Appendix G Preliminary Hydrology and LID Report

Appendix

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Preliminary Hydrology & LID Report

Starlite
VTTM 083399
2540 Rosemead Blvd.
South El Monte

w.o. 20109

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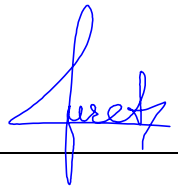

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Aret Binatli
R.C.E. 64448 (Exp. 30 Jun 21)

Date

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1. INTRODUCTION

The proposed development, VTTM 083399, is located at 2540 Rosemead Boulevard, South El Monte, CA, 91733. The 13.45 Ac site is bound by Rosemead Blvd. to the west, commercial and residential buildings to the north, Chico Ave. to the east, and commercial buildings to the south. Proposed construction includes approximately 207 detached and attached condominiums, and single commercial parcel. The general area is shown in Figure 1. Greater detail is available in Figures 2 and 3, in the back of this report.

The purpose of this report is to outline the preliminary hydrology and low impact development methods that will be used during final engineering and are not intended to represent a complete and final design.

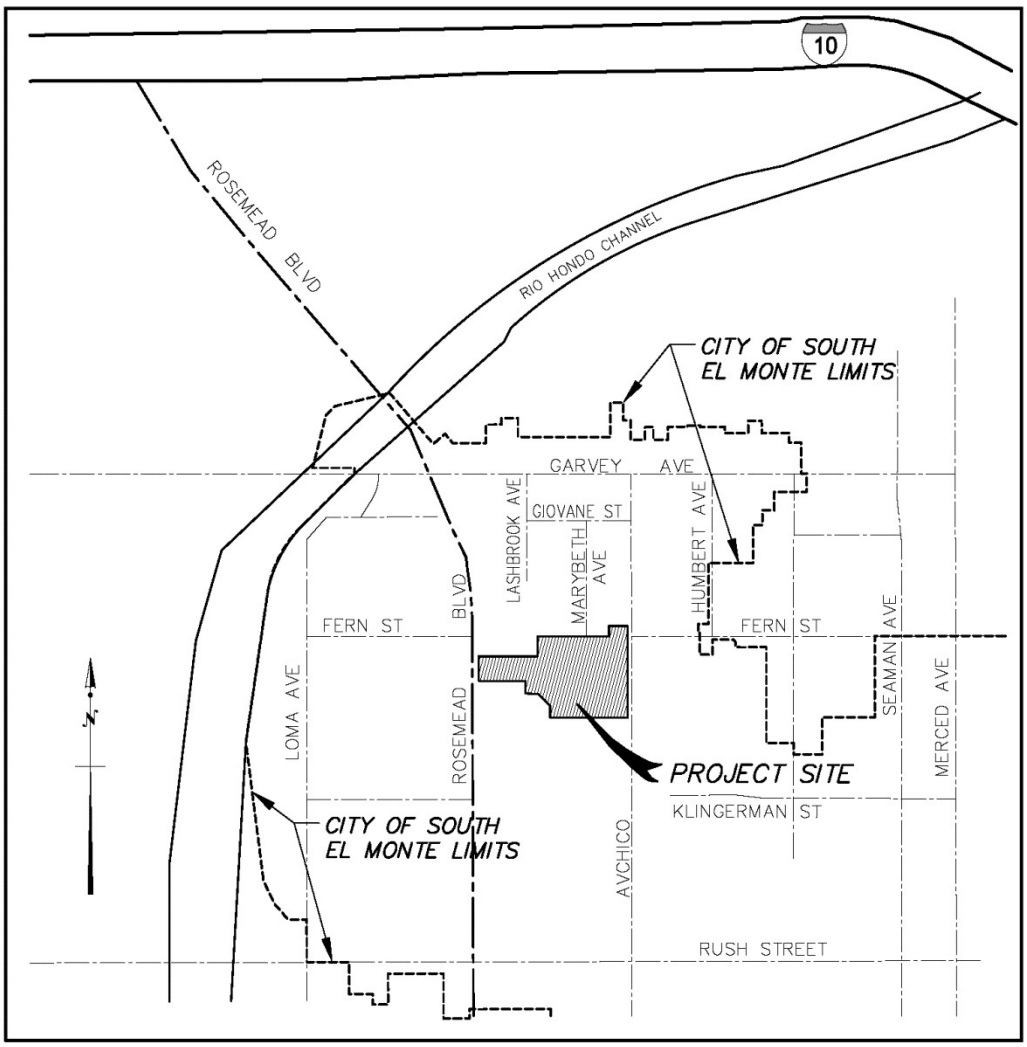


Figure 1. Vicinity map.

2. HYDROLOGY

2.1 Methodology

The hydrology analysis for this project is based on the Los Angeles County Department of Public Works Modified Rational Method and is in accordance with the 2006 Hydrology Manual. Runoff calculations are performed using the LADPW HydroCalc Program.

As determined from the Los Angeles County Hydrology Manual, the 50-year, 24-hour rainfall depth for the site is 6.1-inch; the project is located within soil type 003. A copy of the 50-year, 24-hr rain event Isohyet Map is located in Appendix G of this report.

AutoCAD Civil 3D software was utilized to establish subarea boundaries and uniform imperviousness.

2.2 Predeveloped Site Drainage Condition

The existing site consists almost entirely of paved surfaces and several existing storm drain inlets that discharge to County owned systems; a portion along the easterly property line surface drains to Chico Avenue. The existing drainage conditions are represented on Figure 2 in Appendix G of this report. Existing survey of the area shows current drainage conditions; however, design of the proposed development is based on the County's drainage map and allowable discharge into County systems. Existing drainage areas from the survey shown on Figure 2 are for reference only.

The response to an information request for allowable Q in July 2020 to the Los Angeles County Department of Public Works for discharge into the County drains provided a drainage map that roughly defines the pre-developed onsite drainage condition and is the basis of analysis. A copy of the allowable Q request response letter and reference material provided by the County, including county drainage maps, is located in Appendix C of this report.

The County drainage map shows approximately 87% of the 13.45 Ac. site , known as subarea A, drains from east to west to a sump catch basin located near the middle of the site. The remaining 13% of the site drains east to west towards Rosemead Blvd. known as subarea B.

Subarea A defines the easterly portion of the site draining toward the onsite sump catch basin; on paved surfaces and discharges to Los Angeles County Flood Control District, Project No. 7750, Line A. The 10-yr hydrology map exhibit provided as part of the County's responses, places subarea A, within "Subarea No. 2", with an allowable discharge Q to Line A of 1.90 cfs/Ac.

Subarea B defining the remaining westerly portion of the site drains toward Rosemead Blvd.; on paved surfaces and discharges to two existing CMP inlets connecting to the Los Angeles County Municipal Transfer Drain (MTD) 138. The allowable discharge Q to MTD138 is 1.00 cfs/Ac.

Existing walls and barriers along the property line prevents water runon.

2.3 Developed Site Drainage Condition

In the developed condition, the drainage pattern remains genearally the same as the predeveloped condition. Subarea A in the developed condition is defined by Lot 1 and consists of residential condominiums. Subarea B in the developed condition is defined by Lot 2 and consists of a single commercial parcel to be rough graded.

Storm water from the Subarea A is collected by a private underground storm drain system and discharges to Line A onsite via a new junction structure. Storm water from the Subarea B surface flows via graded swale at 1% to the existing CMP inlet that discharges to MTD 138 in Rosemead Blvd. Table 2 defines the developed Q discharging to the county storm drains Project No. 7750, Line A and MTD 138.

2.4 Results

Tables 1A, 1B, and 1C summarizes how the developed condition runoff flowrates are less than the allowable flowrates for the 50-year storm event. The Stormwater Quality Design Flowrate, Q_{PM}, is used for LID design. HydroCalc Reports are located in Appendix B of this report.

Subarea	Area (Ac)	$Q_{ALLOWABLE}$ ($ft^3/s/Ac$)	$Q_{ALLOWABLE}$ (ft^3/s)	Outfall Location
A	11.60	1.90	22.04	Project No. 7750, Line A
B	1.85	1.00	1.85	MTD 138

Table 1A. Allowable Runoff Flowrate Results.

Subarea	Area (Ac)	Q_{PM} (ft^3/s)	Q_{50} (ft^3/s)	Outfall Location
A	12.26	1.56	21.86	Project No. 7750, Line A
B	1.19	N/A	1.41	MTD 138

Table 1B. Developed Runoff Flowrate Results.

Subarea	Q_{50} (ft^3/s)	Outfall Location
A	-0.18	Project No. 7750, Line A
B	-0.44	MTD 138

Table 1C. Allowable & Development Discharge Flowrate Differences

Table 2A summarize the developed condition runoff volumes for the 50-year storm event and the Stormwter Quality Design Volume, $SWQD_V$, is used to determine detention volume requirements for LID design. HydroCalc Reports are located in Appendix B of this report.

Subarea	Area (Ac)	$SWQD_V$ (ft^3)	V_{50} (ft^3)	Outfall Location
A	12.26	27,807	189,906	Project No. 7750, Line A
B	1.19	N/A	3,427	MTD 138

Table 2A. Developed Runoff Volume Results.

2.5 Flood Hazards

According to the Federal Emergency Management Administration (FEMA) flood zone maps, the project site is located within Zone X, an area of minimum flood risk, or 0.2% chance annually. A copy of the FEMA Firm map is located in Appendix G. An existing flood control storm drain is present onsite that has the potential cause localized flooding onsite. To protect building pads from potential flooding, building pads are located 1ft minimum above the Rosemead Blvd street right of way.

3. LOW IMPACT DEVELOPMENT

3.1 Introduction

The proposed project will treat the runoff from the site in accordance with the Los Angeles County Low Impact Development Manual, 2014. To do so, the runoff resulting from the greater of the first 0.75-inch of rainfall or the 85th percentile rain event is treated prior to leaving the site. As determined from the Los Angeles County Hydrology GIS Maps, the 85-percentile rain event for the project site site is 0.90 inches, which is used as the design storm for Low Impact Development because it is greater than 0.75 inches. Hydrology methodology, water quality design flowrates and volumes are presented in Section 2 of this report.

3.2 Project Category

The proposed development consists of 207 attached condominia, is 13.45 Acres of disturbed area, and adds more than 10,000 square feet of impervious surface area; as such, the project must follow the requirements for Designated Projects.

Category	YES	NO
1. Development [a] of a new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious area [b]	☒	☐
2. Development [a] of a new industrial park with 10,000 square feet or more of surface area [c]	☐	☒
3. Development [a] of a new commercial mall with 10,000 square feet or more surface area [c]	☐	☒
4. Development [a] of a new retail gasoline outlet with 5,000 square feet or more of surface area [c]	☐	☒
5. Development [a] of a new restaurant (SIC 5812) with 5,000 square feet or more of surface area [c]	☐	☒
6. Development [a] of a new parking lot with either 5,000 ft^2 or more of impervious area [b] or with 25 or more parking spaces	☐	☒
7. Development [a] of a new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area [c]	☐	☒
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA),[d] 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 area [b]	☐	☒
9. Redevelopment [e] of 5,000 square feet or more in one of the categories listed above **If yes, list redevelopment category here:**	☐	☒
10. Redevelopment [e] of 10,000 square feet or more to a Single Family Home, without a change in landuse.	☐	☒

a Development includes any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.

b Surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc.

c The surface area is the total footprint of an area. Not to include the cumulative area above or below the ground surface.

d An area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

e Land-disturbing activities that result in the creation, addition, or replacement of a certain amount of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

3.3 Hydrology and Drainage Pattern

As described in section 2 of this report, the proposed site is divided into two subareas as illustrated in Figure 3, Developed Condition Hydrology Map, located in Appendix G. Subarea B is to be left rough graded but undeveloped for future commercial space. Therefore, LID is ignored for Subarea B until it is developed. Subarea A is to be developed into residential condominiums, with a central LID BMP. Overflow from the proposed BMP will be directed to County storm drain Project No. 7750, Line A. Water quality design volume (SWQDv) and flow rates (Qpm) resulting from the 85th percentile rain event, as decribed in Section 2, used for sizing of LID BMPs are summarized in Table 3.

Subarea	Area (Ac)	$SWQD_V$ (ft^3)	Q_{PM} (ft^3/s)	Outfall Location
A	12.26	27,807	1.56	Project No. 7750, Line A
B	1.19	N/A	N/A	MTD 138

Table 3. Low Impact Development, Stormwater Quality Design Volume and Flowrates

3.4 Hydromodification

The proposed project is considered exempt from the requirements of the hydromodification for the following reasons:

1) The proposed project site was previously developed in an urbanized area and does not increase the effective impervious area of the site as compared to the pre-project conditions. On the contrary, effective imperviousness of the site will be decreased from 90% to 75% once the site is developed.
2) The project discharges into a LA County Flood Control storm drain and satisfies the allowable discharge flowrates provided by the County.

3.4 Infiltration BMP

3.4.1 Feasibility Screening

Infiltration is the first option in Los Angeles County when screening potentially feasible LID BMPs. Infiltration systems collect storm water runoff and conducts it into permeable soils beneath the site; effectively reducing pollution, reducing runoff and flooding, and recharging ground water. Initial investigations by the soils engineer did not include infiltration testing and recommendations. Calculations of liquefaction potential provided by the soils engineer indicate that there are discrete layers of soils that are susceptible to liquefaction. Further investigation at specific location and design depth is necessary to rule out liquefaction as a potential hazard. However, other hazards such as expansive soils, high ground water, landslides, or polluted soils, were identified during initial explorations that would disallow infiltration onsite.

Due to the lack of testing, an underground infiltration trench has been designed using an estimated infiltration rate of 1.0 inch per hour (in/hr) estimated by the soils engineering based on soil material, which serve as a benchmark to adjust the size of the system. To be technically feasible per the County of Los Angeles Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration, GS200.1. GS200.1, testing must confirm a

minimum corrected infiltration rate of 0.3 in/hr. If an infiltration rate of 0.3 in/hr is not achieved during testing, or other hazards are identified, then the next option for LID BMP screening process is harvest and reuse.

3.4.2 Preliminary Design

Design of the infiltration system is based upon LADPW LID Manual, 2014, RET-4, Dry Well. Setbacks are based upon GS200.1. The dry wells are designed to infiltration between 20'-30' deep as recommend by the soils engineer based on preliminary borings. The dry well system selected is MaxWell Plus, a drywell designed and install by Torrent Resources.

Water that must be retained onsite, SWQDv, is temporarily detained upstream of the drywells. The detention system choosed for the preliminary storage design is a proprietary chamber system, StormTech, by Advanced Drainage Systems, Inc. (ADS). StormTech utilizes HDPE chambers surrounded by open graded gravel and encapsulated in a waterproof membrane to prevent infiltration. The StormTech system incorporates an isolator row that serves as a settling basin for silt and debris and accessible for maintenance which will provide pretreatment for water prior to entering the drywell.

The locations of the proposed detention system and dry wells BMPs are shown on Figure 3, Developed Condition Hydrology Map, located in Appendix G. The detention system is located within open areas of the site, which allow the detention volume to be adjusted once infiltration testing has occurred and required detention volume is adjusted based on infiltration occuring during the rain event. Sizing of the RET-4 Dry Well system is as follows:

Step 1: Determine the SWQDv

From HydroCalc, the SWQDv is the runoff volume resulting from the 85th percentile, 24-hour rain event for Subareas A listed in Table 3 above.

Step 2: Determine the design infiltration rate

Infiltration rate has not been established, as percolation testing has not yet been performed. An approximate preliminary infiltration rate suggested by the soils engineer, RMA GeoScience, based on boring data is 1-2 in/hr between 20'-30' depth. 1.0 in/hr is used as the corrected infiltration rate for preliminary design purposes. Additional Geotechnical investigations must occur prior to final engineering

Step 3: Calculate the bioretention area and number of dry wells

Determine the size of the required infiltration surface by assuming the SWQDv will fill the available void spaces of the gravel storage layer. The maximum depth of stormwater runoff that can be infiltrated within the maximum retention time (96 hrs) is calculated using the following equation:

$$d_{max} = \frac{f_{design}}{12} \text{ x } t$$

where:
- d_{max} = Maximum depth of water that can be infiltrated within the maximum retention time (ft),
- f_{design} = Design infiltration rate (in/hr)
- t = Maximum retention time (max 96 hrs) (hr).

A design infiltration rate, 1.0 in/hr, is used for preliminary design. The maximum allowable drawdown time for underground infiltration is 96 hrs. Determine the maximum depth of water that can be infiltrated.

$$d_{max} = \frac{1.0}{12} \text{ x } 96$$

$$= 8.0 \text{ ft}$$

Select the dry well depth (dt) such that:

$$d_t \leq \frac{d_{max}}{n_t}$$

where:
- dt= Depth of infiltration trench (ft),
- dmax = Maximum depth of water that can be infiltrated within the maximum retention time (ft),
- n_t = Infiltration trench gravel void ratio.

For this project, all drywells are designed to be filled with gravel with a void ratio of 40% (0.40 Calculate the maximum allowable depth of gravel filled drywell.

$$d_t \leq \frac{8.0}{0.4}$$

$\leq$ 20 ft (soils engineer has identified a 10ft thick layer that may be suitable for infiltration. Each drywell is designed to be 10 ft high per MaxWell Plus drawings locted in Appendix E)

Calculate the infiltration surface area (total surface area of drywells) required:

$$A = \frac{SWQDv}{d_t \times n_t}$$

where:
- A = Surface area of the dry wells (ft^2),
- SWQDv = Stormwater quality design volume (ft^3),
- dt = Depth of dry well fill (ft),
- nt = Dry well fill porosity.

Subarea A SWQDv is 27,807 ft^3. The depth of gravel fill allowed is 20 ft. Calculate the infiltration surface area (total surface area of drywells) required:

$$A_{SUBAREA\ 1} = \frac{27{,}807}{20X0.4}$$

$$= 3476 \text{ ft}^2 \text{ (640 ft}^2 \text{ provided, See Appendix D for Drawings by ADS)}$$

Calculate the number of drywells required:

$$N = \frac{A_{SUBAREA}}{A_{DRY\ WELL}}$$

where:
- $A_{SUBAREA}$ = Total surface area of all dry well required (ft^2),
- $A_{DRY\ WELL}$ = Surface area of Stormwater quality design volume (ft^2),
- N = Number of dry wells.

$A_{SUBAREA}$ is 3,476 ft^2. Each preliminary drywell is 10 ft deep min, and 6 ft in diameter, which results in $A_{DRY\ WELL}$ of 188 ft^2. The number of drywells required:

$$N = \frac{3{,}476}{188}$$

= 18.49 (say 19 drywells, provides 3,572 ft^2 of biofiltration area, and

Dry Well BMP Design Summary

StormTech details generated by ADS includes the detention volume, area, and layout of the system, see Appendix D according the criteria above. The BMP sizing is summarized in Table 5.

Subarea	BMP	BMP Area Required (ft^2)	BMP Area Provided (ft^2)	BMP Volume Required, V_{85th} (SWQDv) (ft^3)	BMP Volume Provided (ft^3)
A	MaxWell Plus Drywell (RET-4)	3,476	3,572	27,807	28,067

Table 4A. Low Impact Development Dry Well BMP Design Summary

3.5 Harvest and Reuse Feasibility Screening

Harvest and reuse systems collect and temporarily store storm water runoff for future use. The most common method of reuse is for landscape irrigation. County guidelines dictate that water must be used within 96 hours following the rain event. The wet-season irrigation demand in the 4 days following a rain event is approximately zero and insufficient to drawdown the captured rainwater. If the detention system is not emptied prior to the next rain event, than runoff from the subsequent storms will bypass the system and not be treated. For this reason, harvest and reuse systems alone are not feasible in the County of Los Angeles. Therefore, harvest and reuse is considered infeasible as a stand-alone LID BMP for the proposed project. The next option in the LID Feasibility screening process is biofiltration.

3.6 Biofiltration BMP

3.6.1 Feasibility Screening

If infiltration is determined to be infeasible during final engineering, and harvest and reuse cannot treat the stormwater in sufficient amount of time, a biofiltration system is proposed.

Reuse of stormwater within 96 hrs after a rain event is infeasible per section 3.5. The detention system used for infiltration will be used to detain the Biofiltration Volume, Vb in excess of the volume not treated during the rain even. A small pump will operate as the detention system begins filling to empty the system slowly over 96 hours in preparation for the next rain event into a biofiltration planter. The biofiltration planter will remove pollutants from the runoff, and clean water will be discharged to Los Angeles Couty Storm Drain Project No. 7750, Line A. In this way, the system satisfies the requirement to treat 1.5xSWQDv from the 85th percentile rain event.

3.6.2 Preliminary Design

To satisfy the requirements of the County of Los Angeles Department of Public Works *Low Impact Development Standards Manual*, a biofiltration BMP must be designed to treat 1.5 times the volume of the SWQDv listed in Table 3, that is not reliably retained on-site, or Vb. This is achieved by filtering the water at a fixed rate, and detaining any runoff exceeding the fixed treatment rate in the onsite storm drain system until the water is drawn down.

The required treatment volume is calculated by multiplying the hydrograph flowrates generated by the County's HydroCalc software by 1.5. The resulting hydrograph represents the biofiltration volume, V_B, curve shown in Figure 4.

The Modular Wetland unit selected provides a suitable level of treatment while minimizing the product footprint and maintenance requirements. A single unit is selected for the proposed drainage area. The treatment capacity (treatment rate) of the Modular Wetland Unit, model MWS-L-8-12, is 0.346 cfs. Refer to Appendix E for manufacturer details and listed treatment capacity. The treatment capacity is then used to size a sump pump that will empty the detentions system at a rate less than the modular wetland treatment capacity, 0.20 cfs. Flow volume that arrives at pump at or below a flow rate less than 0.20 cfs is treated immediately, drains to the County Storm Drain and does not require detention. The volume not requiring detention is represented in green, Vb-t, in Figure 4. Flow volume that arrives at the pump at a flow rate greater than 0.20 cfs, Vb-d, remains in the detention system until it is pumped to the Modular Wetland. Excess water is diverted directly to the County Storm Drain, Project No 2775, Line A.

The following step by step calculations describe the BMP and detention system sizing required to satisfy the County of Los Angeles LID guidelines. Table 4B provides a summary of these calculations.

Subarea	BMP	BMP Max Treatment Rate (cfs)	Peak LID Flow Rate Delivered to BMP by pump (cfs)	V_{85th} (SWQDv) (ft^3)	BMP Volume Required, Vb (1.5xSWQDv) (ft^3)	BMP Volume Provided (ft^3)
A	BioClean, Modular Wetland (MWS-L-8-12) (Biofiltration)	0.346	0.20	27,807	41,711	

Table 4B. Low Impact Development Biofiltration BMP Design Summary

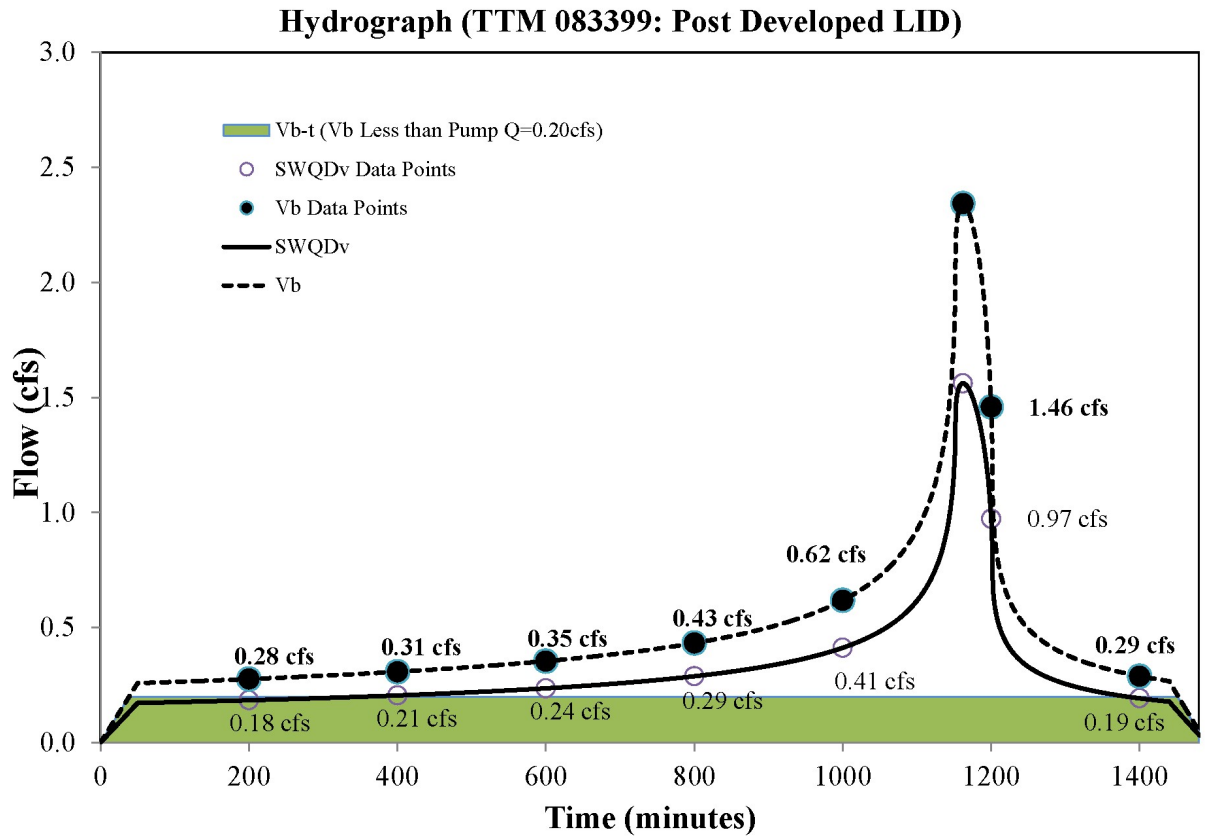


Figure 4. Post Developed LID Hydrograph

Step 1: Calculate the design volume

Biofiltration areas should be sized to capture and treat 1.5 times the portion of the SWQDv that is not reliably retained on the project site. From HydroCalc, the SWQDv is the runoff volume resulting from the 85th percentile; 24-hour rain event is listed in Table 3. Calculate the biofiltration volume, V_B.

$V_B = 1.5 \times (SWQDv - V_R)$

where: V_B = Biofiltration Volume, (ft^3),
$SWQD_V$ = Storm water quality design volume, SWQDv, from HydroCalc. (ft^3),
V_R = Volume of storm water runoff reliably retained onsite, (ft^3)

$V_B = 1.5 \times (27{,}807\ ft^3 - 0)$

$V_B = 41{,}711\ ft^3$

Step 2: Calculate the detention volume required

To determine the portion of V_B, that is being treated during the rain event as compared to volume that has to be detained, the SWQDv HydroCalc results are exported to Excel and a hydrograph plotted for 1.5 times the 85th percentile rain event flowrate. The resulting hydrograph represents the biofiltration volume, V_B, shown in Figure 4.

The portion of V_B arriving at the pump at a flow rate below pump discharge rate of 0.20 cfs is treated immediately and does not require detention; this volume is represented by the green shaded area in Figure 4, referred to herein as $V_{B\text{-}T}$. The remaining volume above the pump discharge rate is detained onsite in the StormTech detention system, referred to herein as $V_{B\text{-}D}$. The shaded area, $V_{B\text{-}T,}$ is measured using formulas in Excel. The minimum volume required to be detained is as follows:

$$V_{B-D} = V_B - V_{B-T}$$

where: $V_{B\text{-}D}$ = Minimum Biofiltration Volume to be detained, (ft^3),
V_B = Biofiltration Volume from Step 1, (ft^3),
$V_{B\text{-}T}$ = Biofiltration Volume Treated during event, shaded area from Fig 3 measured in Excel, (ft^3).

$$V_{B-D} = 41{,}711\text{ft}^3 - 17{,}416\text{ft}^3$$

$$\mathrm{V_{B-D}} = 24{,}295\ \text{ft}^3$$

Because HydroCalc outputs over 7,000 data points to generate the hydrograph, it is difficult to summarize the result; therefore, to verify the Excel results above for V_{B-T}, V_{B-T} is approximated using simplified trapezoidal areas shown in Figure 5.

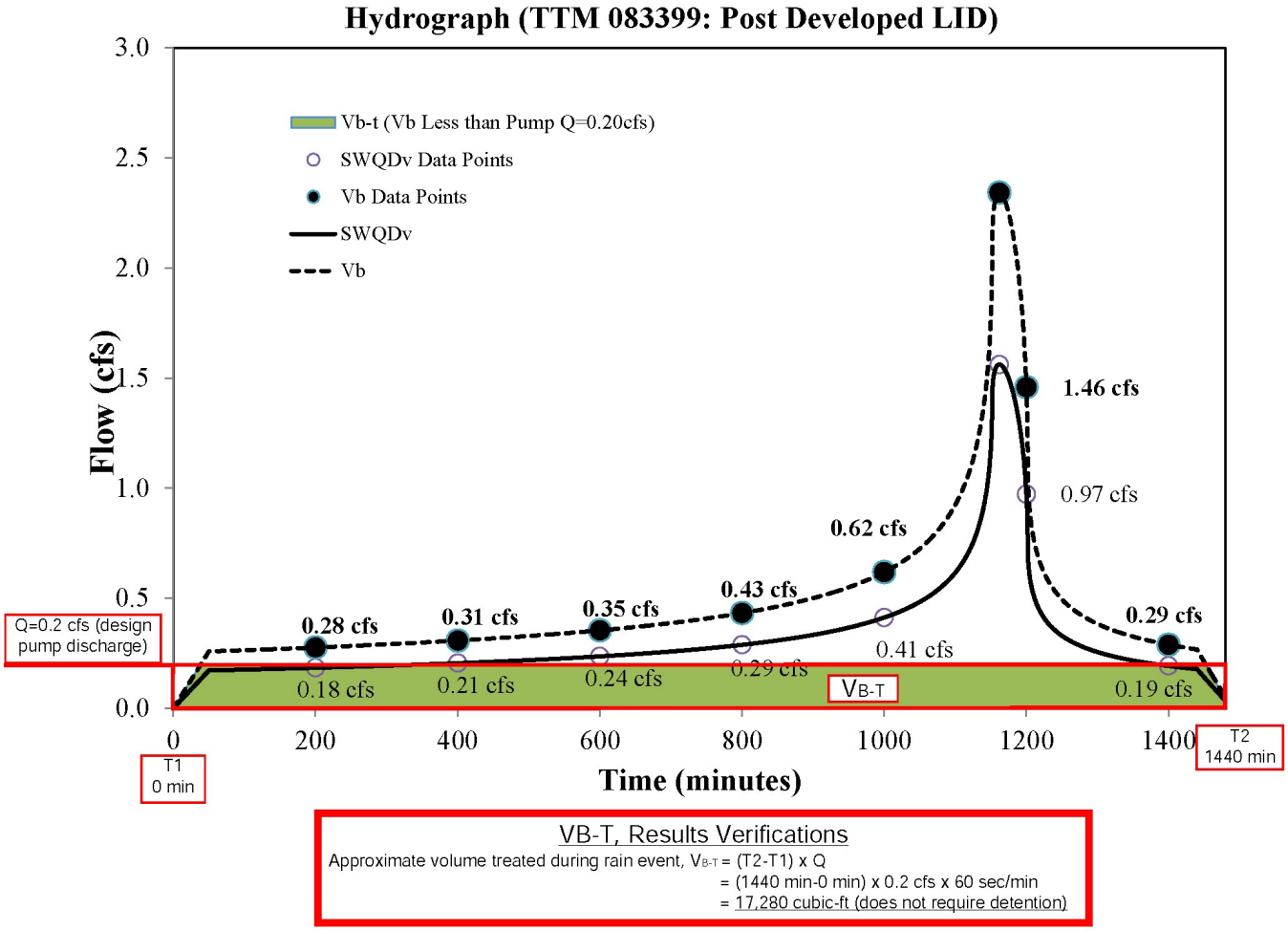


Figure 5. V_{B-T} Results Verification

The approximated total V_{B-T} in Figure 5 is similar to the results measured in Excel; therefore the Excel result provided in Step 2 is used for design.

Step 3: Calculate the detention volume provided

The minimum biofiltration volume to be detained onsite, V_{B-D} calculated in step 2, shall be stored in the StormTech system onsite. A weir within the StormTech system diverts water in excess of the design detention volume. The detention volume provided by the ADS stormtech system for infiltration analysis summarized in Section 3.4.2. is greater than the minimum detention volume required, V_{B-D}. Therefore, the system is capable of treating 1.5×SWQDv or the Biofiltration Volume.

4.0 CONCLUSION

TR 083399 will develop an existing paved drive-in theater into a residential lot and commercial lot. Lot 1, Subarea A, is being developed for residential purposes and includes preliminary measures to satisfy County of Los Angeles LID requirements and allowable discharge into a Los Angeles County Storm Drain, Lot 2, Subarea B, is being graded for future commercial use. Lot 2 satisfies County of Los Angeles allowable discharge requirements, but LID requirements are being deferred until the commercial lot is built out.

Infiltration has been identified as the most likely method for satisfying Los Angeles County Low Impact Development requirements. Preliminary geotechnical investigtions cannot confirm whether or not infiltration is suitable onsite. If infiltration is permitted afer further investigation, the detained volume generated by the 85^{th} percentile rain event will be directed to onsite drywells at suitable depths. If infiltration system is not feasible, the required detention volume will be filtered by high flow biofiltration device over 96 hrs and released to Los Angeles County storm drain system onsite. Storm water in excess of the required treatment volume will be conveyed directly to Los Angeles County storm drain system.

Appendix A
Raw Hydrology Data

Subarea	Area (Ac)	Soil Type	% Imp	Isohyet	Length (ft)	Slope	Area (sq ft)	D z
A	11.60	003	90	6.10		#DIV/0!	505398.30	0.00
B	1.85	003	90	6.10		#DIV/0!	80561.31	0.00
						Sum sub-areas (ft2)	585959.61	13.45
						Total study area (ft2)	585959.69	13.45

Table A1. Raw hydrology data used for the pre-developed condition in HydroCalc.

Subarea	Area (Ac)	Soil Type	% Imp	Isohyet	Length (ft)	Slope	Area (sq ft)	D z
A	12.26	003	**75**	6.10	1146.0	0.0111	534057.17	12.70
B	1.19	003	**1**	6.10	403.0	0.0129	51902.50	5.20
						Sum sub-areas (ft2)	585959.67	13.45
						Total study area (ft2)	585959.69	13.45

Table A2. Raw hydrology data used for the post-developed condition in HydroCalc.

Appendix B
HydroCalc Reports

Peak Flow Hydrologic Analysis

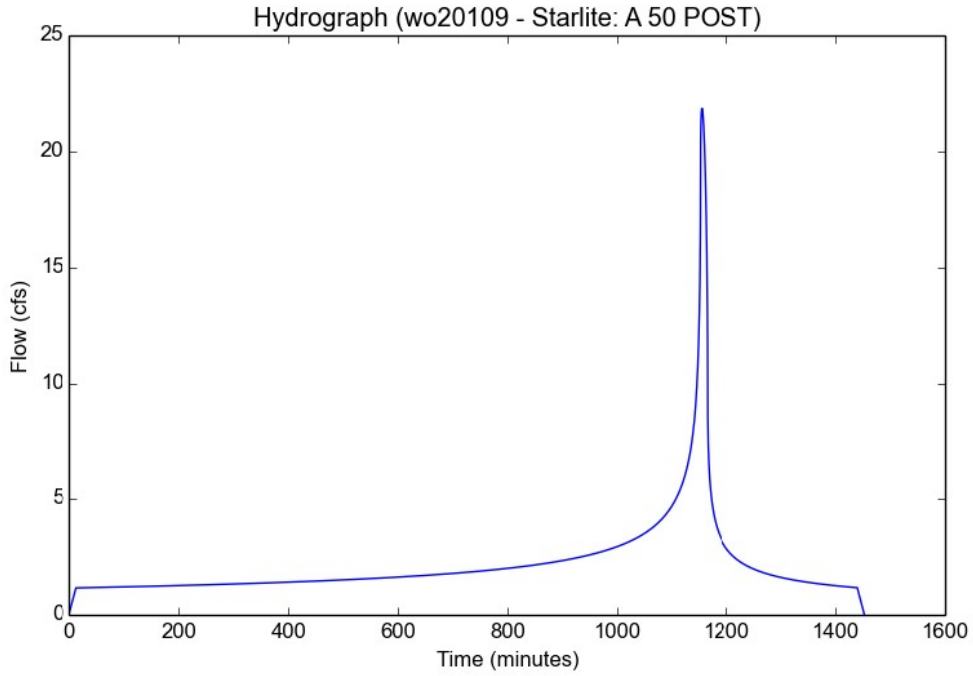
File location: L:/20109/Calc/HydroCalc/wo20109 - Starlite Report_2021-02-25.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	wo20109 - Starlite
Subarea ID	A 50 POST
Area (ac)	12.26
Flow Path Length (ft)	1146.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.75
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.1
Peak Intensity (in/hr)	2.3227
Undeveloped Runoff Coefficient (Cu)	0.3707
Developed Runoff Coefficient (Cd)	0.7677
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	21.8607
Burned Peak Flow Rate (cfs)	21.8607
24-Hr Clear Runoff Volume (ac-ft)	4.3596
24-Hr Clear Runoff Volume (cu-ft)	189906.289



Peak Flow Hydrologic Analysis

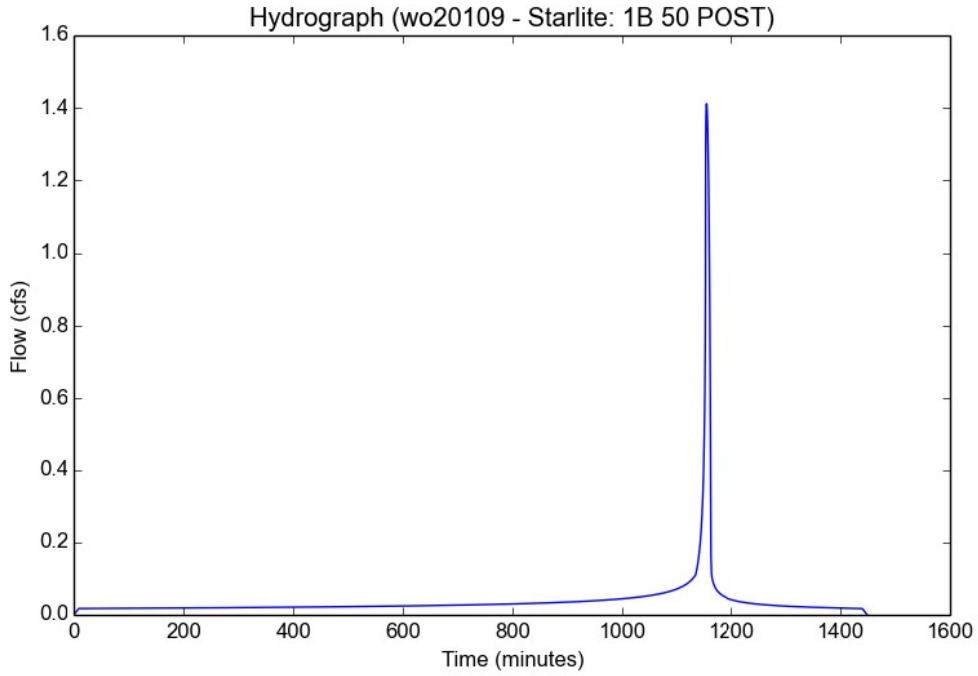
File location: L:/20109/Calc/HydroCalc/wo20109 - Starlite Report_2021-02-25.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	wo20109 - Starlite
Subarea ID	1B 50 POST
Area (ac)	1.19
Flow Path Length (ft)	403.0
Flow Path Slope (vft/hft)	0.013
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.01
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.1
Peak Intensity (in/hr)	2.7609
Undeveloped Runoff Coefficient (Cu)	0.425
Developed Runoff Coefficient (Cd)	0.4297
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	1.4119
Burned Peak Flow Rate (cfs)	1.4119
24-Hr Clear Runoff Volume (ac-ft)	0.0787
24-Hr Clear Runoff Volume (cu-ft)	3426.9858



Peak Flow Hydrologic Analysis

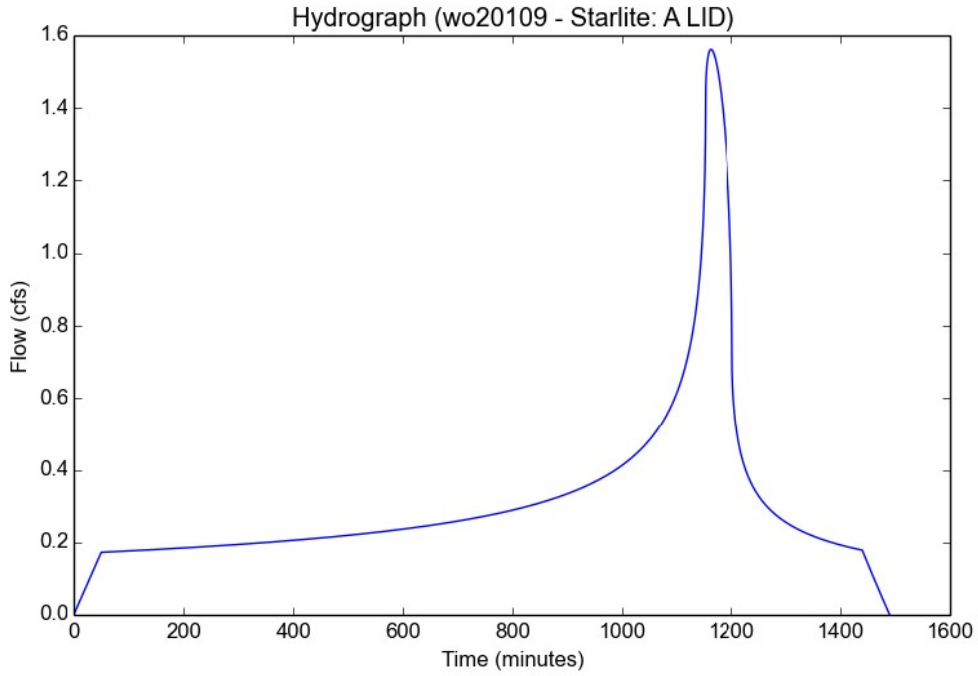
File location: L:/20109/Calc/HydroCalc/wo20109 - Starlite Report_2021-02-25.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	wo20109 - Starlite
Subarea ID	A LID
Area (ac)	12.26
Flow Path Length (ft)	1146.0
Flow Path Slope (vft/hft)	0.011
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.75
Soil Type	3
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1819
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7
Time of Concentration (min)	50.0
Clear Peak Flow Rate (cfs)	1.5615
Burned Peak Flow Rate (cfs)	1.5615
24-Hr Clear Runoff Volume (ac-ft)	0.6384
24-Hr Clear Runoff Volume (cu-ft)	27806.5785



Appendix C

Los Angeles County Department of Public Works Information Request Summary, Allowable Discharge Q

Office Use Only
☒ Sent Initials: _____
☐ Fax ☒ Email ☐ Other: _____
Date: _____ Time: _____

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

*Requester's Name: Aret Binatli
Company: Forma Engineering
*Phone Number: (818) 6988666 Fax Number: (818) 832-1740
*Email: abinatli@formaeng.com

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☒ Email ☐ Prelim. Mtg. Date: 7-15-2020

Intended Use: Design purposes

Proposed Project Type: Residential Condominium Site Acreage Involved: 13.45

*Will information be used in any litigation? ☐ YES ☒ NO
Case Info. Name: _____ No: _____ Location: _____

INFORMATION REQUESTED (Attach Assessor Map)

LACFCD Facility: Name: Project No 7750
Unit: _____ Line: A Station: 4+52
City: South El Monte
*Street/Cross-street: between Rosemead Blvd and Chico Ave
*Thomas Guide: Page: 636 Grid: J2 ☒ Site Map/Plans Submitted
Info. Requested:

Site was historically a drive-in theatre (also noted on the 7750 SD plan sheet 3), currently is being used as South el Monte swap meet. it is completely paved. Catchbasin located at station 4+52 is in a sump. We are preparing preliminary site plans and our intend is to increase pervious area and maintain drainage pattern as is. We may need to add additional catch basins onsite but those can be privately maintained. Please provide the allowable Q for the entire site
Thank you

*Required Information. See Page 2 of 2 for Instructions.

