0.00
36.45	0.59	1.20	0.50*	0.00	0.00	0.00
36.50	0.59	1.20	0.50*	0.00	0.00	0.00
36.55	0.59	1.20	0.50*	0.00	0.00	0.00
36.60	0.59	1.20	0.50*	0.00	0.00	0.00
36.65	0.59	1.20	0.50*	0.00	0.00	0.00
36.70	0.59	1.20	0.50*	0.00	0.00	0.00
36.75	0.59	1.19	0.50*	0.00	0.00	0.00
36.80	0.59	1.19	0.50*	0.00	0.00	0.00
36.85	0.59	1.19	0.50*	0.00	0.00	0.00
36.90	0.59	1.19	0.50*	0.00	0.00	0.00
36.95	0.59	1.19	0.50*	0.00	0.00	0.00
37.00	0.59	1.19	0.50*	0.00	0.00	0.00
37.05	0.59	1.19	0.50*	0.00	0.00	0.00
37.10	0.59	1.19	0.50*	0.00	0.00	0.00
37.15	0.59	1.19	0.50*	0.00	0.00	0.00
37.20	0.59	1.19	0.50*	0.00	0.00	0.00
37.25	0.59	1.19	0.50*	0.00	0.00	0.00
37.30	0.59	1.19	0.50*	0.00	0.00	0.00
37.35	0.59	1.19	0.50*	0.00	0.00	0.00
37.40	0.59	1.19	0.50*	0.00	0.00	0.00
37.45	0.59	1.19	0.50*	0.00	0.00	0.00
37.50	0.59	1.19	0.50*	0.00	0.00	0.00
37.55	0.59	1.19	0.50*	0.00	0.00	0.00
37.60	0.59	1.19	0.50*	0.00	0.00	0.00
37.65	0.59	1.19	0.50*	0.00	0.00	0.00
37.70	0.59	1.19	0.50*	0.00	0.00	0.00
37.75	0.59	1.19	0.50*	0.00	0.00	0.00
37.80	0.59	1.19	0.50*	0.00	0.00	0.00
37.85	0.59	1.19	0.50*	0.00	0.00	0.00
37.90	0.59	1.19	0.50*	0.00	0.00	0.00
37.95	0.59	1.19	0.50*	0.00	0.00	0.00
38.00	0.59	1.19	0.50*	0.00	0.00	0.00
38.05	0.59	1.19	0.50*	0.00	0.00	0.00
38.10	0.59	1.19	0.50*	0.00	0.00	0.00
38.15	0.59	1.18	0.50*	0.00	0.00	0.00
38.20	0.59	1.18	0.50*	0.00	0.00	0.00
38.25	0.59	1.18	0.50*	0.00	0.00	0.00
38.30	0.59	1.18	0.50*	0.00	0.00	0.00
38.35	0.59	1.18	0.50*	0.00	0.00	0.00
38.40	0.59	1.18	0.50*	0.00	0.00	0.00
38.45	0.59	1.18	0.50*	0.00	0.00	0.00
38.50	0.59	1.18	0.50*	0.00	0.00	0.00
38.55	0.59	1.18	0.50*	0.00	0.00	0.00
38.60	0.59	1.18	0.50*	0.00	0.00	0.00
38.65	0.59	1.18	0.50*	0.00	0.00	0.00
38.70	0.59	1.18	0.50*	0.00	0.00	0.00
38.75	0.59	1.18	0.50*	0.00	0.00	0.00

38.80	0.59	1.18	0.50*	0.00	0.00	0.00
38.85	0.59	1.18	0.50*	0.00	0.00	0.00
38.90	0.58	1.18	0.50*	0.00	0.00	0.00
38.95	0.58	1.18	0.50*	0.00	0.00	0.00
39.00	0.58	1.18	0.50*	0.00	0.00	0.00
39.05	0.58	1.18	0.50*	0.00	0.00	0.00
39.10	0.58	1.18	0.50*	0.00	0.00	0.00
39.15	0.58	1.18	0.50*	0.00	0.00	0.00
39.20	0.58	1.18	0.50*	0.00	0.00	0.00
39.25	0.58	1.18	0.50*	0.00	0.00	0.00
39.30	0.58	1.18	0.50*	0.00	0.00	0.00
39.35	0.58	1.18	0.50*	0.00	0.00	0.00
39.40	0.58	1.18	0.50*	0.00	0.00	0.00
39.45	0.58	1.18	0.50*	0.00	0.00	0.00
39.50	0.58	1.17	0.50*	0.00	0.00	0.00
39.55	0.58	1.17	0.50*	0.00	0.00	0.00
39.60	0.58	1.17	0.50*	0.00	0.00	0.00
39.65	0.58	1.17	0.50*	0.00	0.00	0.00
39.70	0.58	1.17	0.50*	0.00	0.00	0.00
39.75	0.58	1.17	0.50*	0.00	0.00	0.00
39.80	0.58	1.17	0.50*	0.00	0.00	0.00
39.85	0.58	1.17	0.50*	0.00	0.00	0.00
39.90	0.58	1.17	0.50*	0.00	0.00	0.00
39.95	0.58	1.17	0.50*	0.00	0.00	0.00
40.00	0.58	1.17	0.50*	0.00	0.00	0.00
40.05	0.58	1.17	0.50*	0.00	0.00	0.00
40.10	0.58	1.17	0.50*	0.00	0.00	0.00
40.15	0.58	1.17	0.50*	0.00	0.00	0.00
40.20	0.58	1.17	0.50*	0.00	0.00	0.00
40.25	0.58	1.17	0.50*	0.00	0.00	0.00
40.30	0.58	1.17	0.50*	0.00	0.00	0.00
40.35	0.58	1.17	0.50*	0.00	0.00	0.00
40.40	0.58	1.17	0.50*	0.00	0.00	0.00
40.45	0.58	1.17	0.50*	0.00	0.00	0.00
40.50	0.58	1.17	0.50*	0.00	0.00	0.00
40.55	0.58	1.17	0.50*	0.00	0.00	0.00
40.60	0.58	1.17	0.50*	0.00	0.00	0.00
40.65	0.58	1.17	0.50*	0.00	0.00	0.00
40.70	0.58	1.17	0.50*	0.00	0.00	0.00
40.75	0.58	1.16	0.50*	0.00	0.00	0.00
40.80	0.58	1.16	0.50*	0.00	0.00	0.00
40.85	0.58	1.16	0.50*	0.00	0.00	0.00
40.90	0.58	1.16	0.50*	0.00	0.00	0.00
40.95	0.58	1.16	0.50*	0.00	0.00	0.00
41.00	0.58	1.16	0.50*	0.00	0.00	0.00
41.05	0.58	1.16	0.50*	0.00	0.00	0.00
41.10	0.58	1.16	0.50*	0.00	0.00	0.00
41.15	0.58	1.16	0.50*	0.00	0.00	0.00
41.20	0.58	1.16	0.50*	0.00	0.00	0.00
41.25	0.58	1.16	0.50*	0.00	0.00	0.00

41.30	0.58	1.16	0.50*	0.00	0.00	0.00
41.35	0.58	1.16	0.50*	0.00	0.00	0.00
41.40	0.58	1.16	0.50*	0.00	0.00	0.00
41.45	0.58	1.16	0.50*	0.00	0.00	0.00
41.50	0.58	1.16	0.50*	0.00	0.00	0.00
41.55	0.58	1.16	0.50*	0.00	0.00	0.00
41.60	0.58	1.16	0.50*	0.00	0.00	0.00
41.65	0.58	1.16	0.50*	0.00	0.00	0.00
41.70	0.58	1.16	0.50*	0.00	0.00	0.00
41.75	0.58	1.16	0.50*	0.00	0.00	0.00
41.80	0.58	1.16	0.50*	0.00	0.00	0.00
41.85	0.58	1.16	0.50*	0.00	0.00	0.00
41.90	0.58	1.16	0.50*	0.00	0.00	0.00
41.95	0.58	1.16	0.50*	0.00	0.00	0.00
42.00	0.58	1.15	0.50*	0.00	0.00	0.00
42.05	0.58	1.15	0.50*	0.00	0.00	0.00
42.10	0.58	1.15	0.50*	0.00	0.00	0.00
42.15	0.57	1.15	0.50*	0.00	0.00	0.00
42.20	0.57	1.15	0.50*	0.00	0.00	0.00
42.25	0.57	1.15	0.50*	0.00	0.00	0.00
42.30	0.57	1.15	0.50*	0.00	0.00	0.00
42.35	0.57	1.15	0.50*	0.00	0.00	0.00
42.40	0.57	1.15	0.50*	0.00	0.00	0.00
42.45	0.57	1.15	0.50*	0.00	0.00	0.00
42.50	0.57	1.15	0.50*	0.00	0.00	0.00
42.55	0.57	1.15	0.50*	0.00	0.00	0.00
42.60	0.57	1.15	0.50*	0.00	0.00	0.00
42.65	0.57	1.15	0.50*	0.00	0.00	0.00
42.70	0.57	1.15	0.50*	0.00	0.00	0.00
42.75	0.57	1.15	0.50*	0.00	0.00	0.00
42.80	0.57	1.15	0.50*	0.00	0.00	0.00
42.85	0.57	1.15	0.50*	0.00	0.00	0.00
42.90	0.57	1.15	0.50*	0.00	0.00	0.00
42.95	0.57	1.15	0.50*	0.00	0.00	0.00
43.00	0.57	1.15	0.50*	0.00	0.00	0.00
43.05	0.57	1.15	0.50*	0.00	0.00	0.00
43.10	0.57	1.15	0.50*	0.00	0.00	0.00
43.15	0.57	1.15	0.50*	0.00	0.00	0.00
43.20	0.57	1.15	0.50*	0.00	0.00	0.00
43.25	0.57	1.14	0.50*	0.00	0.00	0.00
43.30	0.57	1.14	0.50*	0.00	0.00	0.00
43.35	0.57	1.14	0.50*	0.00	0.00	0.00
43.40	0.57	1.14	0.50*	0.00	0.00	0.00
43.45	0.57	1.14	0.50*	0.00	0.00	0.00
43.50	0.57	1.14	0.50*	0.00	0.00	0.00
43.55	0.57	1.14	0.50*	0.00	0.00	0.00
43.60	0.57	1.14	0.50*	0.00	0.00	0.00
43.65	0.57	1.14	0.50*	0.00	0.00	0.00
43.70	0.57	1.14	0.50*	0.00	0.00	0.00
43.75	0.57	1.14	0.50*	0.00	0.00	0.00

43.80	0.57	1.14	0.50*	0.00	0.00	0.00
43.85	0.57	1.14	0.50*	0.00	0.00	0.00
43.90	0.57	1.14	0.50*	0.00	0.00	0.00
43.95	0.57	1.14	0.50*	0.00	0.00	0.00
44.00	0.57	1.14	0.50*	0.00	0.00	0.00
44.05	0.57	1.14	0.50*	0.00	0.00	0.00
44.10	0.57	1.14	0.50*	0.00	0.00	0.00
44.15	0.57	1.14	0.50*	0.00	0.00	0.00
44.20	0.57	1.14	0.50*	0.00	0.00	0.00
44.25	0.57	1.14	0.50*	0.00	0.00	0.00
44.30	0.57	1.14	0.50*	0.00	0.00	0.00
44.35	0.57	1.14	0.50*	0.00	0.00	0.00
44.40	0.57	1.13	0.50*	0.00	0.00	0.00
44.45	0.57	1.13	0.50*	0.00	0.00	0.00
44.50	0.57	1.13	0.50*	0.00	0.00	0.00
44.55	0.57	1.13	0.50*	0.00	0.00	0.00
44.60	0.57	1.13	0.50*	0.00	0.00	0.00
44.65	0.57	1.13	0.50*	0.00	0.00	0.00
44.70	0.57	1.13	0.50*	0.00	0.00	0.00
44.75	0.57	1.13	0.50*	0.00	0.00	0.00
44.80	0.57	1.13	0.50*	0.00	0.00	0.00
44.85	0.57	1.13	0.50*	0.00	0.00	0.00
44.90	0.57	1.13	0.50*	0.00	0.00	0.00
44.95	0.57	1.13	0.50*	0.00	0.00	0.00
45.00	0.57	1.13	0.50*	0.00	0.00	0.00
45.05	0.57	1.13	0.50*	0.00	0.00	0.00
45.10	0.57	1.13	0.50*	0.00	0.00	0.00
45.15	0.57	1.13	0.50*	0.00	0.00	0.00
45.20	0.57	1.13	0.50*	0.00	0.00	0.00
45.25	0.57	1.13	0.50*	0.00	0.00	0.00
45.30	0.57	1.13	0.50*	0.00	0.00	0.00
45.35	0.57	1.13	0.50*	0.00	0.00	0.00
45.40	0.57	1.13	0.50*	0.00	0.00	0.00
45.45	0.57	1.13	0.50*	0.00	0.00	0.00
45.50	0.57	1.13	0.50*	0.00	0.00	0.00
45.55	0.56	1.12	0.50*	0.00	0.00	0.00
45.60	0.56	1.12	0.50*	0.00	0.00	0.00
45.65	0.56	1.12	0.50*	0.00	0.00	0.00
45.70	0.56	1.12	0.50*	0.00	0.00	0.00
45.75	0.56	1.12	0.50*	0.00	0.00	0.00
45.80	0.56	1.12	0.50*	0.00	0.00	0.00
45.85	0.56	1.12	0.50*	0.00	0.00	0.00
45.90	0.56	1.12	0.50*	0.00	0.00	0.00
45.95	0.56	1.12	0.50*	0.00	0.00	0.00
46.00	0.56	1.12	0.50*	0.00	0.00	0.00
46.05	0.56	1.12	0.50*	0.00	0.00	0.00
46.10	0.56	1.12	0.50*	0.00	0.00	0.00
46.15	0.56	1.12	0.50*	0.00	0.00	0.00
46.20	0.56	1.12	0.50*	0.00	0.00	0.00
46.25	0.56	1.12	0.50*	0.00	0.00	0.00

46.30	0.56	1.12	0.50*	0.00	0.00	0.00
46.35	0.56	1.12	0.50*	0.00	0.00	0.00
46.40	0.56	1.12	0.50*	0.00	0.00	0.00
46.45	0.56	1.12	0.50*	0.00	0.00	0.00
46.50	0.56	1.12	0.50*	0.00	0.00	0.00
46.55	0.56	1.12	0.50*	0.00	0.00	0.00
46.60	0.56	1.12	0.50*	0.00	0.00	0.00
46.65	0.56	1.12	0.50*	0.00	0.00	0.00
46.70	0.56	1.11	0.50*	0.00	0.00	0.00
46.75	0.56	1.11	0.50*	0.00	0.00	0.00
46.80	0.56	1.11	0.50*	0.00	0.00	0.00
46.85	0.56	1.11	0.50*	0.00	0.00	0.00
46.90	0.56	1.11	0.50*	0.00	0.00	0.00
46.95	0.56	1.11	0.50*	0.00	0.00	0.00
47.00	0.56	1.11	0.50*	0.00	0.00	0.00
47.05	0.56	1.11	0.50*	0.00	0.00	0.00
47.10	0.56	1.11	0.50*	0.00	0.00	0.00
47.15	0.56	1.11	0.50*	0.00	0.00	0.00
47.20	0.56	1.11	0.50*	0.00	0.00	0.00
47.25	0.56	1.11	0.50*	0.00	0.00	0.00
47.30	0.56	1.11	0.50*	0.00	0.00	0.00
47.35	0.56	1.11	0.50*	0.00	0.00	0.00
47.40	0.56	1.11	0.50*	0.00	0.00	0.00
47.45	0.56	1.11	0.51*	0.00	0.00	0.00
47.50	0.56	1.11	0.51*	0.00	0.00	0.00
47.55	0.56	1.11	0.51*	0.00	0.00	0.00
47.60	0.56	1.11	0.51*	0.00	0.00	0.00
47.65	0.56	1.11	0.51*	0.00	0.00	0.00
47.70	0.56	1.11	0.51*	0.00	0.00	0.00
47.75	0.56	1.11	0.51*	0.00	0.00	0.00
47.80	0.56	1.10	0.51*	0.00	0.00	0.00
47.85	0.56	1.10	0.51*	0.00	0.00	0.00
47.90	0.56	1.10	0.51*	0.00	0.00	0.00
47.95	0.56	1.10	0.51*	0.00	0.00	0.00
48.00	0.56	1.10	0.51*	0.00	0.00	0.00
48.05	0.56	1.10	0.51*	0.00	0.00	0.00
48.10	0.56	1.10	0.51*	0.00	0.00	0.00
48.15	0.56	1.10	0.51*	0.00	0.00	0.00
48.20	0.56	1.10	0.51*	0.00	0.00	0.00
48.25	0.56	1.10	0.51*	0.00	0.00	0.00
48.30	0.56	1.10	0.51*	0.00	0.00	0.00
48.35	0.56	1.10	0.51*	0.00	0.00	0.00
48.40	0.56	1.10	0.51*	0.00	0.00	0.00
48.45	0.56	1.10	0.51*	0.00	0.00	0.00
48.50	0.56	1.10	0.51*	0.00	0.00	0.00
48.55	0.56	1.10	0.51*	0.00	0.00	0.00
48.60	0.56	1.10	0.51*	0.00	0.00	0.00
48.65	0.56	1.10	0.51*	0.00	0.00	0.00
48.70	0.56	1.10	0.51*	0.00	0.00	0.00
48.75	0.56	1.10	0.51*	0.00	0.00	0.00

48.80	0.56	1.10	0.51*	0.00	0.00	0.00
48.85	0.56	1.10	0.51*	0.00	0.00	0.00
48.90	0.56	1.09	0.51*	0.00	0.00	0.00
48.95	0.56	1.09	0.51*	0.00	0.00	0.00
49.00	0.56	1.09	0.51*	0.00	0.00	0.00
49.05	0.56	1.09	0.51*	0.00	0.00	0.00
49.10	0.56	1.09	0.51*	0.00	0.00	0.00
49.15	0.56	1.09	0.51*	0.00	0.00	0.00
49.20	0.56	1.09	0.51*	0.00	0.00	0.00
49.25	0.56	1.09	0.51*	0.00	0.00	0.00
49.30	0.56	1.09	0.51*	0.00	0.00	0.00
49.35	0.56	1.09	0.51*	0.00	0.00	0.00
49.40	0.56	1.09	0.51*	0.00	0.00	0.00
49.45	0.56	1.09	0.51*	0.00	0.00	0.00
49.50	0.56	1.09	0.51*	0.00	0.00	0.00
49.55	0.56	1.09	0.51*	0.00	0.00	0.00
49.60	0.56	1.09	0.51*	0.00	0.00	0.00
49.65	0.56	1.09	0.51*	0.00	0.00	0.00
49.70	0.56	1.09	0.51*	0.00	0.00	0.00
49.75	0.56	1.09	0.51*	0.00	0.00	0.00
49.80	0.56	1.09	0.51*	0.00	0.00	0.00
49.85	0.56	1.09	0.51*	0.00	0.00	0.00
49.90	0.56	1.09	0.51*	0.00	0.00	0.00
49.95	0.56	1.08	0.51*	0.00	0.00	0.00
50.00	0.56	1.08	0.51*	0.00	0.00	0.00
50.05	0.56	1.08	0.51*	0.00	0.00	0.00
50.10	0.56	1.08	0.51*	0.00	0.00	0.00
50.15	0.56	1.08	0.51*	0.00	0.00	0.00
50.20	0.56	1.08	0.51*	0.00	0.00	0.00
50.25	0.55	1.08	0.51*	0.00	0.00	0.00
50.30	0.55	1.08	0.51*	0.00	0.00	0.00
50.35	0.55	1.08	0.51*	0.00	0.00	0.00
50.40	0.55	1.08	0.51*	0.00	0.00	0.00
50.45	0.55	1.08	0.51*	0.00	0.00	0.00
50.50	0.55	1.08	0.51*	0.00	0.00	0.00
50.55	0.55	1.08	0.51*	0.00	0.00	0.00
50.60	0.55	1.08	0.51*	0.00	0.00	0.00
50.65	0.55	1.08	0.51*	0.00	0.00	0.00
50.70	0.55	1.08	0.51*	0.00	0.00	0.00
50.75	0.55	1.08	0.51*	0.00	0.00	0.00
50.80	0.55	1.08	0.51*	0.00	0.00	0.00
50.85	0.55	1.08	0.51*	0.00	0.00	0.00
50.90	0.55	1.08	0.52*	0.00	0.00	0.00
50.95	0.55	1.08	0.52*	0.00	0.00	0.00
51.00	0.55	1.07	0.52*	0.00	0.00	0.00
51.05	0.55	1.07	0.52*	0.00	0.00	0.00
51.10	0.55	1.07	0.52*	0.00	0.00	0.00
51.15	0.55	1.07	0.52*	0.00	0.00	0.00
51.20	0.55	1.07	0.52*	0.00	0.00	0.00
51.25	0.55	1.07	0.52*	0.00	0.00	0.00

51.30	0.55	1.07	0.52*	0.00	0.00	0.00
51.35	0.55	1.07	0.52*	0.00	0.00	0.00
51.40	0.55	1.07	0.52*	0.00	0.00	0.00
51.45	0.55	1.07	0.52*	0.00	0.00	0.00
51.50	0.55	1.07	0.52*	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

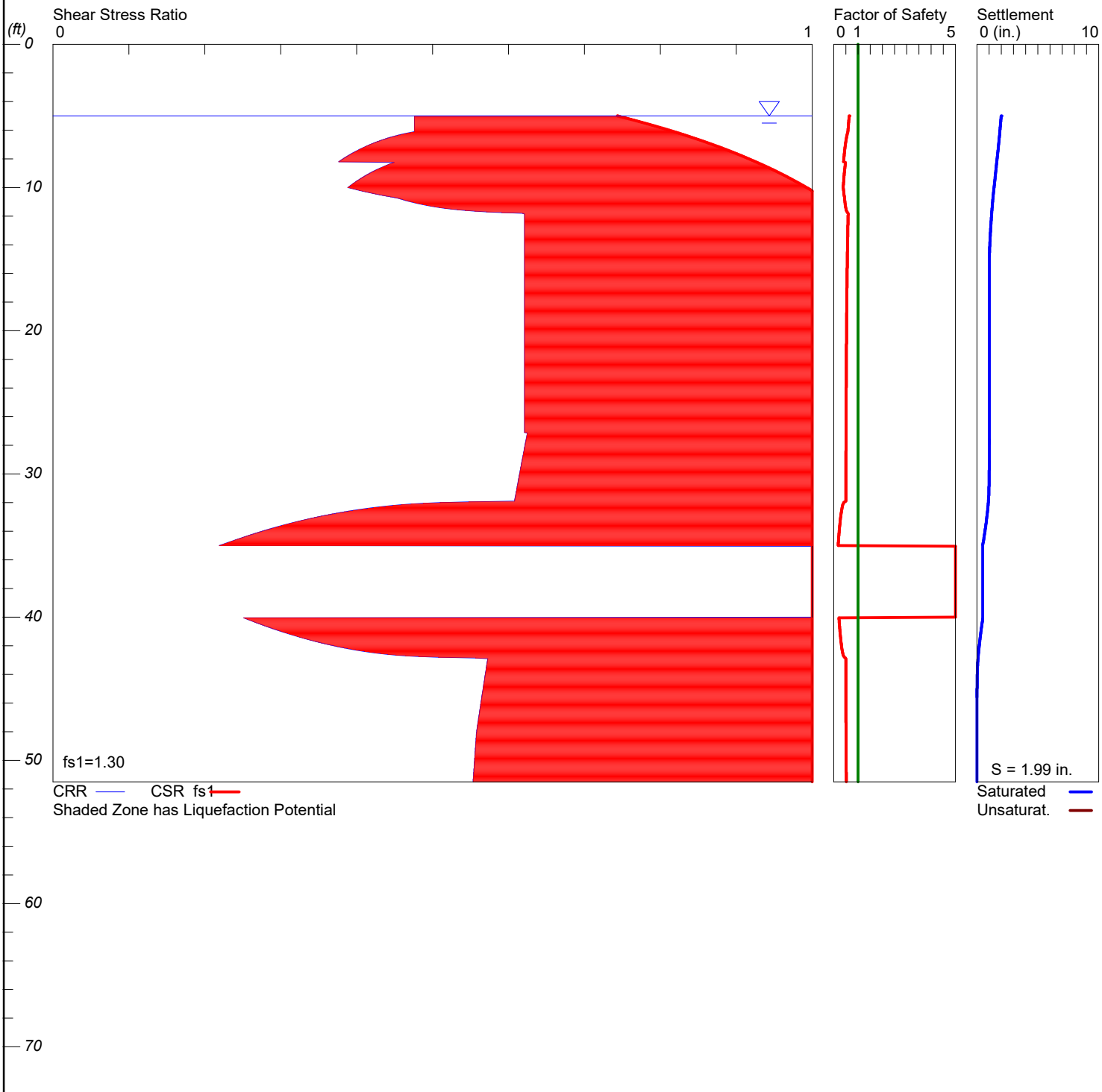
1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils

LIQUEFACTION ANALYSIS

2200 Rosemead Boulevard, South El Monte

Hole No.=B-7 Water Depth=5 ft

Magnitude=6.89
Acceleration=0.89g



****
LIQUEFACTION ANALYSIS SUMMARY

****
Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 12/11/2020 3:00:04 PM

Input File Name: P:\2020 Projects\20-7107 XBC, 9427 Rush St., South El Monte\Report\Liquify\B-7.liq
Title: 2200 Rosemead Boulevard, South El Monte
Subtitle: 20-7106

Surface Elev.=
Hole No.=B-7
Depth of Hole= 51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration= 0.89 g
Earthquake Magnitude= 6.89

Input Data:
Surface Elev.=
Hole No.=B-7
Depth of Hole=51.50 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 48.00 ft
Max. Acceleration=0.89 g
Earthquake Magnitude=6.89
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	10.00	120.00	58.80
10.00	10.00	120.00	39.10
15.00	20.00	120.00	10.90
20.00	25.00	120.00	6.40
25.00	29.00	120.00	5.00
30.00	24.00	120.00	21.00
35.00	8.00	120.00	NoLiq
40.00	11.00	120.00	NoLiq
45.00	28.00	120.00	23.20
50.00	50.00	120.00	5.00

Output Results:

Settlement of Saturated Sands=1.99 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=1.99 in.
Differential Settlement=0.996 to 1.315 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
5.00	0.48	0.74	0.64*	1.99	0.00	1.99
5.05	0.48	0.75	0.64*	1.99	0.00	1.99
5.10	0.48	0.75	0.63*	1.98	0.00	1.98
5.15	0.48	0.75	0.63*	1.98	0.00	1.98
5.20	0.48	0.76	0.63*	1.97	0.00	1.97
5.25	0.48	0.76	0.63*	1.97	0.00	1.97
5.30	0.48	0.77	0.62*	1.96	0.00	1.96
5.35	0.48	0.77	0.62*	1.96	0.00	1.96
5.40	0.48	0.77	0.62*	1.95	0.00	1.95
5.45	0.48	0.78	0.61*	1.95	0.00	1.95
5.50	0.48	0.78	0.61*	1.94	0.00	1.94
5.55	0.48	0.78	0.61*	1.94	0.00	1.94
5.60	0.48	0.79	0.61*	1.93	0.00	1.93
5.65	0.48	0.79	0.60*	1.93	0.00	1.93
5.70	0.48	0.79	0.60*	1.92	0.00	1.92
5.75	0.48	0.80	0.60*	1.92	0.00	1.92
5.80	0.48	0.80	0.60*	1.91	0.00	1.91
5.85	0.48	0.80	0.59*	1.91	0.00	1.91
5.90	0.48	0.81	0.59*	1.90	0.00	1.90
5.95	0.48	0.81	0.59*	1.90	0.00	1.90
6.00	0.48	0.81	0.59*	1.89	0.00	1.89
6.05	0.48	0.81	0.58*	1.89	0.00	1.89
6.10	0.48	0.82	0.58*	1.88	0.00	1.88
6.15	0.47	0.82	0.57*	1.88	0.00	1.88
6.20	0.47	0.82	0.57*	1.87	0.00	1.87
6.25	0.46	0.83	0.56*	1.86	0.00	1.86

6.30	0.46	0.83	0.55*	1.86	0.00	1.86
6.35	0.45	0.83	0.55*	1.85	0.00	1.85
6.40	0.45	0.84	0.54*	1.85	0.00	1.85
6.45	0.45	0.84	0.53*	1.84	0.00	1.84
6.50	0.44	0.84	0.53*	1.84	0.00	1.84
6.55	0.44	0.84	0.52*	1.83	0.00	1.83
6.60	0.44	0.85	0.52*	1.83	0.00	1.83
6.65	0.44	0.85	0.51*	1.82	0.00	1.82
6.70	0.43	0.85	0.51*	1.81	0.00	1.81
6.75	0.43	0.86	0.50*	1.81	0.00	1.81
6.80	0.43	0.86	0.50*	1.80	0.00	1.80
6.85	0.42	0.86	0.49*	1.80	0.00	1.80
6.90	0.42	0.86	0.49*	1.79	0.00	1.79
6.95	0.42	0.87	0.48*	1.78	0.00	1.78
7.00	0.42	0.87	0.48*	1.78	0.00	1.78
7.05	0.42	0.87	0.48*	1.77	0.00	1.77
7.10	0.41	0.87	0.47*	1.77	0.00	1.77
7.15	0.41	0.88	0.47*	1.76	0.00	1.76
7.20	0.41	0.88	0.47*	1.75	0.00	1.75
7.25	0.41	0.88	0.46*	1.75	0.00	1.75
7.30	0.41	0.88	0.46*	1.74	0.00	1.74
7.35	0.40	0.89	0.45*	1.74	0.00	1.74
7.40	0.40	0.89	0.45*	1.73	0.00	1.73
7.45	0.40	0.89	0.45*	1.72	0.00	1.72
7.50	0.40	0.89	0.45*	1.72	0.00	1.72
7.55	0.40	0.90	0.44*	1.71	0.00	1.71
7.60	0.39	0.90	0.44*	1.70	0.00	1.70
7.65	0.39	0.90	0.44*	1.70	0.00	1.70
7.70	0.39	0.90	0.43*	1.69	0.00	1.69
7.75	0.39	0.91	0.43*	1.68	0.00	1.68
7.80	0.39	0.91	0.43*	1.68	0.00	1.68
7.85	0.39	0.91	0.42*	1.67	0.00	1.67
7.90	0.38	0.91	0.42*	1.66	0.00	1.66
7.95	0.38	0.91	0.42*	1.66	0.00	1.66
8.00	0.38	0.92	0.42*	1.65	0.00	1.65
8.05	0.38	0.92	0.41*	1.64	0.00	1.64
8.10	0.38	0.92	0.41*	1.64	0.00	1.64
8.15	0.38	0.92	0.41*	1.63	0.00	1.63
8.20	0.38	0.93	0.41*	1.63	0.00	1.63
8.25	0.45	0.93	0.48*	1.62	0.00	1.62
8.30	0.45	0.93	0.48*	1.61	0.00	1.61
8.35	0.44	0.93	0.48*	1.61	0.00	1.61
8.40	0.44	0.93	0.47*	1.60	0.00	1.60
8.45	0.44	0.94	0.47*	1.60	0.00	1.60
8.50	0.44	0.94	0.47*	1.59	0.00	1.59
8.55	0.43	0.94	0.46*	1.58	0.00	1.58
8.60	0.43	0.94	0.46*	1.58	0.00	1.58
8.65	0.43	0.94	0.46*	1.57	0.00	1.57
8.70	0.43	0.95	0.45*	1.57	0.00	1.57
8.75	0.43	0.95	0.45*	1.56	0.00	1.56

8.80	0.42	0.95	0.45*	1.55	0.00	1.55
8.85	0.42	0.95	0.44*	1.55	0.00	1.55
8.90	0.42	0.95	0.44*	1.54	0.00	1.54
8.95	0.42	0.96	0.44*	1.54	0.00	1.54
9.00	0.42	0.96	0.44*	1.53	0.00	1.53
9.05	0.42	0.96	0.43*	1.52	0.00	1.52
9.10	0.41	0.96	0.43*	1.52	0.00	1.52
9.15	0.41	0.96	0.43*	1.51	0.00	1.51
9.20	0.41	0.97	0.43*	1.51	0.00	1.51
9.25	0.41	0.97	0.42*	1.50	0.00	1.50
9.30	0.41	0.97	0.42*	1.49	0.00	1.49
9.35	0.41	0.97	0.42*	1.49	0.00	1.49
9.40	0.40	0.97	0.42*	1.48	0.00	1.48
9.45	0.40	0.97	0.41*	1.47	0.00	1.47
9.50	0.40	0.98	0.41*	1.47	0.00	1.47
9.55	0.40	0.98	0.41*	1.46	0.00	1.46
9.60	0.40	0.98	0.41*	1.46	0.00	1.46
9.65	0.40	0.98	0.41*	1.45	0.00	1.45
9.70	0.40	0.98	0.40*	1.44	0.00	1.44
9.75	0.39	0.98	0.40*	1.44	0.00	1.44
9.80	0.39	0.99	0.40*	1.43	0.00	1.43
9.85	0.39	0.99	0.40*	1.42	0.00	1.42
9.90	0.39	0.99	0.40*	1.42	0.00	1.42
9.95	0.39	0.99	0.39*	1.41	0.00	1.41
10.00	0.39	0.99	0.39*	1.40	0.00	1.40
10.05	0.39	0.99	0.39*	1.40	0.00	1.40
10.10	0.40	1.00	0.40*	1.39	0.00	1.39
10.15	0.40	1.00	0.40*	1.38	0.00	1.38
10.20	0.40	1.00	0.40*	1.38	0.00	1.38
10.25	0.41	1.00	0.41*	1.37	0.00	1.37
10.30	0.41	1.00	0.41*	1.37	0.00	1.37
10.35	0.42	1.00	0.41*	1.36	0.00	1.36
10.40	0.42	1.01	0.42*	1.35	0.00	1.35
10.45	0.42	1.01	0.42*	1.35	0.00	1.35
10.50	0.43	1.01	0.43*	1.34	0.00	1.34
10.55	0.43	1.01	0.43*	1.34	0.00	1.34
10.60	0.44	1.01	0.43*	1.33	0.00	1.33
10.65	0.44	1.01	0.44*	1.32	0.00	1.32
10.70	0.45	1.01	0.44*	1.32	0.00	1.32
10.75	0.45	1.02	0.45*	1.31	0.00	1.31
10.80	0.46	1.02	0.45*	1.31	0.00	1.31
10.85	0.46	1.02	0.45*	1.30	0.00	1.30
10.90	0.46	1.02	0.46*	1.30	0.00	1.30
10.95	0.47	1.02	0.46*	1.29	0.00	1.29
11.00	0.47	1.02	0.46*	1.29	0.00	1.29
11.05	0.48	1.02	0.46*	1.28	0.00	1.28
11.10	0.48	1.03	0.47*	1.28	0.00	1.28
11.15	0.48	1.03	0.47*	1.27	0.00	1.27
11.20	0.49	1.03	0.47*	1.27	0.00	1.27
11.25	0.49	1.03	0.48*	1.26	0.00	1.26

11.30	0.50	1.03	0.48*	1.26	0.00	1.26
11.35	0.50	1.03	0.49*	1.25	0.00	1.25
11.40	0.51	1.03	0.49*	1.25	0.00	1.25
11.45	0.52	1.04	0.50*	1.24	0.00	1.24
11.50	0.52	1.04	0.51*	1.24	0.00	1.24
11.55	0.53	1.04	0.51*	1.23	0.00	1.23
11.60	0.54	1.04	0.52*	1.23	0.00	1.23
11.65	0.56	1.04	0.53*	1.22	0.00	1.22
11.70	0.57	1.04	0.55*	1.22	0.00	1.22
11.75	0.59	1.04	0.57*	1.21	0.00	1.21
11.80	0.62	1.04	0.59*	1.21	0.00	1.21
11.85	0.62	1.05	0.59*	1.20	0.00	1.20
11.90	0.62	1.05	0.59*	1.20	0.00	1.20
11.95	0.62	1.05	0.59*	1.20	0.00	1.20
12.00	0.62	1.05	0.59*	1.19	0.00	1.19
12.05	0.62	1.05	0.59*	1.19	0.00	1.19
12.10	0.62	1.05	0.59*	1.18	0.00	1.18
12.15	0.62	1.05	0.59*	1.18	0.00	1.18
12.20	0.62	1.05	0.59*	1.18	0.00	1.18
12.25	0.62	1.06	0.59*	1.17	0.00	1.17
12.30	0.62	1.06	0.59*	1.17	0.00	1.17
12.35	0.62	1.06	0.59*	1.16	0.00	1.16
12.40	0.62	1.06	0.59*	1.16	0.00	1.16
12.45	0.62	1.06	0.59*	1.16	0.00	1.16
12.50	0.62	1.06	0.59*	1.15	0.00	1.15
12.55	0.62	1.06	0.58*	1.15	0.00	1.15
12.60	0.62	1.06	0.58*	1.14	0.00	1.14
12.65	0.62	1.06	0.58*	1.14	0.00	1.14
12.70	0.62	1.07	0.58*	1.14	0.00	1.14
12.75	0.62	1.07	0.58*	1.13	0.00	1.13
12.80	0.62	1.07	0.58*	1.13	0.00	1.13
12.85	0.62	1.07	0.58*	1.13	0.00	1.13
12.90	0.62	1.07	0.58*	1.12	0.00	1.12
12.95	0.62	1.07	0.58*	1.12	0.00	1.12
13.00	0.62	1.07	0.58*	1.12	0.00	1.12
13.05	0.62	1.07	0.58*	1.11	0.00	1.11
13.10	0.62	1.07	0.58*	1.11	0.00	1.11
13.15	0.62	1.08	0.58*	1.11	0.00	1.11
13.20	0.62	1.08	0.58*	1.10	0.00	1.10
13.25	0.62	1.08	0.58*	1.10	0.00	1.10
13.30	0.62	1.08	0.58*	1.10	0.00	1.10
13.35	0.62	1.08	0.58*	1.09	0.00	1.09
13.40	0.62	1.08	0.57*	1.09	0.00	1.09
13.45	0.62	1.08	0.57*	1.09	0.00	1.09
13.50	0.62	1.08	0.57*	1.08	0.00	1.08
13.55	0.62	1.08	0.57*	1.08	0.00	1.08
13.60	0.62	1.08	0.57*	1.08	0.00	1.08
13.65	0.62	1.09	0.57*	1.07	0.00	1.07
13.70	0.62	1.09	0.57*	1.07	0.00	1.07
13.75	0.62	1.09	0.57*	1.07	0.00	1.07

13.80	0.62	1.09	0.57*	1.07	0.00	1.07
13.85	0.62	1.09	0.57*	1.06	0.00	1.06
13.90	0.62	1.09	0.57*	1.06	0.00	1.06
13.95	0.62	1.09	0.57*	1.06	0.00	1.06
14.00	0.62	1.09	0.57*	1.06	0.00	1.06
14.05	0.62	1.09	0.57*	1.05	0.00	1.05
14.10	0.62	1.09	0.57*	1.05	0.00	1.05
14.15	0.62	1.10	0.57*	1.05	0.00	1.05
14.20	0.62	1.10	0.57*	1.05	0.00	1.05
14.25	0.62	1.10	0.57*	1.04	0.00	1.04
14.30	0.62	1.10	0.57*	1.04	0.00	1.04
14.35	0.62	1.10	0.56*	1.04	0.00	1.04
14.40	0.62	1.10	0.56*	1.04	0.00	1.04
14.45	0.62	1.10	0.56*	1.04	0.00	1.04
14.50	0.62	1.10	0.56*	1.03	0.00	1.03
14.55	0.62	1.10	0.56*	1.03	0.00	1.03
14.60	0.62	1.10	0.56*	1.03	0.00	1.03
14.65	0.62	1.10	0.56*	1.03	0.00	1.03
14.70	0.62	1.11	0.56*	1.03	0.00	1.03
14.75	0.62	1.11	0.56*	1.02	0.00	1.02
14.80	0.62	1.11	0.56*	1.02	0.00	1.02
14.85	0.62	1.11	0.56*	1.02	0.00	1.02
14.90	0.62	1.11	0.56*	1.02	0.00	1.02
14.95	0.62	1.11	0.56*	1.02	0.00	1.02
15.00	0.62	1.11	0.56*	1.02	0.00	1.02
15.05	0.62	1.11	0.56*	1.02	0.00	1.02
15.10	0.62	1.11	0.56*	1.02	0.00	1.02
15.15	0.62	1.11	0.56*	1.02	0.00	1.02
15.20	0.62	1.11	0.56*	1.02	0.00	1.02
15.25	0.62	1.12	0.56*	1.02	0.00	1.02
15.30	0.62	1.12	0.56*	1.02	0.00	1.02
15.35	0.62	1.12	0.56*	1.02	0.00	1.02
15.40	0.62	1.12	0.56*	1.02	0.00	1.02
15.45	0.62	1.12	0.56*	1.02	0.00	1.02
15.50	0.62	1.12	0.55*	1.02	0.00	1.02
15.55	0.62	1.12	0.55*	1.02	0.00	1.02
15.60	0.62	1.12	0.55*	1.02	0.00	1.02
15.65	0.62	1.12	0.55*	1.02	0.00	1.02
15.70	0.62	1.12	0.55*	1.02	0.00	1.02
15.75	0.62	1.12	0.55*	1.02	0.00	1.02
15.80	0.62	1.12	0.55*	1.02	0.00	1.02
15.85	0.62	1.12	0.55*	1.02	0.00	1.02
15.90	0.62	1.13	0.55*	1.02	0.00	1.02
15.95	0.62	1.13	0.55*	1.02	0.00	1.02
16.00	0.62	1.13	0.55*	1.02	0.00	1.02
16.05	0.62	1.13	0.55*	1.02	0.00	1.02
16.10	0.62	1.13	0.55*	1.02	0.00	1.02
16.15	0.62	1.13	0.55*	1.02	0.00	1.02
16.20	0.62	1.13	0.55*	1.02	0.00	1.02
16.25	0.62	1.13	0.55*	1.02	0.00	1.02

16.30	0.62	1.13	0.55*	1.02	0.00	1.02
16.35	0.62	1.13	0.55*	1.02	0.00	1.02
16.40	0.62	1.13	0.55*	1.02	0.00	1.02
16.45	0.62	1.13	0.55*	1.02	0.00	1.02
16.50	0.62	1.13	0.55*	1.02	0.00	1.02
16.55	0.62	1.13	0.55*	1.02	0.00	1.02
16.60	0.62	1.14	0.55*	1.02	0.00	1.02
16.65	0.62	1.14	0.55*	1.02	0.00	1.02
16.70	0.62	1.14	0.55*	1.02	0.00	1.02
16.75	0.62	1.14	0.55*	1.02	0.00	1.02
16.80	0.62	1.14	0.55*	1.02	0.00	1.02
16.85	0.62	1.14	0.55*	1.02	0.00	1.02
16.90	0.62	1.14	0.54*	1.02	0.00	1.02
16.95	0.62	1.14	0.54*	1.02	0.00	1.02
17.00	0.62	1.14	0.54*	1.02	0.00	1.02
17.05	0.62	1.14	0.54*	1.02	0.00	1.02
17.10	0.62	1.14	0.54*	1.02	0.00	1.02
17.15	0.62	1.14	0.54*	1.02	0.00	1.02
17.20	0.62	1.14	0.54*	1.02	0.00	1.02
17.25	0.62	1.14	0.54*	1.02	0.00	1.02
17.30	0.62	1.15	0.54*	1.02	0.00	1.02
17.35	0.62	1.15	0.54*	1.02	0.00	1.02
17.40	0.62	1.15	0.54*	1.02	0.00	1.02
17.45	0.62	1.15	0.54*	1.02	0.00	1.02
17.50	0.62	1.15	0.54*	1.02	0.00	1.02
17.55	0.62	1.15	0.54*	1.02	0.00	1.02
17.60	0.62	1.15	0.54*	1.02	0.00	1.02
17.65	0.62	1.15	0.54*	1.02	0.00	1.02
17.70	0.62	1.15	0.54*	1.02	0.00	1.02
17.75	0.62	1.15	0.54*	1.02	0.00	1.02
17.80	0.62	1.15	0.54*	1.02	0.00	1.02
17.85	0.62	1.15	0.54*	1.02	0.00	1.02
17.90	0.62	1.15	0.54*	1.02	0.00	1.02
17.95	0.62	1.15	0.54*	1.02	0.00	1.02
18.00	0.62	1.15	0.54*	1.02	0.00	1.02
18.05	0.62	1.15	0.54*	1.02	0.00	1.02
18.10	0.62	1.15	0.54*	1.02	0.00	1.02
18.15	0.62	1.16	0.54*	1.02	0.00	1.02
18.20	0.62	1.16	0.54*	1.02	0.00	1.02
18.25	0.62	1.16	0.54*	1.02	0.00	1.02
18.30	0.62	1.16	0.54*	1.02	0.00	1.02
18.35	0.62	1.16	0.54*	1.02	0.00	1.02
18.40	0.62	1.16	0.54*	1.02	0.00	1.02
18.45	0.62	1.16	0.54*	1.02	0.00	1.02
18.50	0.62	1.16	0.54*	1.02	0.00	1.02
18.55	0.62	1.16	0.54*	1.02	0.00	1.02
18.60	0.62	1.16	0.54*	1.02	0.00	1.02
18.65	0.62	1.16	0.53*	1.02	0.00	1.02
18.70	0.62	1.16	0.53*	1.02	0.00	1.02
18.75	0.62	1.16	0.53*	1.02	0.00	1.02

18.80	0.62	1.16	0.53*	1.02	0.00	1.02
18.85	0.62	1.16	0.53*	1.02	0.00	1.02
18.90	0.62	1.16	0.53*	1.02	0.00	1.02
18.95	0.62	1.16	0.53*	1.02	0.00	1.02
19.00	0.62	1.17	0.53*	1.02	0.00	1.02
19.05	0.62	1.17	0.53*	1.02	0.00	1.02
19.10	0.62	1.17	0.53*	1.02	0.00	1.02
19.15	0.62	1.17	0.53*	1.02	0.00	1.02
19.20	0.62	1.17	0.53*	1.02	0.00	1.02
19.25	0.62	1.17	0.53*	1.02	0.00	1.02
19.30	0.62	1.17	0.53*	1.02	0.00	1.02
19.35	0.62	1.17	0.53*	1.02	0.00	1.02
19.40	0.62	1.17	0.53*	1.02	0.00	1.02
19.45	0.62	1.17	0.53*	1.02	0.00	1.02
19.50	0.62	1.17	0.53*	1.02	0.00	1.02
19.55	0.62	1.17	0.53*	1.02	0.00	1.02
19.60	0.62	1.17	0.53*	1.02	0.00	1.02
19.65	0.62	1.17	0.53*	1.02	0.00	1.02
19.70	0.62	1.17	0.53*	1.02	0.00	1.02
19.75	0.62	1.17	0.53*	1.02	0.00	1.02
19.80	0.62	1.17	0.53*	1.02	0.00	1.02
19.85	0.62	1.17	0.53*	1.02	0.00	1.02
19.90	0.62	1.17	0.53*	1.02	0.00	1.02
19.95	0.62	1.17	0.53*	1.02	0.00	1.02
20.00	0.62	1.18	0.53*	1.02	0.00	1.02
20.05	0.62	1.18	0.53*	1.02	0.00	1.02
20.10	0.62	1.18	0.53*	1.02	0.00	1.02
20.15	0.62	1.18	0.53*	1.02	0.00	1.02
20.20	0.62	1.18	0.53*	1.02	0.00	1.02
20.25	0.62	1.18	0.53*	1.02	0.00	1.02
20.30	0.62	1.18	0.53*	1.02	0.00	1.02
20.35	0.62	1.18	0.53*	1.02	0.00	1.02
20.40	0.62	1.18	0.53*	1.02	0.00	1.02
20.45	0.62	1.18	0.53*	1.02	0.00	1.02
20.50	0.62	1.18	0.53*	1.02	0.00	1.02
20.55	0.62	1.18	0.53*	1.02	0.00	1.02
20.60	0.62	1.18	0.53*	1.02	0.00	1.02
20.65	0.62	1.18	0.53*	1.02	0.00	1.02
20.70	0.62	1.18	0.53*	1.02	0.00	1.02
20.75	0.62	1.18	0.53*	1.02	0.00	1.02
20.80	0.62	1.18	0.53*	1.02	0.00	1.02
20.85	0.62	1.18	0.52*	1.02	0.00	1.02
20.90	0.62	1.18	0.52*	1.02	0.00	1.02
20.95	0.62	1.18	0.52*	1.02	0.00	1.02
21.00	0.62	1.18	0.52*	1.02	0.00	1.02
21.05	0.62	1.18	0.52*	1.02	0.00	1.02
21.10	0.62	1.19	0.52*	1.02	0.00	1.02
21.15	0.62	1.19	0.52*	1.02	0.00	1.02
21.20	0.62	1.19	0.52*	1.02	0.00	1.02
21.25	0.62	1.19	0.52*	1.02	0.00	1.02

21.30	0.62	1.19	0.52*	1.02	0.00	1.02
21.35	0.62	1.19	0.52*	1.02	0.00	1.02
21.40	0.62	1.19	0.52*	1.02	0.00	1.02
21.45	0.62	1.19	0.52*	1.02	0.00	1.02
21.50	0.62	1.19	0.52*	1.02	0.00	1.02
21.55	0.62	1.19	0.52*	1.02	0.00	1.02
21.60	0.62	1.19	0.52*	1.02	0.00	1.02
21.65	0.62	1.19	0.52*	1.02	0.00	1.02
21.70	0.62	1.19	0.52*	1.02	0.00	1.02
21.75	0.62	1.19	0.52*	1.02	0.00	1.02
21.80	0.62	1.19	0.52*	1.02	0.00	1.02
21.85	0.62	1.19	0.52*	1.02	0.00	1.02
21.90	0.62	1.19	0.52*	1.02	0.00	1.02
21.95	0.62	1.19	0.52*	1.02	0.00	1.02
22.00	0.62	1.19	0.52*	1.02	0.00	1.02
22.05	0.62	1.19	0.52*	1.02	0.00	1.02
22.10	0.62	1.19	0.52*	1.02	0.00	1.02
22.15	0.62	1.19	0.52*	1.02	0.00	1.02
22.20	0.62	1.19	0.52*	1.02	0.00	1.02
22.25	0.62	1.19	0.52*	1.02	0.00	1.02
22.30	0.62	1.20	0.52*	1.02	0.00	1.02
22.35	0.62	1.20	0.52*	1.02	0.00	1.02
22.40	0.62	1.20	0.52*	1.02	0.00	1.02
22.45	0.62	1.20	0.52*	1.02	0.00	1.02
22.50	0.62	1.20	0.52*	1.02	0.00	1.02
22.55	0.62	1.20	0.52*	1.02	0.00	1.02
22.60	0.62	1.20	0.52*	1.02	0.00	1.02
22.65	0.62	1.20	0.52*	1.02	0.00	1.02
22.70	0.62	1.20	0.52*	1.02	0.00	1.02
22.75	0.62	1.20	0.52*	1.02	0.00	1.02
22.80	0.62	1.20	0.52*	1.02	0.00	1.02
22.85	0.62	1.20	0.52*	1.02	0.00	1.02
22.90	0.62	1.20	0.52*	1.02	0.00	1.02
22.95	0.62	1.20	0.52*	1.02	0.00	1.02
23.00	0.62	1.20	0.52*	1.02	0.00	1.02
23.05	0.62	1.20	0.52*	1.02	0.00	1.02
23.10	0.62	1.20	0.52*	1.02	0.00	1.02
23.15	0.62	1.20	0.52*	1.02	0.00	1.02
23.20	0.62	1.20	0.52*	1.02	0.00	1.02
23.25	0.62	1.20	0.52*	1.02	0.00	1.02
23.30	0.62	1.20	0.52*	1.02	0.00	1.02
23.35	0.62	1.20	0.52*	1.02	0.00	1.02
23.40	0.62	1.20	0.52*	1.02	0.00	1.02
23.45	0.62	1.20	0.52*	1.02	0.00	1.02
23.50	0.62	1.20	0.52*	1.02	0.00	1.02
23.55	0.62	1.20	0.52*	1.02	0.00	1.02
23.60	0.62	1.20	0.52*	1.02	0.00	1.02
23.65	0.62	1.20	0.52*	1.02	0.00	1.02
23.70	0.62	1.20	0.52*	1.02	0.00	1.02
23.75	0.62	1.21	0.52*	1.02	0.00	1.02