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED:
Project No. 7750 Line "A" Hydrology Data, Drainage Map, As Built Drawing. MTD 138 Discharge Flow.

REFERENCES SEARCHED:
Project No. 7750 File, Drawing No. 470-7750-D.2-3, MTD 138 Files and Drawing No. 364-1115 F 8.1

COMMENTS, ETC:

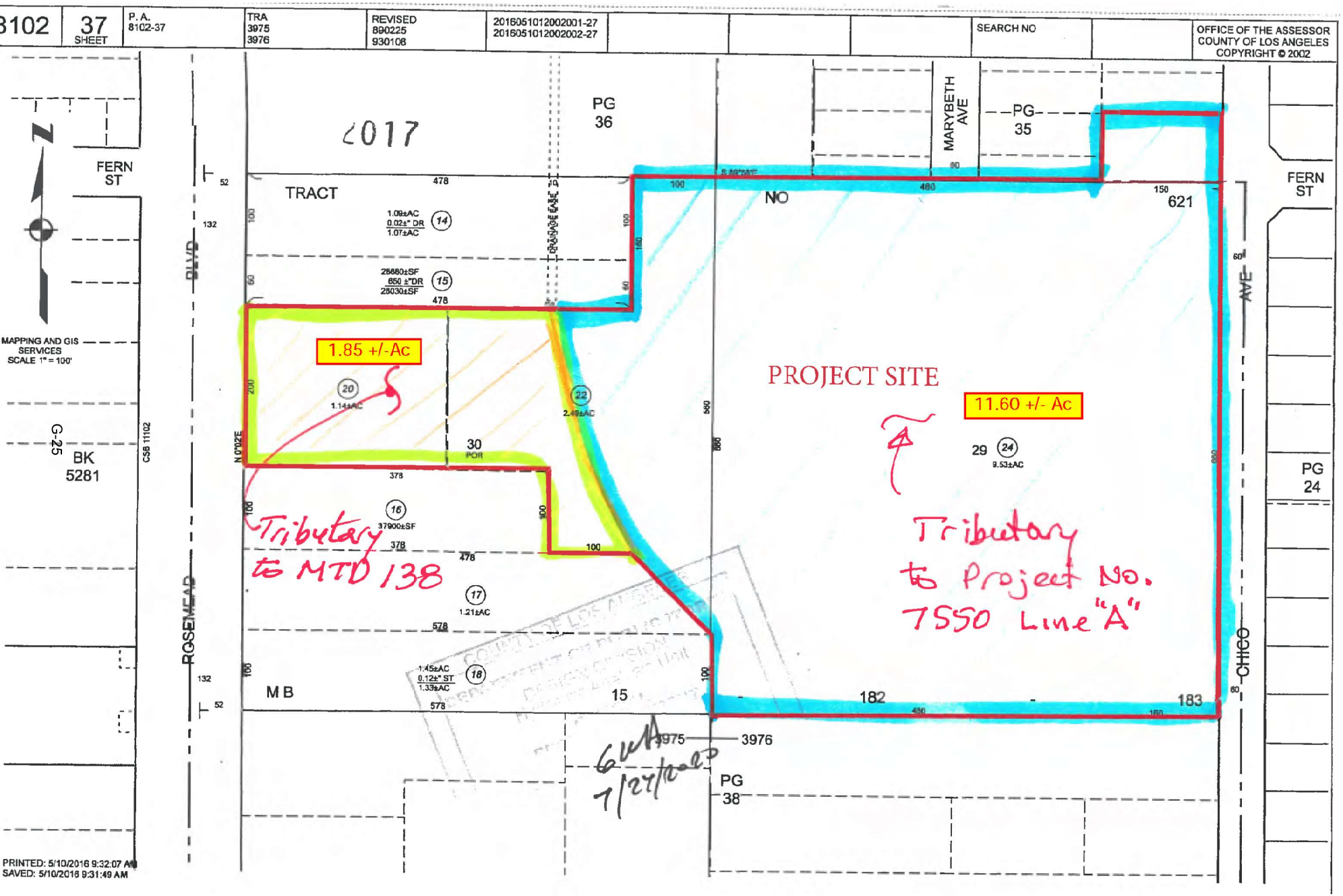
A- Project No. 7750 Line "A"
1- Subarea No. 1 Allowable Q=1.46cfs/acre. TR083399 LOT 1
2- Subarea No. 2 Allowable Q=1.90cfs/acre.
3- Hydraulic Grade Line Shown on As Built Drawing No. 470-7750-D2-3

B- MTD 138
Allowable Discharge Flow into MTD 138 Limited to Q=1.0cfs/acre. TR083399 LOT 2

INFORMATION PROVIDED BY: George K Aintablian Date: 07/24/2020

INFORMATION REVIEWED BY: Date:

Print Save a Copy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P. A.
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COUNTY OF LOS ANGELES
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PG
36
MARYBETH
AVE
PG
35
FERN
ST
TRACT
NO
621
1.09±AC
0.02±" DR
1.07±AC
14
28680±SF
650 ±"DR
28030±SF
15
478
1.85 +/-Ac
PROJECT SITE
11.60 +/- Ac
20
1.14±AC
22
2.49±AC
30
POR
29
24
9.53±AC
16
37900±SF
Tributary
to MTD 138
Tributary
to Project No.
7550 Line "A"
17
1.21±AC
18
1.45±AC
0.12±" ST
1.33±AC
MB
15
182
183
3975
3976
PG
38
6/24/16
7/27/16
MAPPING AND GIS
SERVICES
SCALE 1" = 100'
G-25
BK
5281
CSB 11102
ROSEMEAD
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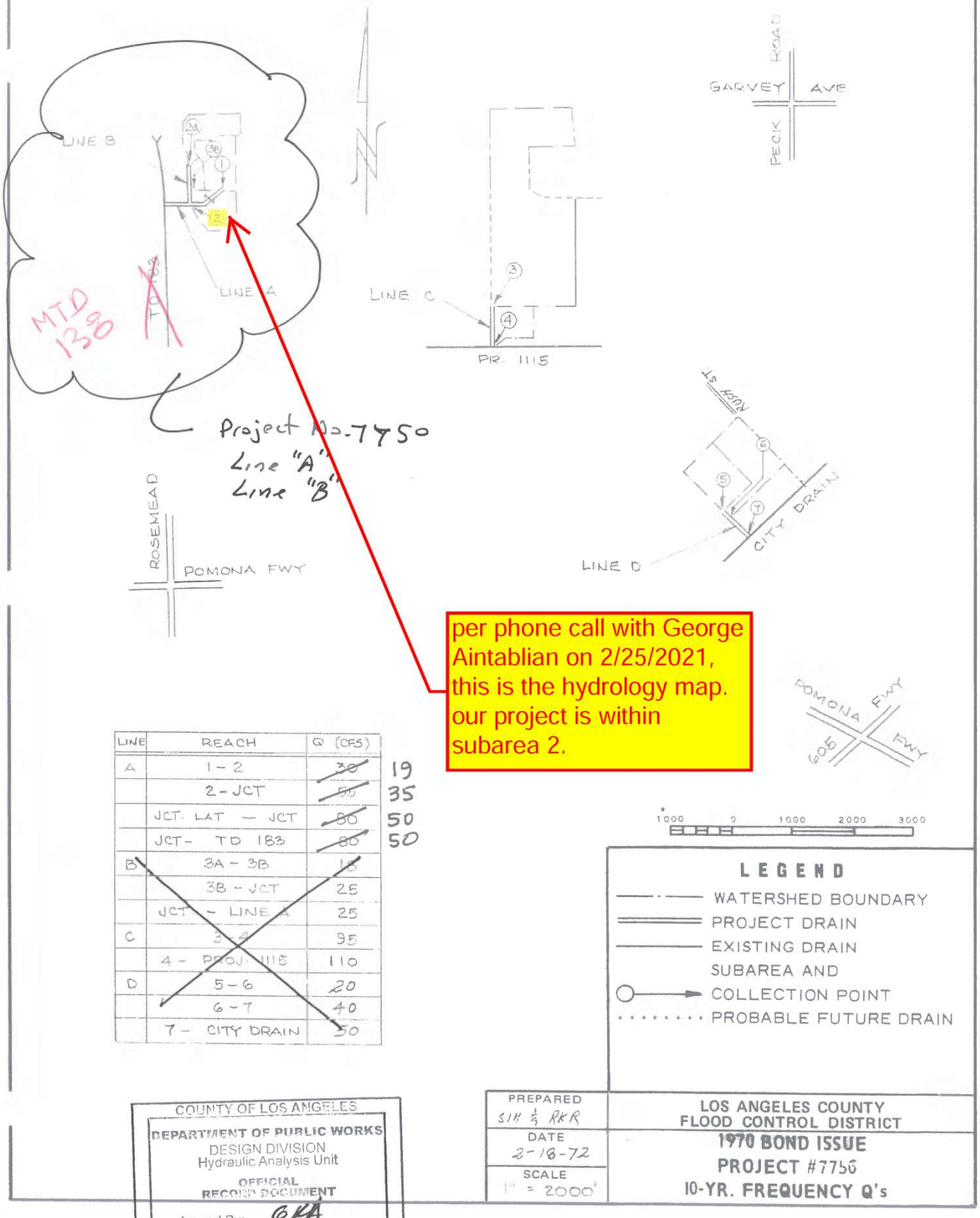


LINE	REACH	Q (CFS)	
A	1 - 2	~~30~~	19
	2 - JCT	~~50~~	35
	JCT. LAT — JCT	~~80~~	50
	JCT - TD 183	~~80~~	50
B	3A - 3B	~~15~~	
	3B - JCT	25	
	JCT - LINE A	25	
C	3 - 4	95	
	4 - PROJ 1115	110	
D	5 - 6	20	
	6 - 7	40	
	7 - CITY DRAIN	50	

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By: GKA
Date: 7/24/02
Public Service Dig. Works

PREPARED SIH ½ RKR	LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
DATE 2-18-72	1970 BOND ISSUE
SCALE 1" = 2000'	PROJECT #7750
	10-YR. FREQUENCY Q's

Los Angeles County Flood Control District
Hydraulic Division

Hydrologic Data

Project 7750 Sheet 1 of 1

Channel Types
4. Pipe
5. Rectangular
6. Trapezoidal

~~10~~ Year Frequency Rainfall Date February 23, 1972

Reach or Subarea	Preliminary Channel Length (feet)	Type	Size (feet)	Slope	Area (acres) Subarea	Total	Q (cfs) Subarea	Reach
Line A								
1					13		30	
1-2	600	5	4.00	.0040		13		~~30~~ 19.5 ✓
2					10		30	
2-Jct. Lat.	0	5	4.00	.0040		23		~~55~~ 35 ✓
Jct.Lat.-Jct	400	5	6.00	.0025		36		~~80~~ 50 ✓
Jct.-TD #183	0	5	6.00	.0025		36		~~80~~ 50 ✓
Line B								
3A					10		18	
3A-3B	650					10		18
3B					3		6	
3B-Jct.	200	5	4.00	.0030		13		25
Jct.-Line A	0	5	4.00	.0030		13		25
Line C								
3						87		
3-4	650	5	5.00	.0045		87		95
4					10		15	
4-Proj.1115	0	5	5.00	.0045		97		110
Line D								
5					14		18	
5-6	180	4	2.00	.0056		14		20
6					17		20	
6-7	470	4	3.25	.0022		31		40
7					12		15	
7-City Dr.	0	4	3.75	.0022		43		50

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By:
Date:
Public Services / Public Works

GENERAL NOTES

1. NUMBERS IN CIRCLES INDICATE ITEMS UNDER WHICH PAYMENT WILL BE MADE.
2. ELEVATIONS SHOWN ARE IN FEET ABOVE THE U.S.G.S. MEAN SEA LEVEL DATUM.
3. STATIONS SHOWN ON DRAWINGS ARE ALONG CENTER LINE OF CONDUIT OR ON A LINE NORMAL TO CENTER LINE OF CONDUIT.
4. STATIONS AND INVERT ELEVATIONS OF PIPE INLETS SHOWN ON THE PROFILES ARE AT THE INSIDE FACE OF THE CONDUIT, UNLESS OTHERWISE SHOWN.
5. ALL FIELD BOOK REFERENCES ARE TO CITY OF SOUTH EL MONTE FIELD BOOKS, UNLESS OTHERWISE NOTED.
6. ALL PIPE IN OPEN TRENCH SHALL BE BEDDED ACCORDING TO STANDARD DRAWING 2-D 177, CASE III, EXCEPT BELL AND SPIGOT PIPE WHICH SHALL BE CASE II BEDDING, UNLESS OTHERWISE SHOWN OR MODIFIED IN THE SPECIFICATIONS.
7. PIPE CONNECTIONS TO STORM DRAIN SHALL CONFORM TO STANDARD DRAWINGS 2-D 191 OR 2-D 193, UNLESS OTHERWISE SHOWN.
8. CONCRETE BACKFILL SHALL BE PROVIDED AROUND PIPE 21 INCHES IN DIAMETER OR LESS WHERE THE COVER IS EQUAL TO OR LESS THAN 2'-0", AROUND PIPE GREATER THAN 21 INCHES IN DIAMETER BUT LESS THAN 39 INCHES WHERE THE COVER IS LESS THAN 1'-2", AND FOR PIPE 39 INCHES OR GREATER WHERE THE COVER IS LESS THAN 1'-6". THE CONCRETE BACKFILL SHALL BE AS SPECIFIED ON STANDARD DRAWING NO. 2-D 177, NOTE 3.
9. TIES FOR CATCH BASINS AS SHOWN ON THE DRAWINGS ARE FROM CURB RETURN TO CENTER LINE OF CATCH BASIN, UNLESS OTHERWISE SHOWN.
10. FOR CATCH BASINS WITHOUT LOCAL DEPRESSIONS, CURB FACE SHALL BE THAT OF THE ADJACENT CURB UNLESS OTHERWISE NOTED ON PROJECT DRAWINGS.
11. CURB FACE (C.F.) SHOWN ON THE GENERAL PLAN PERTAINS TO THE CURB FACE AT THE CATCH BASIN OPENING UNLESS OTHERWISE NOTED. FOR LOCAL DEPRESSION NO. 2, THE CURB FACE SHALL BE THE EXISTING PLUS FOUR INCHES UNLESS OTHERWISE SPECIFIED. FOR LOCAL DEPRESSION NO. 4, REFER TO STANDARD DRAWING NO. 2-D 415.
12. LOCATIONS OF CATCH BASIN CONNECTOR PIPE JUNCTIONS WITH CATCH BASINS AS SHOWN ON THE DRAWINGS ARE SCHEMATIC. IT IS INTENDED THAT SUCH JUNCTIONS BE LOCATED AT THE DOWNSTREAM END OF THE CATCH BASIN, UNLESS A DETAIL OF THE CONNECTION IS SHOWN OR A NOTE SPECIFICALLY INDICATES OTHERWISE. IN ALL CASES, THE EXACT LOCATIONS WILL BE DETERMINED IN THE FIELD BY THE ENGINEER TO MEET FIELD CONDITIONS.
13. MONOLITHIC CATCH BASIN CONNECTIONS SHALL BE CONSTRUCTED, WHERE APPLICABLE, PER STANDARD DRAWING 2-D 224.
14. "V_i" IS THE DEPTH OF INLET OF CATCH BASINS IN SERIES MEASURED FROM TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. EXCEPT AS OTHERWISE NOTED, UTILITIES SHOWN ON THESE DRAWINGS ARE OWNED BY THE FOLLOWING AGENCIES:

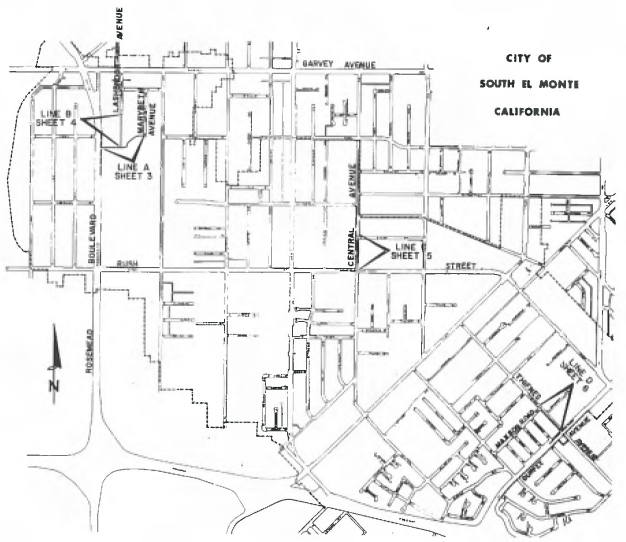
GAS:	SO. CALIFORNIA GAS CO. (DISTRIBUTION LINES)
GAS:	PACIFIC LIGHTING SERVICE CO.(TRANSMISSION LINES)
WATER:	SAN GABRIEL VALLEY WATER CO.
TELEPHONE:	PACIFIC TEL. & TEL. CO.
ELECTRIC:	SO. CALIFORNIA EDISON CO.
SAN SEWERS:	CITY OF SOUTH EL MONTE

16. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
17. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS TO DETERMINE THE DEPTH AND LOCATION OF EXISTING UTILITIES WHERE SO INDICATED BY THE SYMBOL
18. UTILITIES DESIGNATED BY THE SYMBOL "A" WILL BE ABANDONED IN PLACE AND THE OWNER WILL INSTALL A NEW SECTION OF THE AFFECTED UTILITY AT A LOCATION IN CLOSE PROXIMITY TO, BUT WHICH DOES NOT PHYSICALLY INTERFERE WITH, THE PROPOSED STORM DRAIN CONDUIT AND APPURTENANT STRUCTURES.
19. UTILITIES DESIGNATED BY THE SYMBOL # WILL BE REMOVED BY THE OWNER AND THE OWNER WILL REINSTALL A NEW SECTION OF THE AFFECTED UTILITY AT A LOCATION IN CLOSE PROXIMITY TO, BUT WHICH DOES NOT PHYSICALLY INTERFERE WITH, THE PROPOSED STORM DRAIN CONDUIT AND APPURTENANT STRUCTURES.
20. WHERE UTILITIES ARE INDICATED ON THE DRAWINGS TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 2-D 173.1, .2 or .3, UNLESS OTHERWISE INDICATED.
21. LOCATIONS SHOWN ON THE PLANS FOR EXISTING SANITARY SEWER HOUSE CONNECTIONS ARE APPROXIMATE ONLY.
22. SANITARY SEWER HOUSE CONNECTION RECONSTRUCTION AND RECONNECTION SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 2-D 250, UNLESS OTHERWISE SHOWN.
23. SANITARY SEWERS AND HOUSE CONNECTIONS CROSSING OVER THE STORM DRAIN TRENCH SHALL BE SUPPORTED IN ACCORDANCE WITH STANDARD DRAWING 2-D 173.1 to .3 and ENCASED PER GENERAL NOTE 1 ON STANDARD DRAWING 2-D 173.1.
24. WHEN INDICATED ON THE DRAWINGS, SANITARY SEWERS AND HOUSE CONNECTIONS SHALL BE ENCASED OR BLANKETED IN ACCORDANCE WITH STANDARD DRAWING 2-D 251.
25. ALL OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES SHALL BE SEALED WITH 8 INCHES OF BRICK AND MORTAR OR 6 INCHES OF CONCRETE, UNLESS OTHERWISE SHOWN.
26. ALL RESURFACING, CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS, AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED SHALL BE CONSTRUCTED AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
27. REFER TO SHEET 2 FOR TYPICAL CATCH BASIN CONNECTOR PIPE PROFILE.
28. STREET RESURFACING PLANS ARE SHOWN ON SHEET 2 .
29. SOIL TEST BORINGS FOR THIS PROJECT WERE MADE IN MARCH AND JUNE, 1971.
30. AT SIDE OPENING CATCH BASIN LOCATIONS WHERE NO CURB EXISTS, THE CATCH BASIN SHALL BE BUILT WITH A CURB FACE OF 12 INCHES. WHERE THERE IS AN EXISTING CURB WITH A HEIGHT LESS THAN 8 INCHES, THE DEPTH OF DEPRESSION BELOW GUTTER GRADE SHALL BE SUFFICIENT TO PROVIDE AN 8 INCH OPENING INTO THE CATCH BASIN. WHERE THE EXISTING CURB HEIGHT IS 8 INCHES OR MORE, THE CURB FACE AT THE CATCH BASIN SHALL BE THAT OF THE EXISTING CURB HEIGHT PLUS 4 INCHES, UNLESS OTHERWISE SPECIFIED ON THE PROJECT DRAWINGS.
31. ASBESTOS CEMENT PIPE MAY BE USED IN LIEU OF REINFORCED CONCRETE PIPE FOR PIPE 42" OR LESS IN DIAMETER
32. THE REQUIRED D-LOAD FOR THE ASBESTOS CEMENT PIPE SHALL BE 1.5 TIMES THAT SPECIFIED ON THE PLANS FOR THE REINFORCED CONCRETE PIPE
33. DESIGN OF THE PIPE SHOWN HEREON IS BASED ON THE ASSUMPTION THE PIPE WILL BE INSTALLED IN ACCORDANCE WITH CASE III BEDDING AS SHOWN ON STANDARD DRAWING 2-D 177 UNLESS OTHERWISE SHOWN. "M" VALUES SHALL BE AS SPECIFIED ON STANDARD DRAWING 2-D 177 FOR CASE III BEDDING, NOTES 3(a), 3(b), AND 3(c). IF THE "M" VALUE AT THE TOP OF THE PIPE IS EXCEEDED, THE BEDDING SHALL BE MODIFIED, AND/OR PIPE OF ADDITIONAL STRENGTH SHALL BE PROVIDED. THE PROPOSED MODIFICATION SHALL BE APPROVED BY THE DISTRICT.

STANDARD DRAWINGS

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

	Drawing No
LOCAL DEPRESSION NO. 2	2-D88
STANDARD DROP STEP	2-D96
MANHOLE NO. 1	2-D102
CONCRETE RINGS, REDUCER, AND PIPE FOR MANHOLE SHAFT	2-D107
JUNCTION STRUCTURE NO. 2	2-D112
MANHOLE NO. 4	2-D113
MANHOLE FRAME AND COVER FOR CATCH BASINS	2-D156
CATCH BASIN REINFORCEMENT FOR ROUND MANHOLES	2-D157
CATCH BASIN NO. 1	2-D160
CATCH BASIN NO. 2	2-D162
CATCH BASIN NO. 3	2-D163
STANDARD A-615 REINFORCING BARS	2-D171
CATCH BASIN REINFORCEMENT	2-D172
PIPE SUPPORTS ACROSS TRENCHES	2-D173 1 to 3
REMOVABLE PROTECTION BAR FOR CATCH BASINS	2-D175
PIPE BEDDING IN TRENCHES	2-D177
STANDARD NON-ROCKING MANHOLE FRAME AND COVER	2-D181
MANHOLE NO. 2	2-D184
PAVEMENT REMOVAL, EXCAVATION, BACKFILL AND RESURFACING IN STATE HIGHWAYS	2-D187
PIPE CONNECTIONS TO EXISTING STORM DRAINS	2-D190
JUNCTION STRUCTURE NO. 4	2-D193
CONNECTION TO CATCH BASINS FOR PIPE 12" THROUGH 72"	2-D224
FRAME AND GRATING FOR CATCH BASIN	2-D227
DETAIL OF CATCH BASIN OPENING	2-D232
LOCAL DEPRESSION NO. 3	2-D248
REMODELING OF SANITARY SEWER HOUSE CONNECTIONS	2-D250
PROTECTION FOR MAIN LINE AND HOUSE CONNECTION SEWERS	2-D251
ADJUSTABLE PROTECTION BAR STIRRUP	2-D264
CONCRETE COLLAR	2-D393
CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS	2-D399
SAMPLE SHEET FOR USE AS A GUIDE IN PREPARING CALCULATIONS FOR SHORING OF EXCAVATIONS	2-D400
UNIFIED SOIL CLASSIFICATION SYSTEM	2-D413
LOCAL DEPRESSION NO. 4	2-D415
MODIFICATIONS FOR SIDE OPENING CATCH BASINS	2-D461



LOCATION MAP

——— PROPOSED STORM DRAIN
– – – EXISTING STORM DRAIN

INDEX TO DRAWINGS

■ AS BUILT DWGS.
1970 STORM DRAIN BOND ISSUE

APPROVED AS TO CITY OF SOUTH EL MONTE
CITY ADMINISTRATOR
DATE 1-11-72

PREPARED IN THE OFFICE OF
LC (Larry) BEVINGTON, CIVIL ENGINEER
BY Lawrence C. Bevington R.E. 9480 DATE 1-28-72

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PROJECT NO. 7750
SOUTH EL MONTE
LINES A B C & D,
LOCATION MAP, INDEX TO DRAWINGS,
GENERAL NOTES & STANDARD DRAWINGS

DESIGNED BY [illegible] DATE NOV'72
DRAWN BY [illegible] CHECKED BY [illegible] DATE 1-2-72
RECOMMENDED FOR APPROVAL [illegible] DATE 1-2-72
NO. 470-7750-D2-1
SHEET 1 OF 8

"AS BUILT" DRAWING

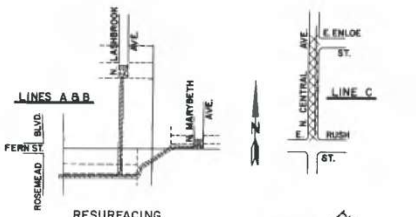
REVISIONS

NO	DATE	DESCRIPTION

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL

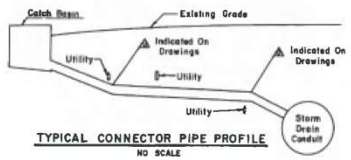
G-28

26



RESURFACING SCHEDULE

	EXISTING PAVEMENT	RESURFACING PAVEMENT
	1" AC	2" AC
	2 AC	3" AC
	3" AC ON 6" CAB	4" AC ON 6" CAB
	5" AC	6" AC
	55" AC ON .55" CLASS 2 BASE ON 1.0' CLASS 4 SUBBASE	PER 2-D187
	2" AC ON 4" CAB	3" AC ON 4" CAB
	3" AC ON 17" CAB	4" AC ON 17" CAB



TYPICAL CONNECTOR PIPE PROFILE

NO SCALE

NOTES:

1. THE CHANGE IN GRADE OF THE CONNECTOR PIPE MAY OCCUR EITHER OVER OR UNDER AN EXISTING UTILITY. THE PARTICULAR UTILITY AT WHICH THE CHANGE IN GRADE OCCURS, IS NOTED ON THE PROJECT DRAWINGS. AT LOCATIONS WHERE UTILITY CROSSINGS ARE MARKED ⚠, THE CONNECTOR PIPE GRADE WILL BREAK OVER THE UTILITY. AT LOCATIONS WHERE THE UTILITY CROSSINGS ARE MARKED ⚠, THE CONNECTOR PIPE GRADE WILL BREAK UNDER THE UTILITY.
2. ON THOSE CONNECTOR PIPES WHERE CHANGE IN GRADE IS NOT INDICATED, IT IS ASSUMED THAT THE CONNECTOR PIPE CAN BE LAID ON A STRAIGHT GRADE FROM THE CATCH BASIN TO THE STORM DRAIN WITHOUT INTERFERENCE WITH UTILITIES.
3. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS TO DETERMINE THE EXACT LOCATION AND DEPTH OF UTILITIES, EXCEPT SANITARY SEWER, WHICH ARE MARKED ⚠ or ⚠. AFTER THE EXACT LOCATION OF A UTILITY HAS BEEN DETERMINED, THE GRADE AND ALIGNMENT OF THE CONNECTOR PIPE WILL BE STAKED SO AS TO CLEAR THE UTILITY.
4. WHERE CONNECTOR PIPE HAS A GRADE CHANGE EXCEEDING 5% OR DIFFERS IN DIAMETER FROM THAT OF EXISTING PIPE, USE CONCRETE COLLAR AS PER STANDARD DRAWING 2-D393.

THESE LOCATIONS WILL BE MARKED y

REVISIONS		
NO.	DATE	DESCRIPTION

LEGEND

- FIRE HYDRANT
- POWER POLE
- TELEPHONE POLE
- ANCHOR GUY
- WATER VALVE
- GAS VALVE
- SANITARY SEWER MANHOLE
- WATER METER
- SIDE INLET CATCH BASIN W/L. D.
- SIGN
- STREET LIGHT
- SPRINKLER HEAD
- GRATING TYPE CATCH BASIN W/L. D.
- TRAFFIC LIGHT
- DRIVEWAY
- TREE
- PALM TREE
- TEST BORING
- BENCH MARK
- TELEPHONE MANHOLE
- GUTTER
- CURB
- SIDEWALK
- PROPERTY LINE
- WATER LINE
- GAS LINE
- SANITARY SEWER
- TELEPHONE M. T. D.
- PULL BOX

ABBREVIATIONS

A. C. D.	ASBESTOS CEMENT CONDUIT
A. C.	ASPHALTIC CONCRETE
B. M.	BENCH MARK
B. C.	BEGINNING OF CURVE
C. B.	CATCH BASIN
C. L. F.	CHAIN LINK FENCE
CONC.	CONCRETE
C. M. P.	CORRUGATED METAL PIPE
CB	CURB
C. F.	CURB FACE
DR.	DRIVE
ELEC.	ELECTRIC
EL.	ELEVATION
E. C.	END OF CURVE
EXIST.	EXISTING
FL.	FLOW LINE
F. H.	FIRE HYDRANT
G. M.	GAS METER
G.	GAS
GR.	GRATE
H. L.	HOUSE LATERAL
J. S.	JUNCTION STRUCTURE
I. P.	IRON PIPE
LAT.	LATERAL
L. A. CO.	LOS ANGELES COUNTY
L. D.	LOCAL DEPRESSION
M. H.	MANHOLE
M. T. D.	MULTIPLE TILE CONDUIT
O. L. C.	ORNAMENTAL LIGHT CONDUIT
P. C. C.	PORTLAND CEMENT CONCRETE
P. R. C.	POINT OF REVERSE CURVE
P. P.	POWER POLE
PVMT.	PAVEMENT
R. C. P.	REINFORCED CONCRETE PIPE
REM.	REMOVE
R/W	RIGHT-OF-WAY
SEWER	SANITARY SEWER
STA. PT.	STATION POINT
S. T. D	SINGLE TILE CONDUIT
TEL.	TELEPHONE
T. P.	TELEPHONE POLE
T. B.	TEST BORING
T. C. EL.	TOP OF CURB ELEVATION
T. S.	TRANSITION STRUCTURE
TS	TRAFFIC SIGNAL
V. C. P.	VITRIFIED CLAY PIPE
W.	WATER
W. M.	WATER METER

PREPARED IN THE OFFICE OF
L C (Larry) BEVINGTON, CIVIL ENGINEER
BY Laurence C Bevington R.E. 6429 DATE 1-28-72

1970 STORM DRAIN BOND ISSUE

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

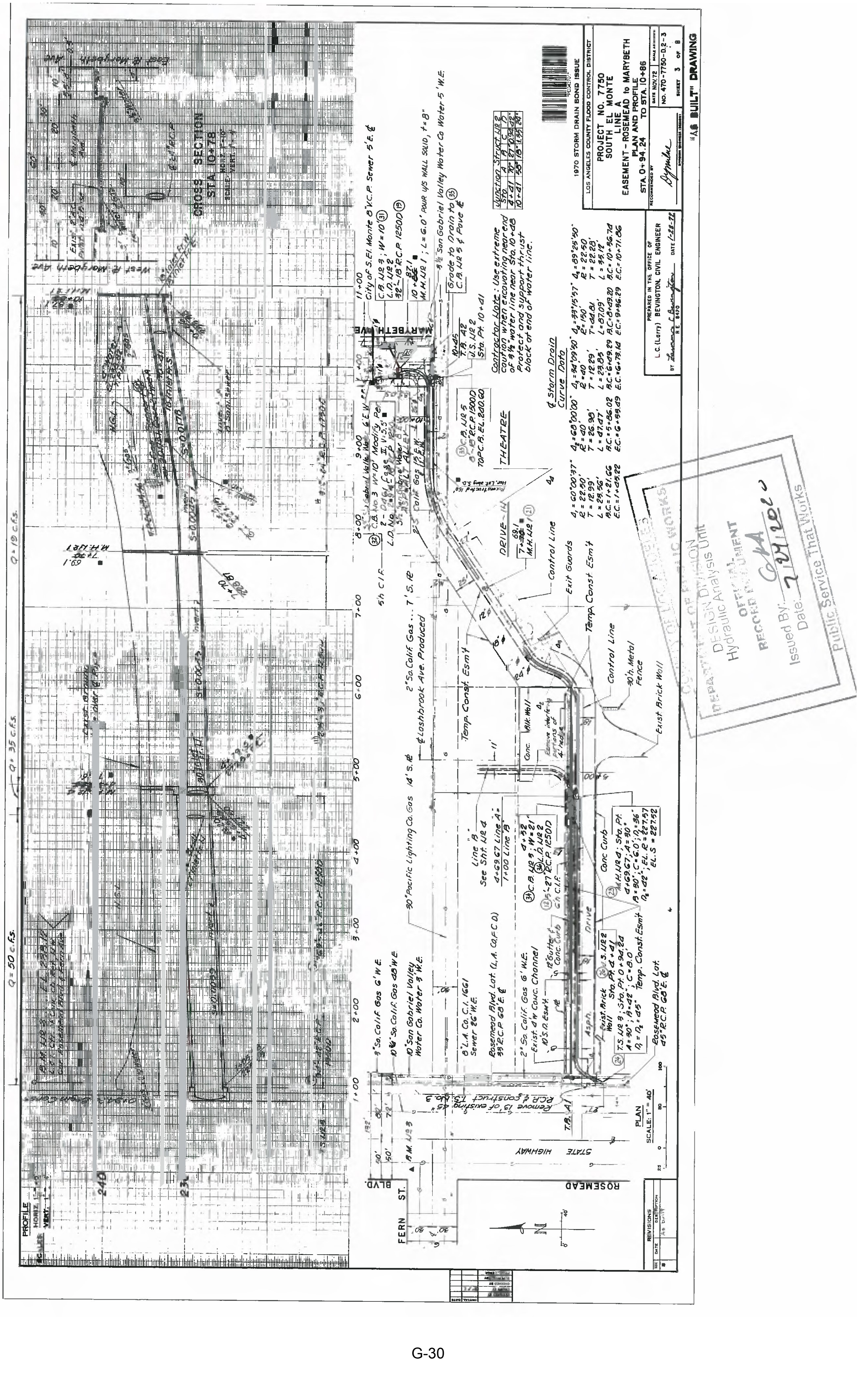
PROJECT NO. 7750
SOUTH EL MONTE

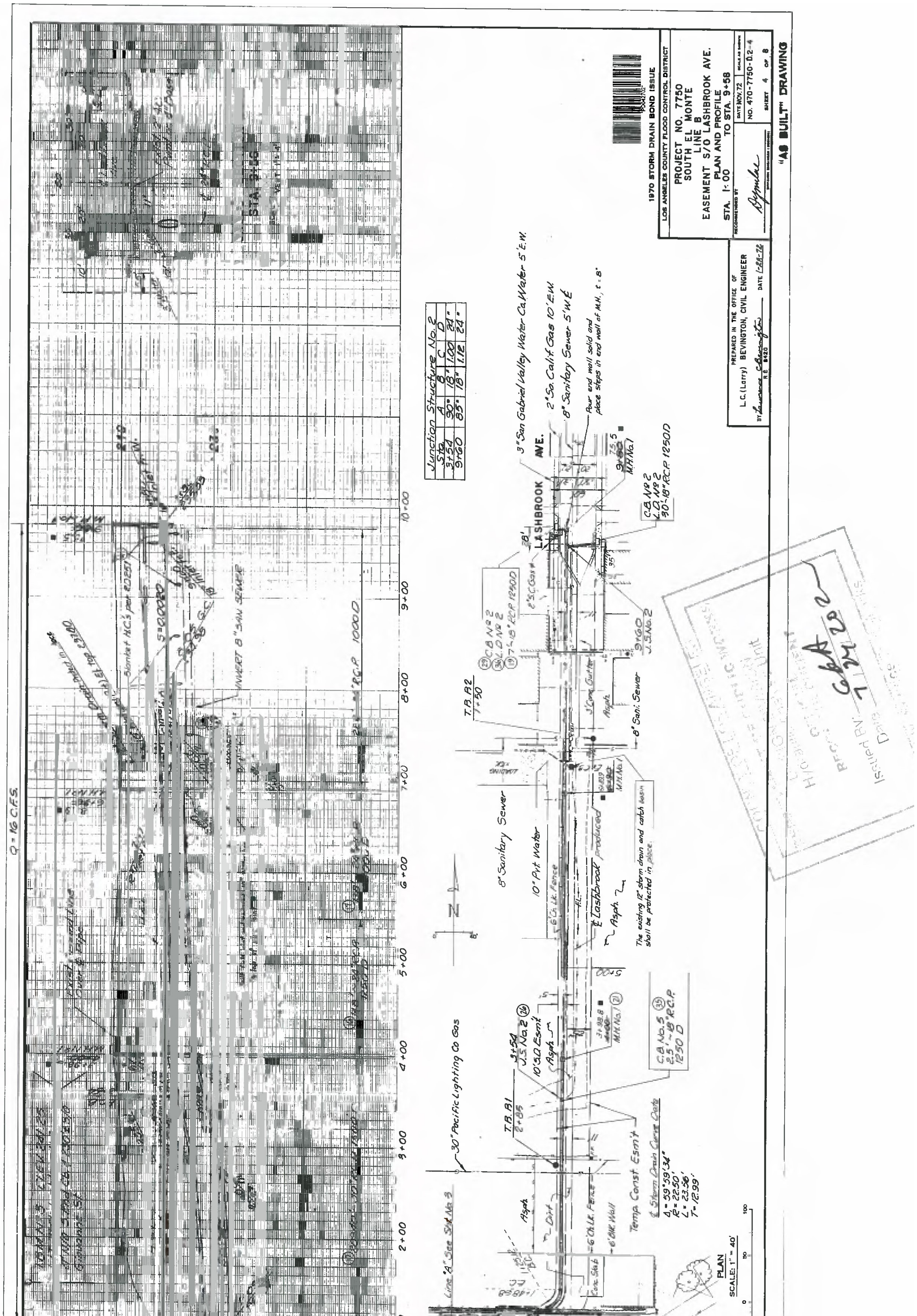
RESURFACING SCHEDULE, ABBREVIATIONS, LEGEND & MISCELLANEOUS DETAILS

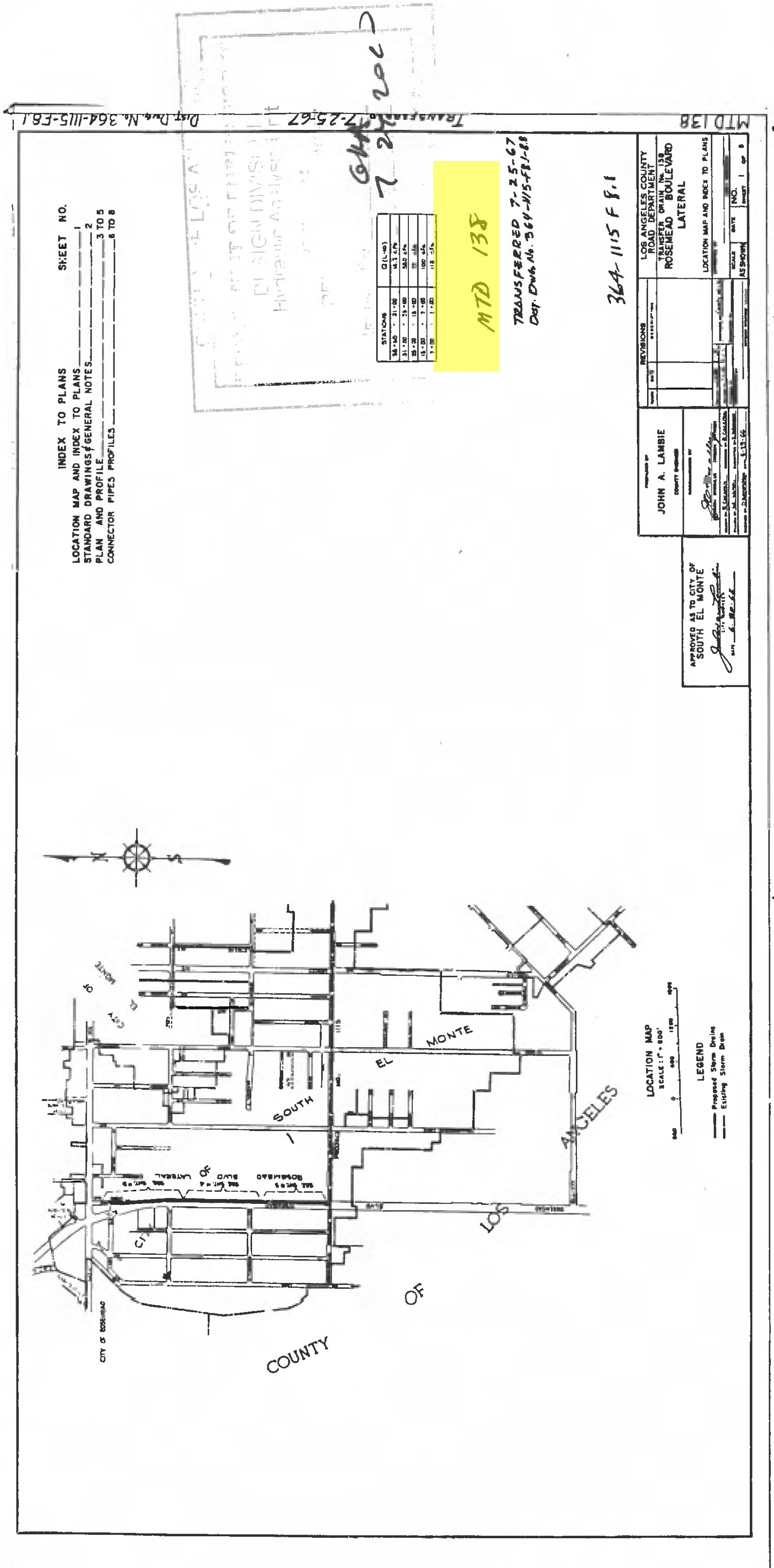
RECOMMENDED BY
DATE NOV. 72
NO. 470-7750-D.2-2
SHEET 2 OF 8

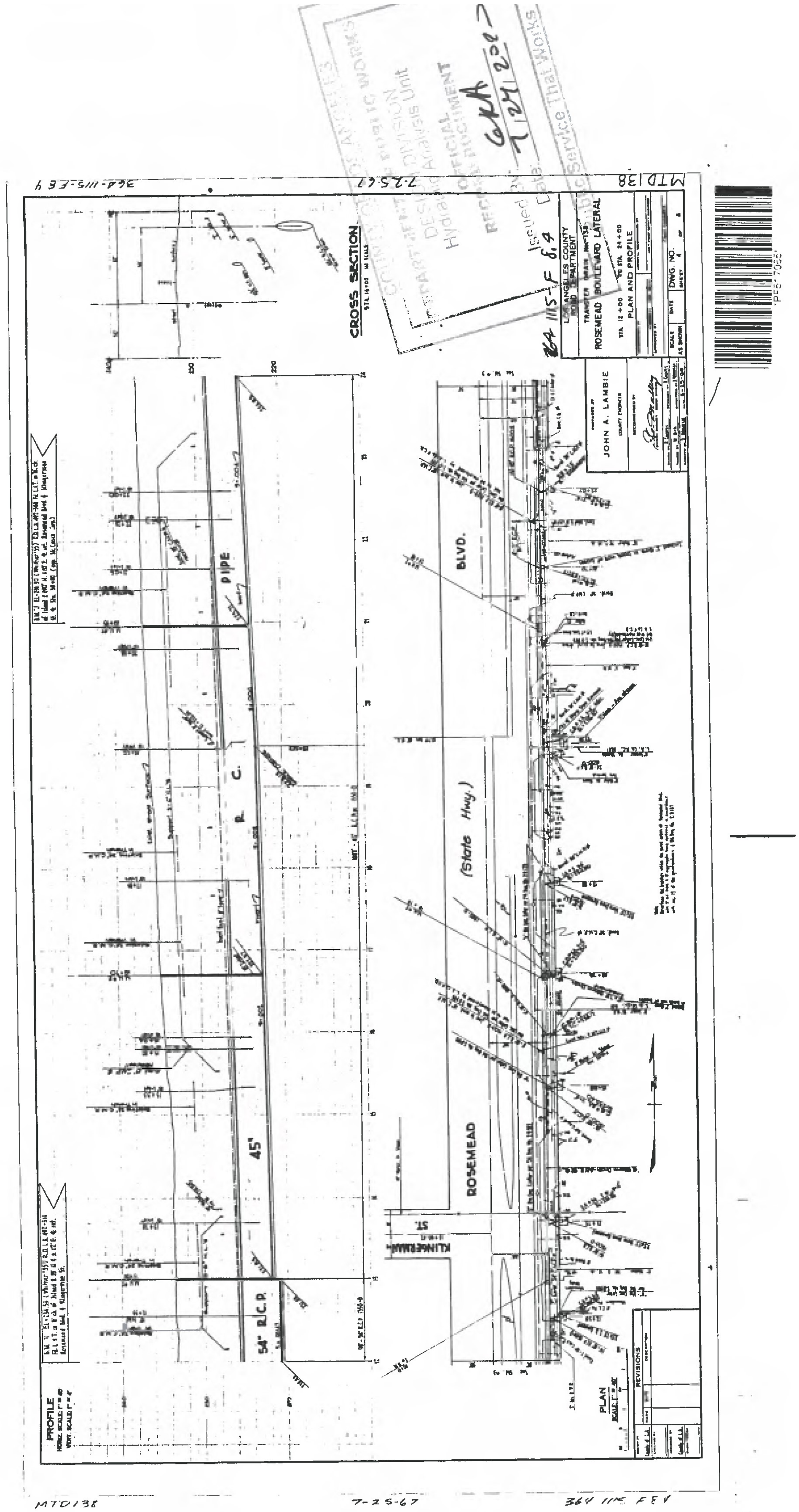
"AS BUILT" DRAWING

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By: GHH
Date: 7 24 2020

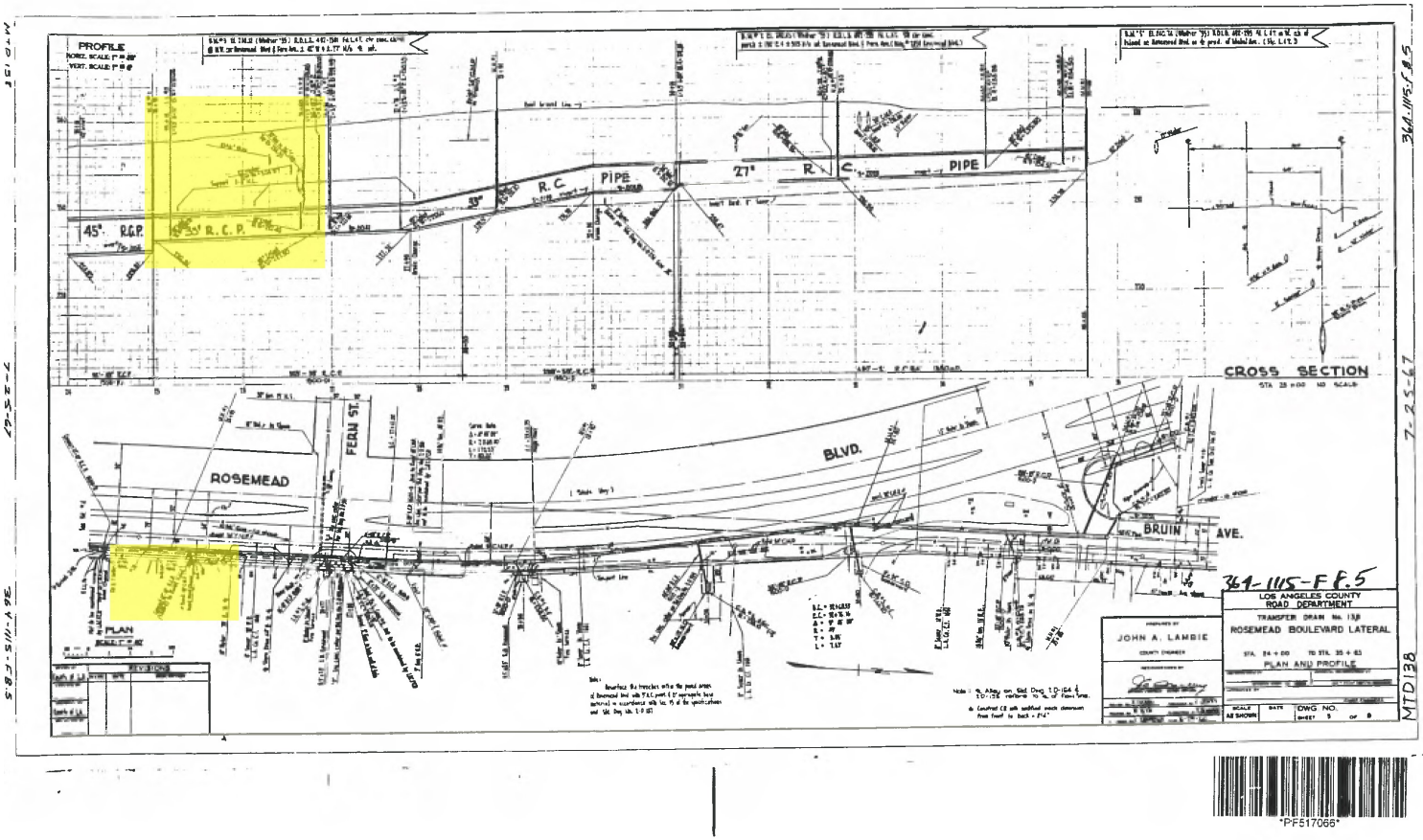

1970 STORM DRAIN BOND ISSUE
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
PROJECT NO. 7750
SOUTH EL MONTE
LINE A
EASEMENT - ROSEMEAD to MARYBETH
PLAN AND PROFILE
STA 0+94.24 TO STA 10+86
"AS BUILT" DRAWING


1970 STORM DRAIN BOND ISSUE
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
PROJECT NO. 7750
SOUTH EL MONTE
LINE B
EASEMENT S/O LASHBROOK AVE.
PLAN AND PROFILE
STA. 1+00 TO STA. 9+58
SHEET 4 OF 8
NO. 470-7750-D2-4
"AS BUILT" DRAWING
PREPARED IN THE OFFICE OF
L.C. (Larry) BEVINGTON, CIVIL ENGINEER
LASHBROOK AVE.
Junction Structure No. 2
PLAN
PROFILE
8" Sanitary Sewer
10" Pit Water
30" Pacific Lighting Co Gas
3" San Gabriel Valley Water Co. Water 5' E.W.
2" So. Calif Gas 10' E.W.
8" Sanitary Sewer 5' W ℄
Temp Const Esm't
REVISIONS


INDEX TO PLANS
SHEET NO.
LOCATION MAP AND INDEX TO PLANS 1
STANDARD DRAWINGS & GENERAL NOTES 2
PLAN AND PROFILE 3 TO 5
CONNECTOR PIPES PROFILES 6 TO 8
N
S
CITY OF ROSEMEAD
CITY OF EL MONTE
SOUTH EL MONTE
COUNTY OF LOS ANGELES
ROSEMEAD BLVD
LATERAL OF
LOCATION MAP
SCALE: 1" = 600'
LEGEND
Proposed Storm Drains
Existing Storm Drain
STATIONS
Q(L-10)
MTD 138
TRANSFERRED 7-25-67
Dist. Dwg. No. 364-1115-F8.1-8.8
364-1115 F 8.1
APPROVED AS TO CITY OF SOUTH EL MONTE
JOHN A. LAMBIE
REVISIONS
LOS ANGELES COUNTY ROAD DEPARTMENT
TRANSFER DRAIN No. 138
ROSEMEAD BOULEVARD LATERAL
LOCATION MAP AND INDEX TO PLANS
AS SHOWN
MTD 138
Dist. Dwg. No. 364-1115-F8.1
PF517062


CROSS SECTION
PROFILE
PLAN
REVISIONS
ROSEMEAD
BLVD.
(State Hwy.)
KLINGERMAN ST.
45" R.C. PIPE
54" R.C.P.
LOS ANGELES COUNTY ROAD DEPARTMENT
ROSEMEAD BOULEVARD LATERAL
PLAN AND PROFILE
JOHN A. LAMBIE
COUNTY ENGINEER
MTD138
7-25-67
364-1115-F8 4

31



Appendix D
ADS StormTech BMP Design Details

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

ADVANCED DRAINAGE SYSTEMS, INC.

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S EL MONTE_SUBAREA A

S EL MONTE, CA

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

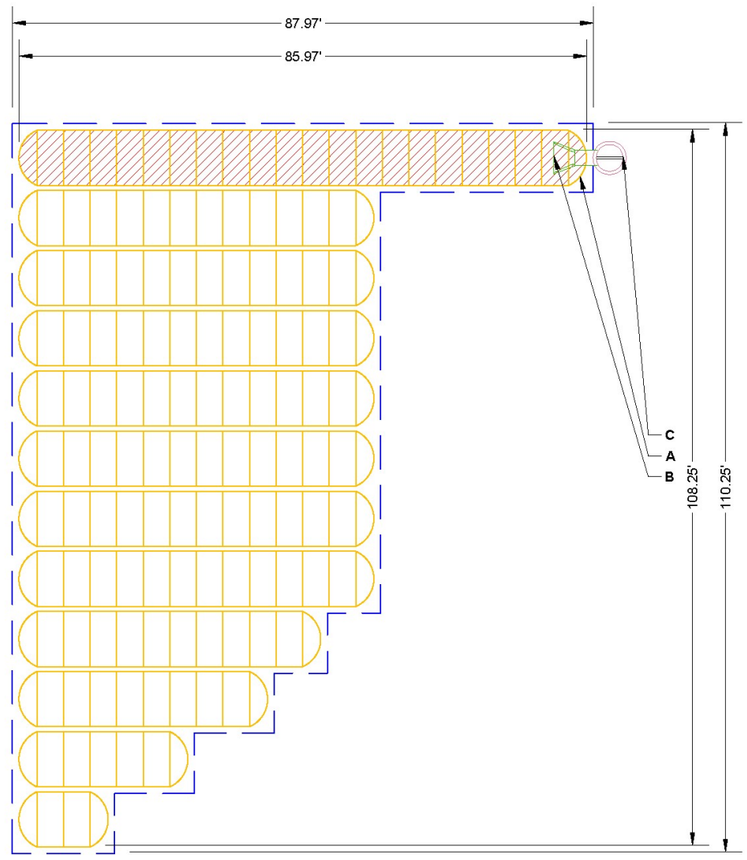
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
129	STORMTECH MC-4500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	43.00
24	STORMTECH MC-4500 END CAPS	TOP OF STONE:	38.50
30	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	38.50
12	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	38.00
40	STONE VOID	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	38.00
27989	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	38.00
		TOP OF MC-4500 CHAMBER:	36.00
		24" ISOLATOR ROW PLUS INVERT:	31.19
		BOTTOM OF MC-4500 CHAMBER:	31.00
5640	SYSTEM AREA (SF)	BOTTOM OF STONE:	30.00
396.4	SYSTEM PERIMETER (ft)		

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.26"	
FLAMP	B	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MC450024RAMP		
CONCRETE STRUCTURE W/WEIR	C	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		



ISOLATOR ROW PLUS (SEE DETAIL)

NO WOVEN GEOTEXTILE

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

S EL MONTE_SUBAREA A
S EL MONTE, CA

DATE: 12/7/2020 | DRAWN: JT | PROJECT #: | CHECKED: N/A

REV	DRW	CHK	DESCRIPTION

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4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

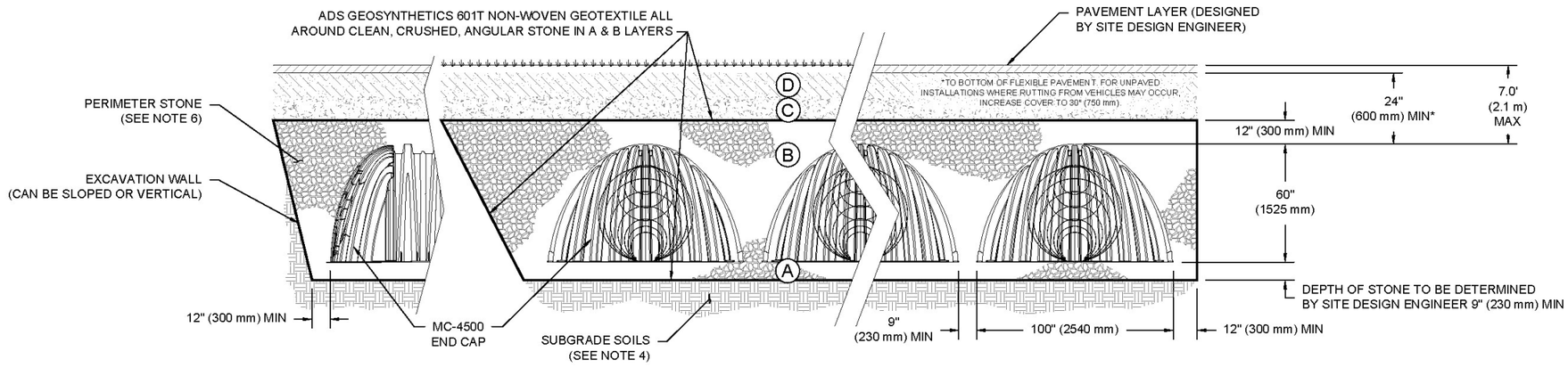
0 20' 40'

SHEET
2 OF 5

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

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2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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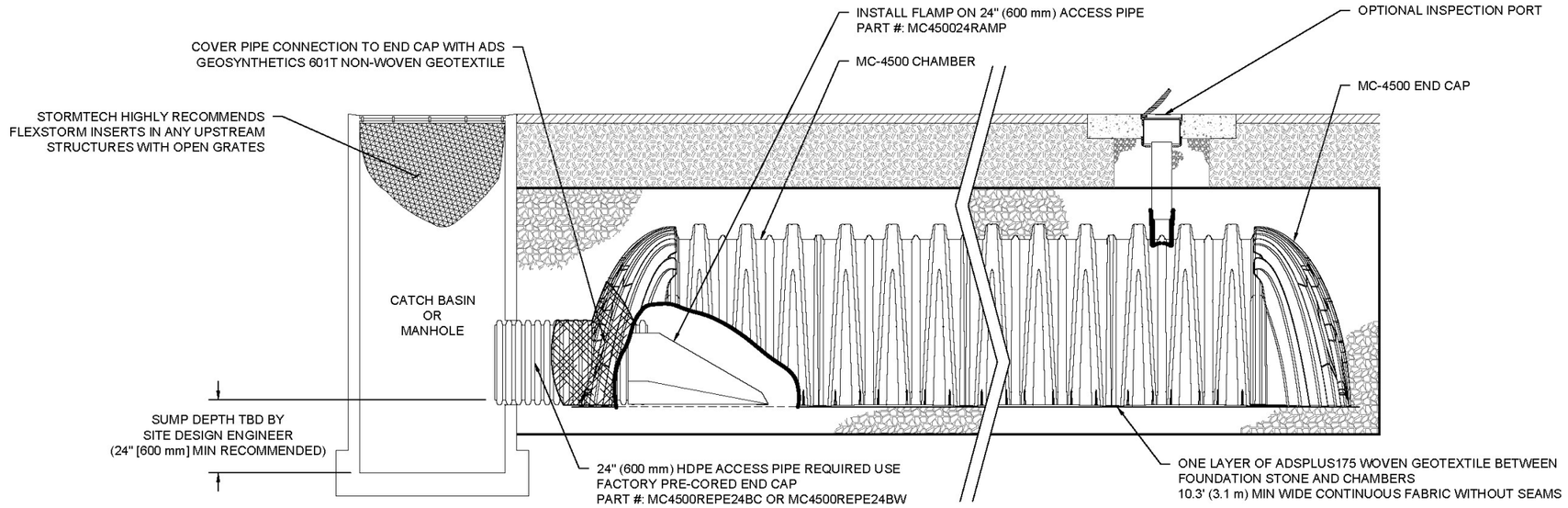

MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

S EL MONTE_SUBAREA A
S EL MONTE, CA

REV	DRW	CHK	DESCRIPTION

DATE: 12/7/2020 | DRAWN: JT | CHECKED: N/A
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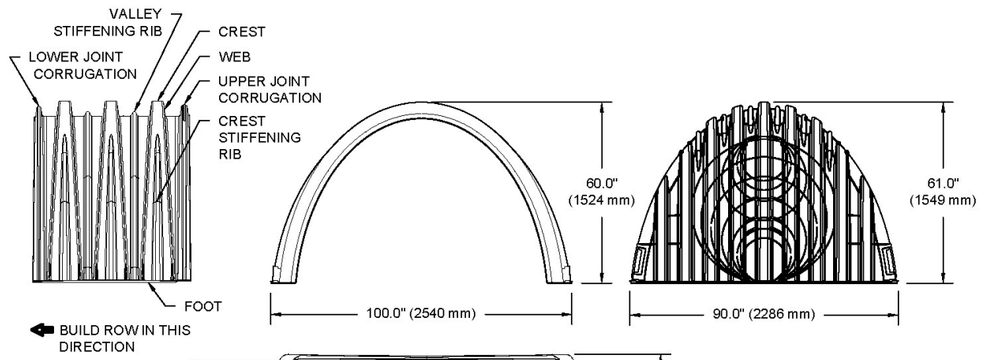
SHEET
4 OF 5

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

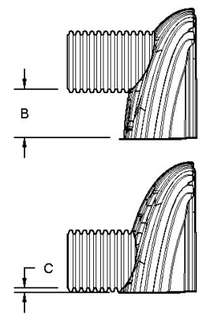
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

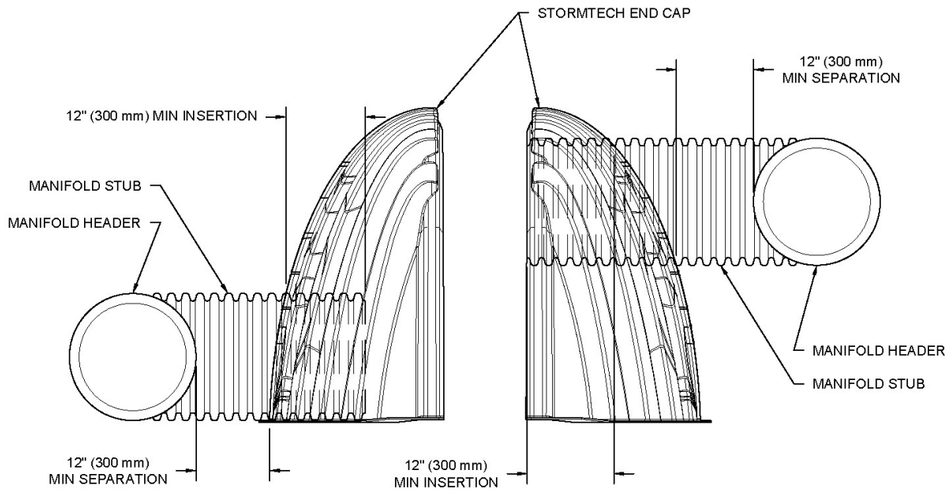
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

S EL MONTE_SUBAREA A
S EL MONTE, CA

DATE: 12/7/2020 | DRAWN: JT | PROJECT #: | CHECKED: N/A

REV	DRW	CHK	DESCRIPTION

StormTech®
Detention • Retention • Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS®
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

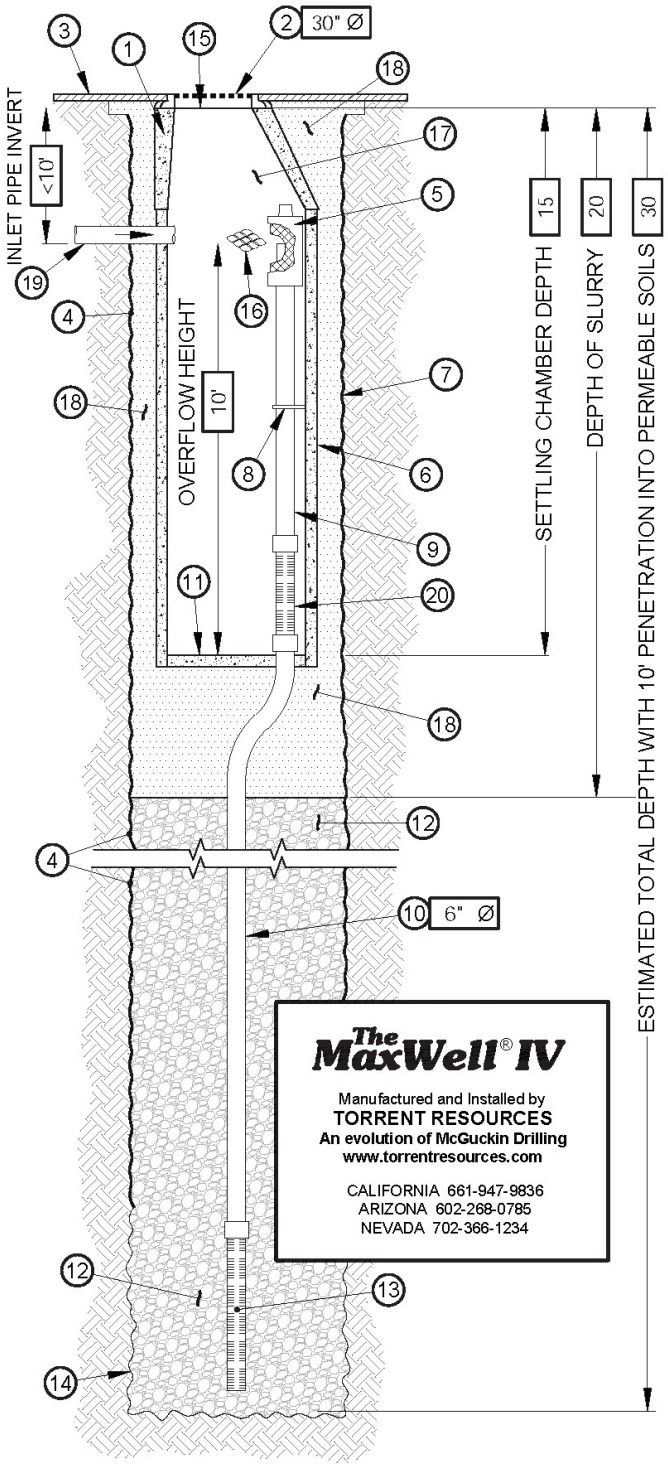
SHEET
5 OF 5

Appendix E
MaxWell Plus Dry Well BMP Design Details

The MaxWell® IV Drainage System Detail And Specifications

ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE** - DIAMETER AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **GRADED BASIN OR PAVING** (BY OTHERS).
4. NON-WOVEN GEOTEXTILE SLEEVE, MIRAFITM/ 140 NL. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
5. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL .265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
6. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE**.
7. **MIN. 6' Ø DRILLED SHAFT**.
8. **SUPPORT BRACKET** - FORMED 12 GA. STEEL. **FUSION BONDED EPOXY COATED**.
9. **OVERFLOW PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
10. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. **SUSPEND PIPE** DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
11. **BASE SEAL** - GEOTEXTILE OR CONCRETE SLURRY.
12. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO **BEST COMPLEMENT SOIL CONDITIONS**.
13. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 120" OVERALL LENGTH WITH TRI-B COUPLER.
14. **MIN. 6' Ø SHAFT** - DRILLED TO **MAINTAIN PERMEABILITY** OF DRAINAGE SOILS.
15. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, TWO PER CHAMBER.
17. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE OVERFLOW PIPE INLET.
18. STABILIZED BACKFILL - SIX-SACK SLURRY MIX.
19. **INLET PIPE** (BY OTHERS).
20. **INTAKE SCREEN** - 6" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 48" OVERALL LENGTH WITH TRI-C END CAP.

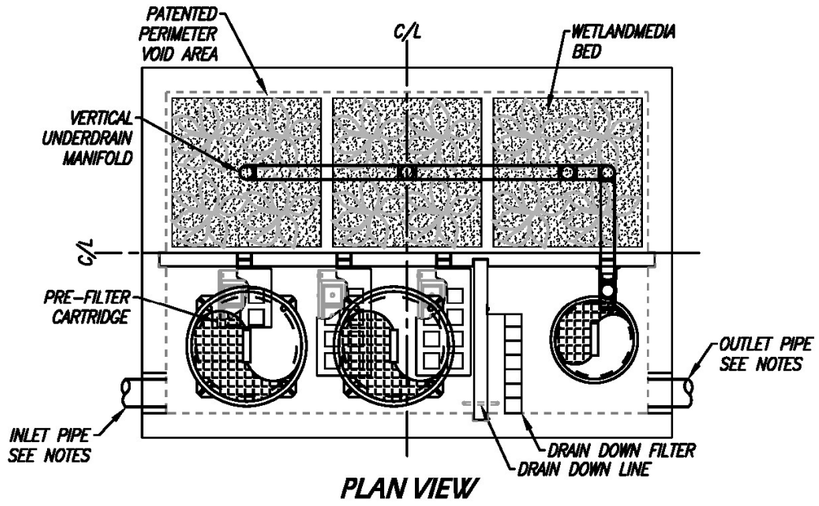


AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
CA Lic. 528080, C-42, HAZ
NV Lic. 0035350 A - NM Lic. 90504 GF04

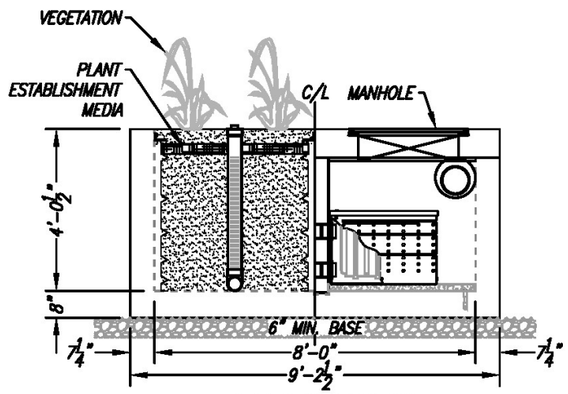
U.S. Patent No. 4,923,330 - ™ Trademark 1974, 1990, 2004

Appendix F
BioClean Modular Wetland BMP Design Details

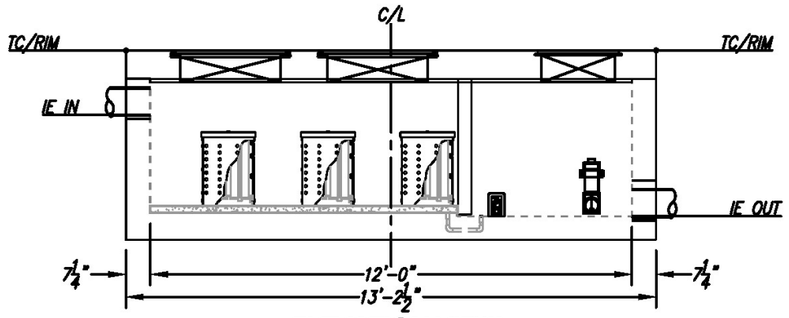
SITE SPECIFIC DATA			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			7.26
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.66"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



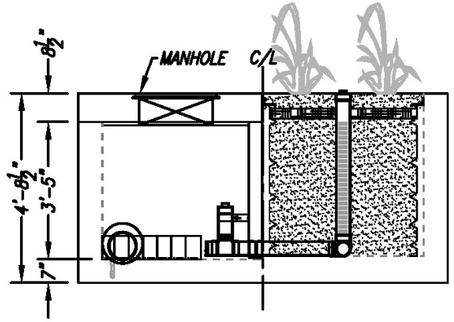
PLAN VIEW



LEFT END VIEW
BIOFILTRATION/PRETREATMENT



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE/BIOFILTRATION

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 MANUFACTURERS 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 TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

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

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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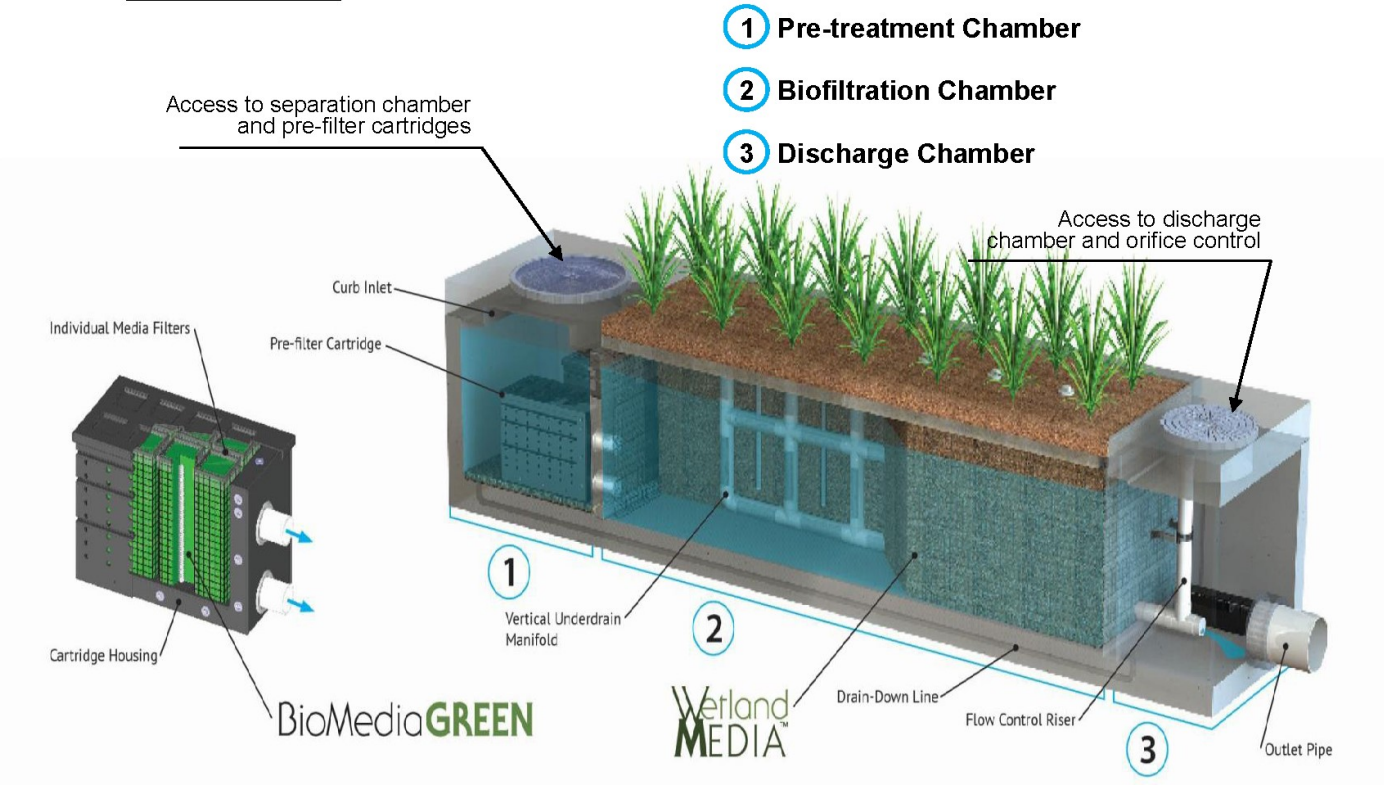
MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

Inspection Guidelines for Modular Wetland System - Linear

Inspection Summary

- Inspect Pre-Treatment, Biofiltration and Discharge Chambers – average inspection interval is 6 to 12 months.
  - (*15 minute average inspection time*).
- NOTE: Pollutant loading varies greatly from site to site and no two sites are the same. Therefore, the first year requires inspection monthly during the wet season and every other month during the dry season in order to observe and record the amount of pollutant loading the system is receiving.

System Diagram



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Inspection Overview

As with all stormwater BMPs inspection and maintenance on the MWS Linear is necessary. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance a BMP will exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the MWS Linear:

- Modular Wetland Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure.
- Protective clothing and eye protection.
- 7/16” open or closed ended wrench.
- Large permanent black marker (initial inspections only – first year)
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system.