23.80	0.62	1.21	0.52*	1.02	0.00	1.02
23.85	0.62	1.21	0.52*	1.02	0.00	1.02
23.90	0.62	1.21	0.51*	1.02	0.00	1.02
23.95	0.62	1.21	0.51*	1.02	0.00	1.02
24.00	0.62	1.21	0.51*	1.02	0.00	1.02
24.05	0.62	1.21	0.51*	1.02	0.00	1.02
24.10	0.62	1.21	0.51*	1.02	0.00	1.02
24.15	0.62	1.21	0.51*	1.02	0.00	1.02
24.20	0.62	1.21	0.51*	1.02	0.00	1.02
24.25	0.62	1.21	0.51*	1.02	0.00	1.02
24.30	0.62	1.21	0.51*	1.02	0.00	1.02
24.35	0.62	1.21	0.51*	1.02	0.00	1.02
24.40	0.62	1.21	0.51*	1.02	0.00	1.02
24.45	0.62	1.21	0.51*	1.02	0.00	1.02
24.50	0.62	1.21	0.51*	1.02	0.00	1.02
24.55	0.62	1.21	0.51*	1.02	0.00	1.02
24.60	0.62	1.21	0.51*	1.02	0.00	1.02
24.65	0.62	1.21	0.51*	1.02	0.00	1.02
24.70	0.62	1.21	0.51*	1.02	0.00	1.02
24.75	0.62	1.21	0.51*	1.02	0.00	1.02
24.80	0.62	1.21	0.51*	1.02	0.00	1.02
24.85	0.62	1.21	0.51*	1.02	0.00	1.02
24.90	0.62	1.21	0.51*	1.02	0.00	1.02
24.95	0.62	1.21	0.51*	1.02	0.00	1.02
25.00	0.62	1.21	0.51*	1.02	0.00	1.02
25.05	0.62	1.21	0.51*	1.02	0.00	1.02
25.10	0.62	1.21	0.51*	1.02	0.00	1.02
25.15	0.62	1.21	0.51*	1.02	0.00	1.02
25.20	0.62	1.21	0.51*	1.02	0.00	1.02
25.25	0.62	1.21	0.51*	1.02	0.00	1.02
25.30	0.62	1.21	0.51*	1.02	0.00	1.02
25.35	0.62	1.21	0.51*	1.02	0.00	1.02
25.40	0.62	1.21	0.51*	1.02	0.00	1.02
25.45	0.62	1.22	0.51*	1.02	0.00	1.02
25.50	0.62	1.22	0.51*	1.02	0.00	1.02
25.55	0.62	1.22	0.51*	1.02	0.00	1.02
25.60	0.62	1.22	0.51*	1.02	0.00	1.02
25.65	0.62	1.22	0.51*	1.02	0.00	1.02
25.70	0.62	1.22	0.51*	1.02	0.00	1.02
25.75	0.62	1.22	0.51*	1.02	0.00	1.02
25.80	0.62	1.22	0.51*	1.02	0.00	1.02
25.85	0.62	1.22	0.51*	1.02	0.00	1.02
25.90	0.62	1.22	0.51*	1.02	0.00	1.02
25.95	0.62	1.22	0.51*	1.02	0.00	1.02
26.00	0.62	1.22	0.51*	1.02	0.00	1.02
26.05	0.62	1.22	0.51*	1.02	0.00	1.02
26.10	0.62	1.22	0.51*	1.02	0.00	1.02
26.15	0.62	1.22	0.51*	1.02	0.00	1.02
26.20	0.62	1.22	0.51*	1.02	0.00	1.02
26.25	0.62	1.22	0.51*	1.02	0.00	1.02

26.30	0.62	1.22	0.51*	1.02	0.00	1.02
26.35	0.62	1.22	0.51*	1.02	0.00	1.02
26.40	0.62	1.22	0.51*	1.02	0.00	1.02
26.45	0.62	1.22	0.51*	1.02	0.00	1.02
26.50	0.62	1.22	0.51*	1.02	0.00	1.02
26.55	0.62	1.22	0.51*	1.02	0.00	1.02
26.60	0.62	1.22	0.51*	1.02	0.00	1.02
26.65	0.62	1.22	0.51*	1.02	0.00	1.02
26.70	0.62	1.22	0.51*	1.02	0.00	1.02
26.75	0.62	1.22	0.51*	1.02	0.00	1.02
26.80	0.62	1.22	0.51*	1.02	0.00	1.02
26.85	0.62	1.22	0.51*	1.02	0.00	1.02
26.90	0.62	1.22	0.51*	1.02	0.00	1.02
26.95	0.62	1.22	0.51*	1.02	0.00	1.02
27.00	0.62	1.22	0.51*	1.02	0.00	1.02
27.05	0.62	1.22	0.51*	1.02	0.00	1.02
27.10	0.62	1.22	0.51*	1.02	0.00	1.02
27.15	0.62	1.22	0.51*	1.02	0.00	1.02
27.20	0.62	1.22	0.51*	1.02	0.00	1.02
27.25	0.62	1.22	0.51*	1.02	0.00	1.02
27.30	0.62	1.22	0.51*	1.02	0.00	1.02
27.35	0.62	1.22	0.51*	1.02	0.00	1.02
27.40	0.62	1.22	0.51*	1.02	0.00	1.02
27.45	0.62	1.22	0.51*	1.02	0.00	1.02
27.50	0.62	1.23	0.51*	1.02	0.00	1.02
27.55	0.62	1.23	0.51*	1.02	0.00	1.02
27.60	0.62	1.23	0.51*	1.02	0.00	1.02
27.65	0.62	1.23	0.51*	1.02	0.00	1.02
27.70	0.62	1.23	0.51*	1.02	0.00	1.02
27.75	0.62	1.23	0.51*	1.02	0.00	1.02
27.80	0.62	1.23	0.51*	1.02	0.00	1.02
27.85	0.62	1.23	0.51*	1.02	0.00	1.02
27.90	0.62	1.23	0.51*	1.02	0.00	1.02
27.95	0.62	1.23	0.51*	1.02	0.00	1.02
28.00	0.62	1.23	0.51*	1.02	0.00	1.02
28.05	0.62	1.23	0.51*	1.02	0.00	1.02
28.10	0.62	1.23	0.51*	1.02	0.00	1.02
28.15	0.62	1.23	0.51*	1.02	0.00	1.02
28.20	0.62	1.23	0.51*	1.02	0.00	1.02
28.25	0.62	1.23	0.51*	1.02	0.00	1.02
28.30	0.62	1.23	0.51*	1.02	0.00	1.02
28.35	0.62	1.23	0.51*	1.02	0.00	1.02
28.40	0.62	1.23	0.50*	1.02	0.00	1.02
28.45	0.62	1.23	0.50*	1.02	0.00	1.02
28.50	0.62	1.23	0.50*	1.02	0.00	1.02
28.55	0.62	1.23	0.50*	1.02	0.00	1.02
28.60	0.62	1.23	0.50*	1.02	0.00	1.02
28.65	0.62	1.23	0.50*	1.02	0.00	1.02
28.70	0.62	1.23	0.50*	1.02	0.00	1.02
28.75	0.62	1.23	0.50*	1.02	0.00	1.02

28.80	0.62	1.23	0.50*	1.02	0.00	1.02
28.85	0.62	1.23	0.50*	1.02	0.00	1.02
28.90	0.62	1.23	0.50*	1.02	0.00	1.02
28.95	0.62	1.23	0.50*	1.02	0.00	1.02
29.00	0.62	1.23	0.50*	1.02	0.00	1.02
29.05	0.62	1.23	0.50*	1.02	0.00	1.02
29.10	0.62	1.23	0.50*	1.02	0.00	1.02
29.15	0.62	1.23	0.50*	1.02	0.00	1.02
29.20	0.62	1.23	0.50*	1.02	0.00	1.02
29.25	0.62	1.23	0.50*	1.02	0.00	1.02
29.30	0.62	1.23	0.50*	1.02	0.00	1.02
29.35	0.62	1.23	0.50*	1.01	0.00	1.01
29.40	0.62	1.23	0.50*	1.01	0.00	1.01
29.45	0.62	1.23	0.50*	1.01	0.00	1.01
29.50	0.62	1.23	0.50*	1.01	0.00	1.01
29.55	0.62	1.23	0.50*	1.01	0.00	1.01
29.60	0.62	1.23	0.50*	1.01	0.00	1.01
29.65	0.62	1.23	0.50*	1.01	0.00	1.01
29.70	0.62	1.23	0.50*	1.01	0.00	1.01
29.75	0.62	1.23	0.50*	1.01	0.00	1.01
29.80	0.62	1.23	0.50*	1.01	0.00	1.01
29.85	0.62	1.23	0.50*	1.01	0.00	1.01
29.90	0.61	1.23	0.50*	1.01	0.00	1.01
29.95	0.61	1.23	0.50*	1.01	0.00	1.01
30.00	0.61	1.23	0.50*	1.01	0.00	1.01
30.05	0.61	1.23	0.50*	1.00	0.00	1.00
30.10	0.61	1.23	0.50*	1.00	0.00	1.00
30.15	0.61	1.23	0.50*	1.00	0.00	1.00
30.20	0.61	1.23	0.50*	1.00	0.00	1.00
30.25	0.61	1.23	0.50*	1.00	0.00	1.00
30.30	0.61	1.23	0.50*	1.00	0.00	1.00
30.35	0.61	1.23	0.50*	1.00	0.00	1.00
30.40	0.61	1.23	0.50*	1.00	0.00	1.00
30.45	0.61	1.23	0.50*	1.00	0.00	1.00
30.50	0.61	1.23	0.50*	1.00	0.00	1.00
30.55	0.61	1.23	0.50*	1.00	0.00	1.00
30.60	0.61	1.23	0.50*	1.00	0.00	1.00
30.65	0.61	1.23	0.50*	0.99	0.00	0.99
30.70	0.61	1.23	0.50*	0.99	0.00	0.99
30.75	0.61	1.23	0.50*	0.99	0.00	0.99
30.80	0.61	1.23	0.50*	0.99	0.00	0.99
30.85	0.61	1.23	0.50*	0.99	0.00	0.99
30.90	0.61	1.23	0.50*	0.99	0.00	0.99
30.95	0.61	1.23	0.50*	0.99	0.00	0.99
31.00	0.61	1.23	0.50*	0.99	0.00	0.99
31.05	0.61	1.23	0.50*	0.99	0.00	0.99
31.10	0.61	1.23	0.50*	0.99	0.00	0.99
31.15	0.61	1.23	0.50*	0.98	0.00	0.98
31.20	0.61	1.23	0.50*	0.98	0.00	0.98
31.25	0.61	1.23	0.50*	0.98	0.00	0.98

31.30	0.61	1.23	0.50*	0.98	0.00	0.98
31.35	0.61	1.23	0.50*	0.98	0.00	0.98
31.40	0.61	1.23	0.50*	0.98	0.00	0.98
31.45	0.61	1.23	0.50*	0.97	0.00	0.97
31.50	0.61	1.23	0.50*	0.97	0.00	0.97
31.55	0.61	1.23	0.50*	0.97	0.00	0.97
31.60	0.61	1.23	0.50*	0.96	0.00	0.96
31.65	0.61	1.23	0.50*	0.96	0.00	0.96
31.70	0.61	1.23	0.50*	0.96	0.00	0.96
31.75	0.61	1.23	0.50*	0.95	0.00	0.95
31.80	0.61	1.23	0.50*	0.95	0.00	0.95
31.85	0.61	1.22	0.50*	0.95	0.00	0.95
31.90	0.61	1.22	0.50*	0.94	0.00	0.94
31.95	0.55	1.22	0.45*	0.94	0.00	0.94
32.00	0.51	1.22	0.42*	0.93	0.00	0.93
32.05	0.49	1.22	0.40*	0.93	0.00	0.93
32.10	0.47	1.22	0.39*	0.92	0.00	0.92
32.15	0.46	1.22	0.38*	0.92	0.00	0.92
32.20	0.45	1.22	0.37*	0.91	0.00	0.91
32.25	0.44	1.22	0.36*	0.91	0.00	0.91
32.30	0.43	1.22	0.35*	0.90	0.00	0.90
32.35	0.42	1.22	0.35*	0.90	0.00	0.90
32.40	0.41	1.22	0.34*	0.89	0.00	0.89
32.45	0.41	1.22	0.33*	0.89	0.00	0.89
32.50	0.40	1.22	0.33*	0.88	0.00	0.88
32.55	0.40	1.22	0.32*	0.87	0.00	0.87
32.60	0.39	1.22	0.32*	0.87	0.00	0.87
32.65	0.38	1.22	0.31*	0.86	0.00	0.86
32.70	0.38	1.22	0.31*	0.85	0.00	0.85
32.75	0.37	1.22	0.31*	0.85	0.00	0.85
32.80	0.37	1.22	0.30*	0.84	0.00	0.84
32.85	0.36	1.22	0.30*	0.83	0.00	0.83
32.90	0.36	1.22	0.29*	0.83	0.00	0.83
32.95	0.35	1.22	0.29*	0.82	0.00	0.82
33.00	0.35	1.22	0.29*	0.81	0.00	0.81
33.05	0.34	1.22	0.28*	0.81	0.00	0.81
33.10	0.34	1.22	0.28*	0.80	0.00	0.80
33.15	0.34	1.22	0.28*	0.79	0.00	0.79
33.20	0.33	1.22	0.27*	0.79	0.00	0.79
33.25	0.33	1.22	0.27*	0.78	0.00	0.78
33.30	0.32	1.22	0.27*	0.77	0.00	0.77
33.35	0.32	1.22	0.26*	0.76	0.00	0.76
33.40	0.32	1.22	0.26*	0.76	0.00	0.76
33.45	0.31	1.22	0.26*	0.75	0.00	0.75
33.50	0.31	1.22	0.25*	0.74	0.00	0.74
33.55	0.31	1.22	0.25*	0.73	0.00	0.73
33.60	0.30	1.22	0.25*	0.72	0.00	0.72
33.65	0.30	1.21	0.25*	0.72	0.00	0.72
33.70	0.29	1.21	0.24*	0.71	0.00	0.71
33.75	0.29	1.21	0.24*	0.70	0.00	0.70

33.80	0.29	1.21	0.24*	0.69	0.00	0.69
33.85	0.28	1.21	0.23*	0.68	0.00	0.68
33.90	0.28	1.21	0.23*	0.68	0.00	0.68
33.95	0.28	1.21	0.23*	0.67	0.00	0.67
34.00	0.28	1.21	0.23*	0.66	0.00	0.66
34.05	0.27	1.21	0.22*	0.65	0.00	0.65
34.10	0.27	1.21	0.22*	0.64	0.00	0.64
34.15	0.27	1.21	0.22*	0.63	0.00	0.63
34.20	0.26	1.21	0.22*	0.62	0.00	0.62
34.25	0.26	1.21	0.22*	0.61	0.00	0.61
34.30	0.26	1.21	0.21*	0.61	0.00	0.61
34.35	0.25	1.21	0.21*	0.60	0.00	0.60
34.40	0.25	1.21	0.21*	0.59	0.00	0.59
34.45	0.25	1.21	0.21*	0.58	0.00	0.58
34.50	0.25	1.21	0.20*	0.57	0.00	0.57
34.55	0.24	1.21	0.20*	0.56	0.00	0.56
34.60	0.24	1.21	0.20*	0.55	0.00	0.55
34.65	0.24	1.21	0.20*	0.54	0.00	0.54
34.70	0.24	1.21	0.19*	0.53	0.00	0.53
34.75	0.23	1.21	0.19*	0.52	0.00	0.52
34.80	0.23	1.21	0.19*	0.51	0.00	0.51
34.85	0.23	1.21	0.19*	0.50	0.00	0.50
34.90	0.22	1.21	0.19*	0.49	0.00	0.49
34.95	0.22	1.21	0.18*	0.48	0.00	0.48
35.00	0.22	1.21	0.18*	0.48	0.00	0.48
35.05	2.00	1.21	5.00	0.48	0.00	0.48
35.10	2.00	1.21	5.00	0.48	0.00	0.48
35.15	2.00	1.21	5.00	0.48	0.00	0.48
35.20	2.00	1.21	5.00	0.48	0.00	0.48
35.25	2.00	1.20	5.00	0.48	0.00	0.48
35.30	2.00	1.20	5.00	0.48	0.00	0.48
35.35	2.00	1.20	5.00	0.48	0.00	0.48
35.40	2.00	1.20	5.00	0.48	0.00	0.48
35.45	2.00	1.20	5.00	0.48	0.00	0.48
35.50	2.00	1.20	5.00	0.48	0.00	0.48
35.55	2.00	1.20	5.00	0.48	0.00	0.48
35.60	2.00	1.20	5.00	0.48	0.00	0.48
35.65	2.00	1.20	5.00	0.48	0.00	0.48
35.70	2.00	1.20	5.00	0.48	0.00	0.48
35.75	2.00	1.20	5.00	0.48	0.00	0.48
35.80	2.00	1.20	5.00	0.48	0.00	0.48
35.85	2.00	1.20	5.00	0.48	0.00	0.48
35.90	2.00	1.20	5.00	0.48	0.00	0.48
35.95	2.00	1.20	5.00	0.48	0.00	0.48
36.00	2.00	1.20	5.00	0.48	0.00	0.48
36.05	2.00	1.20	5.00	0.48	0.00	0.48
36.10	2.00	1.20	5.00	0.48	0.00	0.48
36.15	2.00	1.20	5.00	0.48	0.00	0.48
36.20	2.00	1.20	5.00	0.48	0.00	0.48
36.25	2.00	1.20	5.00	0.48	0.00	0.48

36.30	2.00	1.20	5.00	0.48	0.00	0.48
36.35	2.00	1.20	5.00	0.48	0.00	0.48
36.40	2.00	1.20	5.00	0.48	0.00	0.48
36.45	2.00	1.20	5.00	0.48	0.00	0.48
36.50	2.00	1.20	5.00	0.48	0.00	0.48
36.55	2.00	1.20	5.00	0.48	0.00	0.48
36.60	2.00	1.20	5.00	0.48	0.00	0.48
36.65	2.00	1.20	5.00	0.48	0.00	0.48
36.70	2.00	1.20	5.00	0.48	0.00	0.48
36.75	2.00	1.19	5.00	0.48	0.00	0.48
36.80	2.00	1.19	5.00	0.48	0.00	0.48
36.85	2.00	1.19	5.00	0.48	0.00	0.48
36.90	2.00	1.19	5.00	0.48	0.00	0.48
36.95	2.00	1.19	5.00	0.48	0.00	0.48
37.00	2.00	1.19	5.00	0.48	0.00	0.48
37.05	2.00	1.19	5.00	0.48	0.00	0.48
37.10	2.00	1.19	5.00	0.48	0.00	0.48
37.15	2.00	1.19	5.00	0.48	0.00	0.48
37.20	2.00	1.19	5.00	0.48	0.00	0.48
37.25	2.00	1.19	5.00	0.48	0.00	0.48
37.30	2.00	1.19	5.00	0.48	0.00	0.48
37.35	2.00	1.19	5.00	0.48	0.00	0.48
37.40	2.00	1.19	5.00	0.48	0.00	0.48
37.45	2.00	1.19	5.00	0.48	0.00	0.48
37.50	2.00	1.19	5.00	0.48	0.00	0.48
37.55	2.00	1.19	5.00	0.48	0.00	0.48
37.60	2.00	1.19	5.00	0.48	0.00	0.48
37.65	2.00	1.19	5.00	0.48	0.00	0.48
37.70	2.00	1.19	5.00	0.48	0.00	0.48
37.75	2.00	1.19	5.00	0.48	0.00	0.48
37.80	2.00	1.19	5.00	0.48	0.00	0.48
37.85	2.00	1.19	5.00	0.48	0.00	0.48
37.90	2.00	1.19	5.00	0.48	0.00	0.48
37.95	2.00	1.19	5.00	0.48	0.00	0.48
38.00	2.00	1.19	5.00	0.48	0.00	0.48
38.05	2.00	1.19	5.00	0.48	0.00	0.48
38.10	2.00	1.19	5.00	0.48	0.00	0.48
38.15	2.00	1.18	5.00	0.48	0.00	0.48
38.20	2.00	1.18	5.00	0.48	0.00	0.48
38.25	2.00	1.18	5.00	0.48	0.00	0.48
38.30	2.00	1.18	5.00	0.48	0.00	0.48
38.35	2.00	1.18	5.00	0.48	0.00	0.48
38.40	2.00	1.18	5.00	0.48	0.00	0.48
38.45	2.00	1.18	5.00	0.48	0.00	0.48
38.50	2.00	1.18	5.00	0.48	0.00	0.48
38.55	2.00	1.18	5.00	0.48	0.00	0.48
38.60	2.00	1.18	5.00	0.48	0.00	0.48
38.65	2.00	1.18	5.00	0.48	0.00	0.48
38.70	2.00	1.18	5.00	0.48	0.00	0.48
38.75	2.00	1.18	5.00	0.48	0.00	0.48

38.80	2.00	1.18	5.00	0.48	0.00	0.48
38.85	2.00	1.18	5.00	0.48	0.00	0.48
38.90	2.00	1.18	5.00	0.48	0.00	0.48
38.95	2.00	1.18	5.00	0.48	0.00	0.48
39.00	2.00	1.18	5.00	0.48	0.00	0.48
39.05	2.00	1.18	5.00	0.48	0.00	0.48
39.10	2.00	1.18	5.00	0.48	0.00	0.48
39.15	2.00	1.18	5.00	0.48	0.00	0.48
39.20	2.00	1.18	5.00	0.48	0.00	0.48
39.25	2.00	1.18	5.00	0.48	0.00	0.48
39.30	2.00	1.18	5.00	0.48	0.00	0.48
39.35	2.00	1.18	5.00	0.48	0.00	0.48
39.40	2.00	1.18	5.00	0.48	0.00	0.48
39.45	2.00	1.18	5.00	0.48	0.00	0.48
39.50	2.00	1.17	5.00	0.48	0.00	0.48
39.55	2.00	1.17	5.00	0.48	0.00	0.48
39.60	2.00	1.17	5.00	0.48	0.00	0.48
39.65	2.00	1.17	5.00	0.48	0.00	0.48
39.70	2.00	1.17	5.00	0.48	0.00	0.48
39.75	2.00	1.17	5.00	0.48	0.00	0.48
39.80	2.00	1.17	5.00	0.48	0.00	0.48
39.85	2.00	1.17	5.00	0.48	0.00	0.48
39.90	2.00	1.17	5.00	0.48	0.00	0.48
39.95	2.00	1.17	5.00	0.48	0.00	0.48
40.00	2.00	1.17	5.00	0.48	0.00	0.48
40.05	0.25	1.17	0.21*	0.48	0.00	0.48
40.10	0.25	1.17	0.22*	0.48	0.00	0.48
40.15	0.26	1.17	0.22*	0.47	0.00	0.47
40.20	0.26	1.17	0.22*	0.46	0.00	0.46
40.25	0.26	1.17	0.22*	0.45	0.00	0.45
40.30	0.26	1.17	0.23*	0.44	0.00	0.44
40.35	0.27	1.17	0.23*	0.44	0.00	0.44
40.40	0.27	1.17	0.23*	0.43	0.00	0.43
40.45	0.27	1.17	0.23*	0.42	0.00	0.42
40.50	0.27	1.17	0.23*	0.41	0.00	0.41
40.55	0.28	1.17	0.24*	0.40	0.00	0.40
40.60	0.28	1.17	0.24*	0.39	0.00	0.39
40.65	0.28	1.17	0.24*	0.38	0.00	0.38
40.70	0.28	1.17	0.24*	0.38	0.00	0.38
40.75	0.29	1.16	0.25*	0.37	0.00	0.37
40.80	0.29	1.16	0.25*	0.36	0.00	0.36
40.85	0.29	1.16	0.25*	0.35	0.00	0.35
40.90	0.29	1.16	0.25*	0.34	0.00	0.34
40.95	0.30	1.16	0.26*	0.34	0.00	0.34
41.00	0.30	1.16	0.26*	0.33	0.00	0.33
41.05	0.30	1.16	0.26*	0.32	0.00	0.32
41.10	0.31	1.16	0.26*	0.31	0.00	0.31
41.15	0.31	1.16	0.27*	0.31	0.00	0.31
41.20	0.31	1.16	0.27*	0.30	0.00	0.30
41.25	0.32	1.16	0.27*	0.29	0.00	0.29

41.30	0.32	1.16	0.27*	0.28	0.00	0.28
41.35	0.32	1.16	0.28*	0.28	0.00	0.28
41.40	0.33	1.16	0.28*	0.27	0.00	0.27
41.45	0.33	1.16	0.28*	0.26	0.00	0.26
41.50	0.33	1.16	0.29*	0.26	0.00	0.26
41.55	0.34	1.16	0.29*	0.25	0.00	0.25
41.60	0.34	1.16	0.29*	0.24	0.00	0.24
41.65	0.34	1.16	0.30*	0.23	0.00	0.23
41.70	0.35	1.16	0.30*	0.23	0.00	0.23
41.75	0.35	1.16	0.30*	0.22	0.00	0.22
41.80	0.35	1.16	0.31*	0.21	0.00	0.21
41.85	0.36	1.16	0.31*	0.21	0.00	0.21
41.90	0.36	1.16	0.31*	0.20	0.00	0.20
41.95	0.37	1.16	0.32*	0.19	0.00	0.19
42.00	0.37	1.15	0.32*	0.19	0.00	0.19
42.05	0.37	1.15	0.32*	0.18	0.00	0.18
42.10	0.38	1.15	0.33*	0.18	0.00	0.18
42.15	0.38	1.15	0.33*	0.17	0.00	0.17
42.20	0.39	1.15	0.34*	0.16	0.00	0.16
42.25	0.39	1.15	0.34*	0.16	0.00	0.16
42.30	0.40	1.15	0.35*	0.15	0.00	0.15
42.35	0.40	1.15	0.35*	0.14	0.00	0.14
42.40	0.41	1.15	0.36*	0.14	0.00	0.14
42.45	0.42	1.15	0.36*	0.13	0.00	0.13
42.50	0.42	1.15	0.37*	0.13	0.00	0.13
42.55	0.43	1.15	0.38*	0.12	0.00	0.12
42.60	0.44	1.15	0.38*	0.12	0.00	0.12
42.65	0.45	1.15	0.39*	0.11	0.00	0.11
42.70	0.46	1.15	0.40*	0.11	0.00	0.11
42.75	0.48	1.15	0.42*	0.10	0.00	0.10
42.80	0.51	1.15	0.44*	0.10	0.00	0.10
42.85	0.56	1.15	0.48*	0.09	0.00	0.09
42.90	0.57	1.15	0.50*	0.09	0.00	0.09
42.95	0.57	1.15	0.50*	0.08	0.00	0.08
43.00	0.57	1.15	0.50*	0.08	0.00	0.08
43.05	0.57	1.15	0.50*	0.08	0.00	0.08
43.10	0.57	1.15	0.50*	0.07	0.00	0.07
43.15	0.57	1.15	0.50*	0.07	0.00	0.07
43.20	0.57	1.15	0.50*	0.06	0.00	0.06
43.25	0.57	1.14	0.50*	0.06	0.00	0.06
43.30	0.57	1.14	0.50*	0.06	0.00	0.06
43.35	0.57	1.14	0.50*	0.05	0.00	0.05
43.40	0.57	1.14	0.50*	0.05	0.00	0.05
43.45	0.57	1.14	0.50*	0.05	0.00	0.05
43.50	0.57	1.14	0.50*	0.05	0.00	0.05
43.55	0.57	1.14	0.50*	0.04	0.00	0.04
43.60	0.57	1.14	0.50*	0.04	0.00	0.04
43.65	0.57	1.14	0.50*	0.04	0.00	0.04
43.70	0.57	1.14	0.50*	0.04	0.00	0.04
43.75	0.57	1.14	0.50*	0.04	0.00	0.04