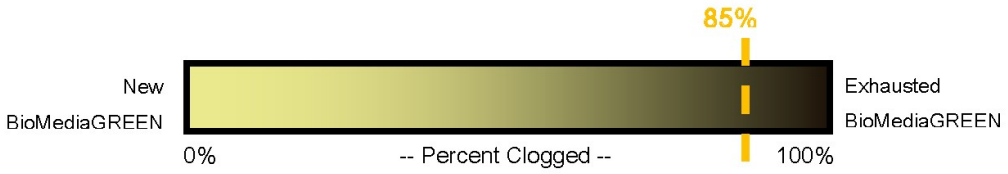
Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the MWS Linear are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long term inspection and maintenance interval requirements.

The MWS Linear can be inspected though visual observation without entry into the system. All necessary pre-inspection steps must be carried out before inspection occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once these access covers have been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the system through the access hatches. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the system and all of its chambers.
- Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, debris and sediment accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick estimate the amount of trash, debris and sediment in this chamber. Record this depth on the inspection form.

- Through visual observation inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediments on the cartridges, any build-up on the top of the cartridges, or clogging of the holes. Record this information on the inspection form. The pre-filter cartridges can further be inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber – see notes above regarding confined space entry). Record the color of the material. New material is a light green in color. As the media becomes clogged it will turn darker in color, eventually becoming dark brown or black. Using the below color indicator record the percentage of media exhausted.



- The biofiltration chamber is generally maintenance free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection and indicate through visual observation or digital photographs if trimming of the vegetation is needed.
- The discharge chamber houses the orifice control structure, drain down filter and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the Pre-Filter Cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL). The water level of the flowing water should be compared to the watermark level on the side walls which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form is there is any difference in level from watermark in inches.

- NOTE: During the first few storms the water level in the outflow chamber should be observed and a 6" long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where a line should be drawn. This line is a reference point for future inspections of the system:

Using a permanent marker draw a 6 inch long horizontal line, as shown, at the higher water level in the MWS Linear discharge chamber.

- Water level in the discharge chamber is a function of flow rate and pipe size. Observation of water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when system is at 100% capacity (water level at maximum level in pre-treatment chamber). If future water levels are below this mark when system is at 100% capacity this is an indicator that maintenance to the pre-filter cartridges may be needed.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges.
- Obstructions in the system or its inlet or outlet.
- Excessive accumulation of floatables in the pre-treatment chamber in which the length and width of the chamber is fully impacted more than 18".

- Excessive accumulation of sediment in the pre-treatment chamber of more than 6" in depth.

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pre-filter cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged replacement is required.

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter. The following photos show of the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged replacement is required.

- Overgrown vegetation.

- Water level in discharge chamber during 100% operating capacity (pre-treatment chamber water level at max height) is lower than the watermark by 20%.

Inspection Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

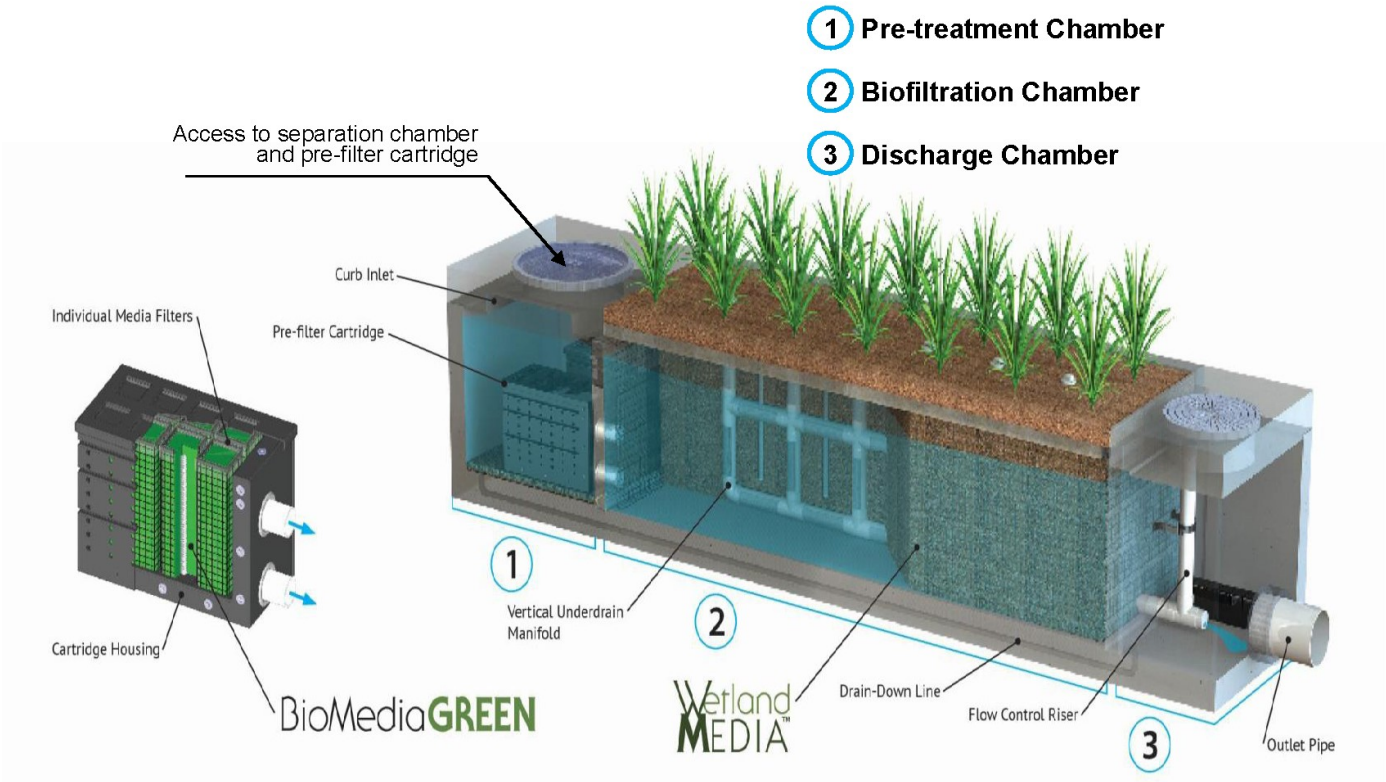
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Sediment from Pre-Treatment Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Pre-Filter Cartridge Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



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Maintenance Overview

The time has come to maintain your Modular Wetland System Linear (MWS Linear). To ensure successful and efficient maintenance on the system we recommend the following. The MWS Linear can be maintained by removing the access hatches over the systems various chambers. All necessary pre-maintenance steps must be carried out before maintenance occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once traffic control has been set up per local and state regulations and access covers have been safely opened the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepare a pre-checks (OSHA, safety, confined space entry) are performed.

Maintenance Equipment

Following is a list of equipment required for maintenance of the MWS Linear:

- Modular Wetland Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight and eye protection.
- 7/16" open or closed ended wrench.
- Vacuum assisted truck with pressure washer.
- Replacement BioMediaGREEN for Pre-Filter Cartridges if required (order from manufacturer).

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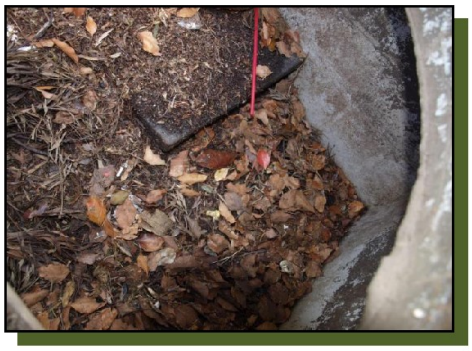
Maintenance Steps

1. Pre-treatment Chamber (bottom of chamber)

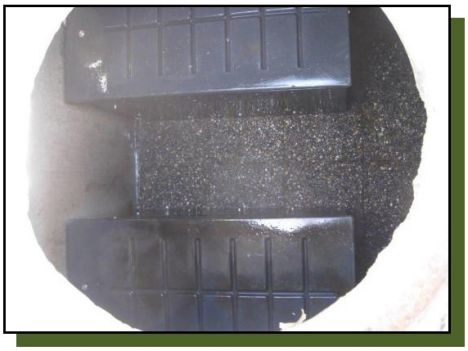
   A. Remove access hatch or manhole cover over pre-treatment chamber and position vacuum truck accordingly.
   B. With a pressure washer spray down pollutants accumulated on walls and pre-filter cartridges.
   C. Vacuum out Pre-Treatment Chamber and remove all accumulated pollutants including trash, debris and sediments. Be sure to vacuum the floor until pervious pavers are visible and clean.
   D. If Pre-Filter Cartridges require media replacement move onto step 2. If not, replace access hatch or manhole cover.



Removal of access hatch to gain access below.

Insertion of vacuum hose into separation chamber.

Removal of trash, sediment and debris.



Fully cleaned separation chamber.

2. Pre-Filter Cartridges (attached to wall of pre-treatment chamber)

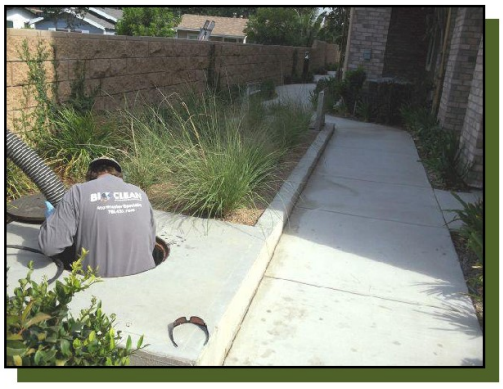
A. After finishing step 1 enter pre-treatment chamber.

B. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.

Pre-filter cartridges with tops on.

Inside cartridges showing media filters ready for replacement.

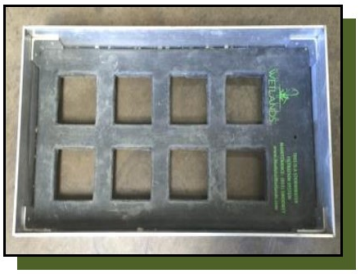
C. Place the vacuum hose over each individual media filter to suck out filter media.



Vacuuming out of media filters.

D. Once filter media has been sucked use a pressure washer to spray down inside of the cartridge and it's containing media cages. Remove cleaned media cages and place to the side. Once removed the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.

E. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture provided refilling trey and place on top of cartridge. Fill trey with new bulk media and shake down into place. Using your hands slightly compact media into each filter cage. Once cages are full removed refilling trey and replace cartridge top ensuring bolts are properly tightened.



Refilling trey for media replacement.

Refilling trey on cartridge with bulk media.

F. Exit pre-treatment chamber. Replace access hatch or manhole cover.

3. Biofiltration Chamber (middle vegetated chamber)

A. In general, the biofiltration chamber is maintenance free with the exception of maintaining the vegetation. Using standard gardening tools properly trim back the vegetation to healthy levels. The MWS Linear utilizes vegetation similar to surrounding landscape areas therefore trim vegetation to match surrounding vegetation. If any plants have died replace plants with new ones:

4. Discharge Chamber (contains drain down cartridge & connected to pipe)

A. Remove access hatch or manhole cover over discharge chamber.

B. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and left up drain down filter housing to remove used BioMediaGREEN filter block as shown below:

C. Insert new BioMediaGREEN filter block and lock drain down filter housing back in place. Replace access hatch or manhole cover over discharge chamber.

Inspection Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration 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 not require irrigation after initial establishment.

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

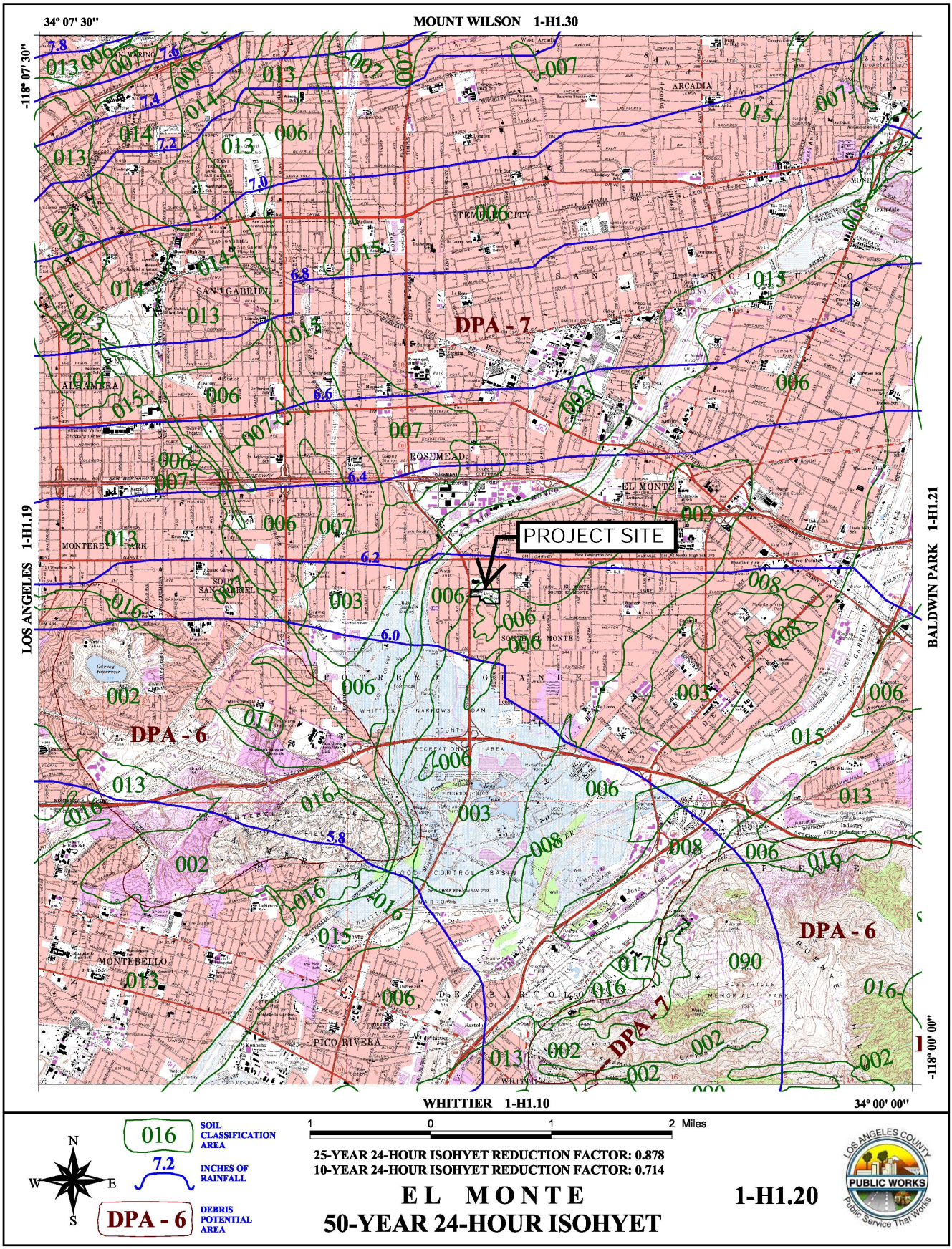
Weather Condition _____ Additional Notes _____

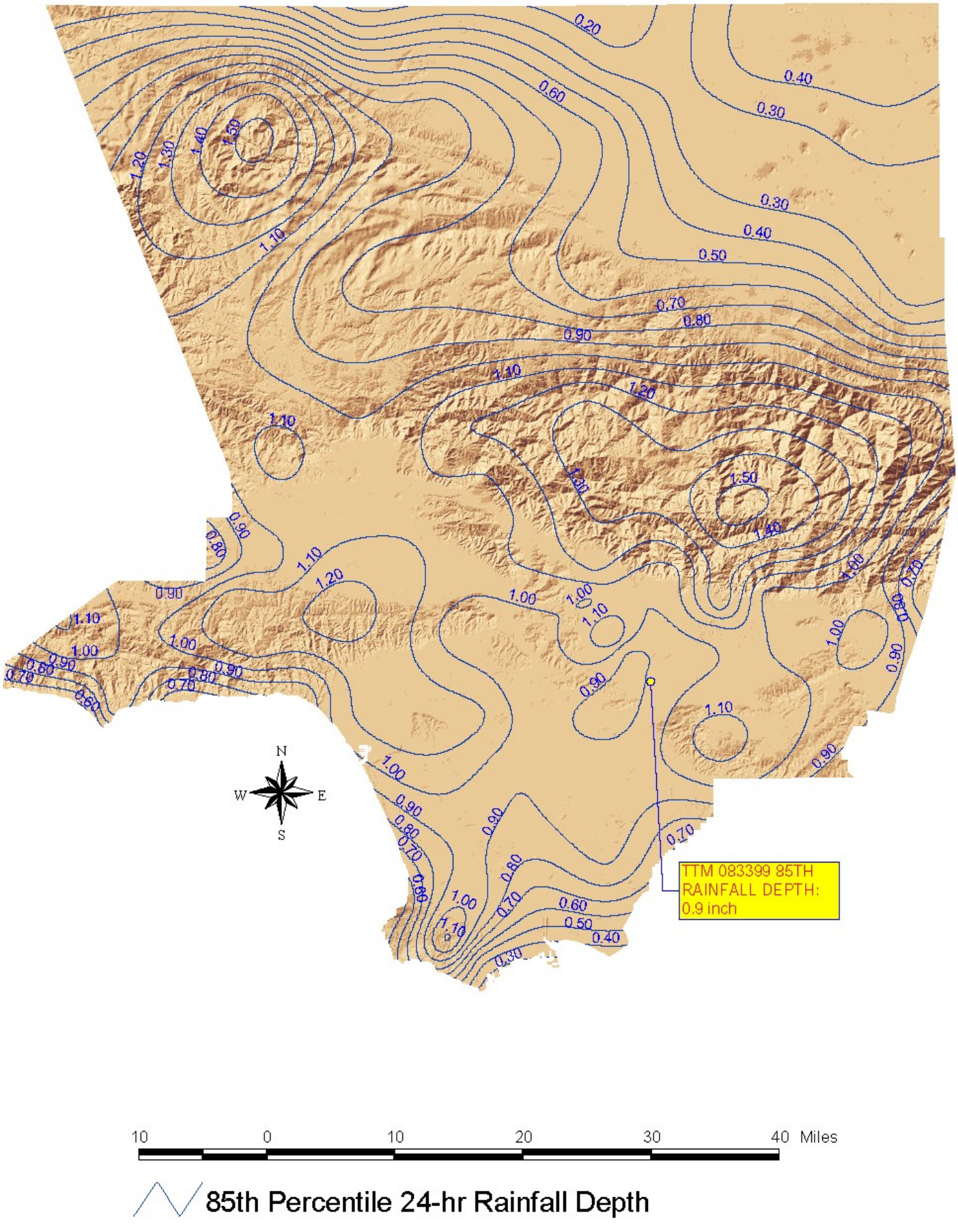
For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

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

Appendix G
Referenced Material


34° 07' 30"
MOUNT WILSON 1-H1.30
-118° 07' 30"
LOS ANGELES 1-H1.19
BALDWIN PARK 1-H1.21
-118° 00' 00"
WHITTIER 1-H1.10
34° 00' 00"
PROJECT SITE
DPA - 7
DPA - 6
DPA - 6
DPA - 7
ARCADIA
TEMPLE CITY
SAN GABRIEL
ALHAMBRA
ROSEMEAD
EL MONTE
SOUTH EL MONTE
MONTEREY PARK
SOUTH SAN GABRIEL
MONTEBELLO
PICO RIVERA
WHITTIER
016
SOIL CLASSIFICATION AREA
7.2
INCHES OF RAINFALL
DPA - 6
DEBRIS POTENTIAL AREA
N
W
E
S
1 0 1 2 Miles
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
EL MONTE
50-YEAR 24-HOUR ISOHYET
1-H1.20
LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works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1.40
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0.80
0.70
1.00
1.10
0.60
0.50
0.40
0.30
N
W
E
S
TTM 083399 85TH
RAINFALL DEPTH:
0.9 inch
10
0
10
20
30
40 Miles
85th Percentile 24-hr Rainfall Depth

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole–foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713–3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later and from National Geospatial Intelligence Agency imagery produced at a scale of 1:4,000 from photography dated 2003 or later.

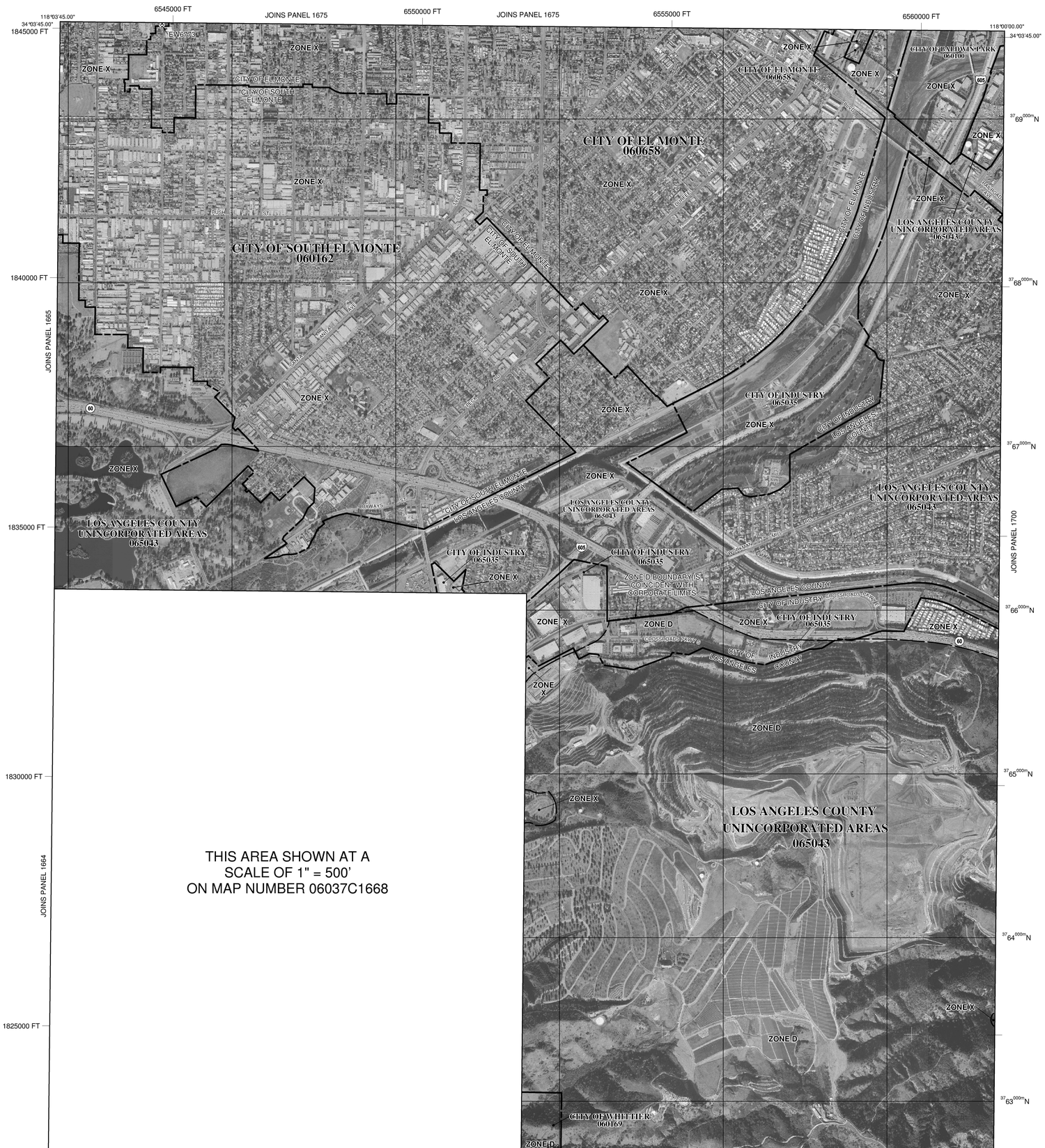
This map reflects more detailed and up–to–date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de–annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1–800–358–9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1–800–358–9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call**1–877–FEMA MAP**(1–877–336–2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1–800–638–6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1670F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1670 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

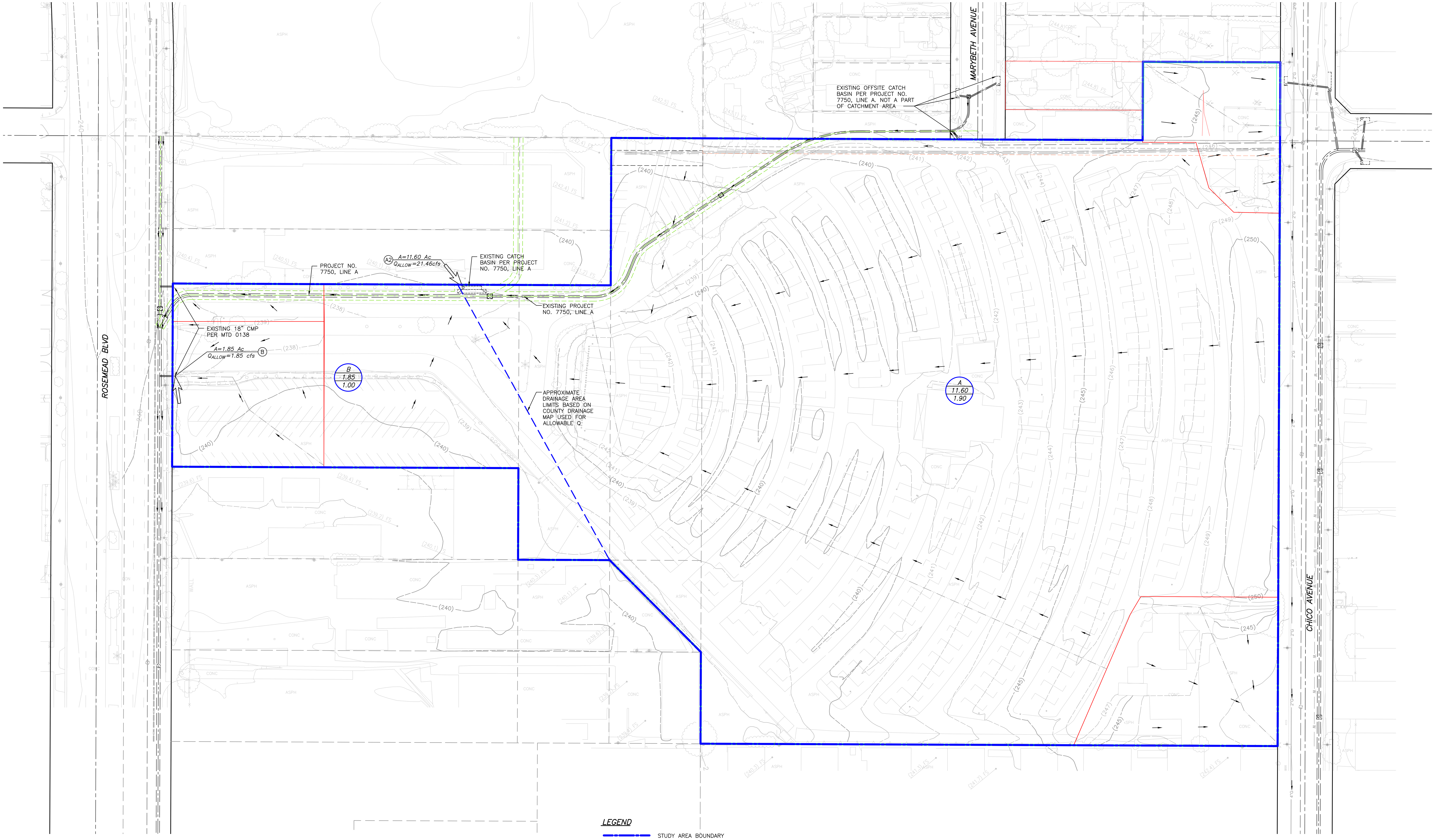
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1670	F
BALDWIN PARK, CITY OF	060100	1670	F
EL MONTE, CITY OF	060658	1670	F
INDUSTRY, CITY OF	065035	1670	F
SOUTH EL MONTE, CITY OF	060162	1670	F
WHITTIER, CITY OF	060169	1670	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C1670F

EFFECTIVE DATE



LEGEND

- STUDY AREA BOUNDARY
- EXISTING SUBAREA BOUNDARY (FROM SURVEY, FOR REFERENCE ONLY)
- EXISTING SUBAREA BOUNDARY (FROM COUNTY DRAINAGE MAP)
  NOTE: COUNTY DRAINAGE MAP DOES NOT PRECISELY MATCH EXISTING CONDITION. HOWEVER, COUNTY AREAS ARE USED FOR DETERMINING ALLOWABLE DISCHARGE Q.
- UNDERGROUND STORM DRAIN PIPE
- EXISTING SURFACE FLOW DIRECTION
- EXISTING PIPE FLOW DIRECTION
- (A) SUBAREA CONCENTRATION POINT (COUNTY DRAINAGE MAP)
- POINT OF CONCENTRATION

A — EX SUBAREA ID
11.60 — EX SUBAREA AREA (AC) (FROM COUNTY DRAINAGE MAP)
1.90 — ALLOWABLE FLOW FACTOR (CFS/AC)

GRAPHIC SCALE 1"= 40'
0 40 80 120 160

This figure is a supplement to this report. It is not, nor is it intended to be, self-explanatory. Any data appearing on this map are taken from the text of this report. In the event of disagreement, the report text should be taken as correct.

FORMA ENGINEERING INC.
400 San Fernando Mission Boulevard, Suite 200
San Fernando, California 91340
Phone: (818) 832-1710 • Fax: (818) 832-1740

PREPARED UNDER THE SUPERVISION OF:

ARET BINATLI, P.E. R.C.E. 64448 DATE

Drawing Title:
Figure 2
SOUTH EL MONTE EXISTING HYDROLOGY MAP

Prepared for:
KB HOME
25152 SPRINGFIELD CT, STE 250
VALENCIA, CA 91355
(661) 219-6843

Work Order	20109
Date:	3/01/2021
Scale:	1"= 40'
Designed:	JT
Drawn:	JT
Checked:	AB
Sheet 1 of	1 Sheets

Drawing Name: L:\20109\Eng\Final Plots\Hydrology\02_20109J.dwg
Last Opened: Mar 01, 2021 - 11:05am by Joel


ROSEMEAD BLVD
MARYBETH AVENUE
CHICO AVENUE
PROPOSED LID DETENTION SYSTEM LOCATION. ADS STORMTECH OR EQUAL
PROPOSED LID ALTERNATIVE 2: MODULAR WETLAND BIOFILTRATION SYSTEM LOCATION
PROPOSED LID ALTERNATIVE 1: DRY WELL INFILTRATION SYSTEM LOCATION, AS NEEDED, UNDER PARKING STALLS
Σ A PROJECT NO. 7750, LINE A
ΣA =11.60 Ac (EXISTING)
ΣA =12.26 Ac (PROPOSED)
ΣQ50=22.04 cfs (ALLOWABLE, 1.90 cfs/Ac EXIST)
ΣQ50=21.86 cfs (PROPOSED)
233.0 INV
PROJECT NO. 7750, LINE A
EXISTING CATCH BASIN PER PROJECT NO. 7750, LINE A
PROPOSED JUNCTION STRUCTURE, CONNECT TO PROJECT NO. 7750, LINE A
B DRIVE
C DRIVE
A DRIVE
D DRIVE
EAST ENTRY
ALLEY 1
ALLEY 2
ALLEY 3
ALLEY 4
ALLEY 5
ALLEY 6
ALLEY 7
ALLEY 8
ALLEY 9
ALLEY 10
ALLEY 11
ALLEY 12
ALLEY 13
ALLEY 14
ALLEY 15
ALLEY 16
ALLEY 17
ALLEY 18
ALLEY 19
ALLEY 20
242.2 FG
245.7 FG
L=403'
L=1146'
237.0 FL EX 18" CMP PER MTD 0138
B MTD 0138
A=1.85 Ac (EXISTING)
A=1.19 Ac (PROPOSED)
Q50=1.85 cfs (ALLOWABLE, 1.0cfs/Ac-Ex)
Q50=1.41 cfs (PROPOSED)
B 1.19 1.41
A 12.26 21.86
LEGEND
STUDY AREA BOUNDARY
PROPOSED SUBAREA BOUNDARY
PROPOSED FLOW PATH
UNDERGROUND STORM DRAIN PIPE
PROPOSED PERVIOUS AREA
L=605' FLOW LENGTH
PROPOSED SURFACE FLOW DIRECTION
PROPOSED PIPE FLOW DIRECTION
EXISTING SURFACE FLOW DIRECTION
EXISTING PIPE FLOW DIRECTION
SUBAREA CONCENTRATION POINT
POINT OF CONCENTRATION
PROPOSED DRAINAGE SUBAREA:
SUBAREA ID
SUBAREA AREA (AC)
SUBAREA Q50 (CFS)
GRAPHIC SCALE 1"= 40'
0 40 80 120 160
This figure is a supplement to this report. It is not, nor is it intended to be, self-explanatory. Any data appearing on this map are taken from the text of this report. In the event of disagreement, the report text should be taken as correct.
FORMA ENGINEERING INC.
400 San Fernando Mission Boulevard, Suite 200
San Fernando, California 91340
Phone: (818) 832-1710 • Fax: (818) 832-1740
PREPARED UNDER THE SUPERVISION OF:
ARET BINATLI, P.E. R.C.E. 64448 DATE
Drawing Title:
Figure 3
SOUTH EL MONTE PROPOSED HYDROLOGY MAP
Prepared for:
KB HOME
25152 SPRINGFIELD CT, STE 250
VALENCIA, CA 91355
(661) 219-6843
Work Order 20109
Date: 3/01/2021
Scale: 1"= 40'
Designed: JT
Drawn: JT
Checked: AB
Sheet 1 of 1 Sheets
Drawing Name: L:\20109\Eng\Final Plots\Hydrology\03_20109J.dwg
Last Opened: Mar 01, 2021 - 11:04am by Joel

RMA GeoScience
Every Project Matters | www.rmacompanies.com

August 5, 2020 RMA Project Number 20G-0418-0

KB Home
25152 Springfield Ct., Suite 180
Valencia, CA 91355

Attention: Mr. David Lelie

Subject: Geotechnical Investigation
Solemo 13 Acres
2540 Rosemead Boulevard
South El Monte, CA

Dear Mr. Lelie:

In accordance with your request, a geotechnical investigation has been completed for the proposed development at the above referenced property. The results of the investigation are presented in the accompanying report, which includes a description of site conditions, results of our field exploration and testing, laboratory testing, conclusions, and recommendations. This report has been prepared for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

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

Respectfully submitted,

RMA GeoScience

Haiyan Liu, PE
Project Engineer
C81463

Mark Swiatek
President

Distribution: (1) Addressee

RMA GeoScience
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL INVESTIGATION
SOLEMO 13 ACRES
2540 ROSEMEAD BOULEVARD
SOUTH EL MONTE, CALIFORNIA

For

KB Home
25152 Springfield Ct., Suite 180
Valencia, CA 91355

August 5, 2020 Project

No. 20G-0418-0

RMA GeoScience
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Table of Contents

FIGURES

RMA GeoScience
Every Project Matters | www.rmacompanies.com

PLATES

Plate 1 Boring and Test Pit Location Map

APPENDICES

Appendix A Field Investigation
Appendix B Laboratory Tests
Appendix C General Earthwork and Grading Specifications
Appendix D Liquefaction Analysis Results
Appendix E References

1.00 INTRODUCTION

1.01 Purpose

The purpose of the investigation was to summarize geotechnical and geologic conditions at the site and to assess their potential impact on the proposed development.

1.02 Scope of the Investigation

The general scope of this geotechnical investigation included the following:

- Review of published and unpublished geologic, seismic, groundwater, and geotechnical literature
- Examination of aerial photographs and topographic maps
- Review of State of California Alquist-Priolo Earthquake Fault Zone and Seismic Hazard maps
- Contacting of Underground Service Alert (USA) to locate onsite utility lines
- Logging, sampling, and backfilling of seven (7) hollow stem auger boring (9 inches diameter) to maximum depths of 50 feet and logging of nine (9) test pits dug with a backhoe to a maximum depth of 17 feet
- Laboratory testing of representative soil samples
- Geotechnical evaluation of the compiled data
- provide a preliminary or narrow range estimate of the expected infiltration rate
- Preparation of this report presenting our findings, conclusions, and recommendations

Our scope of work did not include a preliminary site assessment for the potential of hazardous materials onsite.

1.03 Site Location and Description

The KB Home site is located at Rosemead Boulevard, in El Monte, California within a residential and commercial area. The 17 acre plus property includes Assessor Parcel Numbers 8102-037-020, 8102-037-021, 8102-037-001, 8102-035-017, 8102-029-025, 8102-029-007, 8102-029-006, 8102-029-005, 8102-029-026, 8102-029-019, & 8102-029-020. The site currently serves as a swap meet and drive in theatre. The site is bounded on the south by commercial buildings, on the north by commercial and residential buildings, on the east by Chico Avenue and on the west by Rosemead Boulevard (Site Vicinity Map, Figure 1). There is approximately 12 feet of relief across the site which gently slopes from east to west towards Rosemead Boulevard. The ground surface has been modified by past grading activities. Structures on the site consist of several drive-in associated buildings including two concession stands and a maintenance building. Paved parking areas surround much of the buildings.

The site coordinates are 34.0583 North and -118.0614 West. .

1.04 Site History

Based on review of aerial photographs and other information readily available online the site appears to have

been a mix of vacant land and agricultural land from as far back as 1927 up until the 1950s when the site was paved over and developed for its present day use.

1.05 Planned Development

Formal plans for this site have not been drafted but it is presumed that the site will be developed for residential use.

1.06 Investigation Methods

Our investigation consisted of office research, field exploration, laboratory testing, review and analysis of the compiled data, and preparation of this report. It has been performed in a manner consistent with generally accepted engineering and geologic principles and practices, and has incorporated applicable requirements of California Buildings Code. Definitions of technical terms and symbols used in this report include those of the ASTM International, the California Building Code, and commonly used geologic nomenclature.

Technical supporting data are presented in the attached appendices. Appendix A presents a description of the methods and equipment used in performing the field exploration and logs of our subsurface exploration. Appendix B presents a description of our laboratory testing and the test results. General Earthwork and Grading Specifications are presented in Appendix C. Appendix D presents our engineering analysis. References are presented in Appendix E.

2.00 FINDINGS

2.01 Geologic Setting

The site lies at the southeastern end of the San Gabriel Valley the southern boundary of which is marked by the Puente and Montebello Hills. The valley is an east-west trending structural basin that has accumulated a thick sequence of Holocene- to Pleistocene-age alluvial sediments. The site is situated on a broad alluvial fan emanating from the San Gabriel Mountains to the north. The fan in the area of the site has been dissected by the ancestral San Gabriel Wash to the east and the Rio Hondo Wash at the west.

The earth materials that underlie the site consist of interbedded silt, clay and sand and gravel. Asphalt paving covers most of the site. A full description of the earth materials encountered within each borehole is included on the boring logs, Appendix A.

2.02 Earth Materials

<u>Asphalt and Base</u>

Asphalt and base conditions varied widely across all seven borings and ten test pits. Asphalt paving of up to 2 inches thick overlying up to 2 inches thick base where encountered. In several test pits, two generations of asphalt and concrete where discovered.

Artificial Fill (af)

Artificial fill is at a maximum of 5 feet thick as observed in the boring excavations and is composed of moderate orange brown fine silty sand with clay. It is slightly micaceous, slightly moist and medium dense.

Alluvium Deposits (Q_a)

Quaternary aged alluvial deposits are underlying artificial fill material. This unit consists of light orange brown to whitish grey, interbedded silty sand, sand, clayey sand and clay with sand. The sand was micaceous and ranged from course to fine. The sandy units were in a medium dense to dense condition. The soils were slightly moist with moist conditions occurring in the sand layers at the contact with the finer grained materials. Layers of course to fine gravels were encountered in some samples generally below 17 feet.

2.03 Expansive Soils

Based on our preliminary observations and laboratory data, the soils at shallow depths are expected to have an expansion index in the very low range. Additional expansion index and plasticity index testing will be required at the completion of rough grading to verify the properties of the near surface soils.

2.04 Surface and Groundwater Conditions

Groundwater was not encountered in the boring excavated to a maximum depth of 50 feet. Surface water on the site is limited to precipitation falling directly around the buildings on the site. Depth to groundwater in a monitoring well (Well ID: 2944F) located approximately 0.3 miles to the southeast of the site as measured in May 2020 was 47.68 feet. There was no surface water encountered at the time of our investigation. Depth to historic high groundwater is approximately 5 feet below existing grade according to the Seismic Hazard Zone Report for the El Monte Quadrangle (CDMG, 1998).

2.05 Faults

The proposed site is not located within an Alquist-Priolo Earthquake Fault Zone, and there are no known active faults on or immediately adjacent to the property. However, there are faults in close enough proximity to the site to cause moderate to intense ground shaking during the lifetime of the proposed development. Additionally, the site has experienced earthquake-induced ground shaking in the past and can be expected to experience further shaking in the future. The closest zoned fault is the East Montebello fault zone, located approximately 1.35 miles to the southwest of the subject site.

2.06 Landslides

According to the California Geological Survey Seismic Hazard Zones Map of the El Monte Quadrangle (2017) the site does not lie in a landslide hazard zone. Since the site is relatively flat earthquake-induced landsliding does not appear to be a hazard to proposed development.

2.07 Liquefaction

According to the State of California Seismic Hazard Zones Map of the El Monte Quadrangle, the site lies within a "Zone of Required Investigation for Liquefaction". Therefore, a liquefaction screening evaluation has been performed in accordance with California Geological Survey Special Publication SP-117A (2008), "Guidelines for Evaluating and Mitigating Seismic Hazards in California". The findings of our liquefaction screening evaluation are presented in section 3.04 of this report.

2.08 Historic Seismicity

The region of the subject site has experienced shaking from several earthquakes recorded back to 1812. The nearest large historic earthquake is the Raymond fault that occurred in 1855, the epicenter of which is 3.6 miles from the site. Historic earthquakes with magnitudes of greater than or equal to 6.0 and have been epicentered within approximately 50 miles of the site, are summarized in the table below.

Large Historic Earthquakes

Event	LAT. NORTH	LONG. WEST	DATE	Quake Mag.	APPROX. DISTANCE mi
Raymond	34.100	118.100	7/11/1855	6.3	3.60
Northridge	34.2130	118.5370	01/17/1994	6.7	29.2
Long Beach	33.6170	117.967	3/11/1933	6.3	30.9
	34.4110	118.4010	02/09/1971	6.4	31.1
	34.3	117.6	07/30/1894	6.0	31.2
Wrightwood	34.3	117.65	12/08/1812	7.0	31.9
	34.0	117.5	12/16/1858	7.0	32.4
	34.3	118.6	04/04/1893	6.0	35.0
	34.3	117.50	07/22/1899	6.50	36.1
	33.7	117.4	05/15/1910	6.0	45.3
	34.0	117.25	07/23/1923	6.25	46.6

3.00 CONCLUSIONS AND RECOMMENDATIONS

3.01 General Conclusion

Based on the data collected thus far the project appears feasible from a geotechnical standpoint. Our preliminary recommendations provided below are based on the data collected thus far and our understanding of the project and our general experience in engineering geology and geotechnical engineering.

3.02 Seismic Design Parameters

Mapped Spectral Accelerations were obtained by using the online ATC Calculator (ASCE 7-16 Standard) and a site class D-default was used for the project site. Since the mapped risk-targeted maximum considered earth quake (MCE_R) spectral response acceleration parameter at a period of 1 second (S_1) is greater than 0.2, a ground

motion hazard analysis is required per ACSE/SEI 7-16 to be performed in accordance with Section 21.2 for structures on Site Class D. However, instead of performing the ground motion hazard analysis, a long period coefficient (F_V) of 1.7 was used for calculation of S_{M1} and S_{D1}. The parameters generated for the subject site are presented in the following table:

2019 California Building Code (CBC) Seismic Parameters

Parameter	Value
Site Location	Latitude = 34.0583 degrees Longitude = -118.0614 degrees
Site Class	Site Class = D-default
Mapped Spectral Accelerations	S_s (0.2- second period) = 1.902g S_1 (1-second period) = 0.685g
Site Coefficients (Site Class D-default)	F_a = 1.2 F_v = 1.7
Maximum Considered Earthquake Spectral Accelerations (Site Class D-default)	S_{MS} (0.2- second period) = 2.283g S_{M1} (1-second period) = 1.165g
Design Earthquake Spectral Accelerations (Site Class D-default)	S_{DS} (0.2- second period) = 1.522g S_{D1} (1-second period) = 0.776g

For Risk Category II structures with mapped spectral response acceleration parameter at 1-s period (S_1) is less than 0.75, the Seismic Design Category is D (ASCE 7-16 Section 11.6).

Peak earthquake ground acceleration adjusted for site class effects (PGAM) has been determined in accordance with ASCE 7-10 Section 11.8.3 as follows: $PGA_M = F_{PGA} \times PGA = 1.2 \times 0.82g = 0.984g$.

3.03 Liquefaction and Secondary Earthquake Hazards

Potential secondary seismic hazards that can affect land development projects include liquefaction, tsunamis, seiches, seismically induced settlement, seismically induced flooding and seismically induced landsliding.

Liquefaction

Liquefaction hazard potential for the site is discussed in Section 2.07 and Section 3.04 of this report.

Tsunamis and Seiches

Tsunamis are sea waves that are generated in response to large-magnitude earthquakes. When these waves reach shorelines, they sometimes produce coastal flooding. Seiches are the oscillation of large bodies of standing water, such as lakes, that can occur in response to ground shaking. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water.

Seismically Induced Settlement

Seismically induced settlement occurs most frequently in areas underlain by loose, granular sediments. Damage as a result of seismically induced settlement is most dramatic when differential settlement occurs in areas with large

variations in the thickness of underlying sediments. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

A seismic settlement analysis was performed using LiquefyPro Version 5 (2015 Edition) for this project. A summary of the input data and the results of the seismic settlement analysis are provided in Appendix D.

Seismically Induced Flooding

According to Federal Emergency Management Agency (Flood Insurance Rate Map #06037C1670F and #06037C1665F, Effective date 9/26/2008), the site is located in an area of Flood Zone X, which is an area where the likelihood of flood hazards is considered minimal. In addition there are no water reservoirs in the vicinity of the site. Based on the aforementioned the potential for seismic induced flooding is unlikely.

Seismically Induced Landsliding

According to the California Geological Survey Seismic Hazard Zones Map of the El Monte Quadrangle (2017) the site does not lie in a landslide hazard zone. Since the site is relatively flat earthquake-induced landsliding does not appear to be a hazard to proposed development.

3.04 Liquefaction Screening Evaluation Results

Liquefaction describes a phenomenon where cyclic stresses, which are produced by earthquake-induced ground motions, create excess pore pressures in cohesionless soils. As a result, the soils may acquire a high degree of mobility, which can lead to lateral spreading, consolidation and settlement of loose sediments, ground oscillation, flow failure, loss of bearing strength, ground fissuring, sand boils, and other damaging deformations. This phenomenon occurs only below the water table, but after liquefaction has developed, it can propagate upward into overlying, non-saturated soil as excess pore water escapes. Descriptions of each of the phenomena associated with liquefaction are described below:

Research has shown that saturated, loose sands with a silt content less than about 25 percent are most susceptible to liquefaction, whereas other soil types are generally considered to have a low susceptibility. According to the California Geological Survey (CGS) Special Publication SP-117A (2008), "Guidelines for Evaluating and Mitigating Seismic Hazards in California," any materials with a PI > 12 and moisture content < 85% of the liquid limit were considered not subject to liquefaction. Liquefaction susceptibility is related to numerous factors, and the following conditions must exist for liquefaction to occur:

- Sediments must be relatively young in age and must not have developed large amounts of cementation
- Sediments must consist mainly of cohesionless sands and silts
- The sediment must not have a high relative density
- Free groundwater must exist in the sediment; and
- The site must be exposed to seismic events of a magnitude large enough to induce straining of soil particles

Static groundwater was not encountered in either borings drilled to a maximum depth of 50 feet. However, according to the California Division of Mines and Geology Seismic Hazard Zone Report for the El Monte Quadrangle (CDMG, 1998), the historical high groundwater table is approximately 5 feet below grade. Therefore, RMA

GeoScience considered the potential for groundwater to be at this depth below existing grade in the liquefaction screening evaluation.

For the PGA corresponding to two-thirds of the PGA_M and predominant earthquake magnitude corresponding to a 10% probability of exceedance in 50 years, potential seismic-induced settlements were determined when the safety factor was less than 1.1. Calculations of liquefaction potential, presented in Appendix D, indicate that there are discrete layers of sandy alluvial soils that will be susceptible to liquefaction during a design-level earthquake. The seismic settlement from Boring B-3 and B-6 are 2.47 inches and 3.23 inches, respectively.

3.05 Total and Differential Settlement

The above seismically induced settlements should be combined with the anticipated total static settlement in order to obtain an estimate of the amount of differential settlement that may affect the site. The maximum total static settlement is not expected to exceed ½ inch under the recommended bearing pressure.

We assume the seismic differential settlement is half of the total seismic settlement and static differential settlement is half of the total static settlement. Thus, total settlement (static and seismic) is expected to be less than 3.73 inches with differential settlement (static and seismic) of less than 1.87 inches in a 40 feet span.

3.06 Removals and Overexcavation

Upon demolition and removal of all existing site improvements, all vegetation, organic rich soil (soils containing more that 2 percent organics by weight), trash and debris should be cleared from the grading area and removed from the site. After the removal of deleterious materials, stripping of organic-rich soils, and removal of tree roots, the following removals and over-excavation must be done within the area of the limits of grading:

- All artificial fill soil should be removed within the limits of grading. The fill soil may be used for engineered fill provided it is free of trash and organic material. Within the building areas, removals are recommended to a minimum of five feet below existing grade or three feet below the bottom of planned footings, whichever is greater.
- Within the area of planned streets and all other areas where grading is planned, all artificial fill must be completely removed and the subgrade must be over-excavated at least 12 inches below the stripped surface or the finished subgrade surface, whichever is lower.

Following the over-excavation indicated above, a designated representative for the Project Geotechnical Engineer must review the exposed ground surface and determine if any additional over-excavation is required. The over-excavated ground surface in all areas determined to be satisfactory for the support of fills must be scarified to a minimum depth of 6 inches. Scarification should continue until the soils are broken down and free from lumps or clods and until the scarified zone is uniform. The moisture content of the scarified zone shall be adjusted to within 2% of the optimum moisture content. The scarified zone must then be uniformly compacted to at least 90% relative compaction

The above recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. Hence, overexcavation depths must be verified, and adjusted if necessary, at the time of grading.

3.07 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications outlined in Appendix C, unless specifically revised or amended below. Recommendations contained in Appendix C are general specifications for typical grading projects and may not be entirely applicable to this project.

It is also recommended that all earthwork and grading be performed in accordance with the requirements of the lead agency.

3.08 Earthwork Shrinkage and Subsidence

The site is not located within a zone of land subsidence according to the United States Geological Survey California Water Science Center website. It is our opinion that the potential for land subsidence due to over pumping of groundwater or oil extraction is low.

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Subsidence occurs as natural ground is densified to receive fill. These factors account for changes in earth volumes that will occur during grading. Our estimates are as follows:

- Shrinkage factor = 5% to 15% for soil removed and replaced as compacted fill.
- Subsidence factor = 0.1 foot.

The degree to which fill soils are compacted and variations in the in-situ density of existing soils will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

3.09 Foundation

The expansion index results of the on-site soils had very low expansion potential. However, considering the total and differential settlements from static and seismic conditions, the site may be considered suitable for the support of the anticipated structures using mat foundation systems.

If mat foundations were used to support the proposed structures, an allowable soil bearing pressure of 3,000 psf are recommended under the proposed mat foundations. The total combined settlement (seismic plus static settlements) is 3.73 inches and the total combined differential settlement (seismic plus static) is 1.87 inches. The modulus of subgrade reaction shall be calculated as follows:

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

Where k_1 = 150 pci, coefficient of subgrade reaction of foundations measuring 1 ft by 1 ft.

B = foundation width in ft.

A foundation design engineer experienced in the field of mat foundation design should undertake the design of the foundations. The designer should provide estimates of the anticipated deflection of the mat to the design architect and structural engineer for use in the design of the structure. If the anticipated design deflection exceeds that which the design architect and or structural engineer can accommodate then the slab should be re-designed by the

slab designer to reduce the total deflection.

3.10 Retaining Wall Foundations

Footings for retaining walls should be founded supported on 3 feet of compacted fill with a minimum depth of 12 inches and have a minimum width of 12 inches. Footings may be designed using the allowable bearing capacity of 1,500 psf and the same lateral resistance values recommended for building footings. However, when calculating passive resistance, the upper 6 inches of the footings should be ignored in areas where the footings will not be covered with concrete flatwork.

In view of the seismic setting, a nominal reinforcement consisting of at least two #4 bar placed within 3 inches of the top of footings and another two placed within 3 inches of the bottom of footings is recommended. Reinforcement of wide footings should be determined by the structural engineer who may also require heavier reinforcement.

3.11 Slab-On-Grade

Concrete floor slabs on grade with a minimum thickness of 4 inches are recommended for slabs on grade for the proposed structures for normal floor loading conditions. However, if heavy concentrated or moving loads are anticipated, slabs should be designed using a modulus of subgrade reaction (k) of 150 psi/in when soils are prepared in conformance with the grading recommendations contained within the report. Reinforcement of slabs on grading is not required to mitigate the expansive soils. Reinforcement may be specified by the structural engineer.

Concrete floor slabs on grade should be divided into squares or rectangles using weakened plane joints (contraction joints), each with maximum dimensions not exceeding 15 feet. Contraction joints should be made in accordance with American Concrete Institute (ACI) guidelines. If weakened plane joints are not used, then the slabs shall be reinforced with 6x6-10/10 welded wire fabric placed at mid-height of the slab.

Special care should be taken on floors slabs to be covered with thin-set tile or other inflexible coverings. These areas may be reinforced with 6x6-10/10 welded wire fabric placed at mid-height of the slab, to mitigate drying shrinkage cracks. Alternatively, inflexible flooring may be installed with unbonded fabric or liners to prevent reflection of slab cracks through the flooring.

A moisture vapor retarder/barrier is recommended beneath all slabs-on-grade that will be covered by moisture-sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber, rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the vapor retarder or barrier conform to Section 1805 of the 2019 California Building Code (CBC) and pertinent sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

The moisture vapor retarder/barrier should consist of a minimum 10 mils thick polyethylene with a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed.

ACI guidelines allow for the placement of moisture vapor retarder/barriers either directly beneath floor slabs or

below an intermediate granular soil layer.

Placing the moisture retarder/barrier directly beneath the floor slab will provide improved curing of the slab bottom and will eliminate potential problems caused by water being trapped in a granular fill layer. Concrete slabs poured directly on a vapor retarder/barrier can experience shrinkage cracking and curling due to differential rates of curing through the thickness of the slab. Therefore, for concrete placed directly on the vapor retarded, we recommend a maximum water cement ratio of 0.45 and the use of water-reducing admixtures to increase workability and decrease bleeding.

If granular soil is placed over the vapor retarder/barrier, we recommend that the layer be at least 2 inches thick in accordance with traditional practice in southern California. Granular fill should consist of clean fine graded materials with 10 to 30% passing the No. 100 sieve and free from clay or silt. The granular layer should be uniformly compacted and trimmed to provide the full design thickness of the proposed slab. The granular fill layer should not be left exposed to rain or other sources of water such as wet-grinding, power washing, pipe leaks or other processes, and should be dry at the time of concrete placement. Granular fill layers that become saturated should be removed and replaced prior to concrete placement.

An additional layer of sand may be placed beneath the vapor retarder/barrier at the developer's discretion to minimize the potential of the retarder/barrier being punctured by underlying soils.

3.12 Miscellaneous Concrete Flatwork

Miscellaneous concrete flatwork and walkways may be designed with a minimum thickness of 4 inches. Large slabs should be reinforced with a minimum of 6x6-10/10 welded wire mesh placed at mid-height in the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet.

Walkways may be constructed without reinforcement. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into non-reinforced walkways at a maximum of 5 feet spacing.
The subgrade soils beneath all miscellaneous concrete flatwork should be compacted to a minimum of 95 percent relative compaction for a minimum depth of 12 inches. The geotechnical engineer should monitor the compaction of the subgrade soils and perform testing to verify that proper compaction has been obtained.

3.13 Footing Excavation and Slab Preparation

All footing excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent soils. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed on slab or footing areas unless properly compacted.

Prior to the placement of the moisture barrier and sand, the subgrade soils underlying the slab should be observed by the geotechnical consultant to verify that all under-slab utility trenches have been properly backfilled and compacted, that no loose or soft soils are present, and that the slab subgrade has been properly compacted to a minimum of 95 percent relative compaction within the upper 12 inches.

Footings may experience and overall loss in bearing capacity or an increased potential to settle where located in

close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause cracking, collapse and/or a loss of serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom of the trench.

Subgrade soils beneath slabs on grade and walkways moist prior to the placement of concrete. The geotechnical consultant should verify that the appropriate moisture content has been achieved a maximum of 24 hours prior to the placement of concrete or moisture barriers.

3.14 Lateral Load Resistance

Lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Passive Earth Pressure = 280 pcf (equivalent fluid weight).

  We recommend neglecting passive soil resistance from the upper foot of soil unless protected by a concrete slab or pavement.

- Coefficient of Friction (soil to footing) = 0.27

- Retaining structures should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Materials (Horizontal:Vertical)	Equivalent Fluid Weight (pcf)
Level	37
5:1	39
4:1	40
3:1	43
2:1	54

  These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required minimum horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at-rest lateral earth pressure if this horizontal strain cannot be achieved.

- At-rest Lateral Earth Pressure = 57 pcf (equivalent fluid weight)

The lateral earth pressure due to earthquake motions for the retaining walls are calculated by using PGA=S_{DS}/2.5=0.608g and γ=130 pcf for retaining wall dynamic load increment calculations. The point of application may vary between 0.37H to 0.40H.

- Basement (restrained) walls with level backfill:
  $P_{ae} = \frac{1}{2}\gamma H^2(0.68\ PGA/g) = 29\ H^2$

- Cantilever (unrestrained) walls with level backfill:
  $P_{ae} = \frac{1}{2}\gamma H^2(0.42\ PGA/g) = 18\ H^2$

- Cantilever (unrestrained) walls with no steeper than 2:1 slope:
  $P_{ae} = \frac{1}{2}\gamma H^2(0.70\ PGA/g) = 30\ H^2$

3.15 Cement Type and Corrosion Potential

A soluble sulfate test performed on a shallow sample of soil indicates that concrete at the subject site will have a negligible exposure to water-soluble sulfate in the soil. Our recommendations for concrete exposed to sulfate-containing soils are presented in the following table.

Recommendations for Concrete exposed to Sulfate-containing Soils

Sulfate Exposure	Water Soluble Sulfate (SO_4) in Soil (% by Weight)	Sulfate (SO_4) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
Negligible	0.00 - 0.10	0-150	--	--	2,500
Moderate	0.10 - 0.20	150-1,500	II	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan or slag	0.45	4,500

Use of alternate combinations of cementitious materials may be permitted if the combinations meet design recommendations contained in American Concrete Institute guideline ACI 318-11.

The soils were also tested for soil reactivity (pH) and electrical resistivity (ohm-cm). The test results indicate that the on-site soils have soil reactivity of 8.9 and 8.7 and electrical resistivity of 8,658 and 3,260 ohm-cm. A neutral or non-corrosive soil has a reactivity value ranging from 5.5 to 8.4. Generally, soils that could be considered moderately corrosive to ferrous metals have resistivity values of about 3,000 ohm-cm to 10,000 ohm-cm. Soils with resistivity values less than 3,000 ohm-cm can be considered corrosive and soils with resistivity values less than 1,000 ohm-cm can be considered extremely corrosive.

Based on our analysis, underlying onsite soils are corrosive to ferrous metals. Protection of buried pipes utilizing coatings on all underground pipes; clean backfills and a cathodic protection system can be effective in controlling corrosion. A qualified corrosion engineer may be consulted to further assess the corrosive properties of the soil.

3.16 Preliminary Pavement Sections

Based on the soil profiles at the subject project, a subgrade R-value of 30 has been used to develop the preliminary pavement sections given below. The structural section recommendations (AC over processed miscellaneous base materials (with a minimum R-value of 78)) given herein were developed using the procedures outlined in Chapter 630 of the California Highway Design Manual (Caltrans, 2012). This procedure uses the principle that the pavement structural section must be of adequate thickness to distribute the load from the design TI to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R-value). We would

recommend the following preliminary structural sections:

ASPHALT SECTIONS

TRAFFIC INDEX	ASPHALT THICKNESS, IN.	BASE THICKNESS, IN.
4.5	3.0	5.0
5.0	3.0	6.0
6.0	4.0	7.0

At a minimum, the upper 12 inches of subgrade soils should be at or no more than 2% over optimum moisture content and compacted to a minimum of 90% relative compaction prior to placement of base. All aggregate base courses should also be at or no more than 2% over optimum moisture and compacted to a minimum of 95% relative compaction.

3.17 Utility Trench Backfill

The onsite fill soils will not be suitable for use as pipe bedding for buried utilities. All pipes should be bedded in a sand, gravel or crushed aggregate imported material complying with the requirements of the Standard Specifications for Public Works Construction (Greenbook) Section 306-1.2.1. Crushed rock products that do not contain appreciable fines should not be utilized as pipe bedding and/or backfill. Bedding materials should be densified to at least 90% relative compaction (ASTM D1557). The geotechnical consultant should review and approve of proposed bedding materials prior to use.

The on-site soils are expected to be suitable as trench backfill provided they are screened of organic matter, boulders and cobbles over 6 inches in diameter. Trench backfill should be densified to at least 90% relative compaction (ASTM D1557). On-site granular soils with a sand equivalent value of 15 or greater may be water densified initially per Greenbook Specifications. Supplemental mechanical compaction methods will be required to attain the required 90% relative compaction.

All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the footing influence zone defined as the area within a line projected at a 1:1 drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Cal/OSHA construction safety orders should be observed during all underground work.

3.18 Temporary Excavations

Based on the recommended removal depths as described in Section 3.06, temporary excavations within the limits of grading are expected to be 5 feet. Excavations may be cut vertically to a maximum height of 4 feet. Cuts above 4 feet may be laid back at a gradient of 1:1.

3.19 Drainage

Surface drainage should be directed away from the proposed structures into suitable drainage devices. Neither excess irrigation nor rainwater should be allowed to collect or pond against building foundations or within low-lying or level areas of the lot. Surface waters should be diverted away from the tops of slopes and prevented from draining over the top of slopes and down the slope face.

3.20 Plan Review

Once formal plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the plan used during preparation of this report and revise the recommendations of this report where necessary.

4.00 CLOSURE

This investigation was completed in accordance with generally accepted industry practice to provide recommendations for developing the property from a geotechnical perspective. Information presented in this report is based on research, field investigation, laboratory testing, and engineer judgment obtained from similar projects completed on nearby properties. This assessment is not, and should not be construed as, a warranty or guarantee concerning the geotechnical conditions which may affect the future development of the property. All discovered information has been disclosed and a good faith effort has been made to consult pertinent sources.

This study and report have been prepared on behalf and for the exclusive use of KB Home, and solely for use as a preliminary evaluation of the subject site. This report and its findings shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party in whole or in part, without prior written consent of RMA Geoscience, Inc. and KB Home. However, RMA Geoscience, Inc. acknowledges and agrees that the report may be conveyed to the design professionals for consideration in developing the property.

FIGURES

Source: Google Earth Images

RMA GeoScience

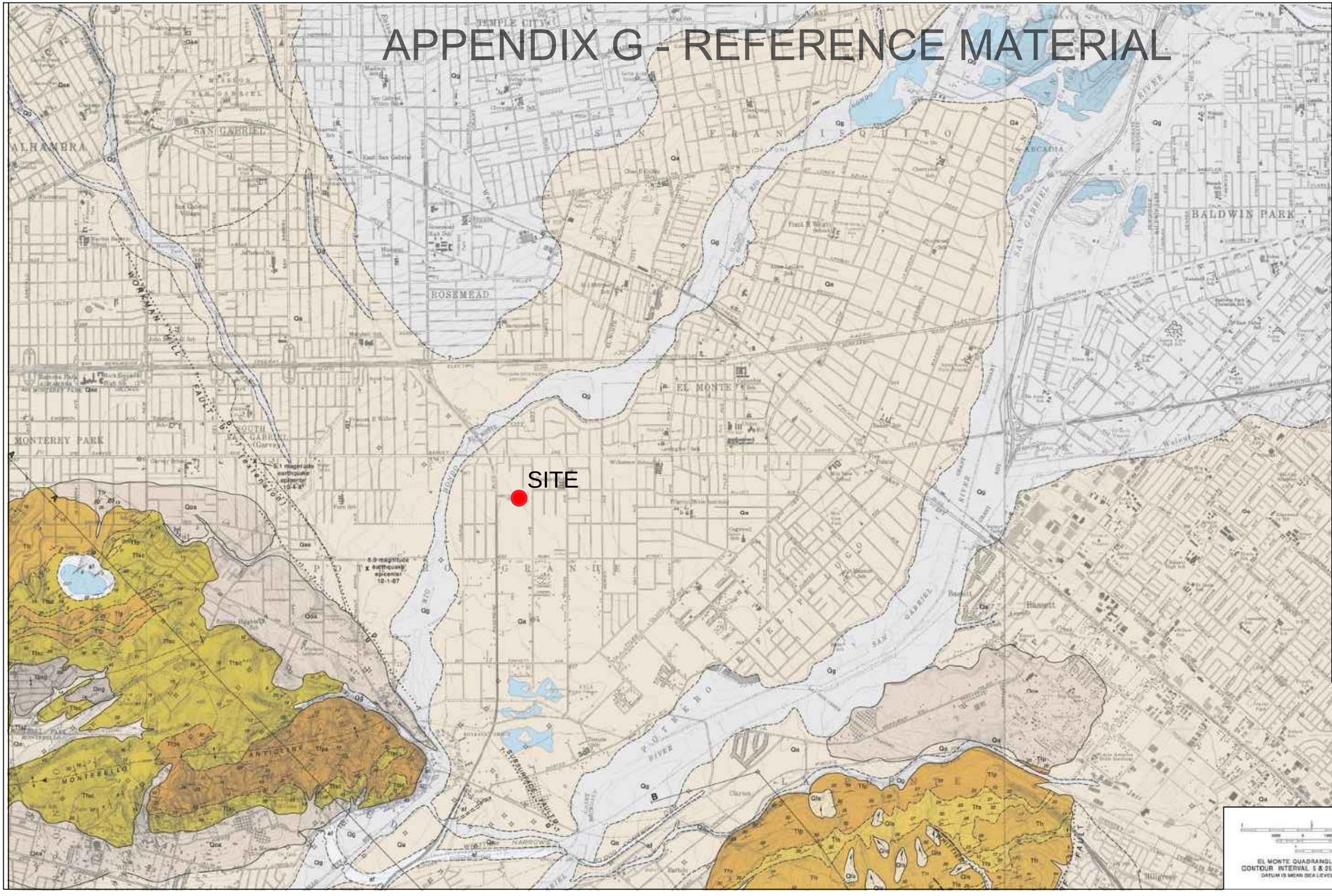
Site Vicinity Map

2540 Rosemead Boulevard
South El Monte, CA

Figure 1

RMA Job No:	20G-0418
Report Date:	8/2020
Prepared By:	MRM

APPENDIX G - REFERENCE MATERIAL



EL MONTE AND BALDWIN PARK MAP (DF

LEGEND

af / Qg / Qa

SURFICIAL SEDIMENTS
Undissected alluvial deposits

af *Artificial fill, and cut and fill areas*
Qg *Gravel and sand of major streams, and alluvial fan detritus from Sae Gabriel Mountains, grades southward into alluvium* **(Qa)** *as sizes of clastic decrease*
Qa *Alluvial gravel, sand and silt of valleys and floodplains*

Qls

LANDSLIDE DEBRIS

Qof / Qae / Qoa / Qog

OLDER DISSECTED SURFICIAL SEDIMENTS

Qof *Alluvial fan sediments derived from San Gabriel Mountains*
Qae *Slightly aveivated and locally dissected alluvial gravel and sand at base of hill areas; shown as* **Qa** *on adjacent Los Angeles (Dibblee, 1989) and on Mt. Wilson/Azusa (Dibblee, 1990) quadrangles*
Qoa *Uplifted remnants of alluvial sand and gravel, north of hill areas*
Qog *Uplifted remnants of alluvial gravel, south of Montebello Hills*

— *UNCONFORMITY* —

Tfsc / Tfps / Tfp / Tfs / Tfr

FERNANDO FORMATION
(Of Daviess and Woodford, 1949; Yerkes, 1972); Marine to nonmarine clastic sediments, weakly indurated; early Pliocene to Pleistocene (?) age

Tfsc *Nonmarine sandstone and conglomerate: light gray to tan, crudely bedded; conglomerate composed of pebbles and cobbles of mostly granitic detritus in friable sandstone matrix, probably nonmarine; sandstone may be in part marine; late (?) Pliocene to Pleistocene age; unit is lithologically similar to Saugus Formation of Ventura basin*
Tfps *"Pico" silty sandstone facies: at southwest end of Montebello Hills, composed of light gray, very fine-grained silty sandstone to siltstone, vaguely bedded, contains gray lenticular calcareous concretions and fossil shell fragments; deposited in shallow regressive sea*
Tfp *"Pico" claystone: gray micaceous silty claystone or siltstone, with spheroidal fracture, vaguely bedded, includes some silty sandstone; deposited in moderately deep sea; late (?) Pliocene age; probably equivalent to upper member of Fernando Fm. (of Yerkes, 1965 et al., in Puente Hills)*
Tfs *Sandstone facies of Fernando Formation: light to medium gray, weathered brown, fine to medium-grained, arkosic, bedded, locally pebbly; deposited in moderately deep sea*
Tfr *"Repetto" claystone member, lithologically similar to* **Tfp**, *early Pliocene age (Repettian Stage), probably equivalent to lower member of Fernando Fm. (of Yerkes et al., 1965, in Puente Hills)*

Tsc / Tscs / Tscg

SYCAMORE CANYON FORMATION
Named by Daviess and Woodford, 1949, as uppermost member of Puente Fm.; as so mapped by Durham and Yerkes, 1965, and Yerkes, 1972, in Puente Hills; equivalent to "Unnamed Shale" in Los Angeles quadrangle (Dibblee, 1989), and to Sisquoc Fm. in Ventura basin)
Marine clastic sediments: moderately indurated; late Miocene age

Tsc *Gray silty clay shale: micaceous, vaguely bedded to locally thin bedded, nodular, in places includes thin layers of fine-grained sandstone*
Tscs *Clay shale, light gray, vaguely bedded to locally thin bedded, includes thin layers of fine grained sandstone*
Tscg *Conglomerate and sandstone: gray to rusty brown conglomerate, crudely bedded, composed of cobbles and pebbles of mostly light-colored granitic rocks and others of gray quartz diorite, gneiss, a few of andesitic porphyry and quartzite, in arkosic sandstone matrix; sandstone rusty brown, lenticular, coarse to fine-grained, arkosic*

Tmy / Tmcg / Tms / Tmlv

MONTEREY FORMATION
(Major part of Puente Fm. of Olmstead, 1956; Yerkes, 1972; Durham and Yerkes, 1965)
Marine biogenic and clastic sediments, moderately lithified; middle Miocene age, Mohnian Stage

Tmy *Yorba Shale Member: interlayered thin-bedded gray shaly siltstone, fine-grained sandstone and white weathering semi-siliceous to siliceous shale; includes some thin, hard beds of yellowish-gray to gray dolomite; late Mohnian Stage (Yerkes, 1972)*
Tmcg *Conglomerate facies of cobbles & pebbles of plutonic rocks in sandstone matrix lenses in unit* **Tms**, *deposited as submarine deltas*
Tms *Soquel Sandstone Member: mostly sandstone, light gray, weathering to tan, medium to locally coarse-grained, locally pebbly, bedded, arkosic, with minor biotite; in eastern exposures in San Jose Hills includes silty shale similar to that of unit* **Tmy**
Tmlv *La Vida Shale Member: thinly bedded shale similar in that of unit* **Tmy**, *but containing somewhat more semi-siliceous shale; exposed only in San Jose Hills, base not exposed*

Pliocene / ? / Pleistocene / ? / Pliocene / Miocene

GEOLOGIC MAP OF THE
EL MONTE & BALDWIN PARK QUADRANGLES
LOS ANGELES COUNTY, CALIFORNIA

BY THOMAS W. DIBBLEE, JR., 1999
EDITED BY HELMUT T. EHRENSPECK, 1999
EDITED BY JOHN A. MINCH, 2009

Dibblee Geology Center Map #DF-69. First Printing, 1999; Second Printing, 2009
PUBLISHED BY AND AVAILABLE FROM THE
SANTA BARBARA MUSEUM OF NATURAL HISTORY
2559 PUESTA DEL SOL ROAD, SANTA BARBARA, CA 93105
HTTP://WWW.SBNATURE.ORG/

TED L. BEAR HONORARY MAP

N

Source: Geology Map of the EL Monte and Baldwin Park Quadrangle, Thomas W. Dibblee, Jr. 1999, Dibblee Geology Center Map #DF-69:, 1:24000

Regional Geology Map

El Monte, CA

G-92

Figure 2

RMA Job No:	20G-0418
Report Date:	8/2020
Prepared By:	MRM

APPENDIX A

FIELD INVESTIGATION

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APPENDIX A

FIELD INVESTIGATION

A-1.00 FIELD EXPLORATION

A-1.01 Number of Borings and Test Pits

Our subsurface investigation consisted of seven (7) hollow stem boring auger to depths of up to 50 feet and nine (9) test pits t dug with a backhoe to a maximum depth of 17 feet.

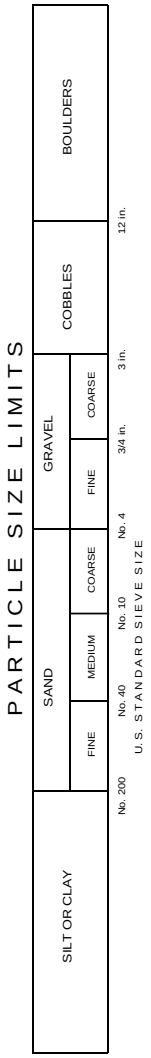
A-1.02 Location of Boring and Test Pits

A Boring Location Map showing the approximate locations of the borings and test pits are presented as Plate 1.

A-1.03 Boring and Test Pit Logging

Logs of the borings and test pits were prepared by one of our staff and are attached in this appendix. The logs contain factual information and interpretation of subsurface conditions between samples. The strata indicated on these logs represent the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soils Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this appendix. Bag samples of the major earth units were obtained for laboratory inspection and testing.



MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravel, gravel-sand mixtures. little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% 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 or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatamaceous 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.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

UNIFIED SOIL CLASSIFICATION SYSTEM

I. SOIL STRENGTH/DENSITY

BASED ON STANDARD PENETRATION TESTS

Compactness of sand		Consistency of clay	
Penetration Resistance N (blows/Ft)	Compactness	Penetration Resistance N (blows/ft)	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

N = Number of blows of 140 lb. weight falling 30 in. to drive 2-in OD sampler 1 ft.