43.80	0.57	1.14	0.50*	0.03	0.00	0.03
43.85	0.57	1.14	0.50*	0.03	0.00	0.03
43.90	0.57	1.14	0.50*	0.03	0.00	0.03
43.95	0.57	1.14	0.50*	0.03	0.00	0.03
44.00	0.57	1.14	0.50*	0.03	0.00	0.03
44.05	0.57	1.14	0.50*	0.03	0.00	0.03
44.10	0.57	1.14	0.50*	0.03	0.00	0.03
44.15	0.57	1.14	0.50*	0.03	0.00	0.03
44.20	0.57	1.14	0.50*	0.02	0.00	0.02
44.25	0.57	1.14	0.50*	0.02	0.00	0.02
44.30	0.57	1.14	0.50*	0.02	0.00	0.02
44.35	0.57	1.14	0.50*	0.02	0.00	0.02
44.40	0.57	1.13	0.50*	0.02	0.00	0.02
44.45	0.57	1.13	0.50*	0.02	0.00	0.02
44.50	0.57	1.13	0.50*	0.02	0.00	0.02
44.55	0.57	1.13	0.50*	0.02	0.00	0.02
44.60	0.57	1.13	0.50*	0.02	0.00	0.02
44.65	0.57	1.13	0.50*	0.02	0.00	0.02
44.70	0.57	1.13	0.50*	0.02	0.00	0.02
44.75	0.57	1.13	0.50*	0.01	0.00	0.01
44.80	0.57	1.13	0.50*	0.01	0.00	0.01
44.85	0.57	1.13	0.50*	0.01	0.00	0.01
44.90	0.57	1.13	0.50*	0.01	0.00	0.01
44.95	0.57	1.13	0.50*	0.01	0.00	0.01
45.00	0.57	1.13	0.50*	0.01	0.00	0.01
45.05	0.57	1.13	0.50*	0.01	0.00	0.01
45.10	0.57	1.13	0.50*	0.01	0.00	0.01
45.15	0.57	1.13	0.50*	0.01	0.00	0.01
45.20	0.57	1.13	0.50*	0.01	0.00	0.01
45.25	0.57	1.13	0.50*	0.00	0.00	0.00
45.30	0.57	1.13	0.50*	0.00	0.00	0.00
45.35	0.57	1.13	0.50*	0.00	0.00	0.00
45.40	0.57	1.13	0.50*	0.00	0.00	0.00
45.45	0.57	1.13	0.50*	0.00	0.00	0.00
45.50	0.57	1.13	0.50*	0.00	0.00	0.00
45.55	0.56	1.12	0.50*	0.00	0.00	0.00
45.60	0.56	1.12	0.50*	0.00	0.00	0.00
45.65	0.56	1.12	0.50*	0.00	0.00	0.00
45.70	0.56	1.12	0.50*	0.00	0.00	0.00
45.75	0.56	1.12	0.50*	0.00	0.00	0.00
45.80	0.56	1.12	0.50*	0.00	0.00	0.00
45.85	0.56	1.12	0.50*	0.00	0.00	0.00
45.90	0.56	1.12	0.50*	0.00	0.00	0.00
45.95	0.56	1.12	0.50*	0.00	0.00	0.00
46.00	0.56	1.12	0.50*	0.00	0.00	0.00
46.05	0.56	1.12	0.50*	0.00	0.00	0.00
46.10	0.56	1.12	0.50*	0.00	0.00	0.00
46.15	0.56	1.12	0.50*	0.00	0.00	0.00
46.20	0.56	1.12	0.50*	0.00	0.00	0.00
46.25	0.56	1.12	0.50*	0.00	0.00	0.00

46.30	0.56	1.12	0.50*	0.00	0.00	0.00
46.35	0.56	1.12	0.50*	0.00	0.00	0.00
46.40	0.56	1.12	0.50*	0.00	0.00	0.00
46.45	0.56	1.12	0.50*	0.00	0.00	0.00
46.50	0.56	1.12	0.50*	0.00	0.00	0.00
46.55	0.56	1.12	0.50*	0.00	0.00	0.00
46.60	0.56	1.12	0.50*	0.00	0.00	0.00
46.65	0.56	1.12	0.50*	0.00	0.00	0.00
46.70	0.56	1.11	0.50*	0.00	0.00	0.00
46.75	0.56	1.11	0.50*	0.00	0.00	0.00
46.80	0.56	1.11	0.50*	0.00	0.00	0.00
46.85	0.56	1.11	0.50*	0.00	0.00	0.00
46.90	0.56	1.11	0.50*	0.00	0.00	0.00
46.95	0.56	1.11	0.50*	0.00	0.00	0.00
47.00	0.56	1.11	0.50*	0.00	0.00	0.00
47.05	0.56	1.11	0.50*	0.00	0.00	0.00
47.10	0.56	1.11	0.50*	0.00	0.00	0.00
47.15	0.56	1.11	0.50*	0.00	0.00	0.00
47.20	0.56	1.11	0.50*	0.00	0.00	0.00
47.25	0.56	1.11	0.50*	0.00	0.00	0.00
47.30	0.56	1.11	0.50*	0.00	0.00	0.00
47.35	0.56	1.11	0.50*	0.00	0.00	0.00
47.40	0.56	1.11	0.50*	0.00	0.00	0.00
47.45	0.56	1.11	0.51*	0.00	0.00	0.00
47.50	0.56	1.11	0.51*	0.00	0.00	0.00
47.55	0.56	1.11	0.51*	0.00	0.00	0.00
47.60	0.56	1.11	0.51*	0.00	0.00	0.00
47.65	0.56	1.11	0.51*	0.00	0.00	0.00
47.70	0.56	1.11	0.51*	0.00	0.00	0.00
47.75	0.56	1.11	0.51*	0.00	0.00	0.00
47.80	0.56	1.10	0.51*	0.00	0.00	0.00
47.85	0.56	1.10	0.51*	0.00	0.00	0.00
47.90	0.56	1.10	0.51*	0.00	0.00	0.00
47.95	0.56	1.10	0.51*	0.00	0.00	0.00
48.00	0.56	1.10	0.51*	0.00	0.00	0.00
48.05	0.56	1.10	0.51*	0.00	0.00	0.00
48.10	0.56	1.10	0.51*	0.00	0.00	0.00
48.15	0.56	1.10	0.51*	0.00	0.00	0.00
48.20	0.56	1.10	0.51*	0.00	0.00	0.00
48.25	0.56	1.10	0.51*	0.00	0.00	0.00
48.30	0.56	1.10	0.51*	0.00	0.00	0.00
48.35	0.56	1.10	0.51*	0.00	0.00	0.00
48.40	0.56	1.10	0.51*	0.00	0.00	0.00
48.45	0.56	1.10	0.51*	0.00	0.00	0.00
48.50	0.56	1.10	0.51*	0.00	0.00	0.00
48.55	0.56	1.10	0.51*	0.00	0.00	0.00
48.60	0.56	1.10	0.51*	0.00	0.00	0.00
48.65	0.56	1.10	0.51*	0.00	0.00	0.00
48.70	0.56	1.10	0.51*	0.00	0.00	0.00
48.75	0.56	1.10	0.51*	0.00	0.00	0.00

48.80	0.56	1.10	0.51*	0.00	0.00	0.00
48.85	0.56	1.10	0.51*	0.00	0.00	0.00
48.90	0.56	1.09	0.51*	0.00	0.00	0.00
48.95	0.56	1.09	0.51*	0.00	0.00	0.00
49.00	0.56	1.09	0.51*	0.00	0.00	0.00
49.05	0.56	1.09	0.51*	0.00	0.00	0.00
49.10	0.56	1.09	0.51*	0.00	0.00	0.00
49.15	0.56	1.09	0.51*	0.00	0.00	0.00
49.20	0.56	1.09	0.51*	0.00	0.00	0.00
49.25	0.56	1.09	0.51*	0.00	0.00	0.00
49.30	0.56	1.09	0.51*	0.00	0.00	0.00
49.35	0.56	1.09	0.51*	0.00	0.00	0.00
49.40	0.56	1.09	0.51*	0.00	0.00	0.00
49.45	0.56	1.09	0.51*	0.00	0.00	0.00
49.50	0.56	1.09	0.51*	0.00	0.00	0.00
49.55	0.56	1.09	0.51*	0.00	0.00	0.00
49.60	0.56	1.09	0.51*	0.00	0.00	0.00
49.65	0.56	1.09	0.51*	0.00	0.00	0.00
49.70	0.56	1.09	0.51*	0.00	0.00	0.00
49.75	0.56	1.09	0.51*	0.00	0.00	0.00
49.80	0.56	1.09	0.51*	0.00	0.00	0.00
49.85	0.56	1.09	0.51*	0.00	0.00	0.00
49.90	0.56	1.09	0.51*	0.00	0.00	0.00
49.95	0.56	1.08	0.51*	0.00	0.00	0.00
50.00	0.56	1.08	0.51*	0.00	0.00	0.00
50.05	0.56	1.08	0.51*	0.00	0.00	0.00
50.10	0.56	1.08	0.51*	0.00	0.00	0.00
50.15	0.56	1.08	0.51*	0.00	0.00	0.00
50.20	0.56	1.08	0.51*	0.00	0.00	0.00
50.25	0.55	1.08	0.51*	0.00	0.00	0.00
50.30	0.55	1.08	0.51*	0.00	0.00	0.00
50.35	0.55	1.08	0.51*	0.00	0.00	0.00
50.40	0.55	1.08	0.51*	0.00	0.00	0.00
50.45	0.55	1.08	0.51*	0.00	0.00	0.00
50.50	0.55	1.08	0.51*	0.00	0.00	0.00
50.55	0.55	1.08	0.51*	0.00	0.00	0.00
50.60	0.55	1.08	0.51*	0.00	0.00	0.00
50.65	0.55	1.08	0.51*	0.00	0.00	0.00
50.70	0.55	1.08	0.51*	0.00	0.00	0.00
50.75	0.55	1.08	0.51*	0.00	0.00	0.00
50.80	0.55	1.08	0.51*	0.00	0.00	0.00
50.85	0.55	1.08	0.51*	0.00	0.00	0.00
50.90	0.55	1.08	0.52*	0.00	0.00	0.00
50.95	0.55	1.08	0.52*	0.00	0.00	0.00
51.00	0.55	1.07	0.52*	0.00	0.00	0.00
51.05	0.55	1.07	0.52*	0.00	0.00	0.00
51.10	0.55	1.07	0.52*	0.00	0.00	0.00
51.15	0.55	1.07	0.52*	0.00	0.00	0.00
51.20	0.55	1.07	0.52*	0.00	0.00	0.00
51.25	0.55	1.07	0.52*	0.00	0.00	0.00

51.30	0.55	1.07	0.52*	0.00	0.00	0.00
51.35	0.55	1.07	0.52*	0.00	0.00	0.00
51.40	0.55	1.07	0.52*	0.00	0.00	0.00
51.45	0.55	1.07	0.52*	0.00	0.00	0.00
51.50	0.55	1.07	0.52*	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils

APPENDIX F
STANDARD GRADING GUIDELINES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

STANDARD GRADING SPECIFICATIONS

These specifications present the usual and minimum requirements for grading operations performed under the observation and testing of TGR Geotechnical, Inc.

No deviation from these specifications will be allowed, except where specifically superseded in the Preliminary Geotechnical Investigation report, or in other written communication signed by the Soils Engineer or Engineering Geologist.

1.0 GENERAL

- The Soils Engineer and Engineering Geologist are the Owner's or Builder's representatives on the project. For the purpose of these specifications, observation and testing by the Soils Engineer includes that observation and testing performed by any person or persons employed by, and responsible to, the licensed Geotechnical Engineer or Geologist signing the grading report.

- All clearing, site preparation or earthwork performed on the project shall be conducted by the Contractor under the observation of the Geotechnical Engineer.

- It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Geotechnical Engineer and to place, spread, mix, water and compact the fill in accordance with the specifications of the Geotechnical Engineer. The Contractor shall also remove all material considered unsatisfactory by the Geotechnical Engineer.

- It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of Compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement and time of year.

- A final report will be issued by the Geotechnical Engineer and Engineering Geologist attesting to the Contractor's conformance with these specifications.

2.0 SITE PREPARATION

- All vegetation and deleterious material such as rubbish shall be disposed of off-site. The removal must be concluded prior to placing fill.

- The Civil Engineer shall locate all houses, sheds, sewage disposal systems, large trees or structures on the site, or on the grading plan to the best of his knowledge prior to preparing the ground surface.

- Soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Any material incorporated as part of a compacted fill must be approved by the Geotechnical Engineer.

- After the ground surface to receive fill has been cleared, it shall be scarified, disced or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks or other uneven features which may prevent uniform compaction.

  The scarified ground surface shall then be brought to optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts restricted to six inches. Prior to placing fill, the ground surface to receive fill shall be inspected, tested and approved by the Geotechnical Engineer.

- Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines or others not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer.

3.0 COMPACTED FILLS

- Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Engineer. Roots, tree branches and other matter missed during clearing shall be removed from the fill as directed by the Geotechnical Engineer.
- Rock fragments less than six inches in diameter may be utilized in the fill, provided:

- They are not placed in concentrated pockets.
- There is a sufficient percentage of fine-grained material to surround the rocks.
- The distribution of the rocks is observed by the Geotechnical Engineer.

- Rocks greater than six inches in diameter shall be taken off-site, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal. Details for rock disposal such as location, moisture control, percentage of the rock placed, etc., will be referred to in the "Conclusions and Recommendations" section of the Geotechnical Report, if applicable.

  If rocks greater than six inches in diameter were not anticipated in the Preliminary Geotechnical report, rock disposal recommendations may not have been made in the "Conclusions and Recommendations" section. In this case, the Contractor shall notify the Geotechnical Engineer if rocks greater than six inches in diameter are encountered. The Geotechnical Engineer will then prepare a rock disposal recommendation or request that such rocks be taken off-site.

- Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

- Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the Geotechnical Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Engineer as soon as possible.

- Material used in the compacting process shall be evenly spread, watered or dried, processed and compacted in thin lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.

- If the moisture content or relative compaction varies from that required by the Geotechnical Engineer, the Contractor shall rework the fill until it is approved by the Geotechnical Engineer.

- Each layer shall be compacted to 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency; (in general, ASTM D1557 will be used.)

  If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use of expansive soil conditions, the area to receive fill compacted to less than 90 percent shall either be delineated on the grading plan or appropriate reference made to the area in the grading report.

- All fill shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the Geotechnical Engineer.

- The key for side hill fills shall be a minimum of 15 feet within bedrock or firm materials, unless otherwise specified in the Preliminary report. (See details)

- Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendation of the Geotechnical Engineer and Engineer Geologist.

- The Contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses and stabilization fills. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

The Contractor shall prepare a written detailed description of the method or methods he will employ to obtain the required slope compaction. Such documents shall be submitted to the Geotechnical Engineer for review and comments prior to the start of grading.

If a method other than overbuilding and cutting back to the compacted core is to be employed, slope tests will be made by the Geotechnical Engineer during construction of the slopes to determine if the required compaction is being achieved. Where failing tests occur or other field problems arise, the contractor will be notified by the Geotechnical Engineer.

If the method of achieving the required slope compaction selected by the Contractor fails to produce the necessary results, the Contractor shall rework or rebuild such slopes until the required degree of compaction is obtained, at no additional cost to the Owner or Geotechnical Engineer.

- All fill slopes should be planted or protected from erosion by methods specified in the preliminary report or by means approved by the governing authorities.

- Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials; and the transition shall be stripped of all soil prior to placing fill. (See detail)

4.0 CUT SLOPES

- The Engineering Geologist shall inspect all cut slopes excavated in rock, lithified or formation material at vertical intervals not exceeding ten feet.

- If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these

conditions shall be analyzed by the Engineering Geologist and Geotechnical Engineer; and recommendations shall be made to treat these problems.

- Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.

- Unless otherwise specified in the soils and geological report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

- Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies, or with the recommendations of the Geotechnical Engineer or Engineering Geologist.

5.0 GRADING CONTROL

- Inspection of the fill placement shall be provided by the Geotechnical Engineer during the progress of grading.

- In general, density tests should be made at intervals not exceeding two feet of fill height or every 500 cubic yards of fill placed. This criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction of being achieved.
- Density tests should be made on the surface material to receive fill as required by the Geotechnical Engineer.

- All cleanout, processed ground to receive fill, key excavations, subdrains and rock disposal must be inspected and approved by the Geotechnical Engineer (and often by the governing authorities) prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Engineer and governing authorities when such areas are ready for inspection.

6.0 CONSTRUCTION CONSIDERATIONS

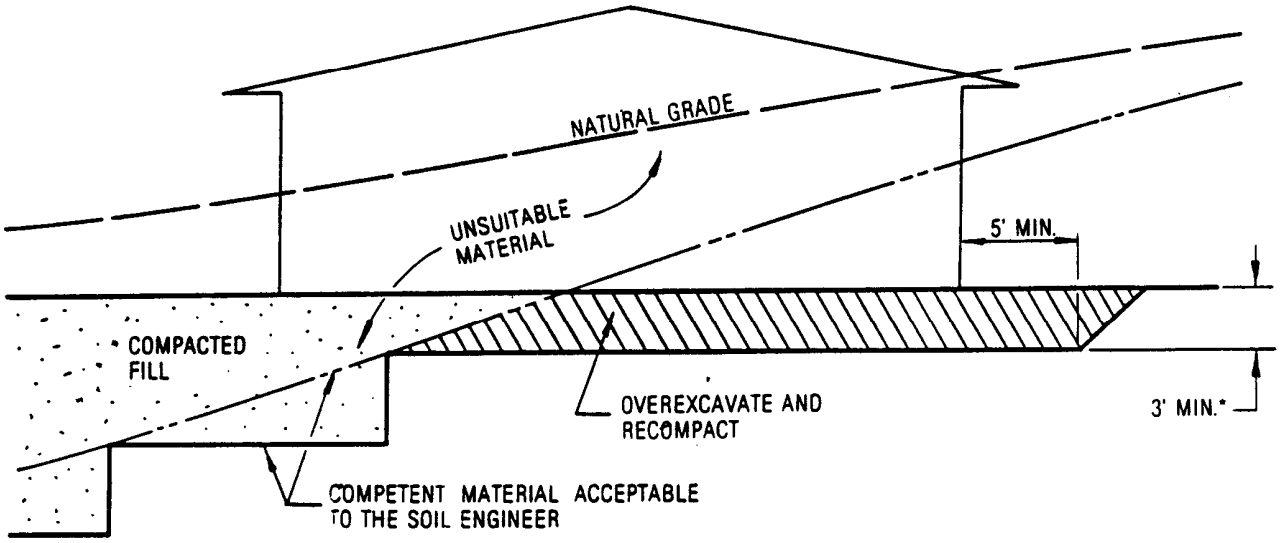
- Erosion control measures, when necessary, shall be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.

- Upon completion of grading and termination of observations by the Geotechnical Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Engineer or Engineering Geologist.

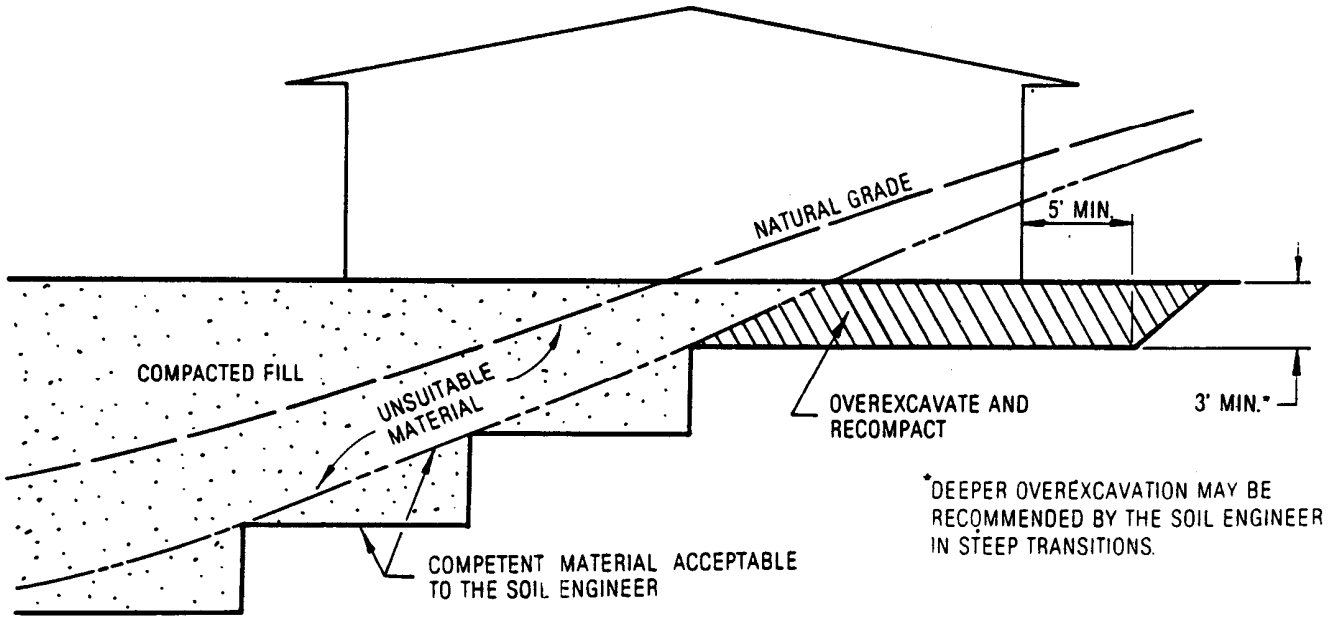
- Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE

CUT LOT

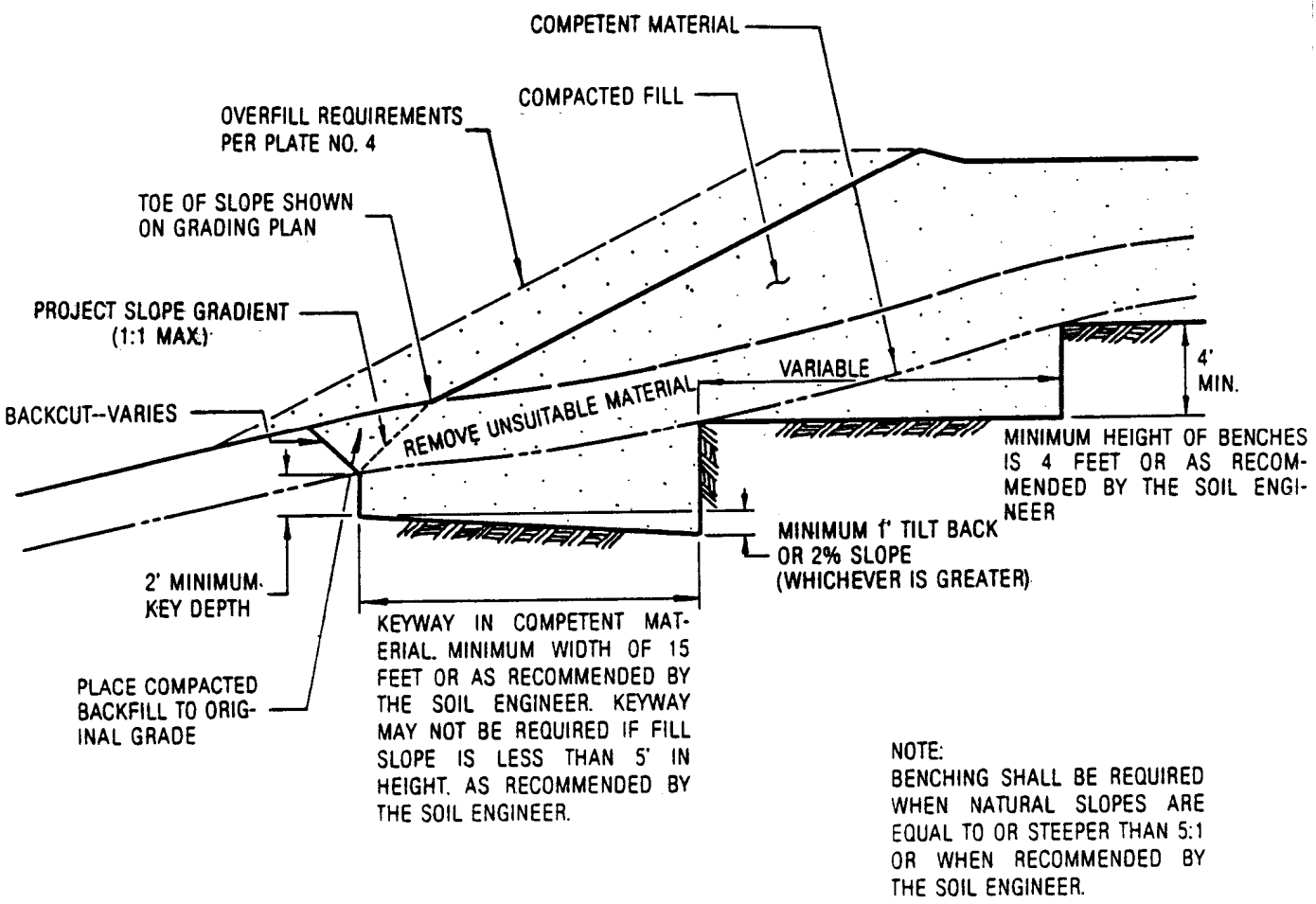


CUT FILL LOT (TRANSITION)

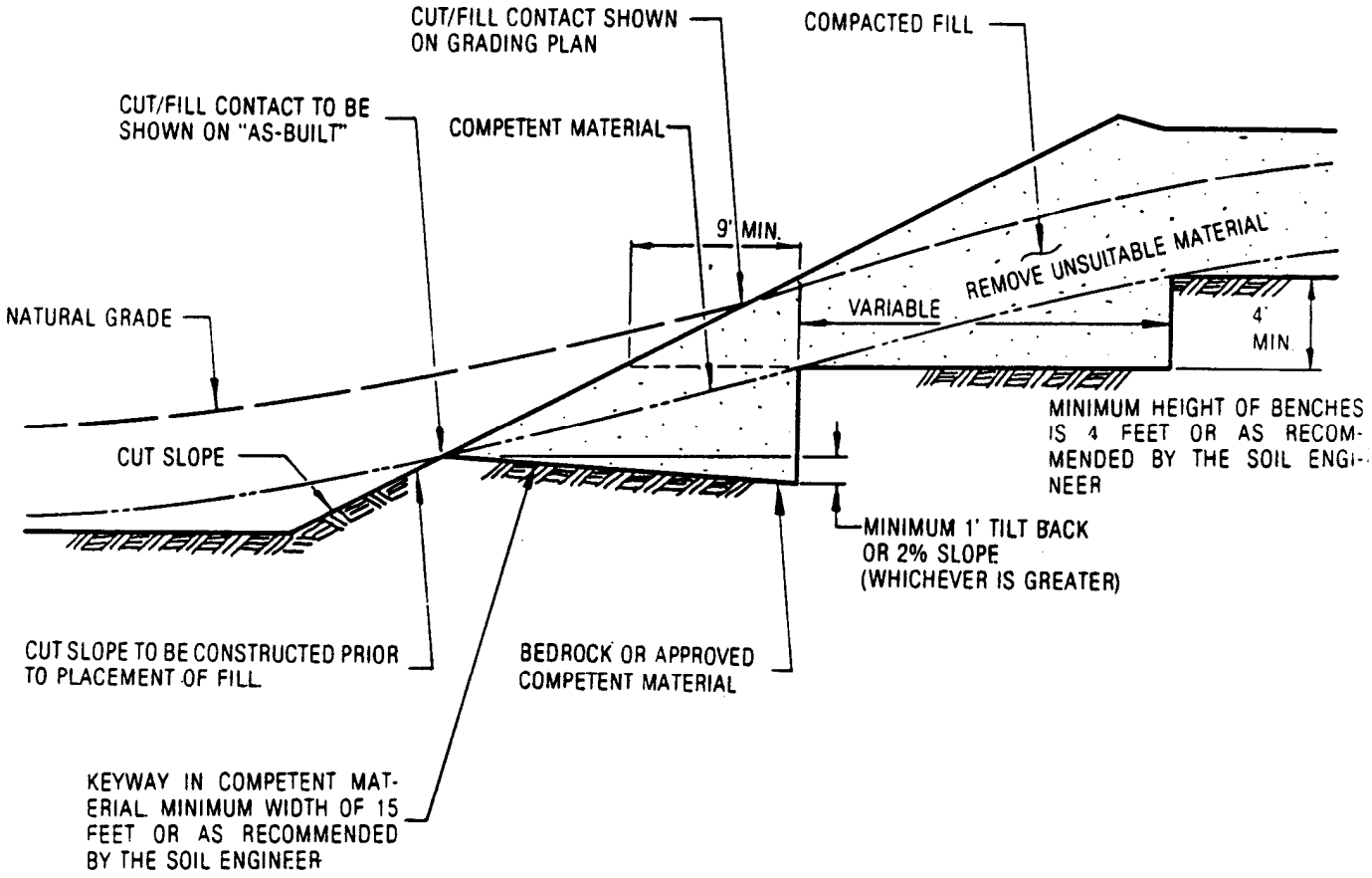


*DEEPER OVEREXCAVATION MAY BE RECOMMENDED BY THE SOIL ENGINEER IN STEEP TRANSITIONS.