BASED ON RELATIVE COMPACTION

Compactness of sand		Consistency of clay	
% Compaction	Compactness	% Compaction	Consistency
<75	Loose	<80	Soft
75-83	Medium Dense	80-85	Medium Stiff
83-90	Dense	85-90	Stiff
>90	Very Dense	>90	Very Stiff

II. SOIL MOISTURE

Moisture of sands		Moisture of clays	
% Moisture	Description	% Moisture	Description
<5%	Dry	<12%	Dry
5-12%	Moist	12-20%	Moist
>12%	Very Moist	>20%	Very Moist, wet

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/15/2020 Completed: 7/15/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: mbk Checked By: hhl
140 lb AutoHammer with 30 inch drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										ASPHALT: 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange brown fine Silty SAND with Clay, slighlty micaceous, slightly moist, meduim dense			SM
										ALLUVIUM (Qa): Light orange gray fine Silty SAND with minor Clay,			
		5,5,5		17.4	103.2	121.1				micaceous, orange iron oxide stains along minor rootlet pathways, slightly moist, intact, loose density			SM
5		3,3,4		8.2	91.3	98.8				@ 5 feet, same as above, with thin SILT layers, slightly moist, intact, very loose density			SM
		7,12,14		24.4	100.7	125.3				@ 7.5 feet, lighty orange gray Sandy SILT and Silty SAND layers, orange oxide staining along rootlet pores and organic debris clasts (1mmx5mm), micaceous, slightly moist, medium dense or stiff			ML/SM
10		4,4,4		9.8	109.4	120.1				@ 10 feet, very light gray fine Silty SAND, slightly micaceous, slighlty moist intact, very loose density			SM
		6,10,11		9.8						@ 12.5 feet, very light gray fine SAND with Silt, friable, slightly moist to dry, dense			SP
15		40,50/4"		10.5	116.9	129.1				@ 15 feet, same as above fine SAND with Gravel and Cobbles, friable, dry to slightly moist, medium dense			SP
		9,10,15		2.0						@ 17.5 feet, same as above fine SAND with Silt, Gravel, and Cobbles, friable, slightly moist to dry, medium dense, Cobble in sample shoe			SW
20		20,28,31		1.8	121.0	123.1				@ 20 feet, very light gray fine SAND with Silt, and minor medium to coarse grains, friable, slightly moist to dry, medium dense, three rings			SW
		11,9,11		2.3						@ 22.5 feet, light yellow brown gray fine to coarse Gravally SAND with Silt, friable, slightly moist, dense			SW
25		30,40,50/6"		2.3	108.6	111.1				@ 25 feet, light yellow brown gray fine Gravelly SAND with fine to coarse SAND and pockets of fine Sandy SILT lenses, slight moist, medium dense			SW
30										**Total Depth drilled 26.5 feet** **No Groundwater** **No Caving** **Backfilled and Asphalt Capped 7/15/20**			

Material Description: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

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BORING NUMBER 2

Page 1 of 1

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte,
Date Started: 7/15/2020 Completed: 7/15/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: mbk Checked By: hhl
140 lb AutoHammer with 30 inch drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										ASPHALT: 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange fine Silty SAND with Clay, slightly moist, meduim dense			SM
										@ 6 inches change to moderate brown gray with strong petroleum			
		7,11,13		12.3	98.7	110.9				ALLUVIUM (Qa): Very light orange gray fine to medium Silty SAND slightly moist, medium dense.			SM
5		6,4,3		29.3	80.3	103.8				@ 5 feet, very light orange gray fine Silty SAND with orange iron staining along rootlet pathways, slighlty micaceous, very loose			SM
		12,13,15		34.7	89.9	121.1				@ 7.5 feet, same as above, slighlty moist, medium dense			SM
10		7,8,10		6.6						@ 10 feet, very light orange gray fine SAND with thin orange clasts stained orange (iron oxide), slightly moist, meduim dense			SP
		28,50/6"		1.6	114.8	116.6				@ 12.5 feet, same as above, slightly moist, medium dense			SP
15		11,13,14		1.3						@ 15 feet, same as above fine SAND with lenses and thin layers of brown SILT with Clay, slightly moist, medium dense			SP
		27,50/6"		3.2	102.0	105.3				@ 17.5 feet, very light yellow gray fine to medium SAND with Silt, dry to slighlty moist, medium dense			SW
20		17,22,24		3.2						@ 20 feet, very light yellow gray fine to coarse SAND with minor Silt and fine Gravel (subangular to subrounded), friable, slighlty moist to dry,			SW
		40,50/6"		4.1	124.0	129				@ 22.5 feet, same as above with minor Gravel, friable, slightly dense			SW
25		18,21,39		9.4						@ 25 feet, same as above, fine to medium SAND, friable, slightly dry, dense			SW
30										**Total Depth drilled 26.5 feet** **No Groundwater** **No Caving to 20 feet as auger pulled** **Backfilled and Asphalt Capped 7/15/20**			

Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

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APPENDIX G - REFERENCE MATERIAL

BORING NUMBER 3

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/15/2020 Completed: 7/15/2020
Ground Elevation: 240* Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choise Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: mbk Checked By: hhl
140 lb AutoHammer with 30 inch drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table			
										ASPHALT: 2 inches **ARTIFICIAL FILL Qaf):** Moderate orange brown fine Silty SAND, slighlty moist, medium dense			SM
										Orange brown fine Silty SAND, slighlty moist, medium dense			
		6,8,7		12.6	112.2	126.4				**ALLUVIUM (Qa):** Olive gray with minor orange iron oxide stained fine			SM
										Silty SAND, micaceous, strong hydrocarbon odor, moist, medium dense			SM
5		6,8,11		12.8	115.0	130				@ 5 feet, same as above, hydrocarbon odor, slighlty moist medium dense			SM
		6,9,12		29.5	90.1	117				@ 7.5 feet, same as above, strong hydrocarbon odor, slighlty moist to moist, medium dense			SM
10		2,3,4								@ 10 feet, same as above, hydrocarbon odor, slightly moist to moist, medium dense	15		SM
		6,8,14		20.3	109.3	132				@ 12.5 feet, olive grey fine Sandy SILT with clay with orange iron oxide staining along rootlet pathways, minor charcoal flecks, hydrocarbon odor (PID 300), slightly moist,very stiff			ML
15		4,6,2		12.5			42	37	5	@ 15 feet, sandy SILT with clay, hydrocarbon odor, medium dense, slightly moist, very stiff	80		ML
		6,9,15		7.2	96.1	103				@ 17.5 feet, light gray brown fine SAND with Silt, slightly moist,			SP
20		4,9,15								Light gray brown SILT, micaceous, hydrocarbon odor (PID 386), slightly moist to moist, medium stiff	20		ML
										Light gray brown fine SAND with Silt, friable,slighlty moist, medium dense			SP
		28,50/6"		1.7	110.1	112				@ 22.5 feet, light gray fine to coarse Gravelly SAND with Silt, friable, no hydrocarbon odor, dry to slighlty moist, medium dense			SW
25		7,9,11		1.5						@ 25 feet, same as above, friable, dry to slightly moist, medium dense			SW
		10,11,20		12.4	95.4	107				@ 27.5 feet, same as above, with SILT and fine SAND layers, slightly moist, medium dense			SW
30		5,7,8								@ 30 feet, light gray Silty fine SAND with gravel, friable, slightly moist, dense	18		SM/SP
		17,28,30		3.3	109.6	113				@ 32.5 feet, same as above, dense			SP

Client: KB Home
Project Name: Solemo 13 Acre
Project Number: 20G-0418-0
Project Location: 2540 Rosemead Blvd, South El Monte
Date Started: 7/15/2020 Completed: 7/15/2020
Ground Elevation: 240* Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choise Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: mbk Checked By: hi

Material Description

Thin Wall Tube | 2.5" Ring Sample | Bulk Sample | Standard Split Spoon Sample | Static Water Table

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
		9,14,15		4.3						@ 35 feet, same as above, light gray fine SAND with SILT, friable, slighty moist, dense			SP
		50/6"		2.1	108.8	111.1				@ 37.5 feet, same as above with Gravel, friable, slightly moist, dense			SP/SW
40		15,21,22								@ 40 feet, light gray fine SAND, slightly moist, dense	6.4		SP
		27,50/2"		19.7	107.6	129				@ 425 feet, Gray Gravelly SAND, sub angular to sub rounded, moist, medium dense with lenses of Silty CLAY, organic rich, moist, soft			SW
45		27,50/2"		33.4						@ 45 feet, Gray green SILT with Clay to Clayey SILT with minor Gravel, organic rich, slighlty micaceous, slighlty moist to moist, soft			ML
		10,15,21		18.9	113.4	135				@ 47.5 feet, dark gray, Silty CLAY to Clayey SILT with coarse Sand to fine Gravel, stiff			CL/ML
50		12,15,16								@ 50 feet, Silty Sand with clay, less Gravel, slightly moist, stiff	34.9		SM/SC
55										**Total Depth drilled 51.5 feet** **No Groundwater** **No Caving** **Backfilled and Asphalt Capped 7/15/20**			
60													
65													

BORING NUMBER 4

Page 1 of 1

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9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: KB Home | Project Name: Solemo 13 Acres

Project Number: 20G-0418 | Project Location: 2540 Rosemead Blvd, South El Monte, CA

Date Started: 7/15/2020 | Completed: 7/15/2020 | Ground Elevation: 244 ft. * | Boring Diameter: 9"

Excavation Method: Hollow Stem Auger | Ground Water Levels: Not Encountered

Drilling Contractor: Choice Drilling (Samm and Darwin) | Notes: * Topographic map by B & E Engineers 10/23/15

Logged By: MRM | Checked By: HL | 140 lb Auto Hammer with 30 in. drop

Depth (ft)	Blow Count (N Value)	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Material Description	<#200	D_{50}	USCS Classification
					ASPHALT: 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange brown fine Silty SAND with Clay, slighlty micaceous, slightly moist, meduim dense			
	9-9-8	12.3	106.3	119	**ALLUVIUM (Qa):** Light orange brown Silty fine SAND with minor Clay, micaceous, orange iron oxide stains, slightly moist, intact, loose density			SM
5	1-1-2				@ 3 feet, medium light brown SILT with fine Sand, micaceous, red iron odixe staining, slightly moist			ML
	4-7-12	19.4	109.9	131	@ 7.5 feet, medium light brown SILT with medium course Sand, micaceous, red iron odixe staining, slightly moist			
10	10-17-20	3.8	104.1	108	@ 10 feet, orange yellow medium to fine grained SAND, micaceous, red iron odixe staining, slightly moist, medium dense			SM
	8-13-14				@ 12.5 feet, orange yellow medium to fine grained SAND, red iron odixe staining, slightly moist, medium dense			
15	20-34-50(6")	1.4	121.4	123	@ 15 feet, greyish white course grained SAND with abundant Gravels (fine to course), slightly moist to dry, many fractured gravels in sample			SM-SP
	9-15-16				@ 17.5 feet, greyish white course grained SAND with some Gravels (fine to course), slightly moist to dry, some fractured gravels in sample			SM
20	14-21-30	1.7	113.3	115	@ 20 feet, greyish white course grained SAND with some Gravels (fine to course), slightly moist to dry, few fractured gravels in sample			
	14-28-33				@ 22.5 feet, greyish white medium to fine grained SAND with some Gravels (fine to course), slightly moist to dry, few fractured gravels in sample			
25	31-50(6")	3.6	110.0	114	@ 25 feet, greyish white medium to fine grained SAND with some Gravels (fine to course), slightly moist to dry, few fractured gravels in sample			
	2-3-4				@ 27.5 feet, Blue grey Clayey SAND with Silt, very micaceous, slightly moist, soft,			SC-SM
30					**Total Depth drilled 27.5 feet** **No Groundwater** **No Caving** **Backfilled and Asphalt Capped 7/16/20**			

Thin Wall Tube | 2.5" Ring Sample | Bulk Sample | Standard Split Spoon Sample | Static Water Table

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/16/2020 Completed: 7/16/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: MRM Checked By: HHL
140 lb Auto Hammer with 30 in. drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										ASPHALT: 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange brown fine Silty SAND with Clay, slighlty micaceous, slightly moist, medium dense			
										ALLUVIUM (Qa): Light orange brown Silty fine SAND with minor Clay, micaceous, orange iron oxide stains, slightly moist, intact, loose density			SM
		2-4-10		22.3	101.4	124.0							
5				20.9						@ 3 feet, medium light brown Silty SAND to Sandy SILT, micaceous, red iron odixe staining, slightly moist			SM/ML
										@ 5 feet, medium light brown Silty SAND to Sandy SILT with Clay, micaceous, red iron odixe staining on rootlets, slightly moist, medium stiff			
		18-24-31		3.1	106.7	110.0				@ 7.5 feet, orange yellow medium to course SAND with Silt and some Gravels, slightly moist, fractured gravels coming up in auger			SM
10		4-8-10		3.6						@ 10 feet, orange yellow medium to course SAND with Silt and some Gravels, slightly moist, fractured gravels coming up in auger			
		16-18-8		4.9	102.2	107.2				@ 12.5 feet, whitish yellow medium to fine grained SAND, no gravels, red iron odixe staining, slightly moist, medium dense			
15		2-2-6		21.0						@ 15 feet, Redish iron staining on layer of sandy silt with clay, soft with lower half of sample containing medium brown fine to medium SAND, slightly moist			CL/ML
		12-28-50(6")		1.9	125.8	128.1				@ 17.5 feet, whitish course to medium grained SAND with Gravels (fine to course), slightly moist to dry, abundant fractured gravels in sample			SM
20		2-3-4		25.9						@ 20 feet, blue grey green SILT with Clay to Clayey SILT with little to no Sand, soft, slightly moist			ML
		12-16-17		19.3	102.0	121.8				@ 22.5 feet, blue grey green SILT with Clay to Clayey SILT with little to no Sand, medium dense, slightly moist			
25		5-7-7		11.4						@ 25 feet, blue grey green fine grained SAND with Silt, slightly moist, soft, no cobbles, minor iron oxide staining			SM
		8-10-12		18	104.0	122.7				@ 27.5 feet, brown grey SILT with Clay to CLAY with Silt, some iron oxide staining, soft, low recovery			ML/CL
30		2-4-8		34									
				15.6	115.4	133.5							

Material Description: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/16/2020 Completed: 7/16/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: MRM Checked By: HHL

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
35		5-6-9		11.9						@ 35 feet, blue green grey Silty SAND with Clay, slightly moist, medium dense, micaceous			SM
		25-50(6")		11.4	123.9	138				@ 37.5 feet, blue green grey Silty SAND with Clay, slightly moist, medium dense, micaceous			
40		8-11-6		14.0						@ 40 feet, Lower sampler consists of approximately 6 inches of grey green Silty CLAY, below it there is approximately 6 inches of whitish grey course SAND and below that there is approximately 6 inches of blue green medium course SAND, slightly moist			CL/SM
		15-38-50(6"		12.6	119.7	135				@ 42.5 feet, blue green grey Silty coarse SAND with Clay, slightly moist, medium dense, micaceous			SM
45		8-12-17		11.8						@ 45 feet, blue green grey Silty coarse SAND with Clay, slightly moist, medium dense, micaceous			
		11-14-15		23.4	100.9	125				@ 47.5 feet, blue green grey Silty coarse SAND with Clay, slightly moist, medium dense, micaceous			
50		7-11-14		33.5						@ 50 feet, blue green grey Silty coarse SAND with Clay, slightly moist, medium dense, micaceous			

Thin Wall Tube | 2.5" Ring Sample | Bulk Sample | Standard Split Spoon Sample | Static Water Table

Total Depth drilled 50 feet

No Groundwater

No Caving

Backfilled and Asphalt Capped 7/16/20

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/16/2020 Completed: 7/16/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: MRM Checked By: HHL
140 lb Auto Hammer with 30 in. drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										ASPHALT: 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange brown fine Silty SAND with Clay, slighlty micaceous, slightly moist, medium dense			
		2-3-4								**ALLUVIUM (Qa):** Light orange brown Silty fine SAND with minor Clay, micaceous, orange iron oxide stains, slightly moist, loose to medium density	52		SM/ML
5		7-9-10		13.4	96.2	109.1				@ 2.5 feet, medium light brown Silty SAND to Sandy SILT, micaceous, red iron odixe staining, slightly moist			
		1-2-4		4.3						@ 5 feet, medium light brown Silty SAND to Sandy SILT with Clay, micaceous, red iron odixe staining on rootlets, slightly moist, medium stiff			
10		4-6-8		18.4	76.6	90.7				@ 7.5 feet, whitish medium to course SAND, some finer sand in upper sanmple, slightly moist,			
		1-1-1					61	54	7	@ 10 feet, medium light brown Silty SAND to Sandy SILT, micaceous, red iron odixe staining, slightly moist, low recovery			
15		4-4-5		60.5	55.2	88.6				@ 12.5 feet, Black Sandy SILT trace clay, very strong hydrocarbon smell, abundant black organics and brown degrading roots, soft, slightly moist to moist	83		ML/SM
		5-4-4		12.8						@ 15 feet, Blacksilty Sandy SILT, very strong hydrocarbon smell, abundant black organics and brown degrading roots, soft, slightly moist to moist,			
20		6-8-9		23.9	100.6	124.7				@ 17.5 feet, Upper layer is dark grey course to medium SAND, lower half of sample is black Sandy SILT, very strong hydrocarbon smell, abundant black organics and brown degrading roots, soft, slightly moist to moist,			
		3-3-3								@ 20 feet, Upper layer is dark grey course to medium SAND, lower half of sample is black Sandy SILT, very strong hydrocarbon smell, abundant black organics and brown degrading roots, soft, slightly moist to moist,			
25		8-10-14		16.9	109.3	127.8				@ 22.5 feet, dark grey green silty SAND trace clay, micaceous, no visible organics, slightly moist, soft	61		ML/SM
		6-13-15		12.6						@ 25 feet, dark grey green silty SAND trace clay, micaceous, no visible organics, slightly moist, soft, some course grey gravel and a course Sand layer approx. 3"			
30		17-50(6")		12.8	111.5	125.8				@ 27.5 feet, grey green medium to fine SAND with minor Silt, upper 3 in. of sampler are silty SAND trace clay, micaceous, no visible organics, moist,			SM
		6-12-20								@ 30 feet, grey green medium to fine SAND with minor Silt, micaceous, no visible organics, moist, medium dense to dense			
										@ 32.5 feet, grey green medium to fine SAND with minor Silt, micaceous, no visible organics, moist, medium dense to dense	11		

Material Description: Thin Wall Tube; 2.5" Ring Sample; Bulk Sample; Standard Split Spoon Sample; Static Water Table

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

BORING NUMBER 6
Page 2 of 2

Client: KB Home
Project Name: Solemo 13 Acres
Project Number: 20G-0418
Project Location: 2540 Rosemead Blvd, South El Monte, CA
Date Started: 7/16/2020 Completed: 7/16/2020
Ground Elevation: 244 ft. * Boring Diameter: 9"
Excavation Method: Hollow Stem Auger
Ground Water Levels: Not Encountered
Drilling Contractor: Choice Drilling (Samm and Darwin)
Notes: * Topographic map by B & E Engineers 10/23/15
Logged By: MRM Checked By:

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
35		45-50(6")		7.7	125.7	135.5				@ 32.5 feet, grey green medium to fine SAND with minor Silt, micaceous, no visible organics, moist, medium dense to dense			SM
		6-7-8								@ 37.5 feet, grey green medium coarse to coarse SAND with some Silt, micaceous, moist, medium dense			
40		13-22-35		8.3	113.4	122.8				@ 40 feet, medium brown Sandy SILT to Silty SAND with Gravel, slightly moist, medium dense,			SM/ML
		6-8-9								@ 42.5 feet, medium brown course to medium course SAND, slightly moist, medium dense, grades into finer grey green SILT with Clay	27		SM
45		11-20-23								@ 45 feet, medium brown coarse SAND interspersed with black tubes, layers of green Silty Clay in lower rings, slightly moist, dense			
		8-12-20								@ 47.5 feet, light brown Silty SAND, slightly moist, friable, medium dense to dense			
50		50(6")								@ 50 feet, light brown Silty SAND, slightly moist, friable, medium dense to dense			

Thin Wall Tube | 2.5" Ring Sample | Bulk Sample | Standard Split Spoon Sample | Static Water Table

Total Depth drilled 50 feet

No Groundwater

No Caving

Backfilled and Asphalt Capped 7/16/20

BORING NUMBER 7

Page 1 of 1

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: KB Home | Project Name: Solemo 13 Acres

Project Number: 20G-0418 | Project Location: 2540 Rosemead Blvd, South El Monte, CA

Date Started: 7/16/2020 | Completed: 7/16/2020 | Ground Elevation: 244 ft. * | Boring Diameter: 9"

Excavation Method: Hollow Stem Auger | Ground Water Levels: Not Encountered

Drilling Contractor: Choice Drilling (Samm and Darwin) | Notes: * Topographic map by B & E Engineers 10/23/15

Logged By: MRM | Checked By: | 140 lb Auto Hammer with 30 in. drop

Depth (ft)	Drive Sample	Blow Count (N Value)	Material Description	<#200	D_{50}	USCS Classification
0			**ASPHALT:** 2 inch thick **ARTIFICIAL FILL (af):** Moderate orange brown fine Silty SAND with Clay, slighlty micaceous, slightly moist, medium dense			SM
		4-6-10	@ 3 feet, medium light brown Silty SAND to Sandy SILT, asphault pieces,medium dense, slightly moist			SM/ML
5			**ALLUVIUM (Qa):** Light orange brown Silty fine SAND with minor Clay, micaceous, orange iron oxide stains, slightly moist, loose to medium density			SM
		4-6-10	@ 6 feet, medium light brown Silty SAND to Sandy SILT, micaceous, slightly moist, medium stiff			SM/ML
10		9-12-18	@ 9 feet, medium light brown Silty SAND to Sandy SILT, micaceous, slightly moist, medium stiff, red iron oxide staining			
		7-12-13	@ 12 feet, medium light brown Silty SAND to Sandy SILT, micaceous, slightly moist, medium stiff, red iron oxide staining			
15		11-13-20	@ 15 feet, medium brown Silty SAND to Sandy SILT, micaceous, slightly moist, medium stiff to stiff, red iron oxide staining areas are sandier			
		13-17-18	@ 18 feet, whitish grey fine to medium SAND with minor Silt, slightly moist, medium dense			SM
20		8-20-30	@ 21 feet, whitish grey fine to medium SAND with minor Silt and minor well graded gravels, slightly moist, medium dense			
			@ 24 feet, whitish grey fine to medium SAND with minor Silt and minor well graded gravels, slightly moist, medium dense			
25		14-21-28				
30			**Total Depth drilled 24 feet** **No Groundwater** **No Caving** **Backfilled and Asphalt Capped 7/16/20**			

Thin Wall Tube | 2.5" Ring Sample | Bulk Sample | Standard Split Spoon Sample | Static Water Table

RMA GeoScience

Log of Exploratory Test Pit

Test Pit Number: 1

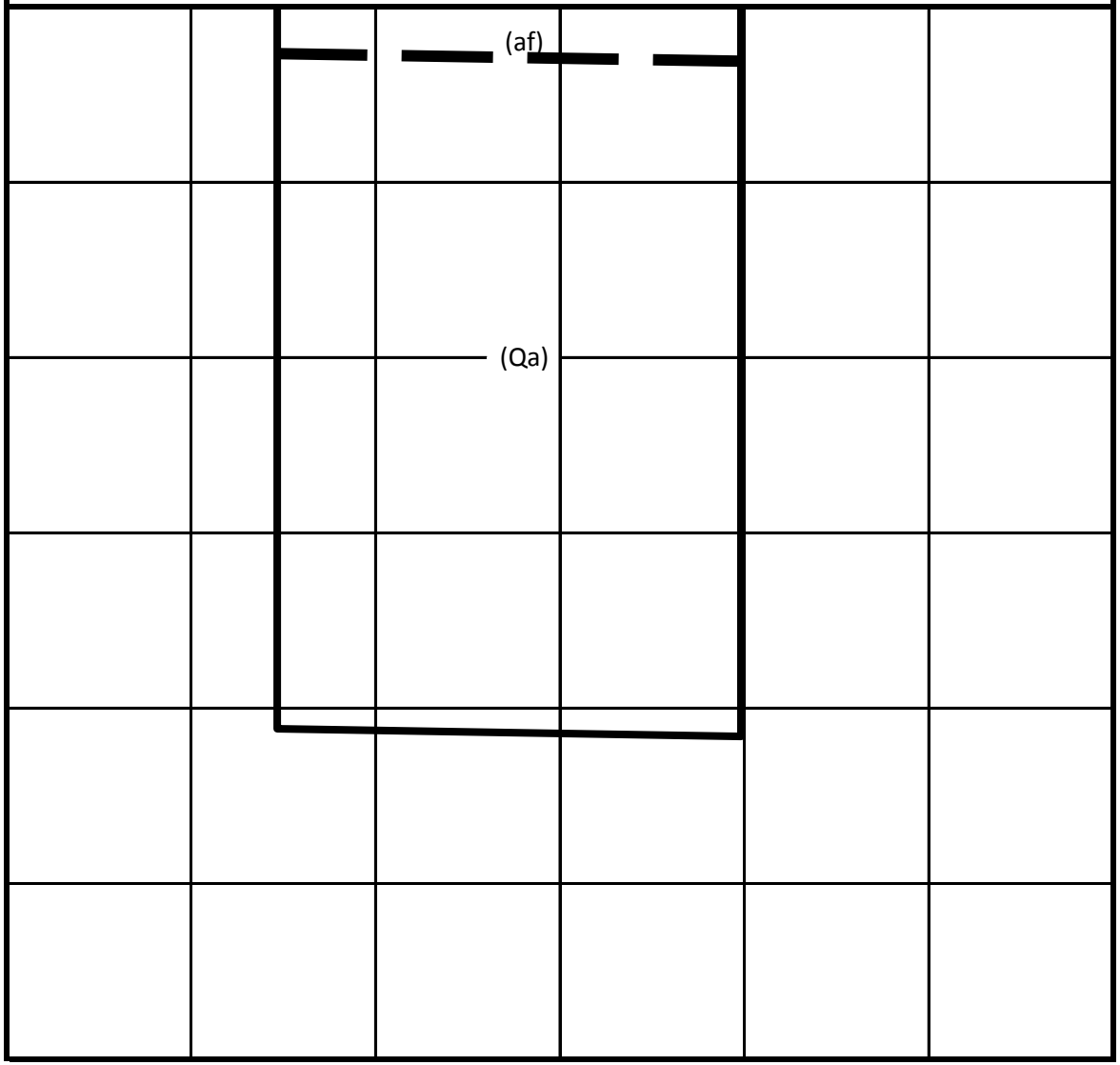
Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-1' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **1-17' Quaternary Alluvium (Qa)** 1-10': Grey green blue Silty SAND to SAND with Silt, slightly moist, no cobbles or gravels, friable, medium dense 10-17': Grey green blue Silty SAND with Clay, slightly moist, no cobbles or gravels, medium dense, strong hydrocarbon smell, breaks in chunks 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**

1 inch = 4 feet



RMA GeoScience

Log of Exploratory Test Pit

Test Pit Number: 2

Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-2' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **Refusal at two feet due to concrete slab** **TD: 2 ft** **No Caving** **No Subsurface Water or Groundwater**

1 inch = 1 feet

(af)

RMA GeoScience

Log of Exploratory Test Pit

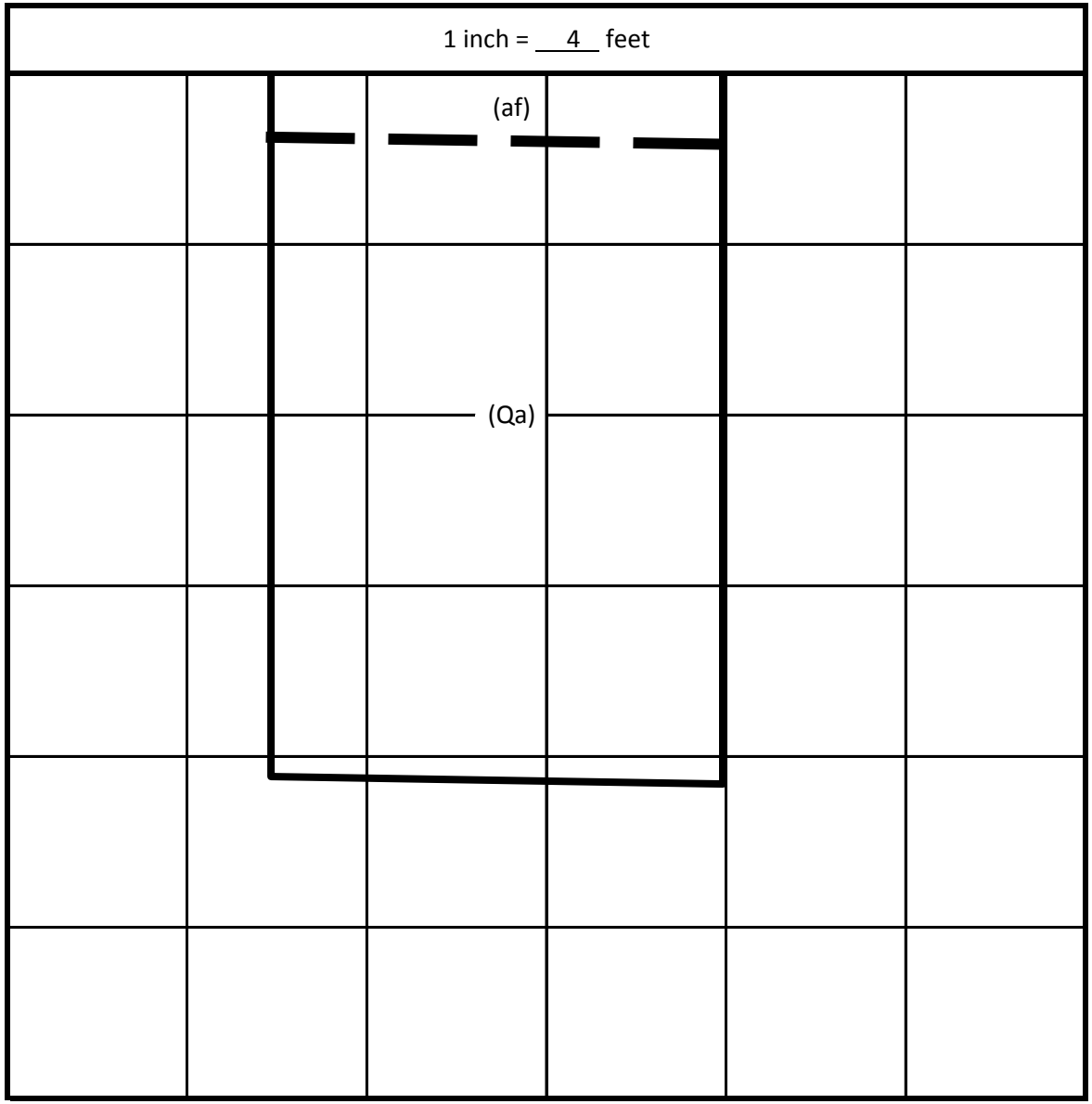
Test Pit Number: 3

Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-2' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **2-17' Quaternary Alluvium (Qa)** 1-10': Grey green blue Silty SAND to SAND with Silt, slightly moist, no cobbles or gravels, friable, medium dense 10-17': Grey green blue Silty SAND with Clay, slightly moist, no cobbles or gravels, medium dense, very strong hydrocarbon smell, breaks in chunks, sparce black potential chunks of hydrocarbons 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**



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Log of Exploratory Test Pit

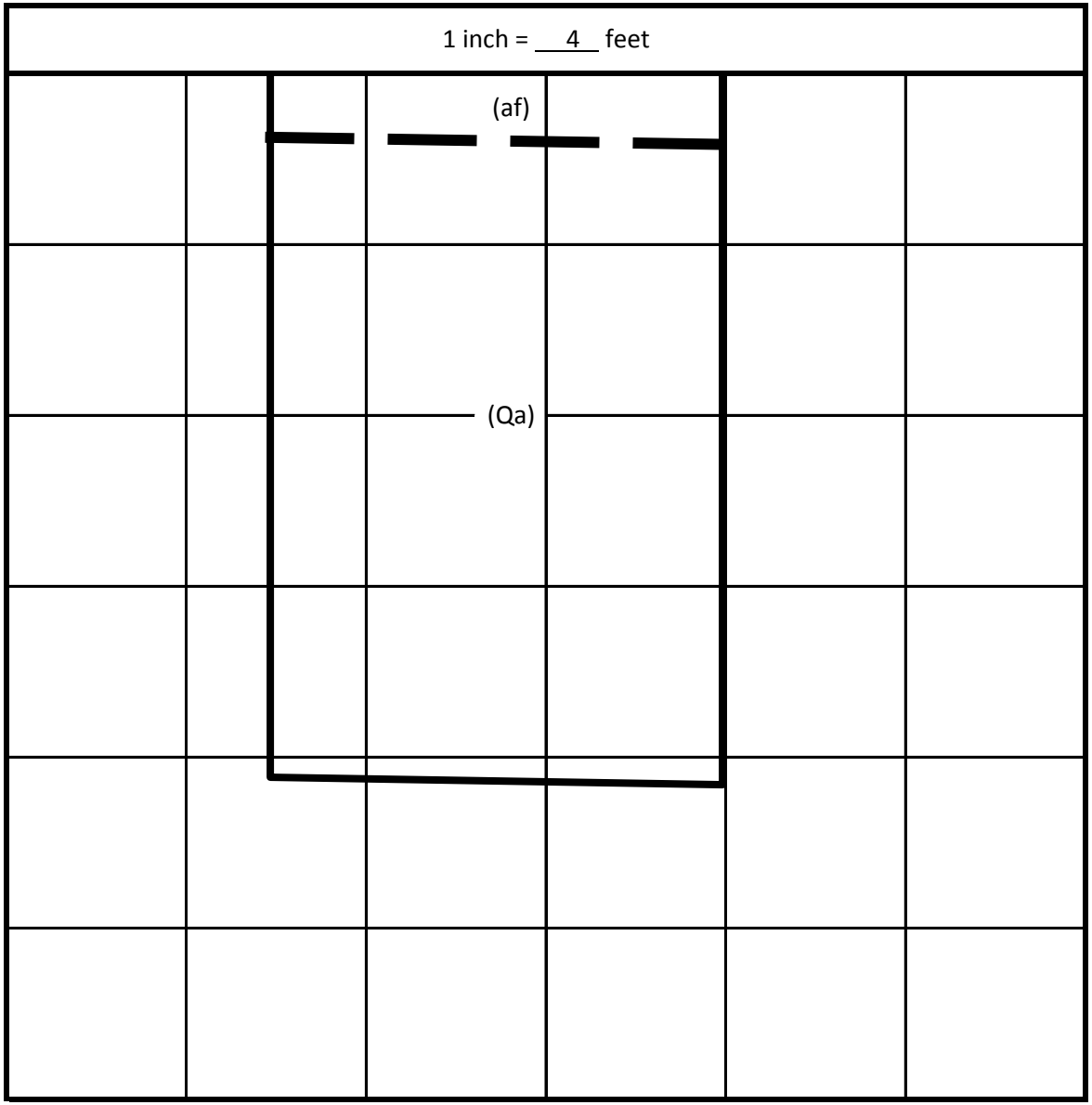
Test Pit Number: 4

Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-2' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **2-17' Quaternary Alluvium (Qa)** 1-10': light grey green blue Silty SAND to Sandy SILT, dry, no cobbles or gravels, friable, medium dense, micaceous 10-17': Grey green blue Silty SAND with Clay, micaceous, slightly moist, no cobbles or gravels, medium dense, very strong hydrocarbon smell, breaks in chunks, sparce black potential chunks of hydrocarbons 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**



RMA GeoScience

Log of Exploratory Test Pit

Test Pit Number: 5

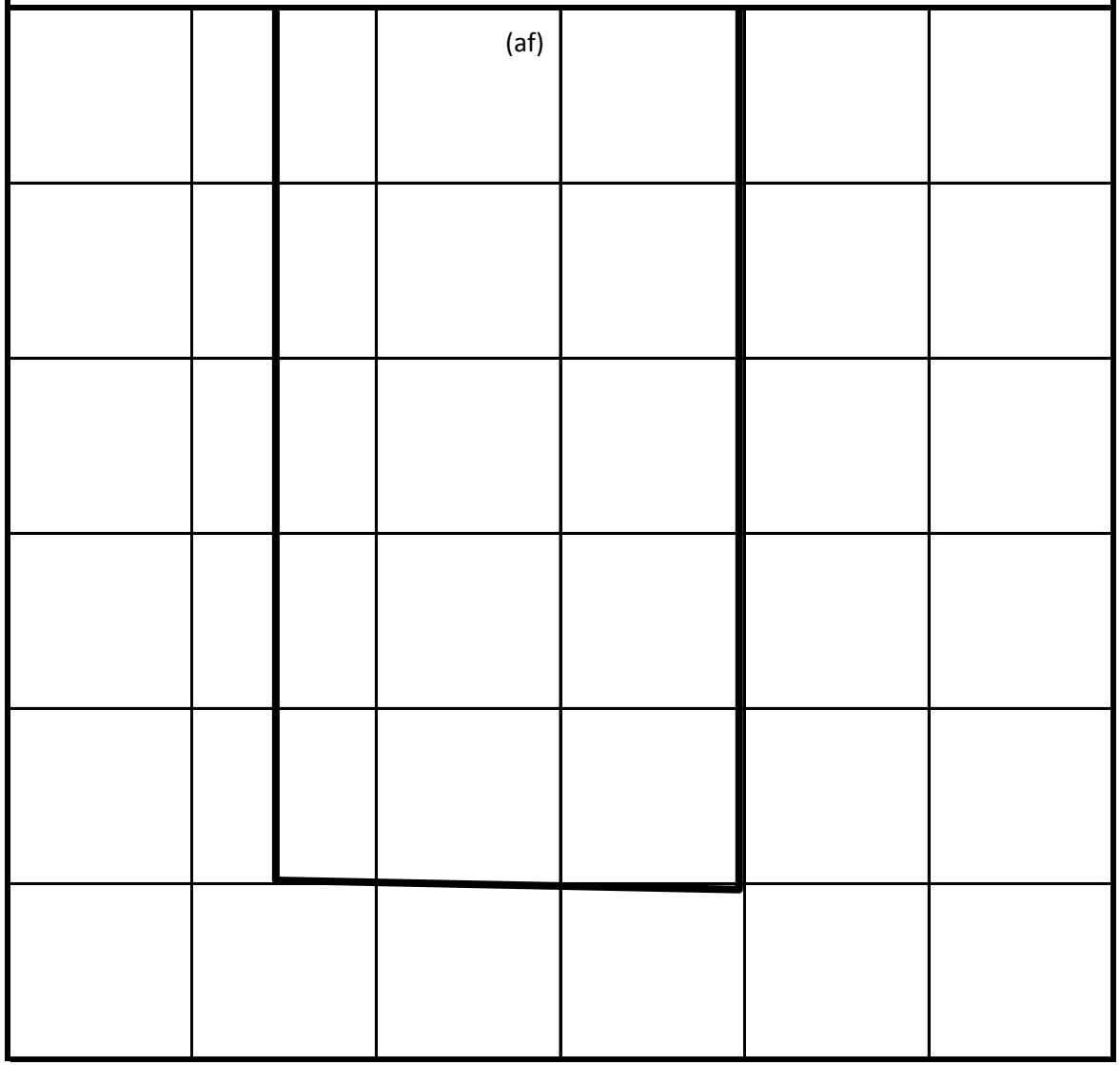
Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-5' Artificial Fill (af)** Light medium brown Silty coarse SAND to coarse Sandy SILT with no cobbles, asphalt chunks, dry **Refusal at five feet due to concrete slab** **TD: 5 ft** **No Caving** **No Subsurface Water or Groundwater**

1 inch = 1 feet



RMA GeoScience

Log of Exploratory Test Pit

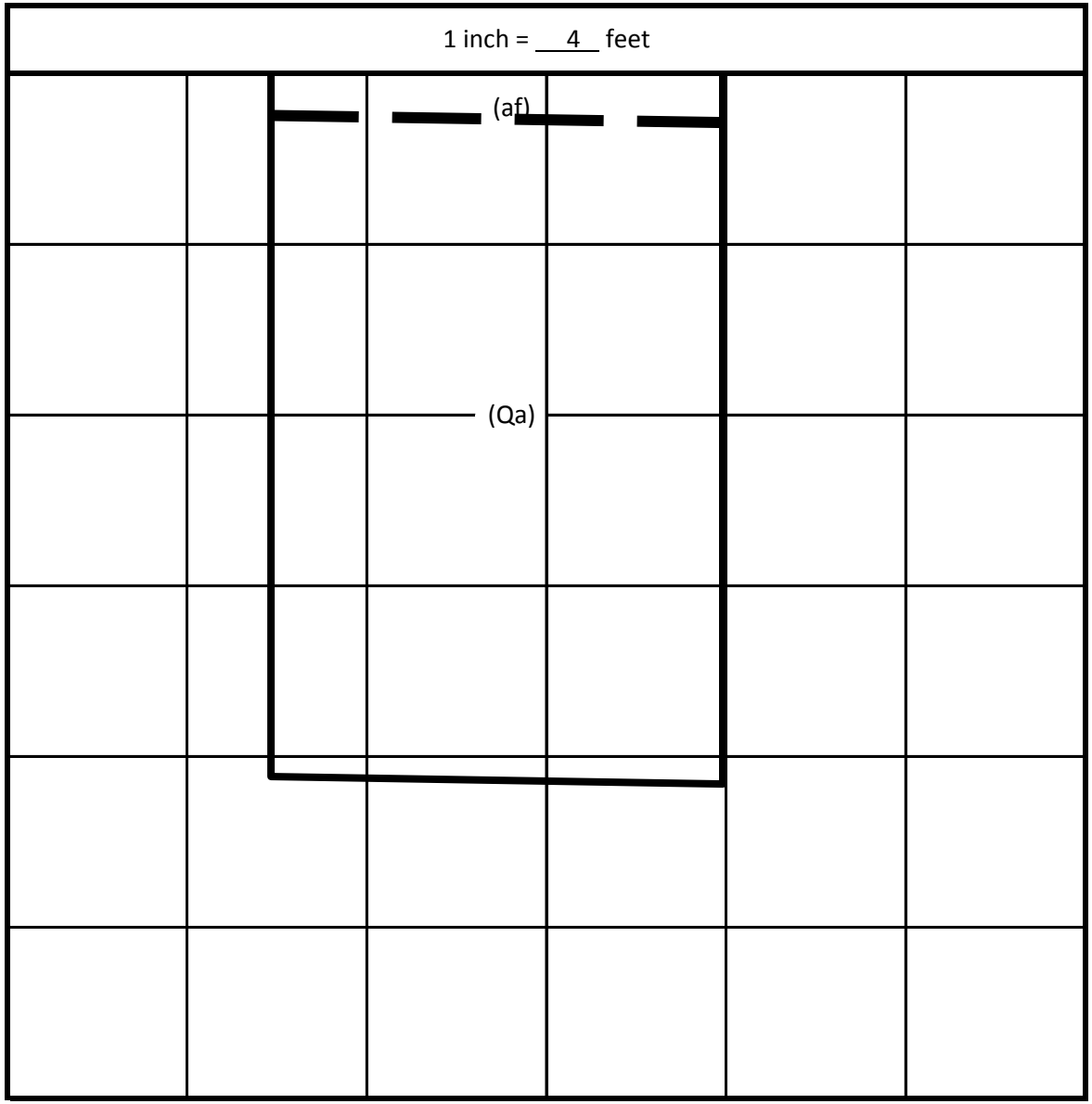
Test Pit Number: 6

Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-1' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **1-17' Quaternary Alluvium (Qa)** 1-10': light grey green blue Silty fine SAND to fine Sandy SILT, dry, no cobbles or gravels, friable, medium dense, micaceous, contamination begins at 3 feet 10-17': Grey green blue Silty fine SAND with Clay, micaceous, slightly moist, no cobbles or gravels, medium dense, very strong hydrocarbon smell, breaks in chunks (somewhat sticky), black potential chunks/clumps of hydrocarbons 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**



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Log of Exploratory Test Pit

Test Pit Number: 7

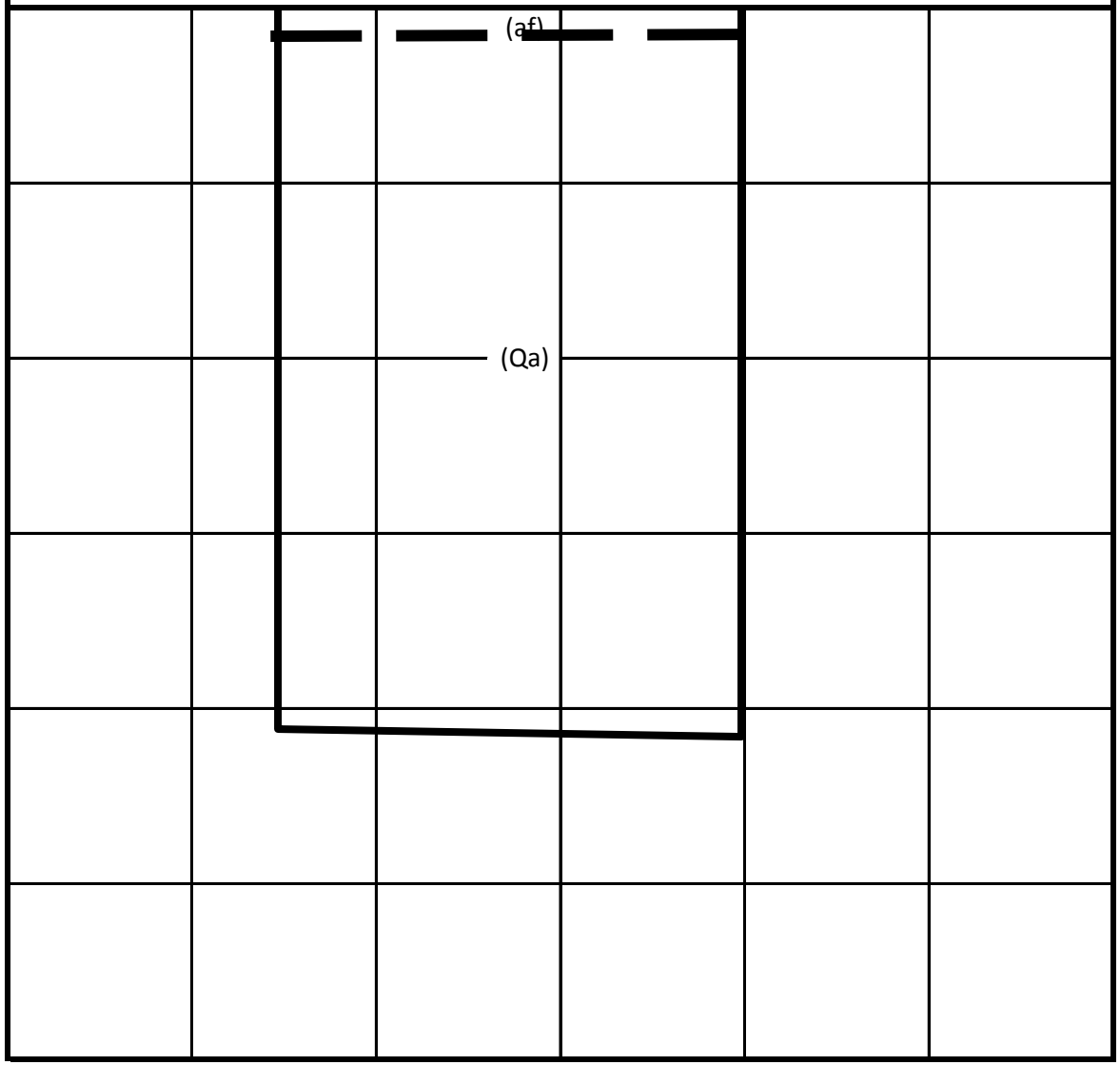
Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-0.5' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **0.5-17' Quaternary Alluvium (Qa)** 1-10': light grey green blue Silty fine SAND to fine Sandy SILT, dry, friable, medium dense, micaceous, contamination begins at 1 foot 10-17': Grey green blue Silty fine SAND with Clay, micaceous, slightly moist, no cobbles or gravels, medium dense, very strong hydrocarbon smell, breaks in chunks (somewhat sticky), black potential chunks/clumps of hydrocarbons all the way to depth **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**

1 inch = 4 feet



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Log of Exploratory Test Pit

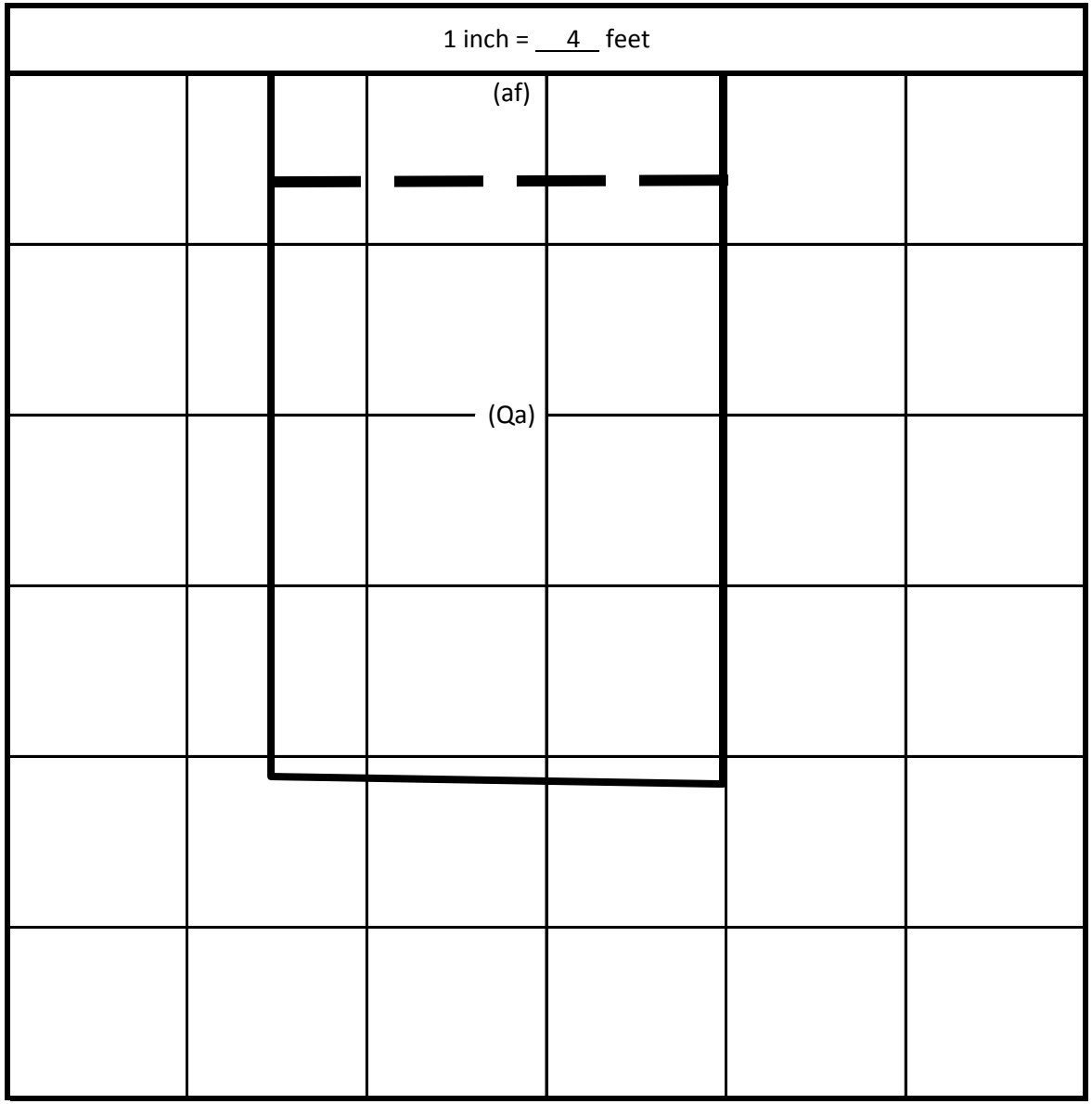
Test Pit Number: 8

Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt with base **0-1.5' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **0.5-17' Quaternary Alluvium (Qa)** 1-13': brown Silty fine SAND to fine Sandy SILT, dry, friable, medium dense, micaceous, contamination begins at 1 foot 13-17': Grey green blue Silty fine SAND with Clay, micaceous, slightly moist, no cobbles or gravels, medium dense, very strong hydrocarbon smell, breaks in chunks (somewhat sticky), black potential chunks/clumps of hydrocarbons all the way to depth 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**



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Log of Exploratory Test Pit

Test Pit Number: 9

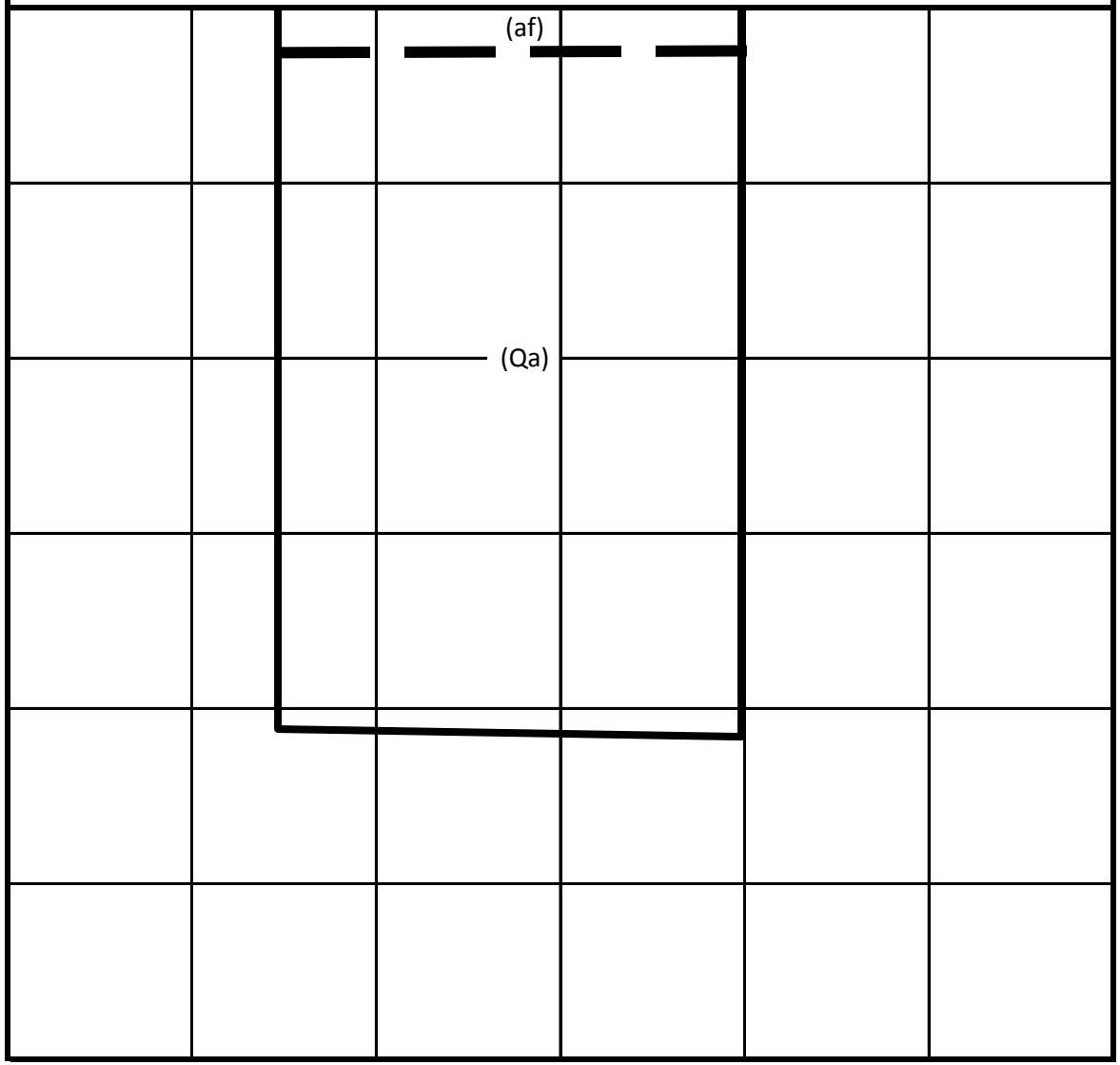
Date: 7/15/2020

Project Name: Solemo 13 Acres
Project Number: 20G-0418
Equipment: Backhoe
Logged By: MRM

Location: 2540 Rosemead Blvd, South El Monte, CA
Notes: Stantec Environmental Test Pits

USCS	Material Description
	Surface: Asphalt (2") with base **0-1' Artificial Fill (af)** Light brown Silty SAND to Sandy SILT, asphalt chunks, dry **1-17' Quaternary Alluvium (Qa)** 1-17': light brown Silty SAND to Sandy SILT, slightly moist, friable, medium dense, micaceous, no detectable contamination/hydrocarbons 17': light grey Course SAND, little to no fines, slightly moist, very friable, medium dense, some gravels, hydrocarbons absent **TD: 17 ft** **No Caving** **No Subsurface Water or Groundwater**

1 inch = 4 feet



APPENDIX B

LABORATORY TESTS

APPENDIX B

B-1.00 LABORATORY TESTS

B-1.01 Maximum Density

Maximum density - optimum moisture relationships for the major soil types encountered during the field exploration were performed in the laboratory using the standard procedures of ASTM D1557.

B-1.02 Particle Size Analysis

Particle size analysis was performed on a representative sample of the on-site soils in accordance with the standard test methods of the ASTM D422. The test results are included in this Appendix B.

B-1.03 Materials Finer than #200

Particle size analysis was performed on representative samples of the on-site soils in accordance with the standard test methods of the ASTM D1140. The test results are presented on the boring logs in Appendix A.

B-1.04 Expansion Tests

Expansion index tests were performed on representative samples of the major soil types encountered by the test methods outlined in ASTM D4829.

B-1.05 Soluble Sulfates

A test was performed on representative sample encountered during the investigation using the California Test Method 417.

B-1.06 Soil Reactivity (pH) and Minimum Resistivity

A near-surface soil samples were tested for soil reactivity (pH) and minimum electrical resistivity using California Test Method 643. The pH measurement determines the degree of acidity or alkalinity in the soils. The minimum resistivity is used as an indicator of how corrosive the soil is relative to buried metallic items.

B-1.07 Moisture Determination

Moisture content of the soil samples was performed in accordance to standard method for determination of water content of soil by drying oven, ASTM D2216. The mass of material remaining after oven drying is used as the mass of the solid particles.

B-1.08 Density of Split-Barrel Samples

The density of ring and tube samples, which were obtained using a split-barrel sampler, were determined in accordance with ASTM D2937. The results of these tests are provided on the boring logs in Appendix A.

B-1.09 Atterberg Limits

The liquid limit, plastic limit, and the plasticity index of the major soil types encountered in the test holes were determined using the standard test methods of ASTM D4318.

B-1.10 Direct Shear

Direct shear test was performed on a representative sample of the major soil types encountered in the test holes

using the standard test method of ASTM D3080 (consolidated and drained). Test was performed on remolded samples. Remolded samples were tested at 90 percent relative compaction. The test results are included in this Appendix B.

Shear tests were performed on a direct shear machine of the strain-controlled type. To simulate possible adverse field conditions, the samples were saturated prior to shearing. Several samples were sheared at varying normal loads and the results plotted to establish the angle of the internal friction and cohesion of the tested samples.

B-1.11 Test Results

Test results for all laboratory tests performed on the subject project are presented in this appendix. For a sample-by-sample description, see the logs presented in Appendix A.

MAXIMUM DENSITY - OPTIMUM MOISTURE

(Test Method: ASTM D1557)

Sample Number	Optimum Moisture (Percent)	Maximum Density (lbs/ft^3)
B1 @ 0-5 ft	9.7	120.1
B2 @ 0-5 ft	13.0	122.0
B3 @ 0-5 ft	10.2	121.9
B5 @ 0-5 ft	12.7	116.5

EXPANSION INDEX

(Test Method: ASTM D4829)

Sample Number	Expansion Index	Classification
B-1 @ 0-5 ft	0	Very Low
B-5 @ 0-5 ft	0	Very Low

SOLUBLE SULFATES

(California Test Methods: 417 & 422)

Sample Number	Soluble Sulfate (ppm)	Chloride Content (ppm)
B-2 @ 0-5 ft	46	36
B-4 @ 0-5 ft	61	26

SOIL REACTIVITY (pH) AND MINIMUM RESISTIVITY

(California Test Method: 643)

Sample Number	pH	Minimum Resistivity (Ohm-cm)
B-2 @ 0-5 ft	8.9	8658
B-4 @ 0-5 ft	8.7	3260

ATTERBERG LIMITS

(Test Method: ASTM D4318)

Sample Number	Liquid Limit (Percent)	Plastic Limit (Percent)	Plasticity Index (Percent)	Water Content (Percent)
B-3 @ 15 ft	42	37	5	12.5
B-6 @ 12.5 ft	61	54	7	54.5

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DIRECT SHEAR TEST
ASTM D3080

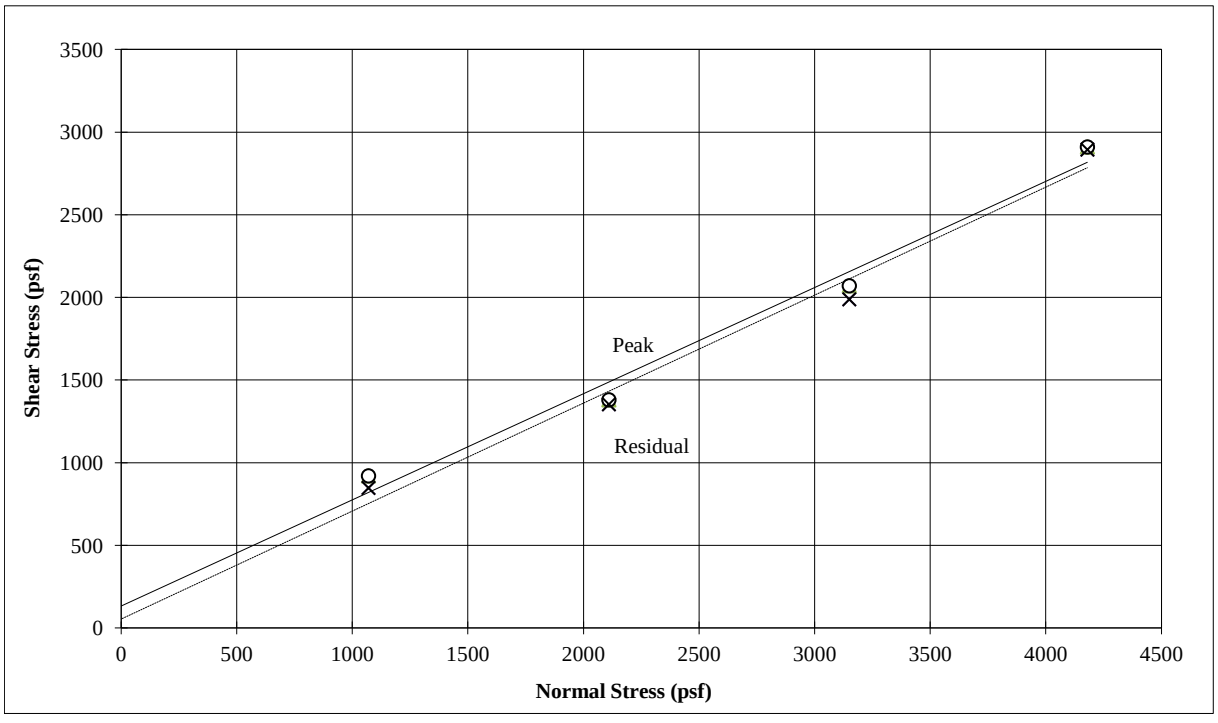
Project ID: 20G-0418-0
Location: B2
Depth: 0-5 feet
Soil Description: Silty Sand

Remolded or Undisturbed: Remolded
Maximum Dry Density (pcf) = 122.0
Optimum Moisture Content (%) = 13.0
Initial Dry Density (pcf) = 110.4
Relative Compaction (%) = 90%
Initial Moisture Content (%) = 10.7%
Final Moisture Content (%) = 24.6%

Diameter (in)	2.5
Area of sample (in^2)	4.91
Load Ring Constant (lb/in)	4010

Load Applied (g)	Normal Pressure (psf)	Peak		Residual	
		Dial Reading	Shear Resist (psf)	Dial Reading	Shear Resist (psf)
16615	1070	0.0078	920	0.0072	847
32600	2110	0.0117	1380	0.0115	1353
48674	3150	0.0176	2070	0.0169	1988
64681	4180	0.0247	2910	0.0246	2894

	Peak	Residual
Cohesion (psf) =	130	50
Friction Angle (deg) =	33	33



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APPENDIX C

GENERAL EARTHWORK
AND
GRADING SPECIFICATIONS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

C-1.00 GENERAL DESCRIPTION

C-1.01 Introduction

These specifications present our general recommendations for earthwork and grading as shown on the approved grading plans for the subject project. These specifications shall cover all clearing and grubbing, removal of existing structures, preparation of land to be filled, filling of the land, spreading, compaction and control of the fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades and slopes as shown on the approved plans.

The recommendations contained in the geotechnical report of which these general specifications are a part of shall supersede the provisions contained hereinafter in case of conflict.

C-1.02 Laboratory Standard and Field Test Methods

The laboratory standard used to establish the maximum density and optimum moisture shall be ASTM D1557.

The insitu density of earth materials (field compaction tests) shall be determined by the sand cone method (ASTM D1556), direct transmission nuclear method (ASTM D2922) or other test methods as considered appropriate by the geotechnical consultant.

Relative compaction is defined, for purposes of these specifications, as the ratio of the in-place density to the maximum density as determined in the previously mentioned laboratory standard.

C-2.00 Clearing

C-2.01 Surface Clearing

All structures marked for removal, timber, logs, trees, brush and other rubbish shall be removed and disposed of off the site. Any trees to be removed shall be pulled in such a manner so as to remove as much of the root system as possible.

C-2.02 Subsurface Removals

A thorough search should be made for possible underground storage tanks and/or septic tanks and cesspools. If found, tanks should be removed and cesspools pumped dry.

Any concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the site.

C-2.03 Backfill of Cavities

All cavities created or exposed during clearing and grubbing operations or by previous use of the site shall be cleared of deleterious material and backfilled with native soils or other materials approved by the soil engineer. Said backfill shall be compacted to a minimum of 90% relative compaction.

C-3.00 ORIGINAL GROUND PREPARATION

C-3.01 Stripping of Vegetation

After the site has been properly cleared, all vegetation and topsoil containing the root systems of former vegetation shall be stripped from areas to be graded. Materials removed in this stripping process may be used as fill in areas designated by the soil engineer, provided the vegetation is mixed with a sufficient amount of soil to assure that no appreciable settlement or other detriment will occur due to decaying of the organic matter. Soil materials containing more than 3% organics shall not be used as structural fill.

C-3.02 Removals of Non-Engineered Fills

Any non-engineered fills encountered during grading shall be completely removed and the underlying ground shall be prepared in accordance to the recommendations for original ground preparation contained in this section. After cleansing of any organic matter the fill material may be used for engineered fill.

C-3.03 Overexcavation of Fill Areas

The existing ground in all areas determined to be satisfactory for the support of fills shall be scarified to a minimum depth of 6 inches. Scarification shall continue until the soils are broken down and free from lumps or clods and until the scarified zone is uniform. The moisture content of the scarified zone shall be adjusted to within 2% of optimum moisture. The scarified zone shall then be uniformly compacted to 90% relative compaction.

Where fill material is to be placed on ground with slopes steeper than 5:1 (H:V) the sloping ground shall be benched. The lowermost bench shall be a minimum of 15 feet wide, shall be a minimum of 2 feet deep, and shall expose firm material as determined by the geotechnical consultant. Other benches shall be excavated to firm material as determined by the geotechnical consultant and shall have a minimum width of 4 feet.

Existing ground that is determined to be unsatisfactory for the support of fills shall be overexcavated in accordance to the recommendations contained in the geotechnical report of which these general specifications are a part.

C-4.00 FILL MATERIALS

C-4.01 General

Materials for the fill shall be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than is recommended by the geotechnical consultant, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength properties shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils providing satisfactory fill material.

C-4.02 Oversize Material

Oversize material, rock, or other irreducible material with a maximum dimension greater than 12 inches shall not be placed in fills, unless the location, materials, and disposal methods are specifically approved by the geotechnical consultant. Oversize material shall be placed in such a manner that nesting of oversize material does not occur and in such a manner that the oversize material is completely surrounded by fill material compacted to a minimum of

90% relative compaction. Oversize material shall not be placed within 10 feet of finished grade without the approval of the geotechnical consultant.

C-4.03 Import

Material imported to the site shall conform to the requirements of Section 4.01 of these specifications. Potential import material shall be approved by the geotechnical consultant prior to importation to the subject site.

C-5.00 PLACING AND SPREADING OF FILL

C-5.01 Fill Lifts

The selected fill material shall be placed in nearly horizontal layers which when compacted will not exceed approximately 6 inches in thickness. Thicker lifts may be placed if testing indicates the compaction procedures are such that the required compaction is being achieved and the geotechnical consultant approves their use.
Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to insure uniformity of material in each layer.

C-5.02 Fill Moisture

When the moisture content of the fill material is below that recommended by the soils engineer, water shall then be added until he moisture content is as specified to assure thorough bonding during the compacting process.

When the moisture content of the fill material is above that recommended by the soils engineer, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

C-5.03 Fill Compaction

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than 90% relative compaction. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tired rollers, or other types approved by the soil engineer.

Rolling shall be accomplished while the fill material is at the specified moisture content. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to insure that the desired density has been obtained.

C-5.04 Fill Slopes

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting of the slopes may be done progressively in increments of 3 to 4 feet in fill height. At the completion of grading, the slope face shall be compacted to a minimum of 90% relative compaction. This may require track rolling or rolling with a grid roller attached to a tractor mounted side-boom.

Slopes may be over filled and cut back in such a manner that the exposed slope faces are compacted to a minimum of 90% relative compaction.

The fill operation shall be continued in six inch (6") compacted layers, or as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

C-5.05 Compaction Testing

Field density tests shall be made by the geotechnical consultant of the compaction of each layer of fill. Density tests shall be made at locations selected by the geotechnical consultant.

Frequency of field density tests shall be not less than one test for each 2.0 feet of fill height and at least every one thousand cubic yards of fill. Where fill slopes exceed four feet in height their finished faces shall be tested at a frequency of one test for each 1000 square feet of slope face.

Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density reading shall be taken in the compacted material below the disturbed surface. When these readings indicate that the density of any layer of fill or portion thereof is below the required density, the particular layer or portion shall be reworked until the required density has been obtained.

C-6.00 SUBDRAINS

C-6.01 Subdrain Material

Subdrains shall be constructed of a minimum 4-inch diameter pipe encased in a suitable filter material. The subdrain pipe shall be Schedule 40 Acrylonitrile Butadiene Styrene (ABS) or Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe or approved equivalent. Subdrain pipe shall be installed with perforations down. Filter material shall consist of 3/4" to 1 1/2" clean gravel wrapped in an envelope of filter fabric consisting of Mirafi 140N or approved equivalent.

C-6.02 Subdrain Installation

Subdrain systems, if required, shall be installed in approved ground to conform the approximate alignment and details shown on the plans or herein. The subdrain locations shall not be changed or modified without the approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in the subdrain line, grade or material upon approval by the design civil engineer and the appropriate governmental agencies.

C-7.00 EXCAVATIONS

C-7.01 General

Excavations and cut slopes shall be examined by the geotechnical consultant. If determined necessary by the geotechnical consultant, further excavation or overexcavation and refilling of overexcavated areas shall be performed, and/or remedial grading of cut slopes shall be performed.

C-7.02 Fill-Over-Cut Slopes

Where fill-over-cut slopes are to be graded the cut portion of the slope shall be made and approved by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope.

C-8.00 TRENCH BACKFILL

C-8.01 General

Trench backfill within street right of ways shall be compacted to 90% relative compaction as determined by the ASTM D1557 test method. Backfill may be jetted as a means of initial compaction; however, mechanical compaction will be required to obtain the required percentage of relative compaction. If trenches are jetted, there must be a suitable delay for drainage of excess water before mechanical compaction is applied.

C-9.00 SEASONAL LIMITS

C-9.01 General

No fill material shall be placed, spread or rolled while it is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.

C-10.00 SUPERVISION

C-10.01 Prior to Grading

The site shall be observed by the geotechnical consultant upon completion of clearing and grubbing, prior to the preparation of any original ground for preparation of fill.

The supervisor of the grading contractor and the field representative of the geotechnical consultant shall have a meeting and discuss the geotechnical aspects of the earthwork prior to commencement of grading.

C-10.02 During Grading

Site preparation of all areas to receive fill shall be tested and approved by the geotechnical consultant prior to the placement of any fill.

The geotechnical consultant or his representative shall observe the fill and compaction operations so that he can provide an opinion regarding the conformance of the work to the recommendations

APPENDIX D

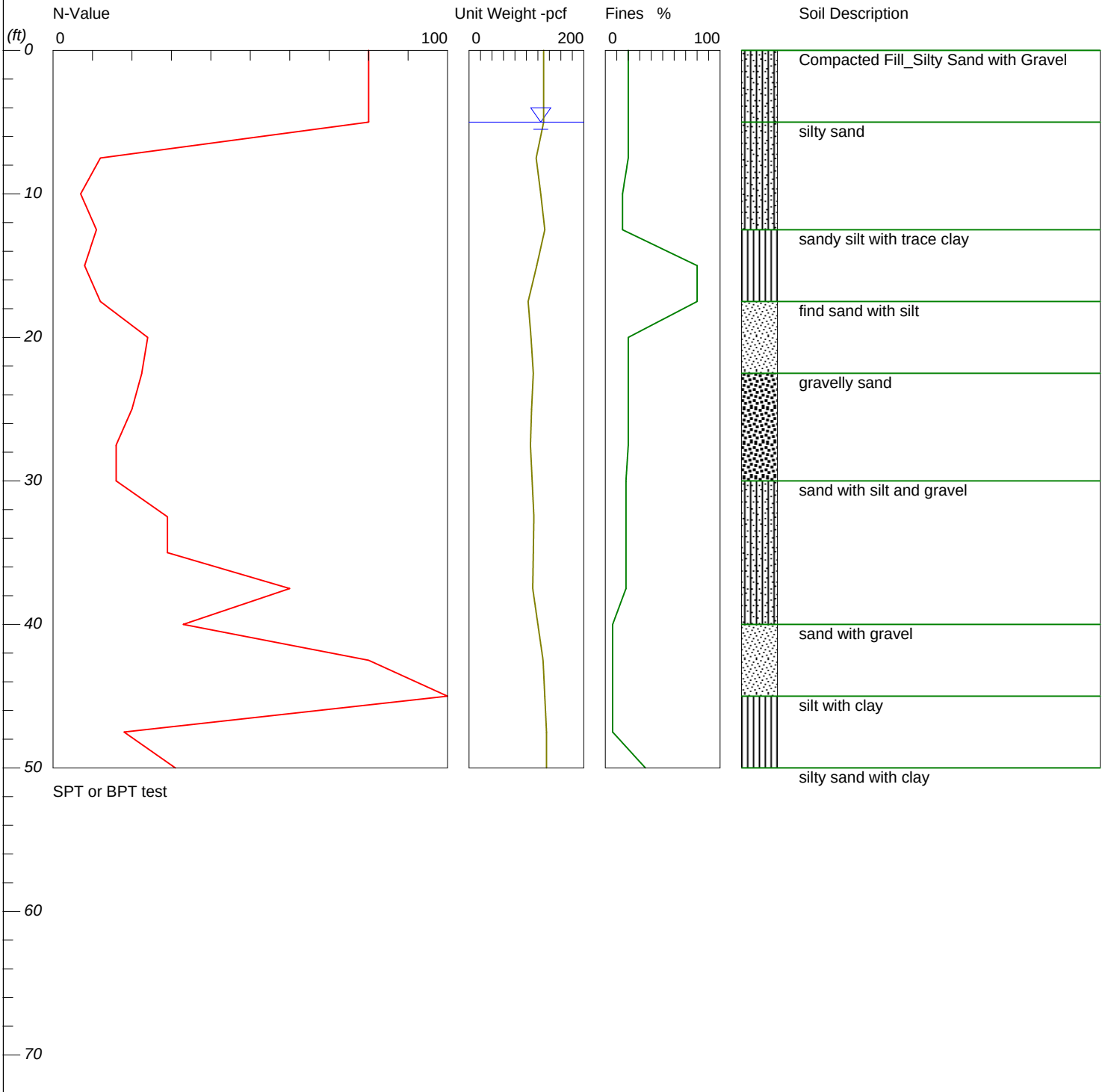
LIQUIFACTION AND SEISMIC SETTLEMENT ANALYSIS
(Figures and Analysis Summary)

LIQUEFACTION ANALYSIS

Solemo 13 Acres

Hole No.=B-3 Water Depth=5 ft Surface Elev.=240

Magnitude=6.81
Acceleration=0.656g

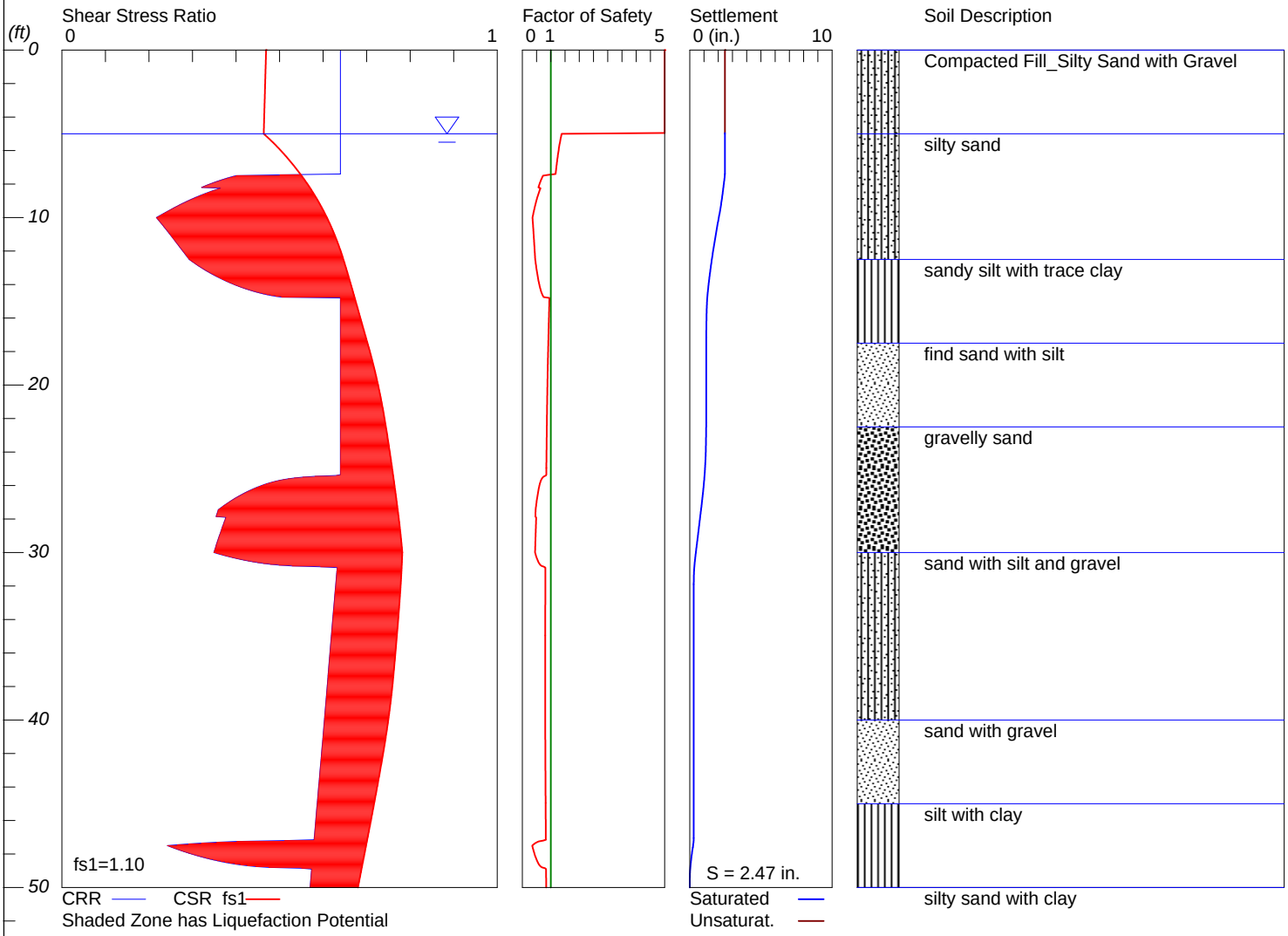


LIQUEFACTION ANALYSIS

Solemo 13 Acres

Hole No.=B-3 Water Depth=5 ft Surface Elev.=240

Magnitude=6.81
Acceleration=0.656g



Liquefy.sum

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: G:_Projects\2020\20G-0418\Liqefaction Analysis\20G-0418 b3.liq
Title: Solemo 13 Acres
Subtitle: 20G-0418-0

Surface Elev.=240
Hole No.=B-3
Depth of Hole= 50.00 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 60.00 ft
Max. Acceleration= 0.66 g
Earthquake Magnitude= 6.81

Input Data:
Surface Elev.=240
Hole No.=B-3
Depth of Hole=50.00 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 60.00 ft
Max. Acceleration=0.66 g
Earthquake Magnitude=6.81
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Modify Stark/Olson
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= 1.1
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	80.00	130.00	20.00
2.50	80.00	130.00	20.00
5.00	80.00	130.00	20.00
7.50	12.00	117.00	20.00
10.00	7.00	125.00	15.00
12.50	11.00	132.00	15.00
15.00	8.00	118.00	80.00
17.50	12.00	103.00	80.00
20.00	24.00	108.00	20.00
22.50	22.50	112.00	20.00

25.00	20.00	109.00	20.00
27.50	16.00	107.00	20.00
30.00	16.00	110.00	18.00
32.50	29.00	113.00	18.00
35.00	29.00	112.00	18.00
37.50	60.00	111.00	18.00
40.00	33.00	120.00	6.40
42.50	80.00	129.00	6.40
45.00	100.00	132.00	6.40
47.50	18.00	135.00	6.40
50.00	31.00	135.00	34.90

Output Results:

Settlement of Saturated Sands=2.47 in.
Settlement of Unsaturated Sands=0.01 in.
Total Settlement of Saturated and Unsaturated Sands=2.47 in.
Differential Settlement=1.236 to 1.632 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.64	0.47	5.00	2.47	0.01	2.47
0.05	0.64	0.47	5.00	2.47	0.01	2.47
0.10	0.64	0.47	5.00	2.47	0.01	2.47
0.15	0.64	0.47	5.00	2.47	0.01	2.47
0.20	0.64	0.47	5.00	2.47	0.01	2.47
0.25	0.64	0.47	5.00	2.47	0.01	2.47
0.30	0.64	0.47	5.00	2.47	0.01	2.47
0.35	0.64	0.47	5.00	2.47	0.01	2.47
0.40	0.64	0.47	5.00	2.47	0.01	2.47
0.45	0.64	0.47	5.00	2.47	0.01	2.47
0.50	0.64	0.47	5.00	2.47	0.01	2.47
0.55	0.64	0.47	5.00	2.47	0.01	2.47
0.60	0.64	0.47	5.00	2.47	0.01	2.47
0.65	0.64	0.47	5.00	2.47	0.01	2.47
0.70	0.64	0.47	5.00	2.47	0.01	2.47
0.75	0.64	0.47	5.00	2.47	0.01	2.47
0.80	0.64	0.47	5.00	2.47	0.01	2.47
0.85	0.64	0.47	5.00	2.47	0.01	2.47
0.90	0.64	0.47	5.00	2.47	0.01	2.47
0.95	0.64	0.47	5.00	2.47	0.01	2.47
1.00	0.64	0.47	5.00	2.47	0.01	2.47
1.05	0.64	0.47	5.00	2.47	0.01	2.47
1.10	0.64	0.47	5.00	2.47	0.01	2.47
1.15	0.64	0.47	5.00	2.47	0.01	2.47
1.20	0.64	0.47	5.00	2.47	0.01	2.47
1.25	0.64	0.47	5.00	2.47	0.01	2.47
1.30	0.64	0.47	5.00	2.47	0.01	2.47
1.35	0.64	0.47	5.00	2.47	0.01	2.47
1.40	0.64	0.47	5.00	2.47	0.01	2.47
1.45	0.64	0.47	5.00	2.47	0.01	2.47
1.50	0.64	0.47	5.00	2.47	0.01	2.47
1.55	0.64	0.47	5.00	2.47	0.01	2.47
1.60	0.64	0.47	5.00	2.47	0.01	2.47
1.65	0.64	0.47	5.00	2.47	0.01	2.47
1.70	0.64	0.47	5.00	2.47	0.01	2.47
1.75	0.64	0.47	5.00	2.47	0.01	2.47
1.80	0.64	0.47	5.00	2.47	0.00	2.47
1.85	0.64	0.47	5.00	2.47	0.00	2.47
1.90	0.64	0.47	5.00	2.47	0.00	2.47
1.95	0.64	0.47	5.00	2.47	0.00	2.47
2.00	0.64	0.47	5.00	2.47	0.00	2.47