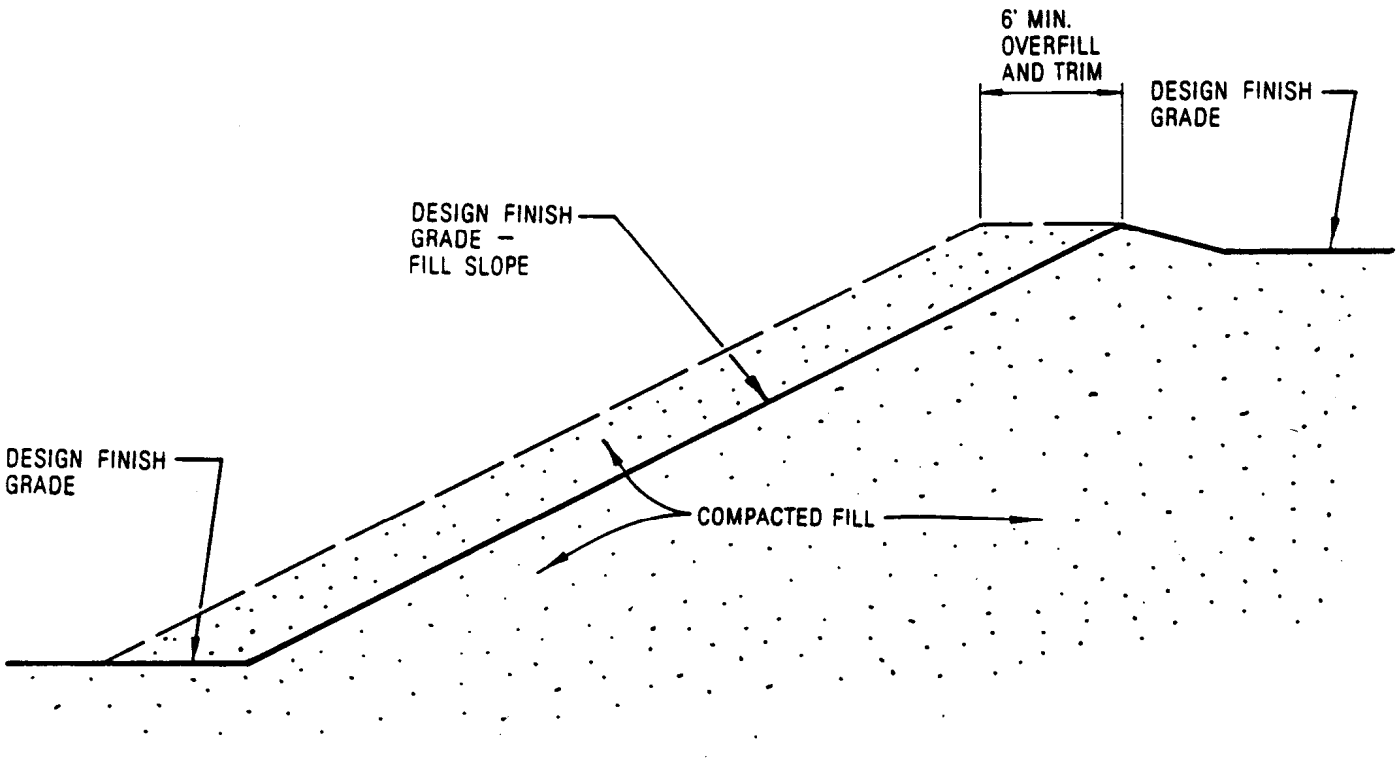
TYPICAL FILL OVER NATURAL SLOPE



TYPICAL FILL-OVER-CUT SLOPE



TYPICAL FILL SLOPE CONSTRUCTION



NOTES:

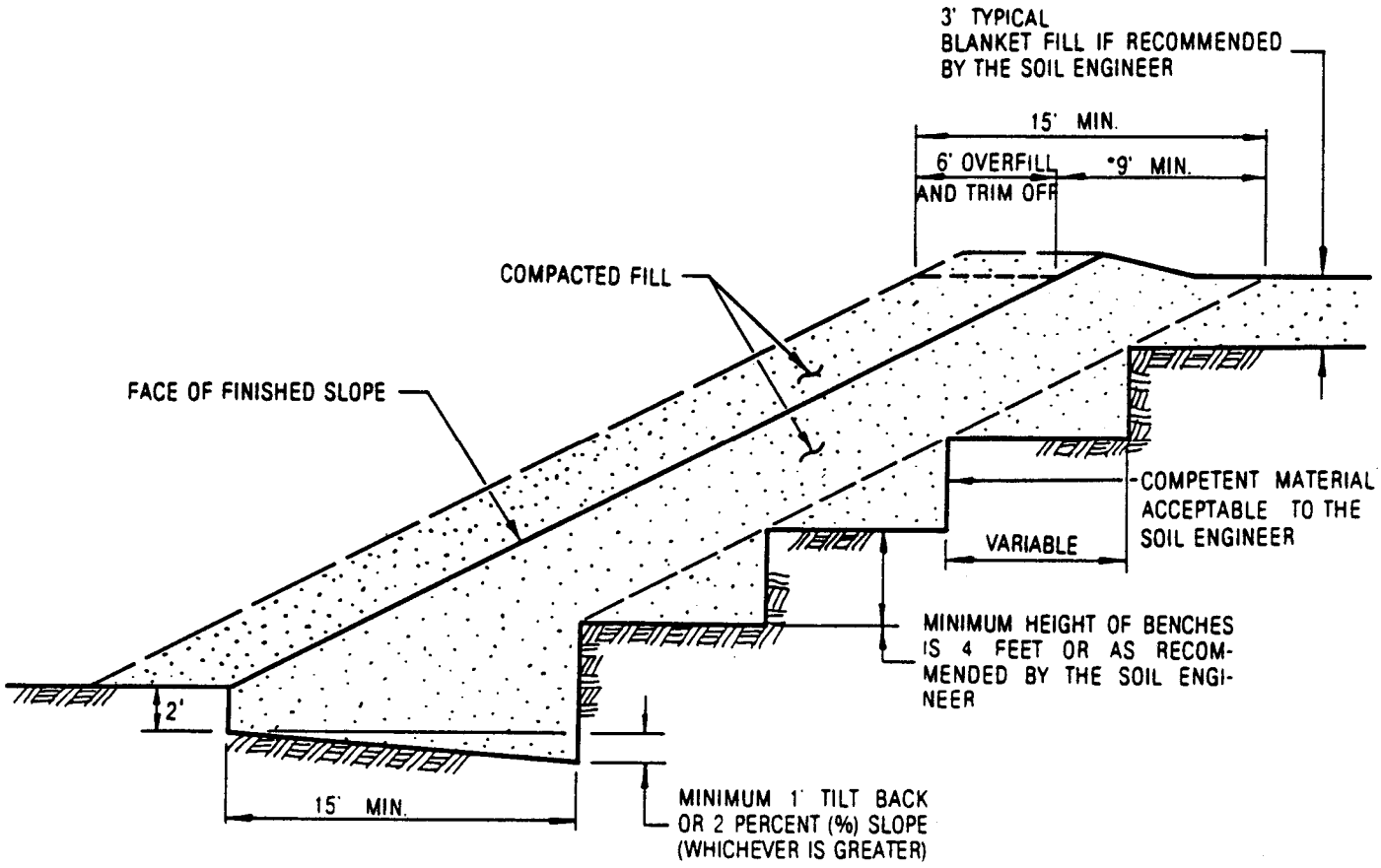
1. ALL FILL SLOPES, INCLUDING BUTTRESS AND STABILIZATION FILLS, SHALL BE OVERFILLED A MINIMUM OF SIX FEET HORIZONTALLY WITH COMPACTED FILL AND TRIMMED TO THE DESIGN FINISH GRADE.

   EXCEPTIONS:

   A. FILL SLOPE OVER CUT SLOPE.
   B. FILL SLOPE ADJACENT TO EXISTING IMPROVEMENTS.

2. THE EXCEPTIONS ABOVE WHICH DO NOT HAVE THE 6 FOOT SLOPE OVERFILL AND TRIM SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

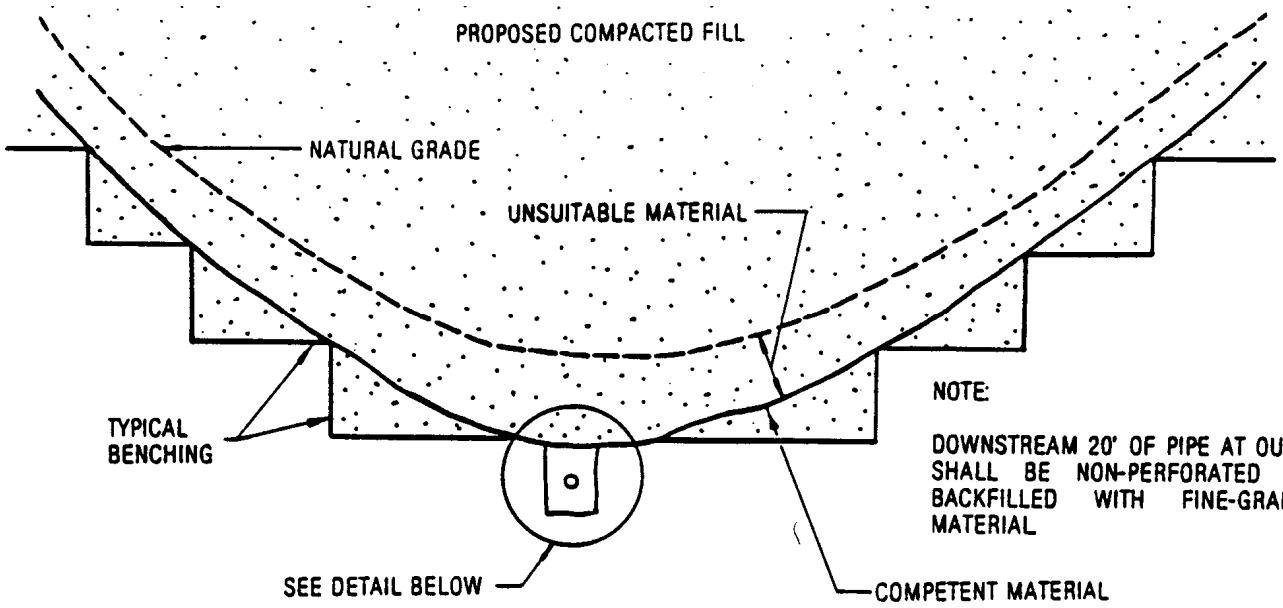
TYPICAL STABILIZATION FILL



NOTE:
SEE PLATE 6 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS. IF RECOMMENDED BY THE SOIL ENGINEER.

*GREATER THAN 9' IF RECOMMENDED BY THE SOIL ENGINEER: 15' WHERE NO 6' OVERFILL

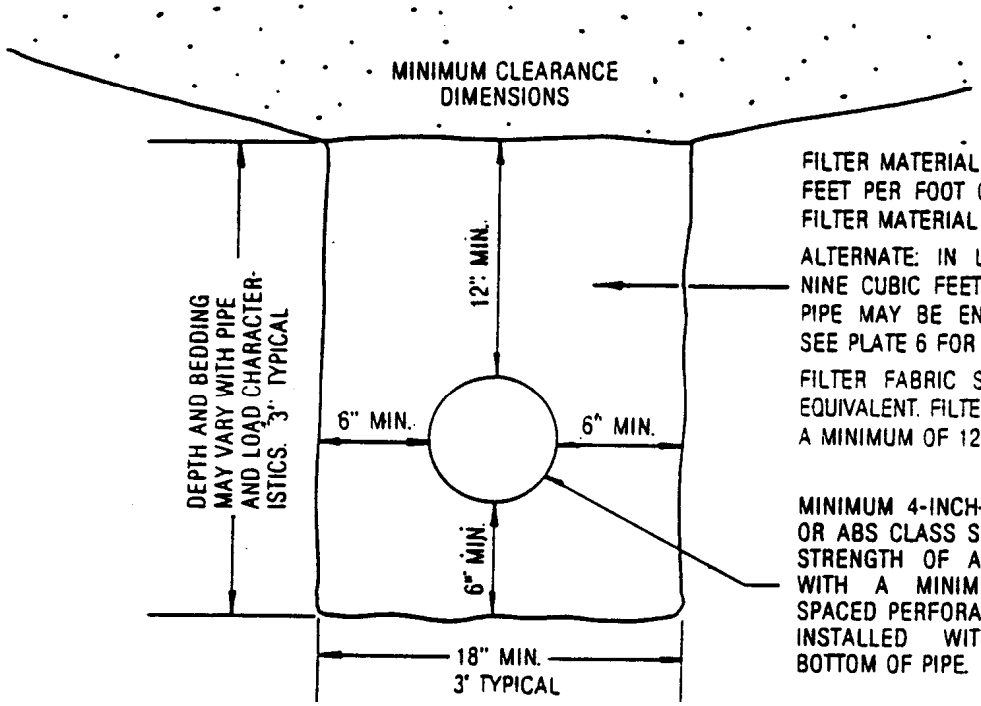
TYPICAL CANYON SUBDRAIN



NOTE:

DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

NOTES:
PIPE SHALL BE A MINIMUM OF 4 INCHES DIAMETER AND RUNS OF 500 FEET OR MORE USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE SOIL ENGINEER



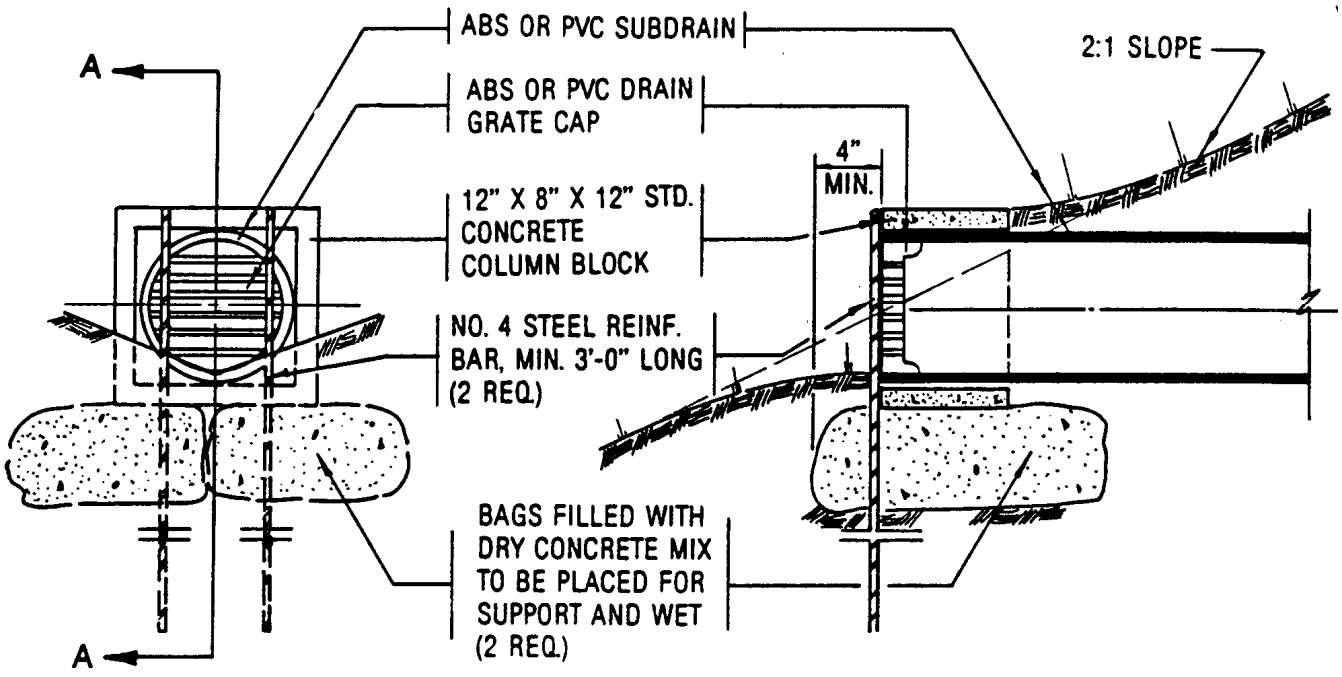
FILTER MATERIAL – MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE PLATE 6 FOR FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL NINE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE PLATE 6 FOR GRAVEL SPECIFICATIONS.

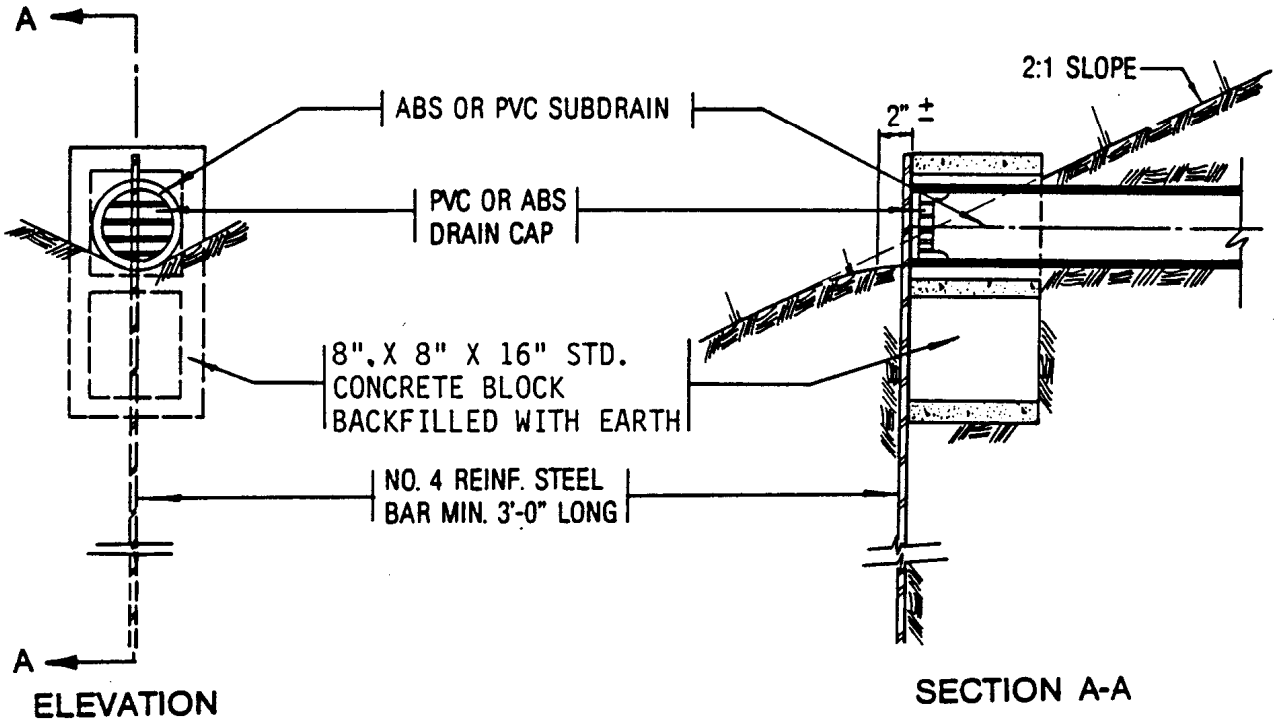
FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4-INCH-DIAMETER, PVC SCH. 40 OR ABS CLASS SDR-35 WITH A CRUSHING STRENGTH OF AT LEAST 1000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE, INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

SUBDRAIN OUTLET MARKER

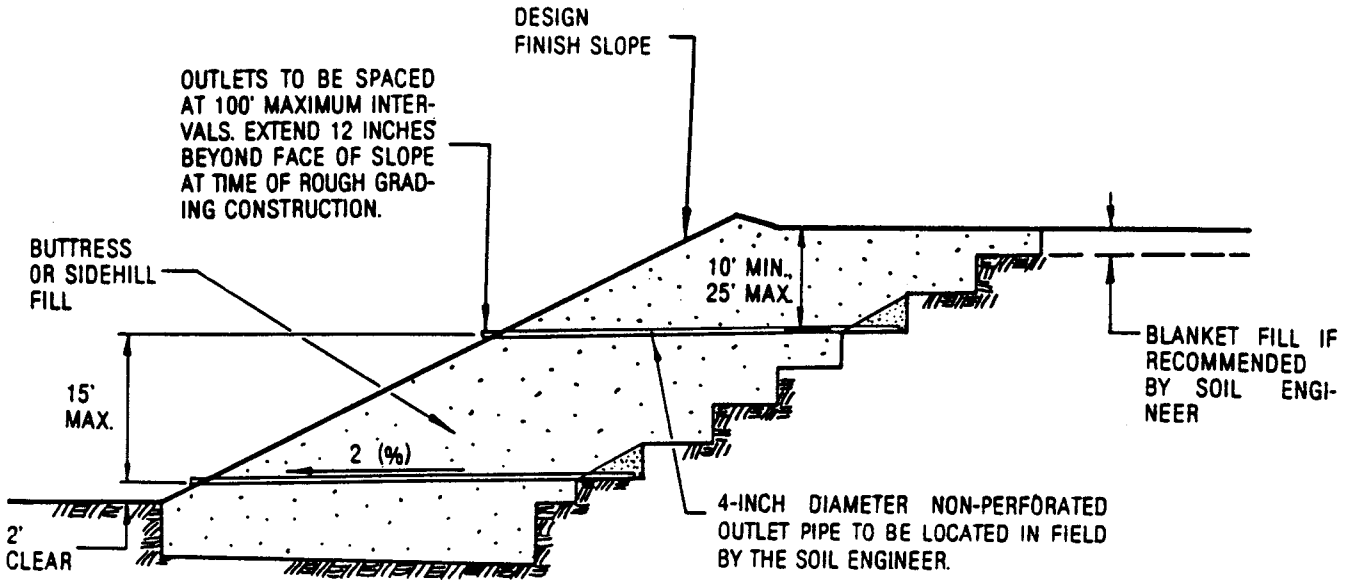


SUBDRAIN OUTLET MARKER FOR 6" AND 8" PIPES



SUBDRAIN OUTLET MARKER – 4" PIPE

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAIN



FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO MA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1½"	100
NO. 4	50
NO. 200	8

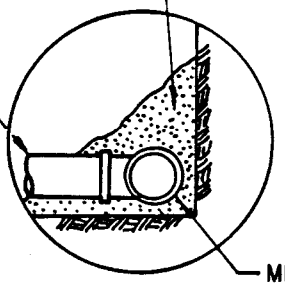
SAND EQUIVALENT = MINIMUM OF 50

FILTER MATERIAL – MINIMUM OF FIVE CUBIC FEET PER FOOT OF PIPE. SEE ABOVE FOR FILTER MATERIAL SPECIFICATION.

ALTERNATIVE: IN LIEU OF FILTER MATERIAL, FIVE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE ABOVE FOR GRAVEL SPECIFICATION.

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW



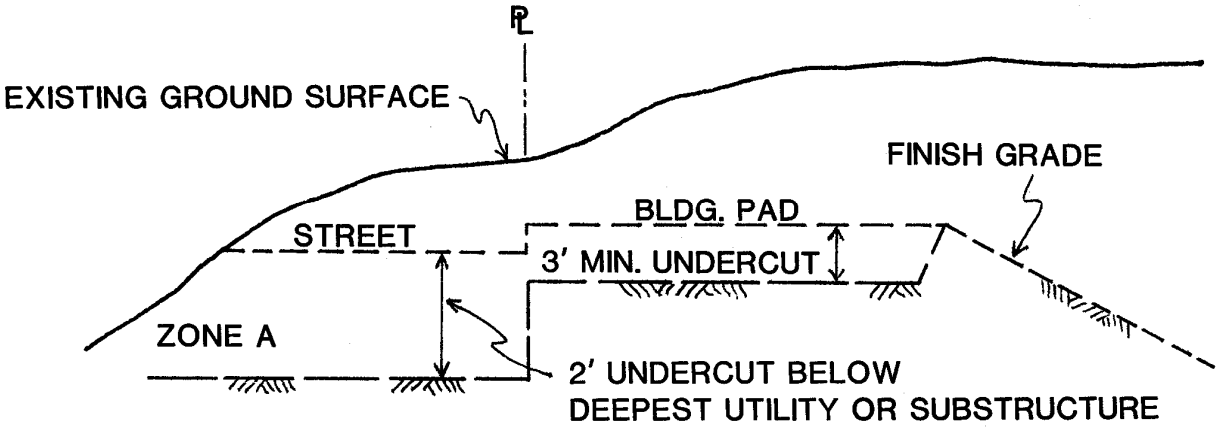
MINIMUM 4-INCH DIAMETER PVC SCH 40 OR ABS CLASS SDR 35 WITH A CRUSHING STRENGTH OF AT LEASE 1,000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

NOTES:

1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

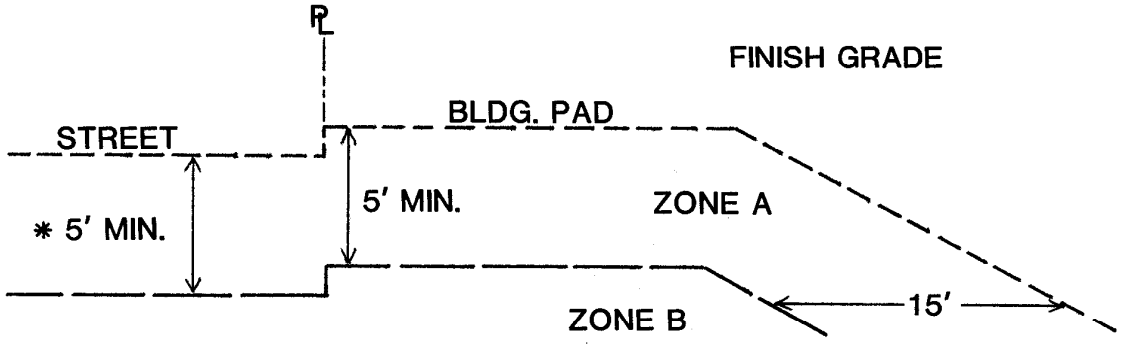
TYPICAL CUT AND FILL GRADING DETAILS

TYPICAL GRADING WITHIN PROPOSED DEEP BEDROCK CUT AREAS



NO SCALE

TYPICAL GRADING WITHIN PROPOSED FILL AREAS



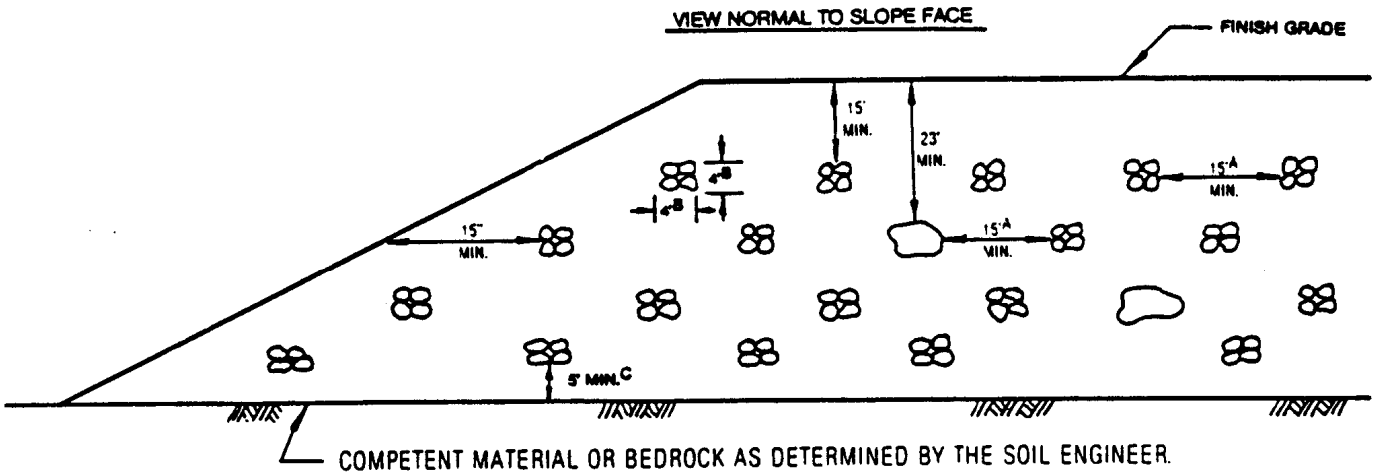
LEGEND

ZONE A ....."SOIL" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

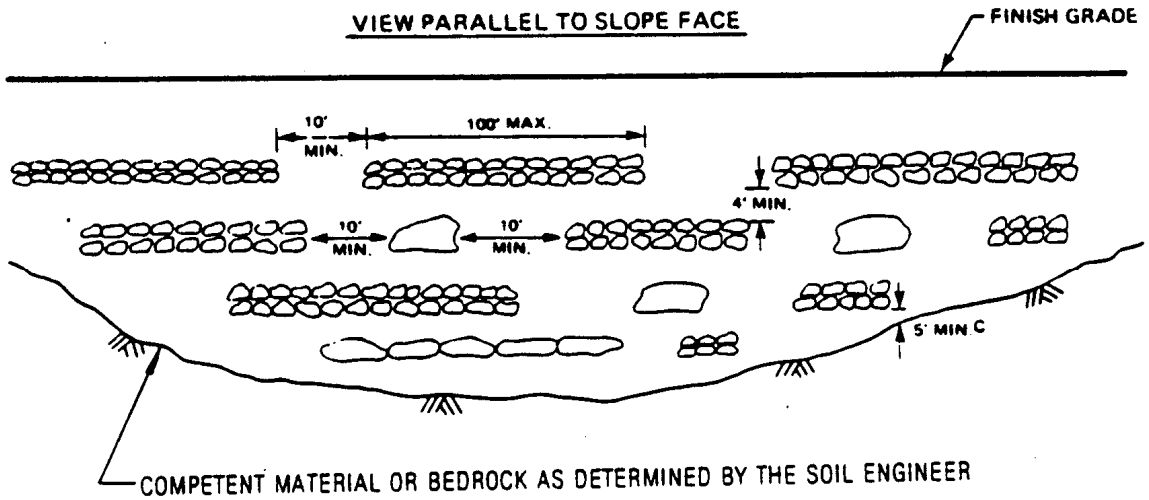
ZONE B ....."SOIL-ROCK" AND/OR "ROCK" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

* 5' OR 1' BELOW DEEPEST UTILITY, WHICHEVER IS GREATER

TYPICAL OVERSIZE ROCK DISPOSAL – "SOIL-ROCK" FILL



NOTE:
ORIENTATION OF WINDROWS MAY VARY BUT SHALL BE AS RECOMMENDED BY SOIL ENGINEER.



NOTES:

A. ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.
B. HEIGHT AND WIDTH MAY VARY DEPENDING ON ROCK SIZE AND TYPE OF EQUIPMENT.
C. IF APPROVED BY THE SOIL ENGINEER, WINDROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK PROVIDING ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.
D. VOIDS IN WINDROW TO BE FILLED BY FLOODING GRANULAR SOIL INTO PLACE. GRANULAR SOIL SHALL MEAN ANY SOIL WHICH HAS A UNIFIED SOIL CLASSIFICATION SYSTEM (UBC 29-1) DESIGNATION OF SM, SP, SW, GM, GP, OR GW.
E. AFTER FILL BETWEEN WINDROWS IS PLACED AND COMPACTED WITH THE LIFT OF FILL COVERING WINDROW, WINDROW SHALL BE PROOF-ROLLED WITH D-9 DOZER OR EQUIVALENT.
F. OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE.

APPENDIX 4

LID INFEASIBILITY

Appendix 4

Please Refer to Geotechnical Report in Appendix 3 for infiltration in feasibility recommendations.

APPENDIX 5

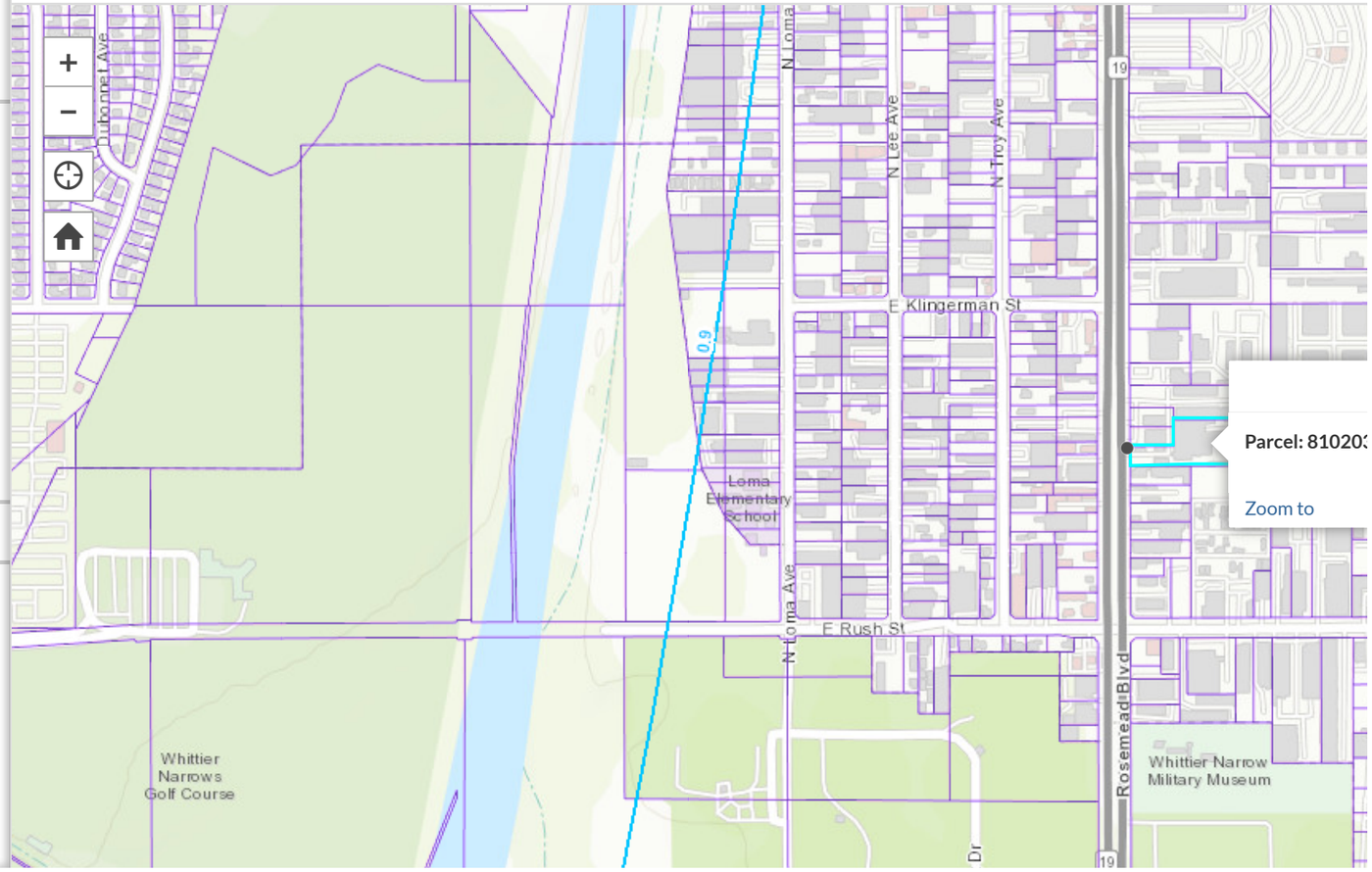
BMP CALCULATIONS

About | Legend | Layers

Layers

- [x] Hydrology GIS
  - [ ] 50yr Two Tenths (Rainfall)
  - [ ] DPA Zones
  - [ ] Soils 2004
  - [x] Final 85th Percentile, 24-hr Rainfall
  - [ ] 1-year, 1-hour Rainfall Intensity
  - [ ] Final 95th Percentile, 24-hr Rainfall
- [x] LA County Parcels

LA County Hydrology Map



Peak Flow Hydrologic Analysis

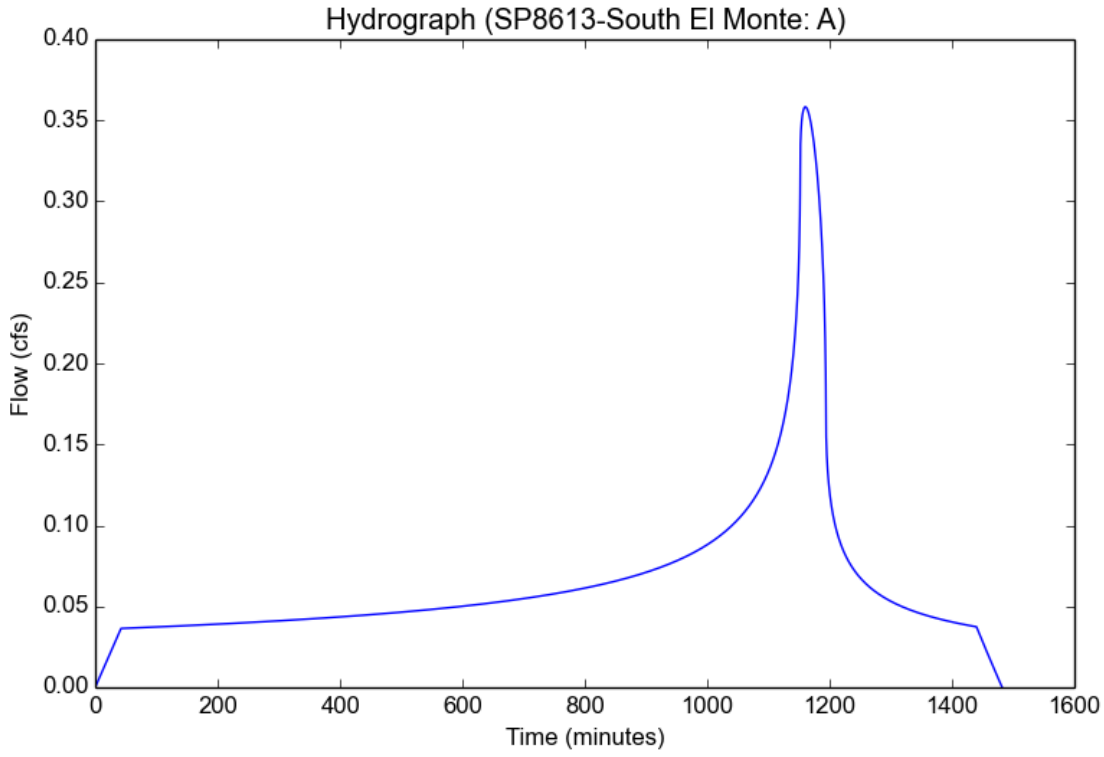
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/LID/Phase 1/Appendix/Appendix 5 - BMP Calcs/SP8613-South El Monte - A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-South El Monte
Subarea ID	A
Area (ac)	1.99
Flow Path Length (ft)	839.0
Flow Path Slope (vft/hft)	0.0035
85th Percentile Rainfall Depth (in)	0.92
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.92
Peak Intensity (in/hr)	0.2019
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	42.0
Clear Peak Flow Rate (cfs)	0.3583
Burned Peak Flow Rate (cfs)	0.3583
24-Hr Clear Runoff Volume (ac-ft)	0.135
24-Hr Clear Runoff Volume (cu-ft)	5879.1983



Peak Flow Hydrologic Analysis

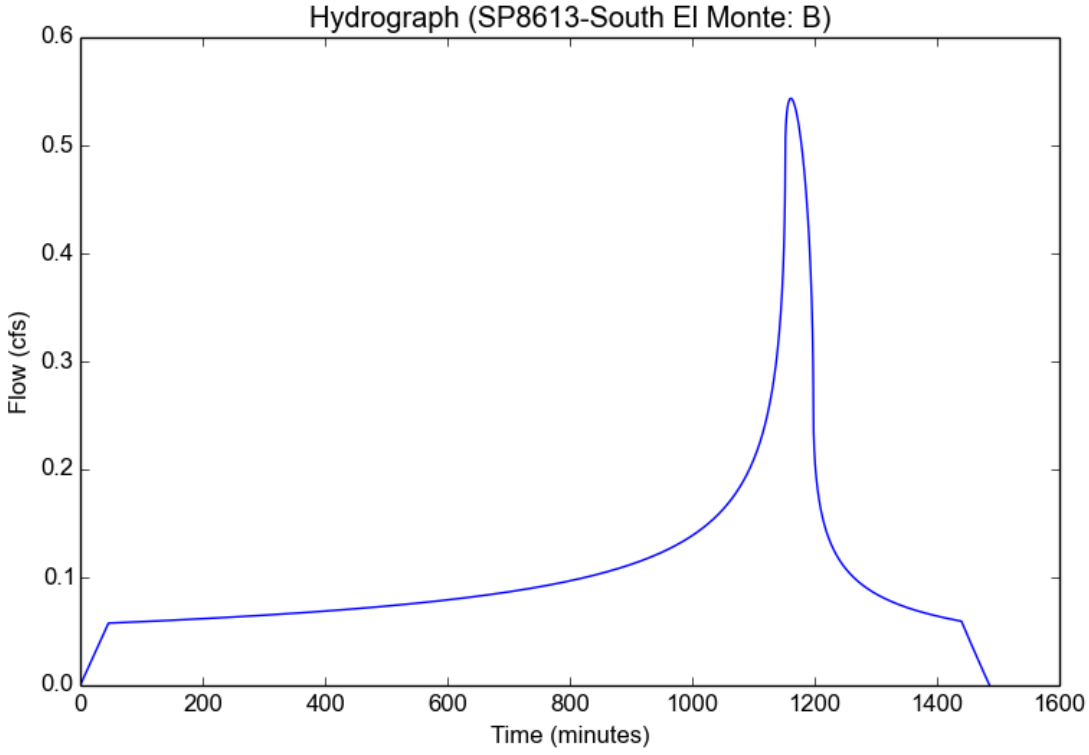
File location: K:/Drawings/SP/SP8613 - South El Monte/Docs/Reports/LID/Phase 1/Appendix/Appendix 5 - BMP Calcs/SP8613-South El Monte - B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	SP8613-South El Monte
Subarea ID	B
Area (ac)	3.15
Flow Path Length (ft)	932.0
Flow Path Slope (vft/hft)	0.0029
85th Percentile Rainfall Depth (in)	0.92
Percent Impervious	0.99
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.92
Peak Intensity (in/hr)	0.1934
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	46.0
Clear Peak Flow Rate (cfs)	0.5435
Burned Peak Flow Rate (cfs)	0.5435
24-Hr Clear Runoff Volume (ac-ft)	0.2136
24-Hr Clear Runoff Volume (cu-ft)	9306.3115



PROPOSED DMA SUMMARY											
Area ID	**Area (ac)**	**Soil Type**	**Flow Path (ft)**	**Percent impervious**	**Flow Rate**	**DCV (CF)**	**1.5* Flow rate**	**1.5* DCV**	**Basin Size CF**	**MWS 4X8 CFS**	**Drawdown HRS**
A	1.990	6	839	0.93	-	5879.0000	-	8818.5	9000	0.115	21.74
B	3.140	6	932	0.99	-	9306.0000	-	13959	14,000		33.82
TOTALS	**5.13**				**0.000**	**15185.00**	-	**22777.50**			

APPENDIX 6

BMP DETAIL AND FACT SHEETS

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

Inspection and Maintenance Guide

DRAINAGE PROTECTION SYSTEMS
DPS
A division of
Oldcastle Infrastructure

Water

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus® Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed FloGard+Plus Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (wash racks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing FloGard+Plus catch basin inserts).
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc., shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary, and the pouch tethers re-attached to the liner's D-ring.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium will be replaced with new material. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of storm drain filters, catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined-space trained and certified. Call us at (888) 950-8826 for further information and assistance.

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

OUR MARKETS

BUILDING STRUCTURES

COMMUNICATIONS

WATER

ENERGY

TRANSPORTATION

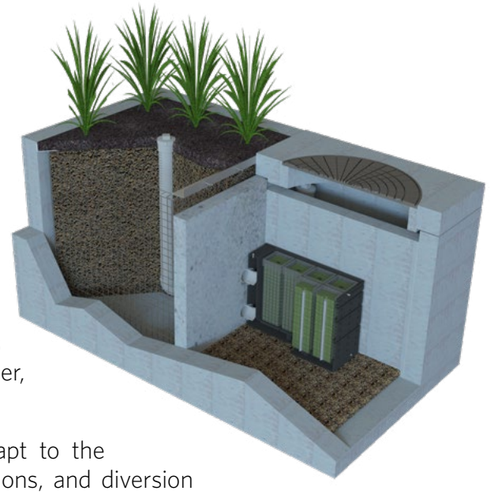
Bio Clean

A Forterra Company

Modular Wetlands® Linear

A Stormwater Biofiltration Solution

OVERVIEW



The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of adaptability. The Modular Wetlands® is also the only pre-packaged subsurface flow wetland for stormwater treatment. While most biofilters use little or no pretreatment, the Modular Wetlands Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter boxes. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands Linear.

*Also known as: Modular Wetlands®, Modular Wetlands® System Linear, Modwet™, or MWS Linear™.

PERFORMANCE

The Modular Wetlands Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. The Modular Wetlands Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**85%** REMOVAL OF TSS	**100%** REMOVAL OF TRASH
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**64%** REMOVAL OF TOTAL PHOSPHORUS

APPROVALS

The Modular Wetlands® Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world.
Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The Modular Wetlands Linear (MWS-Linear) is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® Linear is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the Modular Wetlands Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management BMP Approval

Texas Commission on Environmental Quality (TCEQ) Approval

Atlanta Regional Commission Certification

ADVANTAGES

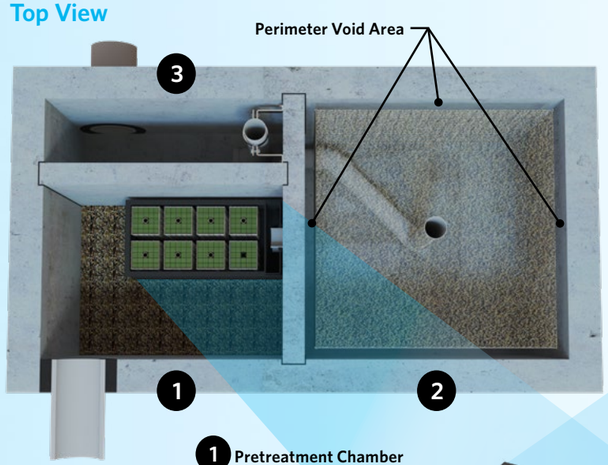
- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

DIAGRAMS

The Modular Wetlands® Linear biofilter supports superior root penetration and plant uptake of metals and nutrients with treatment that includes both aerobic and anaerobic zones.

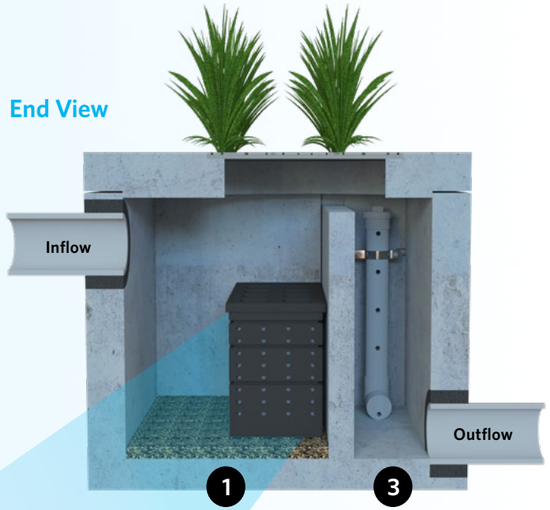
Modular Wetlands Linear
Display Unit - 4x8 Vault Type Unit

Top View

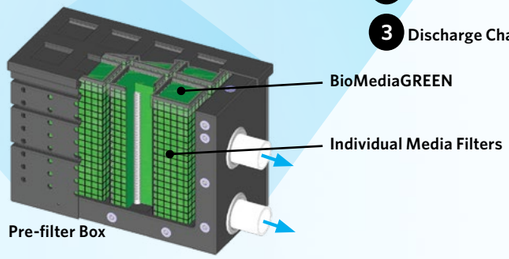


1 Pretreatment Chamber
2 Biofiltration Chamber
3 Discharge Chamber

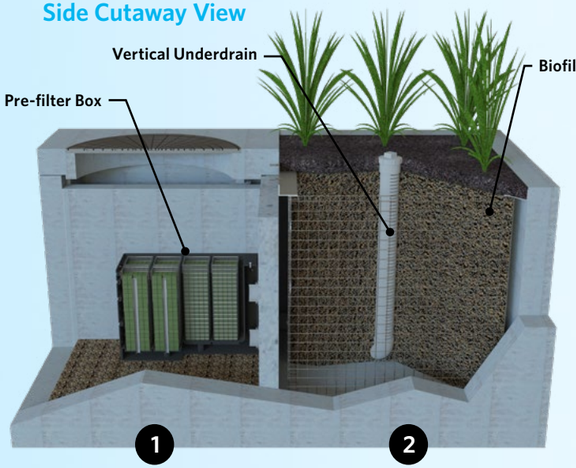
End View



1 Pretreatment Chamber
3 Discharge Chamber

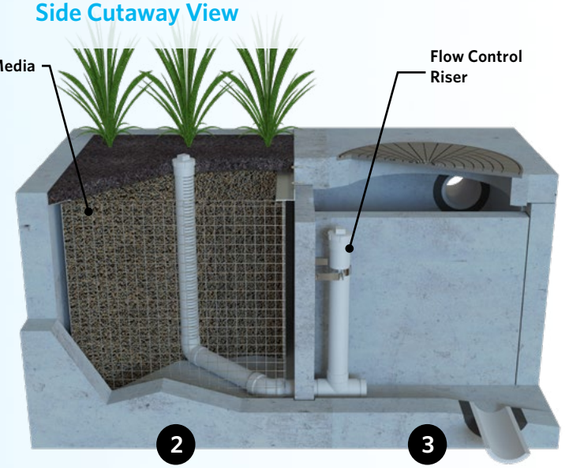


Side Cutaway View



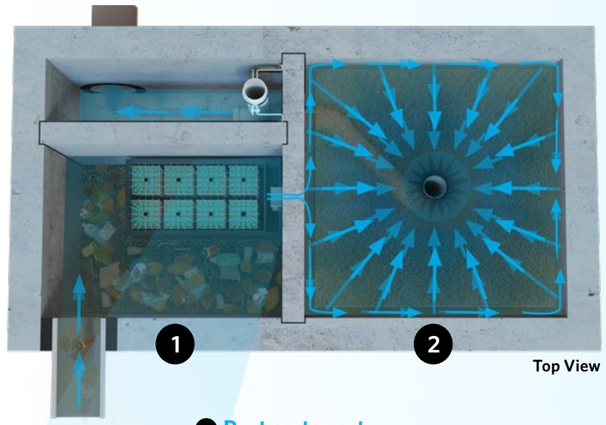
1 Pretreatment Chamber
2 Biofiltration Chamber

Side Cutaway View



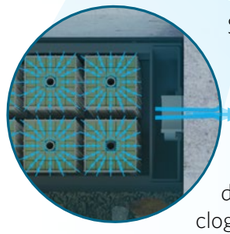
2 Biofiltration Chamber
3 Discharge Chamber

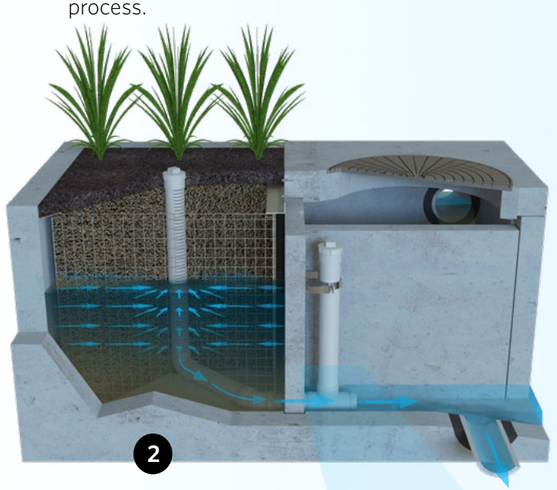
OPERATION



1 Pretreatment

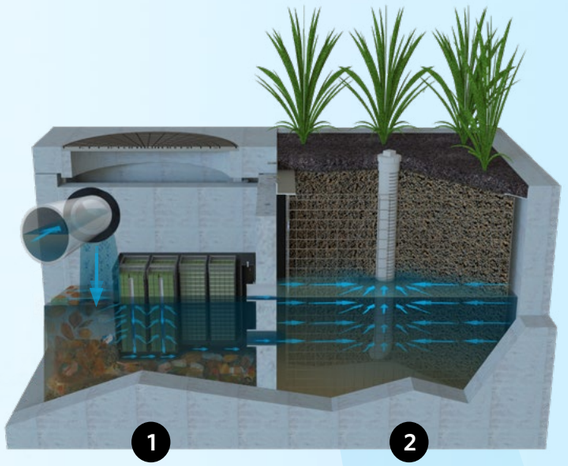
Stormwater and other pollutants all enter the pretreatment chamber first. The larger material remains contained within the pretreatment stage as stormwater travels through the pre-filter boxes and on to the biofiltration chamber. This design enhances treatment, prevents clogging, and expedites the maintenance process.





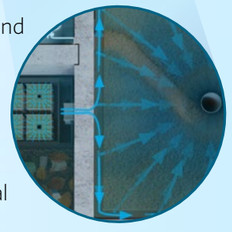
3 Discharge

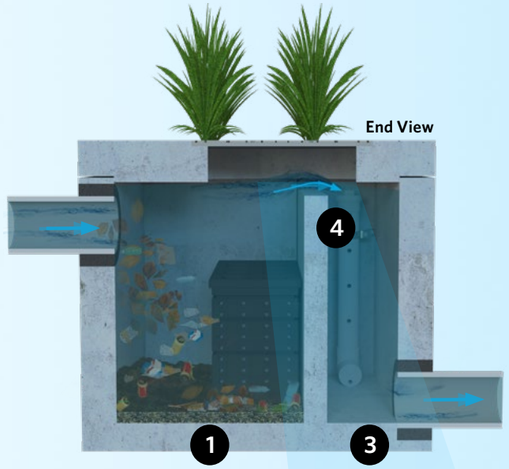
In the final stage or discharge chamber, the flow control riser (shown in the close-up) and the orifice plate, control the flow of water through the media to a level lower than the media's capacity. This extends the life of the media and improves performance.



2 Biofiltration

As water leaves the pre-filter box and enters the biofiltration chamber, it initially fills the void space at the perimeter of the biofiltration chamber. The water's horizontal force grows, pushing it inward toward the centrally located vertical drain pipe, and out to discharge.





4 Bypass

In a side-by-side Modular Wetlands unit, the pretreatment and discharge chambers are adjacent to each other. Another unique advantage of horizontal flow. This allows unusually large flows to bypass the system to avoid flooding.

SIZING CHART

FLOW-BASED DESIGNS

The Modular Wetlands® Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used in decentralized design applications as well as large central end-of-the-line applications.

Model #	Dimensions	WetlandMEDIA Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
TIER 1: EXPRESS MODELS Express model options give our customers an opportunity to benefit from optimal lead times, pricing, and the industry's leading MTD.			
MWS-L-4-8	**4'x8'**	**50**	**0.115**
MWS-L-8-8	**8'x8'**	**100**	**0.230**
TIER 2: PREFERRED MODELS Preferred model sizes give our customers a dependable selection with favorable lead times and dependable pricing.			
MWS-L-4-4	4'x4'	23	0.052
MWS-L-4-6	4'x6'	32	0.073
MWS-L-4-8	**4'x8'**	**50**	**0.115**
MWS-L-8-8	**8'x8'**	**100**	**0.230**
MWS-L-8-12	8'x12'	151	0.346
MWS-L-8-16	8'x16'	201	0.462
MWS-L-8-20	8'x20'	252	0.577
MWS-L-8-24	8'x24'	302	0.693
TIER 3: CUSTOM Custom sizes and applications are always available upon project review, but they may include supplemental lead times and pricing.			

APPLICATIONS

The Modular Wetlands® Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications.

INDUSTRIAL

The Modular Wetlands has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.

RESIDENTIAL

Low to high density developments can benefit from the versatile design of the Modular Wetlands. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

STREETS

The Modular Wetlands is extremely space efficient, and adept to meeting special constraints of existing utilities on retrofit projects.

PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands' 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

COMMERCIAL

Compared to bioretention systems, the Modular Wetlands can treat far more area in less space, meeting treatment and volume control requirements.

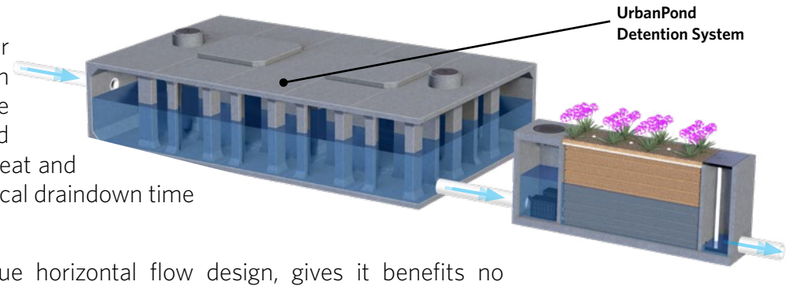
More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water • Mixed Use

HORIZONTAL FLOW ADVANTAGES

VOLUME-BASED DESIGNS

URBANPOND™ PRESTORAGE



In the example above, the Modular Wetlands Linear is installed downstream of the UrbanPond storage system. The Modular Wetlands Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements.

The Modular Wetlands Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.

DESIGN SUPPORT

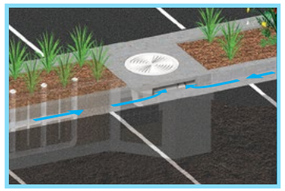
Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands Linear. Bio Clean engineers are aware of state and local regulations, and they are trained to provide you with superior support, so they can optimize a system to maximize feasibility.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

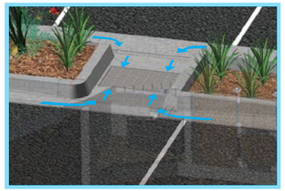
CONFIGURATIONS

The Modular Wetlands® Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



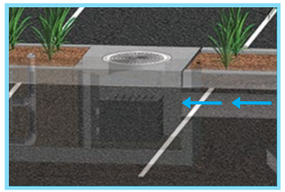
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the system's pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).

DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

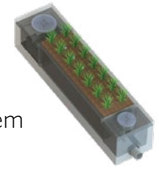
ORIENTATIONS

Side-by-Side (Internal Bypass)

The Side-by-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side.

End-to-End

The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension).

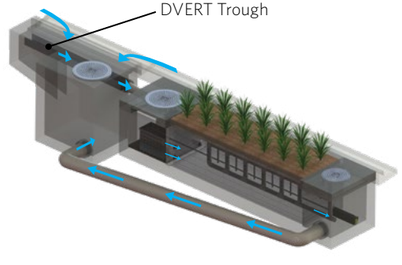


Dvert Low-Flow Diversion

A simple diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands Linear, and then back to the catch basin outlet.

External Diversion Weir Structure

This traditional offline diversion method can be used with the Modular Wetlands® Linear in scenarios where runoff is being piped to the system.



PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the Modular Wetlands®, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

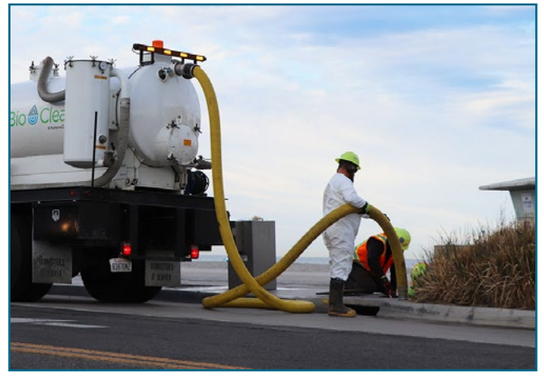
A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

The Modular Wetlands® is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands®. Unlike other biofiltration systems that provide no pretreatment, the Modular Wetlands® is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.

Bio Clean
A Forterra Company

398 Via El Centro
Oceanside, CA 92058
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

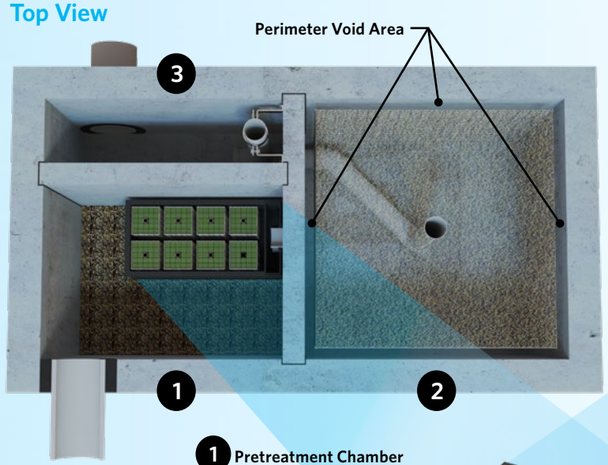
0830_2021

DIAGRAMS

The Modular Wetlands® Linear biofilter supports superior root penetration and plant uptake of metals and nutrients with treatment that includes both aerobic and anaerobic zones.

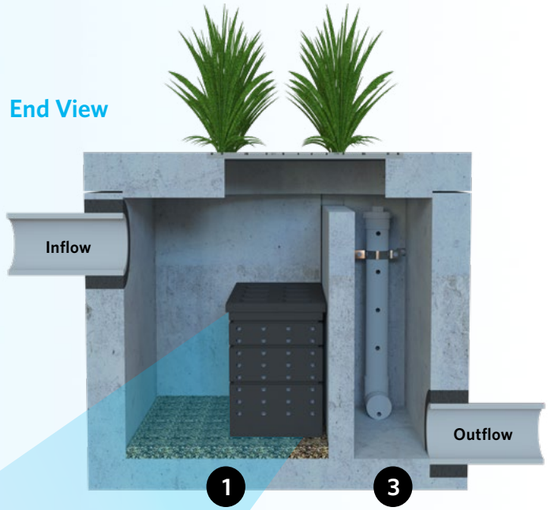
Modular Wetlands Linear
Display Unit - 4x8 Vault Type Unit

Top View

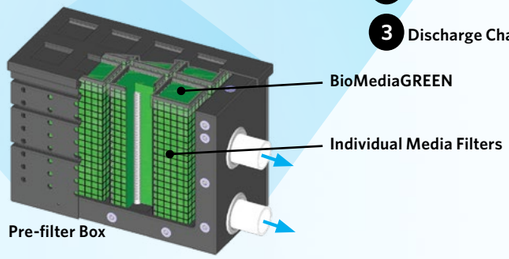


1 Pretreatment Chamber
2 Biofiltration Chamber
3 Discharge Chamber

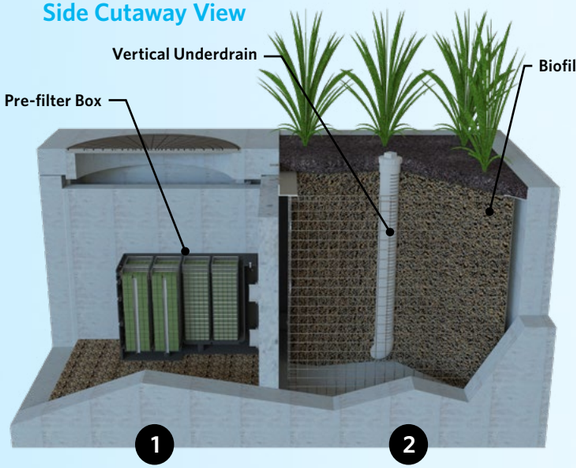
End View



1 Pretreatment Chamber
3 Discharge Chamber

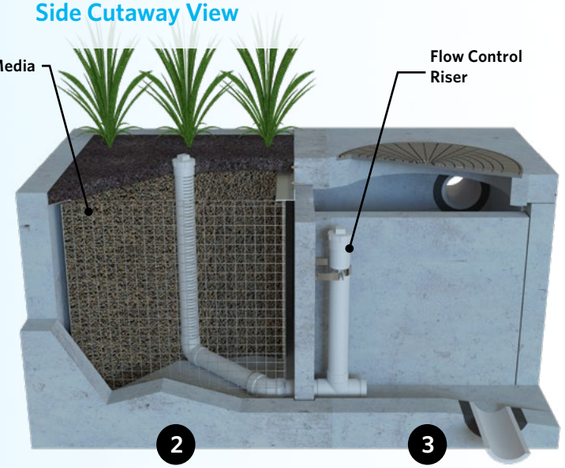


Side Cutaway View



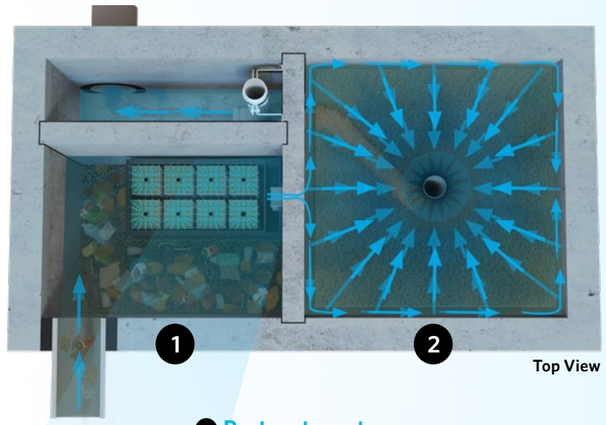
1 Pretreatment Chamber
2 Biofiltration Chamber

Side Cutaway View



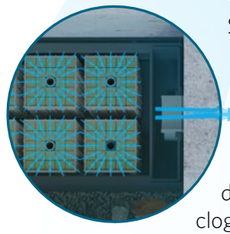
2 Biofiltration Chamber
3 Discharge Chamber

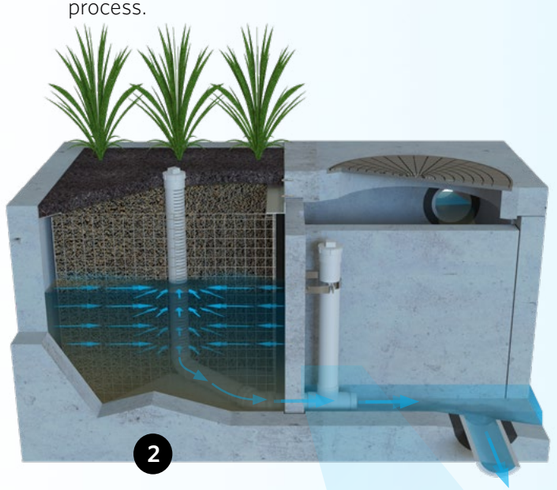
OPERATION



1 Pretreatment

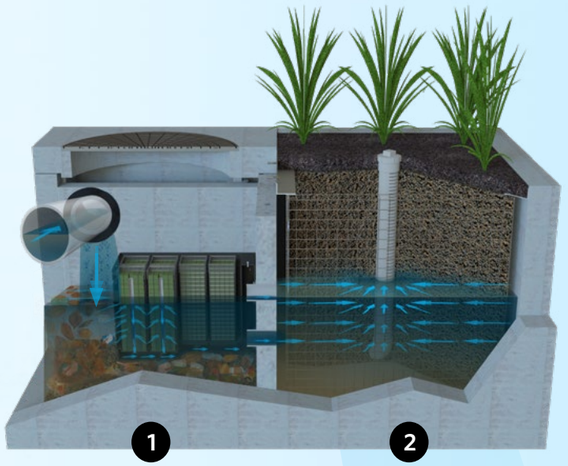
Stormwater and other pollutants all enter the pretreatment chamber first. The larger material remains contained within the pretreatment stage as stormwater travels through the pre-filter boxes and on to the biofiltration chamber. This design enhances treatment, prevents clogging, and expedites the maintenance process.





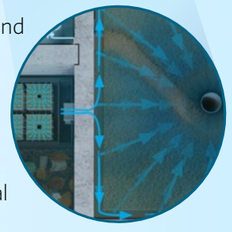
3 Discharge

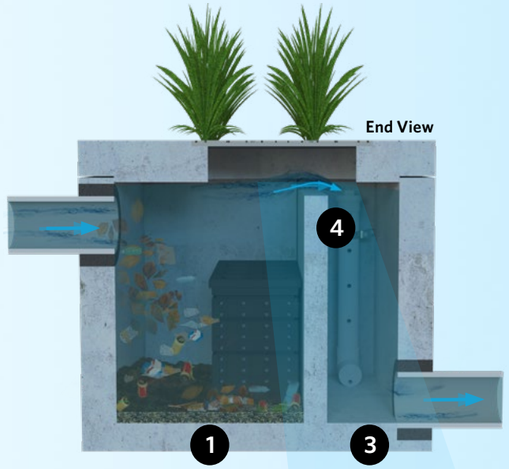
In the final stage or discharge chamber, the flow control riser (shown in the close-up) and the orifice plate, control the flow of water through the media to a level lower than the media's capacity. This extends the life of the media and improves performance.



2 Biofiltration

As water leaves the pre-filter box and enters the biofiltration chamber, it initially fills the void space at the perimeter of the biofiltration chamber. The water's horizontal force grows, pushing it inward toward the centrally located vertical drain pipe, and out to discharge.





4 Bypass

In a side-by-side Modular Wetlands unit, the pretreatment and discharge chambers are adjacent to each other. Another unique advantage of horizontal flow. This allows unusually large flows to bypass the system to avoid flooding.

SIZING CHART

FLOW-BASED DESIGNS

The Modular Wetlands® Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used in decentralized design applications as well as large central end-of-the-line applications.

Model #	Dimensions	WetlandMEDIA Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
TIER 1: EXPRESS MODELS Express model options give our customers an opportunity to benefit from optimal lead times, pricing, and the industry's leading MTD.			
MWS-L-4-8	**4'x8'**	**50**	**0.115**
MWS-L-8-8	**8'x8'**	**100**	**0.230**
TIER 2: PREFERRED MODELS Preferred model sizes give our customers a dependable selection with favorable lead times and dependable pricing.			
MWS-L-4-4	4'x4'	23	0.052
MWS-L-4-6	4'x6'	32	0.073
MWS-L-4-8	**4'x8'**	**50**	**0.115**
MWS-L-8-8	**8'x8'**	**100**	**0.230**
MWS-L-8-12	8'x12'	151	0.346
MWS-L-8-16	8'x16'	201	0.462
MWS-L-8-20	8'x20'	252	0.577
MWS-L-8-24	8'x24'	302	0.693
TIER 3: CUSTOM Custom sizes and applications are always available upon project review, but they may include supplemental lead times and pricing.			

APPLICATIONS

The Modular Wetlands® Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications.

INDUSTRIAL

The Modular Wetlands has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.

RESIDENTIAL

Low to high density developments can benefit from the versatile design of the Modular Wetlands. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

STREETS

The Modular Wetlands is extremely space efficient, and adept to meeting special constraints of existing utilities on retrofit projects.

PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands' 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

COMMERCIAL

Compared to bioretention systems, the Modular Wetlands can treat far more area in less space, meeting treatment and volume control requirements.

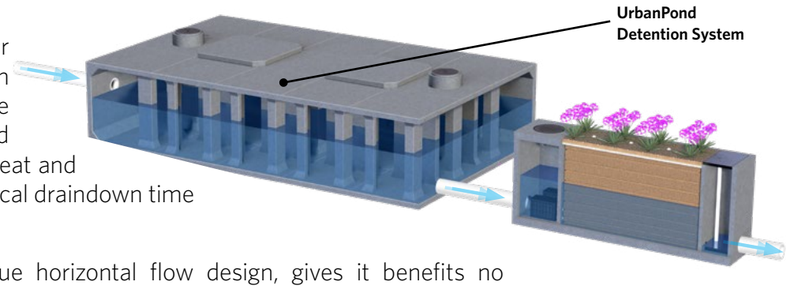
More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water • Mixed Use

HORIZONTAL FLOW ADVANTAGES

VOLUME-BASED DESIGNS

URBANPOND™ PRESTORAGE



In the example above, the Modular Wetlands Linear is installed downstream of the UrbanPond storage system. The Modular Wetlands Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements.

The Modular Wetlands Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.

DESIGN SUPPORT

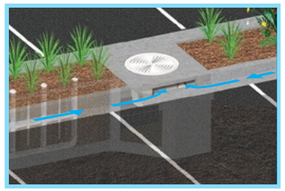
Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands Linear. Bio Clean engineers are aware of state and local regulations, and they are trained to provide you with superior support, so they can optimize a system to maximize feasibility.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

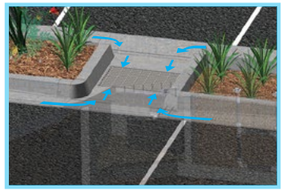
CONFIGURATIONS

The Modular Wetlands® Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



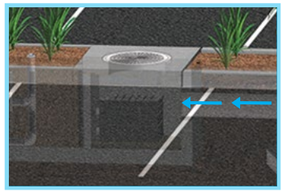
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the system's pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).

DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

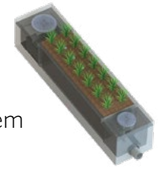
ORIENTATIONS

Side-by-Side (Internal Bypass)

The Side-by-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side.

End-to-End

The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension).

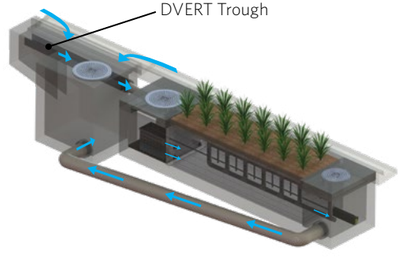


Dvert Low-Flow Diversion

A simple diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands Linear, and then back to the catch basin outlet.

External Diversion Weir Structure

This traditional offline diversion method can be used with the Modular Wetlands® Linear in scenarios where runoff is being piped to the system.



PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the Modular Wetlands®, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

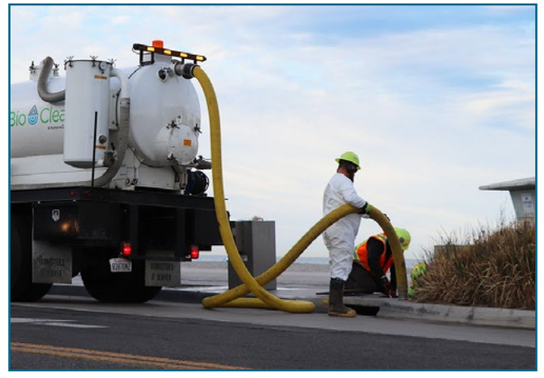
A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

The Modular Wetlands® is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands®. Unlike other biofiltration systems that provide no pretreatment, the Modular Wetlands® is a self-contained treatment train which incorporates simple and effective pretreatment.

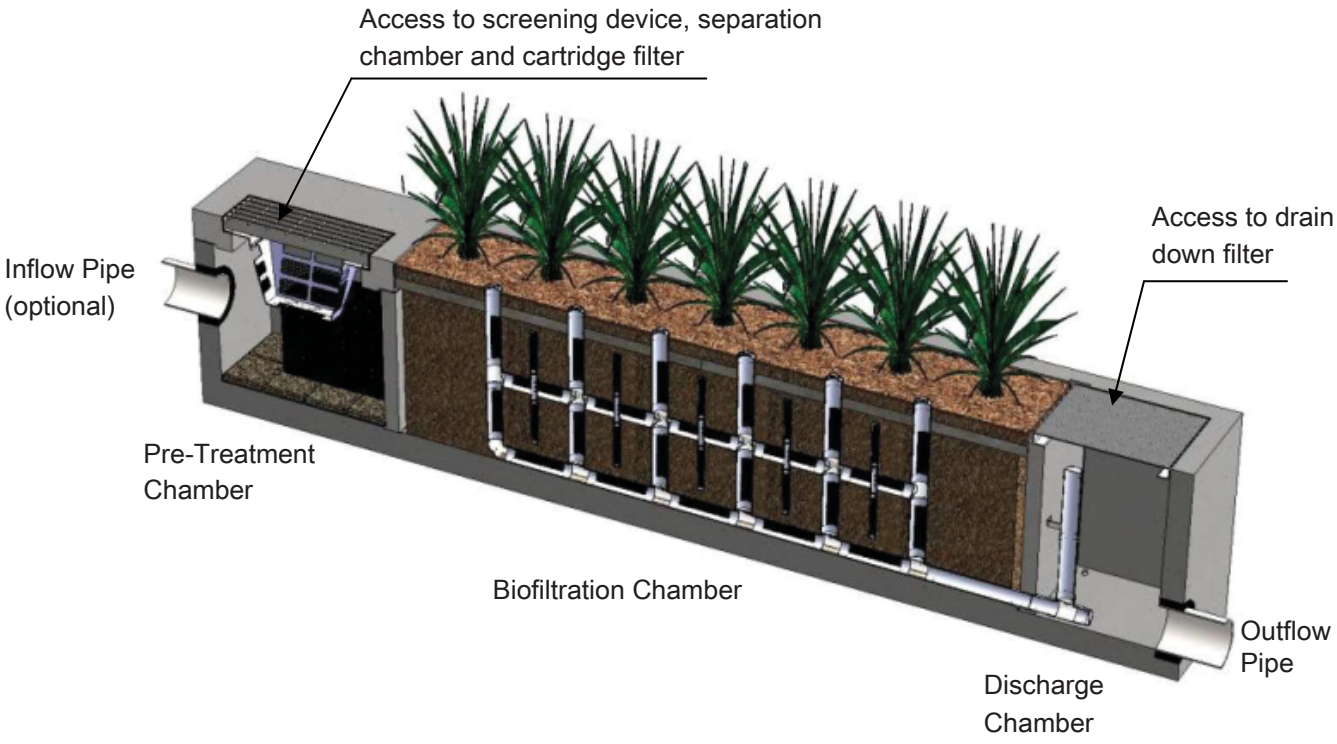
Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance 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 Chamber.

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 require irrigation.

Maintenance Procedure Illustration

Screening Device

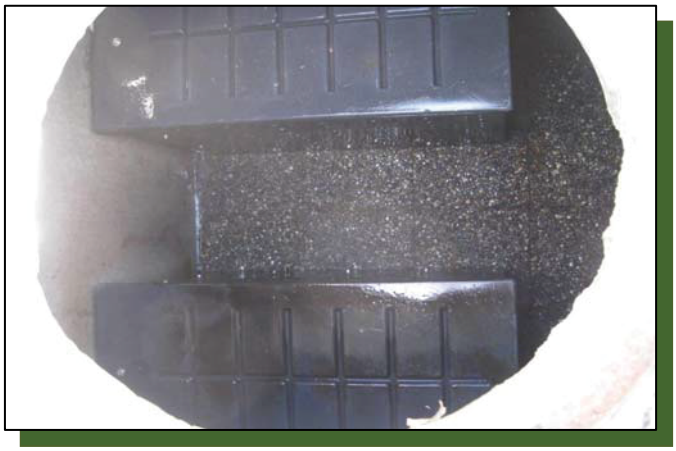
The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

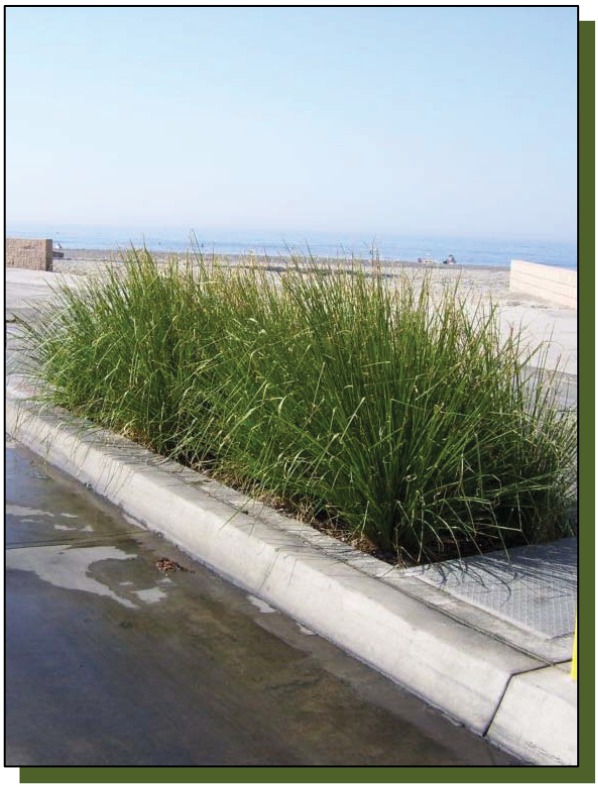


Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.



Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands 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

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

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: _____

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands 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.

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:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

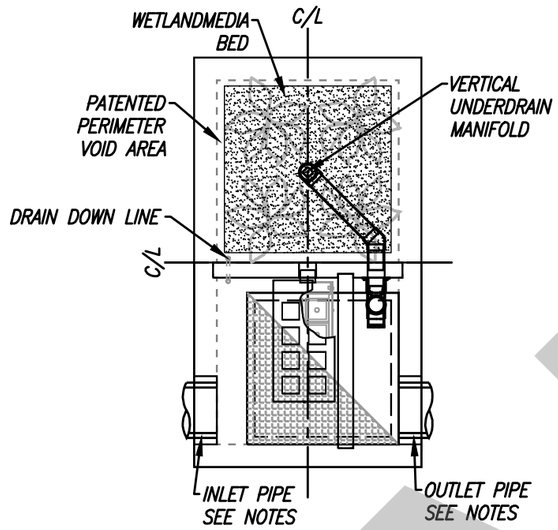
SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.115	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			9.97
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1		PVC	
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE		PVC	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	36" X 36"	OPEN PLANTER	N/A
WETLANDMEDIA VOLUME (CY)			2.66
ORIFICE SIZE (DIA. INCHES)			ø1.53"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

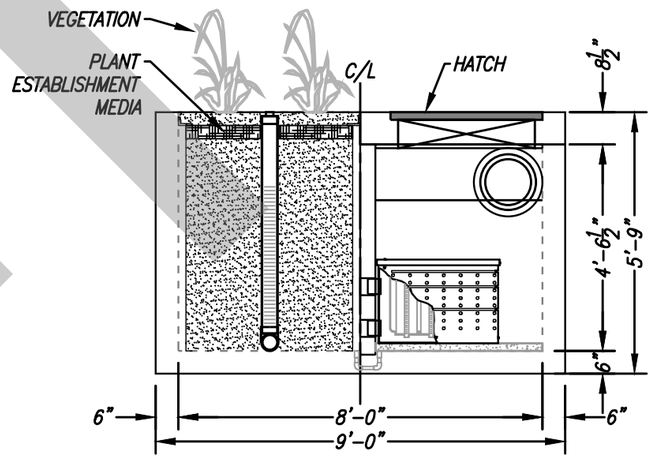
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. 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 PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

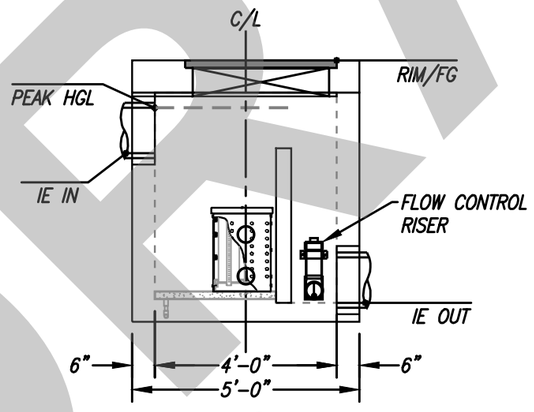
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



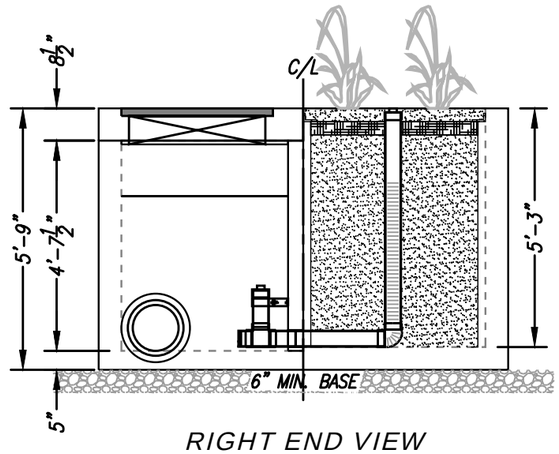
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

Bio Clean
A Forterra Company

MWS-L-4-8-5'-3"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

4/6/22MWBLINGS

VEG-2: Stormwater Planter

Description

A stormwater planter is a stormwater quality control measure that is completely contained within an impermeable structure with an underdrain. Stormwater planters function as a soil- and plant-based filtration device that remove pollutants though a variety of physical, biological, and chemical treatment processes. A stormwater planter consists of a ponding area, mulch layer, planting soils, plantings, and an underdrain within the planter box. As stormwater runoff passes through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Stormwater planters are typically planted with native, drought-tolerant vegetation that does not require fertilization and can withstand wet soils for at least 96 hours.

Stormwater planters may be placed adjacent to or near buildings, other structures, or sidewalks. Stormwater planters can be used directly adjacent to buildings beneath downspouts as long as the planters are properly lined on the building side and the overflow outlet discharges away from the building to ensure water does not percolate into footings or foundations. They can also be placed further away from buildings by conveying roof runoff in shallow engineered open conveyances, shallow pipes, or other innovative drainage structures.

A schematic of a typical stormwater planter is presented in Figure E-9.

LID Ordinance Requirements

Stormwater planters can be used as a stormwater quality control measure to treat stormwater runoff for the following alternative compliance measures:

- Off-site infiltration;
- Groundwater replenishment projects; and
- Off-site retrofit of existing development.

The project applicant must ensure that all pollutants of concern are addressed when using a stormwater planter (see Section 7.4). The following table identifies the pollutants of concern that are treated to the water quality benchmark (see Table 7-2 of the LID Standards Manual) by a stormwater planter:

Pollutant of Concern	Treated by Stormwater Planters?
Suspended solids	No
Total phosphorus	No
Total nitrogen	Yes
Total Kjeldahl nitrogen	Yes
Cadmium, total	No
Chromium, total	Yes
Copper, total	No
Lead, total	Yes
Zinc, total	No

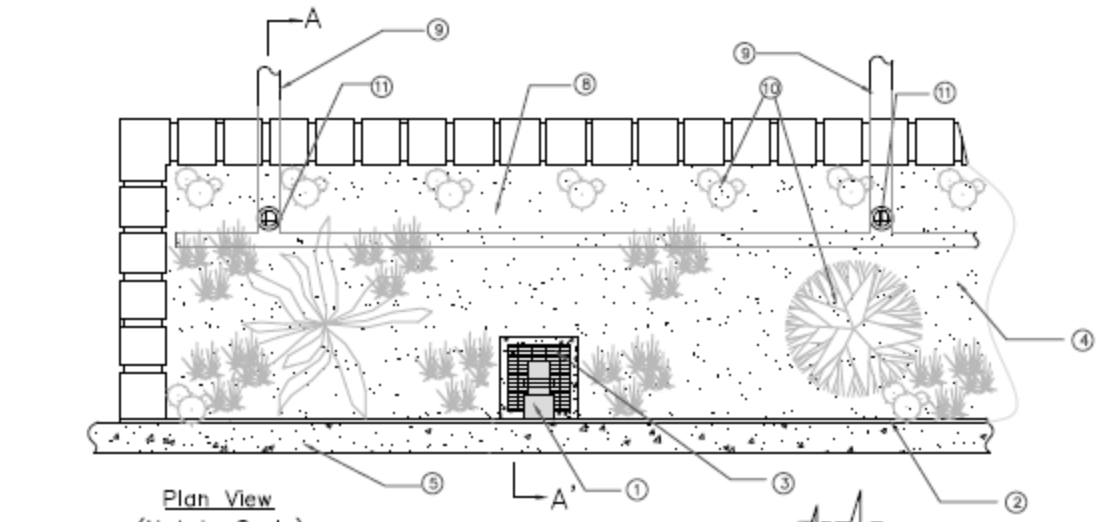
Source: Treatment Best Management Practices Performance, Los Angeles Regional Water Quality Control Board, December 9, 2013.

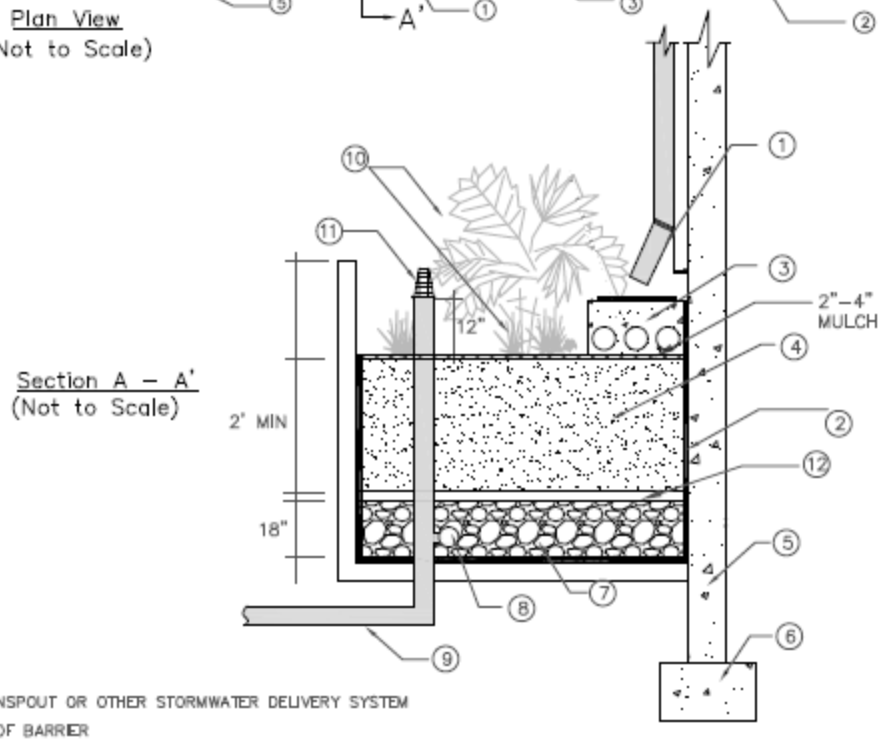
Advantages

- Has a low cost when integrated into site landscaping
- Can be useful for disconnecting downspouts
- Requires little space
- Is suitable for parking lots and sites with limited open area available for stormwater runoff treatment
- Reduces peak flows during small storm events
- Enhances site aesthetics
- May conserve water
- Requires little maintenance

Disadvantages

- May not be appropriate for industrial sites or locations with contaminated soils or where spills may occur because of the potential threat to groundwater contamination
- Is not suitable for areas with steep slopes
- Requires irrigation, which may conflict with water conservation ordinances or landscape requirements, to maintain vegetation
- May result in potentially increased cost due to waterproofing exterior building walls, if needed





NOTES:

1. ROOF DOWNSPOUT OR OTHER STORMWATER DELIVERY SYSTEM
2. WATERPROOF BARRIER
3. SHALLOW ENERGY DISSIPATOR BASIN DISPERSES FLOW AT SOIL SURFACE
4. SOIL MIX (SEE PLANTING MEDIA SECTION)
5. BUILDING
6. FOUNDATION. INSTALL FOUNDATION DRAINS AS NEEDED
7. GRAVEL BEDDING (SEE UNDERDRAIN)
8. PERFORATED PIPE SHALL RUN ENTIRE LENGTH OF PLANTER
9. CONNECTION TO DOWNSTREAM CONVEYANCE SYSTEM
10. PLANTS
11. SET OVERFLOW 2" BELOW THE TOP OF THE PLANTER
12. OPTIONAL CHOKING GRAVEL LAYER

Figure E-9. Stormwater Planter Schematic

General Constraints and Implementation Considerations

- Stormwater planters are suitable for smaller tributary areas such as urban infill projects.
- Stormwater planters can be integrated into other landscaping areas.
- For stormwater planters next to buildings, waterproofing of exterior building walls must be provided as directed by an architect or structural engineer.
- The site topography must be relatively flat.
- During construction activities should avoid compaction of native soils below planting media layer or gravel zone.
- Stormwater runoff must be diverted around the stormwater planter during the period of vegetation establishment. If diversion is not feasible, the graded and seeded areas must be protected with suitable sediment controls (i.e., silt fences).
- All damaged areas should be repaired, seeded, or re-planted immediately.
- The general landscape irrigation system should incorporate the stormwater planter, as applicable.

Design Specifications

The following sections describe the design specifications for stormwater planters.

Geotechnical

Due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and potential for insufficient infiltration capacity, an extensive geotechnical site investigation must be conducted during the site planning process to verify site suitability for a stormwater planter. All geotechnical investigations must be performed according to the most recent GMED Policy GS 200.1. Soil infiltration rates and the groundwater table depth must be evaluated to ensure that conditions are satisfactory for proper operation of a stormwater planter. The project applicant must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist on-site to allow the construction of a properly functioning stormwater planter.

Geometry

- The minimum soil depth should be 12 to 18 inches. The minimum soil depth is required to provide a beneficial root zone for the chosen vegetation and adequate storage capacity for stormwater runoff. A deeper planting soil depth will provide a smaller surface area footprint.
- The minimum stormwater planter width is 30 inches.
- Any stormwater planter shape configuration is possible as long as the other design specifications are met.

- The distance between the downspouts and the overflow outlet should be maximized in order to increase the opportunity for stormwater runoff retention and filtration.

Sizing

Stormwater planters are sized using a simple sizing method where the SWQDv must be completely filtered within 96 hours. If the incoming stormwater runoff flow rate is lower than the long term filtration rate, above ground storage does not need to be provided. If the incoming stormwater runoff flow rate is higher than the long term filtration rate, above ground storage shall be provided (see steps below).

Step 1: Calculate the design volume

Stormwater planters areas should be sized to capture and treat the SWQDv (see Section 6 for SWQDv calculation procedures) that is not reliability retained on the project site, as calculated by the equation below:

$$V_{SP} = \mathrm{SWQDv} - \mathrm{V_r}$$

Where:

V_{SP} = Biofiltration volume [ft^3];
SWQDv = Stormwater quality design volume [ft^3]; and
V_R = Volume of stormwater runoff reliably retained on-site [ft^3].

Step 2: Calculate the design infiltration rate

Determine the corrected in-situ infiltration rate (f_{design}) of the native soil using the procedures described in the most recent GMED Policy GS 200.1.

Step 3: Calculate the surface area

Select a surface ponding depth (d) that satisfies the geometric criteria and meets the site constraints. Selecting a deeper ponding depth (up to 1.5 ft) generally yields a smaller footprint, however, it will require greater consideration for public safety, energy dissipation, and plant selection.

Calculate the time for the selected ponding depth to filter through the planting media using the following equation:

$$t_p = \frac{d}{\left(\frac{f_{design}}{12}\right)}$$

Where:

t_p = Required detention time for surface ponding (max 96 hr) [hr];
d = Ponding depth (max 1.5 ft) [ft]; and
f_{design} = Design infiltration rate [in/hr].

If t_p exceeds 96 hours, reduce surface ponding depth (d). In nearly all cases, t_p should not approach 96 hours unless f_{design} is low.

Calculate the required infiltrating surface (filter bottom area) using the following equation:

$$A = \frac{V_B}{d}$$

Where:

A = Bottom surface area of biofiltration area [ft^2];
V_B = Biofiltration design volume [ft^3]; and
d = Ponding depth (max 1.5 ft) [ft].

Flow Entrance and Energy Dissipation

The following types of flow entrance can be used for stormwater planters:

- Piped entrances, such as roof downspouts, should include rock, splash blocks, or other erosion controls at the entrance to dissipate energy and disperse flows.
- Woody plants (trees, shrubs, etc.) can restrict or concentrate flows and can be damaged by erosion around the root ball and must not be placed directly in the entrance flow path.

Drainage

Stormwater planters must be designed to drain below the planting soil depth in less than 96 hours. Soils must be allowed to dry out periodically in order to restore hydraulic capacity to receive stormwater runoff from subsequent storm events, maintain infiltration rates, maintain adequate soil oxygen levels for healthy soil biota and vegetation, and provide proper soil conditions for biodegradation and retention of pollutants.

Underdrain

Stormwater planters require an underdrain to collect and discharge stormwater runoff that has been filtered through the soil media, but not infiltrated, to another stormwater quality control measure, storm drain system, or receiving water. The underdrain shall have a mainline diameter of eight inches using slotted PVC SDR 26 or PVC C9000. Slotted PVC allows for pressure water cleaning and root cutting, if necessary. The slotted pipe should have two to four rows of slots cut perpendicular to the axis of the pipe or at right angles to the pitch of corrugations. Slots should be 0.04 to 0.1 inches

wide with a length of 1 to 1.25 inches. Slots should be longitudinally-spaced such that the pipe has a minimum of one square inch opening per lineal foot and should face down.

The underdrain should be placed in a gravel envelope (Class 2 Permeable Material per Caltrans Spec. 68-1.025) that measures three feet wide and six inches deep. The underdrain is elevated from the bottom of the stormwater planter by six inches within the gravel envelope to create a fluctuating anaerobic/aerobic zone below the underdrain to facilitate denitrification within the anaerobic/anoxic zone and reduce nutrient concentrations. The top and sides of the underdrain pipe should be covered with gravel to a minimum depth of 12 inches. The underdrain and gravel envelope should be covered with a geomembrane liner to prevent clogging. The following aggregate should be used for the gravel envelope:

Particle Size (ASTM D422)	% Passing by Weight
¾ inch	100%
¼ inch	30-60%
#8	20-50%
#50	3-12%
#200	0-1%

Underdrains should be sloped at a minimum of 0.5 percent, and must drain freely to an acceptable discharge point.

Rigid non-perforated observation pipes with a diameter equal to the underdrain diameter should be connected to the underdrain to provide a clean-out port as well as an observation well to monitor drainage rates. The wells/clean-outs should be connected to the perforated underdrain with the appropriate manufactured connections. The wells/clean-outs should extend six inches above the top elevation of the stormwater planter mulch, and should be capped with a lockable screw cap. The ends of underdrain pipes not terminating in an observation well/clean-out should also be capped.

Hydraulic Restriction Layer

A geomembrane liner may be placed between the planting media and the drain rock. If a geomembrane liner is used, it should meet a minimum permittivity rate of 75 gal/min/ft^2 and should not impede the infiltration rate of the soil media. The geomembrane liner must meet the minimum requirements presented in Table E-16.

Table E-16 Geomembrane Liner Specifications for Stormwater Planters

Parameter	Test Method	Specification
Trapezoidal Tear	ASTM D4533	40 lbs (minimum)
Permeability	ASTM D4491	0.2 cm/sec (minimum)
AOS (sieve size)	ASTM D4751	#60 – #70 (minimum)
Ultraviolet Resistance	ASTM D4355	>70%

Preferably, aggregate should be used in place of a geomembrane layer to reduce the potential for clogging. This aggregate layer should consist of two to four inches of washed sand underlain with two inches of choking stone (typically #8 or #89 washed).

Vegetation

Prior to installation, a licensed landscape architect must certify that all plants, unless otherwise specifically permitted, conform to the standards of the current edition of American Standard for Nursery Stock as approved by the American Standards Institute, Inc. All plant grades shall be those established in the current edition of American Standards for Nursery Stock.

- Shade trees must have a single main trunk. Trunks must be free of branches below the following heights:

CALIPER (in)	Height (ft)
1½-2½	5
3	6

- Plants must be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for up to 96 hours.
- It is recommended that a minimum of three types of tree, shrubs, and/or herbaceous groundcover species be incorporated to protect against facility failure due to disease and insect infestations of a single species.
- Native plant species and/or hardy cultivars that are not invasive and do not require chemical inputs must be used to the maximum extent practicable.

The stormwater planter should be vegetated to resemble a terrestrial forest community ecosystem, which is dominated by understory trees, a shrub layer, and herbaceous ground cover. Stormwater planters should be planted to cover at least 50 percent of the planter surface. Select vegetation that:

- Is suited to well-drained soil;
- Will be dense and strong enough to stay upright, even in flowing water;
- Has minimum need for fertilizers;

- Is not prone to pests and is consistent with Integrated Pest Management practices; and
- Is consistent with local water conservation ordinance requirements.

Irrigation System

Provide an irrigation system to maintain viability of vegetation, if applicable. The irrigation system must be designed to local code or ordinance specifications.

Planter Walls

Planter walls must be made of stone, concrete, brick, clay, plastic, wood, or other stable, permanent material. The use of pressure-treated wood or galvanized metal at or around a stormwater planter is prohibited.

Overflow Device

An overflow device is required at the 18-inch ponding depth. The following, or equivalent, should be provided:

- A vertical PVC pipe (SDR 26) to act as an overflow riser.
- The overflow riser(s) should be eight inches or greater in diameter, so it can be cleaned without damage to the pipe.
- The inlet to the riser should be a maximum of 18 inches above the planting soil, and be capped with a spider cap to exclude floating mulch and debris. Spider caps should be screwed in or glued (e.g., not removable). The overflow device should convey stormwater runoff in excess of the SWQDv to an approved discharge location (another stormwater quality control measure, storm drain system, or receiving water).

Maintenance Requirements

Maintenance and regular inspections are important for proper function of stormwater planters. Stormwater planters require annual plant, soil, and mulch layer maintenance to ensure optimal infiltration, storage, and pollutant removal capabilities. In general, stormwater planter maintenance requirements are typical landscape care procedures and include:

- Irrigate plants as needed during prolonged dry periods. In general, plants should be selected to be drought-tolerant and not require irrigation after establishment (two to three years).
- Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly-designed facilities with appropriate flow velocities should not cause erosion except potentially during in extreme events. If erosion occurs, the flow velocities and gradients within the stormwater planter and flow dissipation

and erosion protection strategies in the flow entrance should be reassessed. If sediment is deposited in the stormwater planter, identify the source of the sediment within the tributary area, stabilize the source, and remove excess surface deposits.

- Prune and remove dead plant material as needed. Replace all dead plants, and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species.
- Remove weeds as needed until plants are established. Weed removal should become less frequent if the appropriate plant species are used and planting density is attained.
- Select the proper soil mix and plants for optimal fertility, plant establishment, and growth to preclude the use of nutrient and pesticide supplements. By design, stormwater planters are located in areas where phosphorous and nitrogen levels are often elevated such that these should not be limiting nutrients. Addition of nutrients and pesticides may contribute pollutant loads to receiving waters.
- Analyze soil for fertility and pollutant levels if necessary. Stormwater planter soil media are designed to maintain long-term fertility and pollutant processing capability.
- Excavate and clean the stormwater planter if it does not drain within 96 hours after a storm event. Replace stormwater planter soil media as needed to improve the infiltration rate.
- Eliminate standing water to prevent vector breeding.
- Inspect, and clean if necessary, the underdrain.
- Inspect overflow devices for obstructions or debris, which should be removed immediately. Repair or replace damaged pipes upon discovery.
- Repair structural deficiencies to the stormwater planter including rot, cracks, and failure.
- Implement Integrated Pest Management practices if pests are present in the stormwater planter.
- Provide training and/or written guidance to all property owners and tenants. Provide a copy of the Maintenance Plan to all property owners and tenants.

A summary of potential problems that may need to be addressed by maintenance activities is presented in Table E-17.

The County requires execution of a maintenance agreement to be recorded by the property owner for the on-going maintenance of any privately-maintained stormwater quality control measures. The property owner is responsible for compliance with the maintenance agreement. A sample maintenance agreement is presented in Appendix H.

Table E-17. Stormwater Planter Troubleshooting Summary

Problem	Conditions When Maintenance Is Needed	Maintenance Required
Vegetation	Overgrown vegetation	Mow and prune vegetation as appropriate.
	Presence of invasive, poisonous, nuisance, or noxious vegetation or weeds	Remove this vegetation and plant native species as needed.
Trash and Debris	Trash, plant litter, and dead leaves present	Remove and properly dispose of trash and debris.
Irrigation (if applicable)	Not functioning correctly	Check irrigation system for clogs or broken lines and repair as needed.
Inlet/Overflow	Inlet/overflow areas clogged with sediment and/or debris	Remove material. Ensure the downspout is clear of debris.
	Overflow pipe blocked or broken	Repair as needed.
Erosion/Sediment Accumulation	Splash pads or spreader incorrectly placed Presence of erosion or sediment accumulation	Check inlet structure to ensure proper function. Repair, or replace if necessary, the inlet device. Repair eroded areas with gravel as needed. Re-grade the stormwater planter as needed.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants	Remove any evidence of visual contamination from floatables such as oil and grease.
Standing water	Standing water observed more than 96 hours after storm event	Inspect, and clean as needed, the underdrain to ensure proper function. Clear clogs as needed. Remove and replace planter media (sand, gravel, topsoil, mulch) and vegetation.

APPENDIX 7

OPERATION AND MAINTENANCE PLAN

Appendix 7

Appendix has not been included as apart of the Preliminary LID report. Placeholder has been kept to keep county report template standards. Appendix will be included as apart of the FINAL LID Report.

APPENDIX 8

BMP INSPECTION MAINTENANCE RECORDS

Appendix 8

Appendix has not been included as apart of the Preliminary LID report. Placeholder has been kept to keep county report template standards. Appendix will be included as apart of the FINAL LID Report.

APPENDIX 9

SOURCE CONTROL MEASURES

Appendix 9

Appendix has not been included as apart of the Preliminary LID report. Placeholder has been kept to keep county report template standards. Appendix will be included as apart of the FINAL LID Report.

APPENDIX 10

HYDROMODIFICATION

Appendix 10

Appendix has not been included as apart of the Preliminary LID report. Placeholder has been kept to keep county report template standards. Appendix will be included as apart of the FINAL LID Report.