2.05	0.64	0.47	5.00	2.47	0.00	2.47
2.10	0.64	0.47	5.00	2.47	0.00	2.47
2.15	0.64	0.47	5.00	2.47	0.00	2.47
2.20	0.64	0.47	5.00	2.47	0.00	2.47
2.25	0.64	0.47	5.00	2.47	0.00	2.47
2.30	0.64	0.47	5.00	2.47	0.00	2.47
2.35	0.64	0.47	5.00	2.47	0.00	2.47
2.40	0.64	0.47	5.00	2.47	0.00	2.47
2.45	0.64	0.47	5.00	2.47	0.00	2.47
2.50	0.64	0.47	5.00	2.47	0.00	2.47
2.55	0.64	0.47	5.00	2.47	0.00	2.47
2.60	0.64	0.47	5.00	2.47	0.00	2.47
2.65	0.64	0.47	5.00	2.47	0.00	2.47
2.70	0.64	0.47	5.00	2.47	0.00	2.47
2.75	0.64	0.47	5.00	2.47	0.00	2.47
2.80	0.64	0.47	5.00	2.47	0.00	2.47
2.85	0.64	0.47	5.00	2.47	0.00	2.47
2.90	0.64	0.47	5.00	2.47	0.00	2.47
2.95	0.64	0.47	5.00	2.47	0.00	2.47
3.00	0.64	0.47	5.00	2.47	0.00	2.47
3.05	0.64	0.47	5.00	2.47	0.00	2.47
3.10	0.64	0.47	5.00	2.47	0.00	2.47
3.15	0.64	0.47	5.00	2.47	0.00	2.47
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3.35	0.64	0.47	5.00	2.47	0.00	2.47
3.40	0.64	0.47	5.00	2.47	0.00	2.47
3.45	0.64	0.47	5.00	2.47	0.00	2.47
3.50	0.64	0.47	5.00	2.47	0.00	2.47
3.55	0.64	0.47	5.00	2.47	0.00	2.47
3.60	0.64	0.47	5.00	2.47	0.00	2.47
3.65	0.64	0.47	5.00	2.47	0.00	2.47
3.70	0.64	0.46	5.00	2.47	0.00	2.47
3.75	0.64	0.46	5.00	2.47	0.00	2.47
3.80	0.64	0.46	5.00	2.47	0.00	2.47
3.85	0.64	0.46	5.00	2.47	0.00	2.47
3.90	0.64	0.46	5.00	2.47	0.00	2.47
3.95	0.64	0.46	5.00	2.47	0.00	2.47
4.00	0.64	0.46	5.00	2.47	0.00	2.47
4.05	0.64	0.46	5.00	2.47	0.00	2.47
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4.20	0.64	0.46	5.00	2.47	0.00	2.47
4.25	0.64	0.46	5.00	2.47	0.00	2.47
4.30	0.64	0.46	5.00	2.47	0.00	2.47
4.35	0.64	0.46	5.00	2.47	0.00	2.47
4.40	0.64	0.46	5.00	2.47	0.00	2.47
4.45	0.64	0.46	5.00	2.47	0.00	2.47
4.50	0.64	0.46	5.00	2.47	0.00	2.47
4.55	0.64	0.46	5.00	2.47	0.00	2.47
4.60	0.64	0.46	5.00	2.47	0.00	2.47
4.65	0.64	0.46	5.00	2.47	0.00	2.47
4.70	0.64	0.46	5.00	2.47	0.00	2.47
4.75	0.64	0.46	5.00	2.47	0.00	2.47
4.80	0.64	0.46	5.00	2.47	0.00	2.47
4.85	0.64	0.46	5.00	2.47	0.00	2.47
4.90	0.64	0.46	5.00	2.47	0.00	2.47
4.95	0.64	0.46	5.00	2.47	0.00	2.47
5.00	0.64	0.46	1.38	2.47	0.00	2.47
5.05	0.64	0.47	1.37	2.47	0.00	2.47
5.10	0.64	0.47	1.37	2.47	0.00	2.47
5.15	0.64	0.47	1.36	2.47	0.00	2.47

5.20	0.64	0.47	1.36	2.47	0.00	2.47
5.25	0.64	0.47	1.35	2.47	0.00	2.47
5.30	0.64	0.48	1.34	2.47	0.00	2.47
5.35	0.64	0.48	1.34	2.47	0.00	2.47
5.40	0.64	0.48	1.33	2.47	0.00	2.47
5.45	0.64	0.48	1.33	2.47	0.00	2.47
5.50	0.64	0.48	1.32	2.47	0.00	2.47
5.55	0.64	0.49	1.32	2.47	0.00	2.47
5.60	0.64	0.49	1.31	2.47	0.00	2.47
5.65	0.64	0.49	1.31	2.47	0.00	2.47
5.70	0.64	0.49	1.30	2.47	0.00	2.47
5.75	0.64	0.49	1.30	2.47	0.00	2.47
5.80	0.64	0.50	1.29	2.47	0.00	2.47
5.85	0.64	0.50	1.29	2.47	0.00	2.47
5.90	0.64	0.50	1.28	2.47	0.00	2.47
5.95	0.64	0.50	1.28	2.47	0.00	2.47
6.00	0.64	0.50	1.27	2.47	0.00	2.47
6.05	0.64	0.50	1.27	2.47	0.00	2.47
6.10	0.64	0.51	1.26	2.47	0.00	2.47
6.15	0.64	0.51	1.26	2.47	0.00	2.47
6.20	0.64	0.51	1.26	2.47	0.00	2.47
6.25	0.64	0.51	1.25	2.47	0.00	2.47
6.30	0.64	0.51	1.25	2.47	0.00	2.47
6.35	0.64	0.51	1.24	2.47	0.00	2.47
6.40	0.64	0.52	1.24	2.47	0.00	2.47
6.45	0.64	0.52	1.23	2.47	0.00	2.47
6.50	0.64	0.52	1.23	2.47	0.00	2.47
6.55	0.64	0.52	1.23	2.47	0.00	2.47
6.60	0.64	0.52	1.22	2.47	0.00	2.47
6.65	0.64	0.52	1.22	2.47	0.00	2.47
6.70	0.64	0.53	1.22	2.47	0.00	2.47
6.75	0.64	0.53	1.21	2.47	0.00	2.47
6.80	0.64	0.53	1.21	2.47	0.00	2.47
6.85	0.64	0.53	1.20	2.47	0.00	2.47
6.90	0.64	0.53	1.20	2.47	0.00	2.47
6.95	0.64	0.53	1.20	2.47	0.00	2.47
7.00	0.64	0.54	1.19	2.47	0.00	2.47
7.05	0.64	0.54	1.19	2.47	0.00	2.47
7.10	0.64	0.54	1.19	2.47	0.00	2.47
7.15	0.64	0.54	1.18	2.47	0.00	2.47
7.20	0.64	0.54	1.18	2.47	0.00	2.47
7.25	0.64	0.54	1.18	2.47	0.00	2.47
7.30	0.64	0.54	1.17	2.47	0.00	2.47
7.35	0.64	0.55	1.17	2.47	0.00	2.47
7.40	0.64	0.55	1.17	2.47	0.00	2.47
7.45	0.50	0.55	0.91*	2.46	0.00	2.46
7.50	0.40	0.55	0.73*	2.46	0.00	2.46
7.55	0.39	0.55	0.71*	2.45	0.00	2.45
7.60	0.39	0.55	0.70*	2.45	0.00	2.45
7.65	0.38	0.55	0.68*	2.44	0.00	2.44
7.70	0.37	0.56	0.67*	2.43	0.00	2.43
7.75	0.37	0.56	0.66*	2.43	0.00	2.43
7.80	0.36	0.56	0.65*	2.42	0.00	2.42
7.85	0.36	0.56	0.63*	2.41	0.00	2.41
7.90	0.35	0.56	0.62*	2.41	0.00	2.41
7.95	0.34	0.56	0.61*	2.40	0.00	2.40
8.00	0.34	0.56	0.60*	2.39	0.00	2.39
8.05	0.33	0.57	0.59*	2.38	0.00	2.38
8.10	0.33	0.57	0.58*	2.38	0.00	2.38
8.15	0.33	0.57	0.57*	2.37	0.00	2.37
8.20	0.32	0.57	0.56*	2.36	0.00	2.36
8.25	0.36	0.57	0.64*	2.35	0.00	2.35
8.30	0.36	0.57	0.63*	2.35	0.00	2.35

8.35	0.35	0.57	0.61*	2.34	0.00	2.34
8.40	0.35	0.57	0.60*	2.33	0.00	2.33
8.45	0.34	0.58	0.59*	2.32	0.00	2.32
8.50	0.34	0.58	0.58*	2.32	0.00	2.32
8.55	0.33	0.58	0.57*	2.31	0.00	2.31
8.60	0.33	0.58	0.56*	2.30	0.00	2.30
8.65	0.32	0.58	0.55*	2.29	0.00	2.29
8.70	0.32	0.58	0.54*	2.29	0.00	2.29
8.75	0.31	0.58	0.53*	2.28	0.00	2.28
8.80	0.31	0.58	0.53*	2.27	0.00	2.27
8.85	0.30	0.58	0.52*	2.26	0.00	2.26
8.90	0.30	0.59	0.51*	2.25	0.00	2.25
8.95	0.29	0.59	0.50*	2.24	0.00	2.24
9.00	0.29	0.59	0.49*	2.24	0.00	2.24
9.05	0.29	0.59	0.48*	2.23	0.00	2.23
9.10	0.28	0.59	0.48*	2.22	0.00	2.22
9.15	0.28	0.59	0.47*	2.21	0.00	2.21
9.20	0.27	0.59	0.46*	2.20	0.00	2.20
9.25	0.27	0.59	0.45*	2.19	0.00	2.19
9.30	0.27	0.59	0.45*	2.18	0.00	2.18
9.35	0.26	0.60	0.44*	2.17	0.00	2.17
9.40	0.26	0.60	0.43*	2.16	0.00	2.16
9.45	0.26	0.60	0.43*	2.15	0.00	2.15
9.50	0.25	0.60	0.42*	2.14	0.00	2.14
9.55	0.25	0.60	0.41*	2.13	0.00	2.13
9.60	0.24	0.60	0.41*	2.12	0.00	2.12
9.65	0.24	0.60	0.40*	2.11	0.00	2.11
9.70	0.24	0.60	0.39*	2.10	0.00	2.10
9.75	0.23	0.60	0.39*	2.09	0.00	2.09
9.80	0.23	0.60	0.38*	2.08	0.00	2.08
9.85	0.23	0.61	0.38*	2.07	0.00	2.07
9.90	0.22	0.61	0.37*	2.06	0.00	2.06
9.95	0.22	0.61	0.36*	2.05	0.00	2.05
10.00	0.22	0.61	0.36*	2.04	0.00	2.04
10.05	0.22	0.61	0.36*	2.03	0.00	2.03
10.10	0.22	0.61	0.36*	2.02	0.00	2.02
10.15	0.22	0.61	0.36*	2.01	0.00	2.01
10.20	0.22	0.61	0.36*	2.00	0.00	2.00
10.25	0.23	0.61	0.37*	1.99	0.00	1.99
10.30	0.23	0.61	0.37*	1.98	0.00	1.98
10.35	0.23	0.62	0.37*	1.96	0.00	1.96
10.40	0.23	0.62	0.37*	1.95	0.00	1.95
10.45	0.23	0.62	0.38*	1.94	0.00	1.94
10.50	0.23	0.62	0.38*	1.93	0.00	1.93
10.55	0.23	0.62	0.38*	1.92	0.00	1.92
10.60	0.24	0.62	0.38*	1.91	0.00	1.91
10.65	0.24	0.62	0.38*	1.90	0.00	1.90
10.70	0.24	0.62	0.38*	1.89	0.00	1.89
10.75	0.24	0.62	0.39*	1.88	0.00	1.88
10.80	0.24	0.62	0.39*	1.87	0.00	1.87
10.85	0.24	0.62	0.39*	1.86	0.00	1.86
10.90	0.25	0.62	0.39*	1.85	0.00	1.85
10.95	0.25	0.63	0.39*	1.84	0.00	1.84
11.00	0.25	0.63	0.40*	1.83	0.00	1.83
11.05	0.25	0.63	0.40*	1.82	0.00	1.82
11.10	0.25	0.63	0.40*	1.81	0.00	1.81
11.15	0.25	0.63	0.40*	1.80	0.00	1.80
11.20	0.25	0.63	0.40*	1.79	0.00	1.79
11.25	0.26	0.63	0.41*	1.78	0.00	1.78
11.30	0.26	0.63	0.41*	1.77	0.00	1.77
11.35	0.26	0.63	0.41*	1.76	0.00	1.76
11.40	0.26	0.63	0.41*	1.75	0.00	1.75
11.45	0.26	0.63	0.41*	1.74	0.00	1.74

11.50	0.26	0.63	0.42*	1.73	0.00	1.73
11.55	0.26	0.63	0.42*	1.72	0.00	1.72
11.60	0.27	0.63	0.42*	1.71	0.00	1.71
11.65	0.27	0.64	0.42*	1.70	0.00	1.70
11.70	0.27	0.64	0.42*	1.69	0.00	1.69
11.75	0.27	0.64	0.42*	1.68	0.00	1.68
11.80	0.27	0.64	0.43*	1.68	0.00	1.68
11.85	0.27	0.64	0.43*	1.67	0.00	1.67
11.90	0.27	0.64	0.43*	1.66	0.00	1.66
11.95	0.28	0.64	0.43*	1.65	0.00	1.65
12.00	0.28	0.64	0.43*	1.64	0.00	1.64
12.05	0.28	0.64	0.44*	1.63	0.00	1.63
12.10	0.28	0.64	0.44*	1.62	0.00	1.62
12.15	0.28	0.64	0.44*	1.61	0.00	1.61
12.20	0.28	0.64	0.44*	1.60	0.00	1.60
12.25	0.29	0.64	0.44*	1.59	0.00	1.59
12.30	0.29	0.64	0.44*	1.59	0.00	1.59
12.35	0.29	0.64	0.45*	1.58	0.00	1.58
12.40	0.29	0.65	0.45*	1.57	0.00	1.57
12.45	0.29	0.65	0.45*	1.56	0.00	1.56
12.50	0.29	0.65	0.45*	1.55	0.00	1.55
12.55	0.30	0.65	0.46*	1.54	0.00	1.54
12.60	0.30	0.65	0.46*	1.53	0.00	1.53
12.65	0.30	0.65	0.46*	1.53	0.00	1.53
12.70	0.30	0.65	0.47*	1.52	0.00	1.52
12.75	0.31	0.65	0.47*	1.51	0.00	1.51
12.80	0.31	0.65	0.47*	1.50	0.00	1.50
12.85	0.31	0.65	0.48*	1.49	0.00	1.49
12.90	0.31	0.65	0.48*	1.48	0.00	1.48
12.95	0.32	0.65	0.49*	1.48	0.00	1.48
13.00	0.32	0.65	0.49*	1.47	0.00	1.47
13.05	0.32	0.65	0.50*	1.46	0.00	1.46
13.10	0.33	0.65	0.50*	1.45	0.00	1.45
13.15	0.33	0.65	0.50*	1.44	0.00	1.44
13.20	0.33	0.65	0.51*	1.44	0.00	1.44
13.25	0.34	0.66	0.51*	1.43	0.00	1.43
13.30	0.34	0.66	0.52*	1.42	0.00	1.42
13.35	0.34	0.66	0.52*	1.41	0.00	1.41
13.40	0.35	0.66	0.53*	1.41	0.00	1.41
13.45	0.35	0.66	0.53*	1.40	0.00	1.40
13.50	0.35	0.66	0.54*	1.39	0.00	1.39
13.55	0.36	0.66	0.54*	1.38	0.00	1.38
13.60	0.36	0.66	0.55*	1.38	0.00	1.38
13.65	0.37	0.66	0.55*	1.37	0.00	1.37
13.70	0.37	0.66	0.56*	1.36	0.00	1.36
13.75	0.37	0.66	0.56*	1.36	0.00	1.36
13.80	0.38	0.66	0.57*	1.35	0.00	1.35
13.85	0.38	0.66	0.58*	1.34	0.00	1.34
13.90	0.39	0.66	0.58*	1.34	0.00	1.34
13.95	0.39	0.66	0.59*	1.33	0.00	1.33
14.00	0.40	0.66	0.60*	1.32	0.00	1.32
14.05	0.40	0.66	0.60*	1.32	0.00	1.32
14.10	0.41	0.66	0.61*	1.31	0.00	1.31
14.15	0.41	0.67	0.62*	1.30	0.00	1.30
14.20	0.42	0.67	0.62*	1.30	0.00	1.30
14.25	0.42	0.67	0.63*	1.29	0.00	1.29
14.30	0.43	0.67	0.64*	1.28	0.00	1.28
14.35	0.43	0.67	0.65*	1.28	0.00	1.28
14.40	0.44	0.67	0.66*	1.27	0.00	1.27
14.45	0.45	0.67	0.67*	1.27	0.00	1.27
14.50	0.45	0.67	0.68*	1.26	0.00	1.26
14.55	0.46	0.67	0.69*	1.25	0.00	1.25
14.60	0.47	0.67	0.70*	1.25	0.00	1.25

14.65	0.48	0.67	0.72*	1.24	0.00	1.24
14.70	0.49	0.67	0.73*	1.24	0.00	1.24
14.75	0.50	0.67	0.75*	1.23	0.00	1.23
14.80	0.64	0.67	0.95*	1.23	0.00	1.23
14.85	0.64	0.67	0.95*	1.22	0.00	1.22
14.90	0.64	0.67	0.95*	1.22	0.00	1.22
14.95	0.64	0.67	0.95*	1.22	0.00	1.22
15.00	0.64	0.67	0.95*	1.21	0.00	1.21
15.05	0.64	0.68	0.95*	1.21	0.00	1.21
15.10	0.64	0.68	0.95*	1.21	0.00	1.21
15.15	0.64	0.68	0.95*	1.20	0.00	1.20
15.20	0.64	0.68	0.95*	1.20	0.00	1.20
15.25	0.64	0.68	0.94*	1.20	0.00	1.20
15.30	0.64	0.68	0.94*	1.20	0.00	1.20
15.35	0.64	0.68	0.94*	1.19	0.00	1.19
15.40	0.64	0.68	0.94*	1.19	0.00	1.19
15.45	0.64	0.68	0.94*	1.19	0.00	1.19
15.50	0.64	0.68	0.94*	1.19	0.00	1.19
15.55	0.64	0.68	0.94*	1.19	0.00	1.19
15.60	0.64	0.68	0.94*	1.18	0.00	1.18
15.65	0.64	0.68	0.94*	1.18	0.00	1.18
15.70	0.64	0.68	0.94*	1.18	0.00	1.18
15.75	0.64	0.68	0.94*	1.18	0.00	1.18
15.80	0.64	0.68	0.94*	1.18	0.00	1.18
15.85	0.64	0.68	0.94*	1.18	0.00	1.18
15.90	0.64	0.68	0.93*	1.18	0.00	1.18
15.95	0.64	0.69	0.93*	1.18	0.00	1.18
16.00	0.64	0.69	0.93*	1.18	0.00	1.18
16.05	0.64	0.69	0.93*	1.17	0.00	1.17
16.10	0.64	0.69	0.93*	1.17	0.00	1.17
16.15	0.64	0.69	0.93*	1.17	0.00	1.17
16.20	0.64	0.69	0.93*	1.17	0.00	1.17
16.25	0.64	0.69	0.93*	1.17	0.00	1.17
16.30	0.64	0.69	0.93*	1.17	0.00	1.17
16.35	0.64	0.69	0.93*	1.17	0.00	1.17
16.40	0.64	0.69	0.93*	1.17	0.00	1.17
16.45	0.64	0.69	0.93*	1.17	0.00	1.17
16.50	0.64	0.69	0.93*	1.17	0.00	1.17
16.55	0.64	0.69	0.93*	1.16	0.00	1.16
16.60	0.64	0.69	0.92*	1.16	0.00	1.16
16.65	0.64	0.69	0.92*	1.16	0.00	1.16
16.70	0.64	0.69	0.92*	1.16	0.00	1.16
16.75	0.64	0.69	0.92*	1.16	0.00	1.16
16.80	0.64	0.69	0.92*	1.16	0.00	1.16
16.85	0.64	0.69	0.92*	1.16	0.00	1.16
16.90	0.64	0.70	0.92*	1.16	0.00	1.16
16.95	0.64	0.70	0.92*	1.16	0.00	1.16
17.00	0.64	0.70	0.92*	1.16	0.00	1.16
17.05	0.64	0.70	0.92*	1.16	0.00	1.16
17.10	0.64	0.70	0.92*	1.16	0.00	1.16
17.15	0.64	0.70	0.92*	1.16	0.00	1.16
17.20	0.64	0.70	0.92*	1.16	0.00	1.16
17.25	0.64	0.70	0.92*	1.16	0.00	1.16
17.30	0.64	0.70	0.91*	1.16	0.00	1.16
17.35	0.64	0.70	0.91*	1.16	0.00	1.16
17.40	0.64	0.70	0.91*	1.16	0.00	1.16
17.45	0.64	0.70	0.91*	1.16	0.00	1.16
17.50	0.64	0.70	0.91*	1.16	0.00	1.16
17.55	0.64	0.70	0.91*	1.16	0.00	1.16
17.60	0.64	0.70	0.91*	1.16	0.00	1.16
17.65	0.64	0.70	0.91*	1.16	0.00	1.16
17.70	0.64	0.70	0.91*	1.16	0.00	1.16
17.75	0.64	0.70	0.91*	1.16	0.00	1.16

17.80	0.64	0.71	0.91*	1.16	0.00	1.16
17.85	0.64	0.71	0.91*	1.16	0.00	1.16
17.90	0.64	0.71	0.91*	1.16	0.00	1.16
17.95	0.64	0.71	0.91*	1.16	0.00	1.16
18.00	0.64	0.71	0.90*	1.16	0.00	1.16
18.05	0.64	0.71	0.90*	1.16	0.00	1.16
18.10	0.64	0.71	0.90*	1.16	0.00	1.16
18.15	0.64	0.71	0.90*	1.16	0.00	1.16
18.20	0.64	0.71	0.90*	1.16	0.00	1.16
18.25	0.64	0.71	0.90*	1.16	0.00	1.16
18.30	0.64	0.71	0.90*	1.16	0.00	1.16
18.35	0.64	0.71	0.90*	1.16	0.00	1.16
18.40	0.64	0.71	0.90*	1.16	0.00	1.16
18.45	0.64	0.71	0.90*	1.16	0.00	1.16
18.50	0.64	0.71	0.90*	1.16	0.00	1.16
18.55	0.64	0.71	0.90*	1.16	0.00	1.16
18.60	0.64	0.71	0.90*	1.16	0.00	1.16
18.65	0.64	0.71	0.90*	1.16	0.00	1.16
18.70	0.64	0.71	0.90*	1.16	0.00	1.16
18.75	0.64	0.72	0.89*	1.16	0.00	1.16
18.80	0.64	0.72	0.89*	1.16	0.00	1.16
18.85	0.64	0.72	0.89*	1.16	0.00	1.16
18.90	0.64	0.72	0.89*	1.16	0.00	1.16
18.95	0.64	0.72	0.89*	1.16	0.00	1.16
19.00	0.64	0.72	0.89*	1.16	0.00	1.16
19.05	0.64	0.72	0.89*	1.16	0.00	1.16
19.10	0.64	0.72	0.89*	1.16	0.00	1.16
19.15	0.64	0.72	0.89*	1.16	0.00	1.16
19.20	0.64	0.72	0.89*	1.16	0.00	1.16
19.25	0.64	0.72	0.89*	1.16	0.00	1.16
19.30	0.64	0.72	0.89*	1.16	0.00	1.16
19.35	0.64	0.72	0.89*	1.16	0.00	1.16
19.40	0.64	0.72	0.89*	1.16	0.00	1.16
19.45	0.64	0.72	0.89*	1.16	0.00	1.16
19.50	0.64	0.72	0.89*	1.16	0.00	1.16
19.55	0.64	0.72	0.89*	1.16	0.00	1.16
19.60	0.64	0.72	0.89*	1.16	0.00	1.16
19.65	0.64	0.72	0.88*	1.16	0.00	1.16
19.70	0.64	0.72	0.88*	1.16	0.00	1.16
19.75	0.64	0.72	0.88*	1.16	0.00	1.16
19.80	0.64	0.72	0.88*	1.16	0.00	1.16
19.85	0.64	0.73	0.88*	1.16	0.00	1.16
19.90	0.64	0.73	0.88*	1.16	0.00	1.16
19.95	0.64	0.73	0.88*	1.16	0.00	1.16
20.00	0.64	0.73	0.88*	1.16	0.00	1.16
20.05	0.64	0.73	0.88*	1.16	0.00	1.16
20.10	0.64	0.73	0.88*	1.16	0.00	1.16
20.15	0.64	0.73	0.88*	1.16	0.00	1.16
20.20	0.64	0.73	0.88*	1.16	0.00	1.16
20.25	0.64	0.73	0.88*	1.16	0.00	1.16
20.30	0.64	0.73	0.88*	1.16	0.00	1.16
20.35	0.64	0.73	0.88*	1.16	0.00	1.16
20.40	0.64	0.73	0.88*	1.16	0.00	1.16
20.45	0.64	0.73	0.88*	1.16	0.00	1.16
20.50	0.64	0.73	0.88*	1.16	0.00	1.16
20.55	0.64	0.73	0.88*	1.16	0.00	1.16
20.60	0.64	0.73	0.88*	1.16	0.00	1.16
20.65	0.64	0.73	0.87*	1.16	0.00	1.16
20.70	0.64	0.73	0.87*	1.16	0.00	1.16
20.75	0.64	0.73	0.87*	1.16	0.00	1.16
20.80	0.64	0.73	0.87*	1.16	0.00	1.16
20.85	0.64	0.73	0.87*	1.16	0.00	1.16
20.90	0.64	0.73	0.87*	1.16	0.00	1.16

20.95	0.64	0.73	0.87*	1.16	0.00	1.16
21.00	0.64	0.73	0.87*	1.16	0.00	1.16
21.05	0.64	0.73	0.87*	1.16	0.00	1.16
21.10	0.64	0.73	0.87*	1.16	0.00	1.16
21.15	0.64	0.74	0.87*	1.16	0.00	1.16
21.20	0.64	0.74	0.87*	1.16	0.00	1.16
21.25	0.64	0.74	0.87*	1.16	0.00	1.16
21.30	0.64	0.74	0.87*	1.16	0.00	1.16
21.35	0.64	0.74	0.87*	1.16	0.00	1.16
21.40	0.64	0.74	0.87*	1.16	0.00	1.16
21.45	0.64	0.74	0.87*	1.16	0.00	1.16
21.50	0.64	0.74	0.87*	1.16	0.00	1.16
21.55	0.64	0.74	0.87*	1.16	0.00	1.16
21.60	0.64	0.74	0.87*	1.16	0.00	1.16
21.65	0.64	0.74	0.87*	1.16	0.00	1.16
21.70	0.64	0.74	0.87*	1.16	0.00	1.16
21.75	0.64	0.74	0.87*	1.16	0.00	1.16
21.80	0.64	0.74	0.86*	1.16	0.00	1.16
21.85	0.64	0.74	0.86*	1.16	0.00	1.16
21.90	0.64	0.74	0.86*	1.16	0.00	1.16
21.95	0.64	0.74	0.86*	1.16	0.00	1.16
22.00	0.64	0.74	0.86*	1.16	0.00	1.16
22.05	0.64	0.74	0.86*	1.16	0.00	1.16
22.10	0.64	0.74	0.86*	1.16	0.00	1.16
22.15	0.64	0.74	0.86*	1.16	0.00	1.16
22.20	0.64	0.74	0.86*	1.16	0.00	1.16
22.25	0.64	0.74	0.86*	1.16	0.00	1.16
22.30	0.64	0.74	0.86*	1.16	0.00	1.16
22.35	0.64	0.74	0.86*	1.15	0.00	1.15
22.40	0.64	0.74	0.86*	1.15	0.00	1.15
22.45	0.64	0.74	0.86*	1.15	0.00	1.15
22.50	0.64	0.74	0.86*	1.15	0.00	1.15
22.55	0.64	0.74	0.86*	1.15	0.00	1.15
22.60	0.64	0.74	0.86*	1.15	0.00	1.15
22.65	0.64	0.75	0.86*	1.15	0.00	1.15
22.70	0.64	0.75	0.86*	1.15	0.00	1.15
22.75	0.64	0.75	0.86*	1.15	0.00	1.15
22.80	0.64	0.75	0.86*	1.15	0.00	1.15
22.85	0.64	0.75	0.86*	1.15	0.00	1.15
22.90	0.64	0.75	0.86*	1.15	0.00	1.15
22.95	0.64	0.75	0.86*	1.15	0.00	1.15
23.00	0.64	0.75	0.86*	1.14	0.00	1.14
23.05	0.64	0.75	0.86*	1.14	0.00	1.14
23.10	0.64	0.75	0.86*	1.14	0.00	1.14
23.15	0.64	0.75	0.86*	1.14	0.00	1.14
23.20	0.64	0.75	0.85*	1.14	0.00	1.14
23.25	0.64	0.75	0.85*	1.14	0.00	1.14
23.30	0.64	0.75	0.85*	1.14	0.00	1.14
23.35	0.64	0.75	0.85*	1.14	0.00	1.14
23.40	0.64	0.75	0.85*	1.14	0.00	1.14
23.45	0.64	0.75	0.85*	1.14	0.00	1.14
23.50	0.64	0.75	0.85*	1.14	0.00	1.14
23.55	0.64	0.75	0.85*	1.13	0.00	1.13
23.60	0.64	0.75	0.85*	1.13	0.00	1.13
23.65	0.64	0.75	0.85*	1.13	0.00	1.13
23.70	0.64	0.75	0.85*	1.13	0.00	1.13
23.75	0.64	0.75	0.85*	1.13	0.00	1.13
23.80	0.64	0.75	0.85*	1.13	0.00	1.13
23.85	0.64	0.75	0.85*	1.13	0.00	1.13
23.90	0.64	0.75	0.85*	1.13	0.00	1.13
23.95	0.64	0.75	0.85*	1.12	0.00	1.12
24.00	0.64	0.75	0.85*	1.12	0.00	1.12
24.05	0.64	0.75	0.85*	1.12	0.00	1.12

24.10	0.64	0.75	0.85*	1.12	0.00	1.12
24.15	0.64	0.75	0.85*	1.12	0.00	1.12
24.20	0.64	0.75	0.85*	1.12	0.00	1.12
24.25	0.64	0.75	0.85*	1.11	0.00	1.11
24.30	0.64	0.75	0.85*	1.11	0.00	1.11
24.35	0.64	0.76	0.85*	1.11	0.00	1.11
24.40	0.64	0.76	0.85*	1.11	0.00	1.11
24.45	0.64	0.76	0.85*	1.10	0.00	1.10
24.50	0.64	0.76	0.85*	1.10	0.00	1.10
24.55	0.64	0.76	0.85*	1.10	0.00	1.10
24.60	0.64	0.76	0.85*	1.10	0.00	1.10
24.65	0.64	0.76	0.85*	1.09	0.00	1.09
24.70	0.64	0.76	0.85*	1.09	0.00	1.09
24.75	0.64	0.76	0.84*	1.09	0.00	1.09
24.80	0.64	0.76	0.84*	1.08	0.00	1.08
24.85	0.64	0.76	0.84*	1.08	0.00	1.08
24.90	0.64	0.76	0.84*	1.08	0.00	1.08
24.95	0.64	0.76	0.84*	1.07	0.00	1.07
25.00	0.64	0.76	0.84*	1.07	0.00	1.07
25.05	0.64	0.76	0.84*	1.07	0.00	1.07
25.10	0.64	0.76	0.84*	1.06	0.00	1.06
25.15	0.64	0.76	0.84*	1.06	0.00	1.06
25.20	0.64	0.76	0.84*	1.05	0.00	1.05
25.25	0.64	0.76	0.84*	1.05	0.00	1.05
25.30	0.64	0.76	0.84*	1.05	0.00	1.05
25.35	0.64	0.76	0.84*	1.04	0.00	1.04
25.40	0.63	0.76	0.83*	1.04	0.00	1.04
25.45	0.58	0.76	0.76*	1.03	0.00	1.03
25.50	0.55	0.76	0.73*	1.03	0.00	1.03
25.55	0.53	0.76	0.70*	1.02	0.00	1.02
25.60	0.52	0.76	0.68*	1.02	0.00	1.02
25.65	0.51	0.76	0.67*	1.01	0.00	1.01
25.70	0.50	0.76	0.65*	1.01	0.00	1.01
25.75	0.49	0.76	0.64*	1.00	0.00	1.00
25.80	0.48	0.76	0.63*	1.00	0.00	1.00
25.85	0.48	0.76	0.62*	0.99	0.00	0.99
25.90	0.47	0.76	0.62*	0.99	0.00	0.99
25.95	0.46	0.76	0.61*	0.98	0.00	0.98
26.00	0.46	0.76	0.60*	0.98	0.00	0.98
26.05	0.45	0.76	0.59*	0.97	0.00	0.97
26.10	0.45	0.76	0.59*	0.97	0.00	0.97
26.15	0.44	0.76	0.58*	0.96	0.00	0.96
26.20	0.44	0.77	0.57*	0.96	0.00	0.96
26.25	0.44	0.77	0.57*	0.95	0.00	0.95
26.30	0.43	0.77	0.56*	0.94	0.00	0.94
26.35	0.43	0.77	0.56*	0.94	0.00	0.94
26.40	0.42	0.77	0.55*	0.93	0.00	0.93
26.45	0.42	0.77	0.55*	0.92	0.00	0.92
26.50	0.42	0.77	0.54*	0.92	0.00	0.92
26.55	0.41	0.77	0.54*	0.91	0.00	0.91
26.60	0.41	0.77	0.53*	0.91	0.00	0.91
26.65	0.41	0.77	0.53*	0.90	0.00	0.90
26.70	0.40	0.77	0.52*	0.89	0.00	0.89
26.75	0.40	0.77	0.52*	0.89	0.00	0.89
26.80	0.40	0.77	0.51*	0.88	0.00	0.88
26.85	0.39	0.77	0.51*	0.87	0.00	0.87
26.90	0.39	0.77	0.51*	0.87	0.00	0.87
26.95	0.39	0.77	0.50*	0.86	0.00	0.86
27.00	0.38	0.77	0.50*	0.85	0.00	0.85
27.05	0.38	0.77	0.49*	0.85	0.00	0.85
27.10	0.38	0.77	0.49*	0.84	0.00	0.84
27.15	0.37	0.77	0.49*	0.83	0.00	0.83
27.20	0.37	0.77	0.48*	0.83	0.00	0.83

27.25	0.37	0.77	0.48*	0.82	0.00	0.82
27.30	0.37	0.77	0.48*	0.81	0.00	0.81
27.35	0.36	0.77	0.47*	0.80	0.00	0.80
27.40	0.36	0.77	0.47*	0.80	0.00	0.80
27.45	0.36	0.77	0.47*	0.79	0.00	0.79
27.50	0.36	0.77	0.46*	0.78	0.00	0.78
27.55	0.36	0.77	0.46*	0.78	0.00	0.78
27.60	0.36	0.77	0.46*	0.77	0.00	0.77
27.65	0.36	0.77	0.46*	0.76	0.00	0.76
27.70	0.36	0.77	0.46*	0.75	0.00	0.75
27.75	0.36	0.77	0.46*	0.75	0.00	0.75
27.80	0.35	0.77	0.46*	0.74	0.00	0.74
27.85	0.35	0.77	0.46*	0.73	0.00	0.73
27.90	0.38	0.77	0.49*	0.73	0.00	0.73
27.95	0.38	0.77	0.49*	0.72	0.00	0.72
28.00	0.38	0.77	0.48*	0.71	0.00	0.71
28.05	0.37	0.77	0.48*	0.70	0.00	0.70
28.10	0.37	0.77	0.48*	0.70	0.00	0.70
28.15	0.37	0.77	0.48*	0.69	0.00	0.69
28.20	0.37	0.77	0.48*	0.68	0.00	0.68
28.25	0.37	0.78	0.48*	0.68	0.00	0.68
28.30	0.37	0.78	0.48*	0.67	0.00	0.67
28.35	0.37	0.78	0.48*	0.66	0.00	0.66
28.40	0.37	0.78	0.48*	0.66	0.00	0.66
28.45	0.37	0.78	0.48*	0.65	0.00	0.65
28.50	0.37	0.78	0.47*	0.64	0.00	0.64
28.55	0.37	0.78	0.47*	0.63	0.00	0.63
28.60	0.37	0.78	0.47*	0.63	0.00	0.63
28.65	0.37	0.78	0.47*	0.62	0.00	0.62
28.70	0.37	0.78	0.47*	0.61	0.00	0.61
28.75	0.36	0.78	0.47*	0.61	0.00	0.61
28.80	0.36	0.78	0.47*	0.60	0.00	0.60
28.85	0.36	0.78	0.47*	0.59	0.00	0.59
28.90	0.36	0.78	0.47*	0.59	0.00	0.59
28.95	0.36	0.78	0.47*	0.58	0.00	0.58
29.00	0.36	0.78	0.46*	0.57	0.00	0.57
29.05	0.36	0.78	0.46*	0.56	0.00	0.56
29.10	0.36	0.78	0.46*	0.56	0.00	0.56
29.15	0.36	0.78	0.46*	0.55	0.00	0.55
29.20	0.36	0.78	0.46*	0.54	0.00	0.54
29.25	0.36	0.78	0.46*	0.54	0.00	0.54
29.30	0.36	0.78	0.46*	0.53	0.00	0.53
29.35	0.36	0.78	0.46*	0.52	0.00	0.52
29.40	0.36	0.78	0.46*	0.51	0.00	0.51
29.45	0.36	0.78	0.46*	0.51	0.00	0.51
29.50	0.36	0.78	0.46*	0.50	0.00	0.50
29.55	0.35	0.78	0.45*	0.49	0.00	0.49
29.60	0.35	0.78	0.45*	0.48	0.00	0.48
29.65	0.35	0.78	0.45*	0.48	0.00	0.48
29.70	0.35	0.78	0.45*	0.47	0.00	0.47
29.75	0.35	0.78	0.45*	0.46	0.00	0.46
29.80	0.35	0.78	0.45*	0.46	0.00	0.46
29.85	0.35	0.78	0.45*	0.45	0.00	0.45
29.90	0.35	0.78	0.45*	0.44	0.00	0.44
29.95	0.35	0.78	0.45*	0.43	0.00	0.43
30.00	0.35	0.78	0.45*	0.43	0.00	0.43
30.05	0.36	0.78	0.45*	0.42	0.00	0.42
30.10	0.36	0.78	0.46*	0.41	0.00	0.41
30.15	0.37	0.78	0.47*	0.41	0.00	0.41
30.20	0.38	0.78	0.48*	0.40	0.00	0.40
30.25	0.38	0.78	0.49*	0.39	0.00	0.39
30.30	0.39	0.78	0.50*	0.38	0.00	0.38
30.35	0.40	0.78	0.51*	0.38	0.00	0.38

30.40	0.41	0.78	0.52*	0.37	0.00	0.37
30.45	0.42	0.78	0.53*	0.37	0.00	0.37
30.50	0.43	0.78	0.55*	0.36	0.00	0.36
30.55	0.44	0.78	0.56*	0.35	0.00	0.35
30.60	0.45	0.78	0.58*	0.35	0.00	0.35
30.65	0.46	0.78	0.59*	0.34	0.00	0.34
30.70	0.48	0.78	0.61*	0.34	0.00	0.34
30.75	0.50	0.78	0.64*	0.33	0.00	0.33
30.80	0.53	0.78	0.68*	0.33	0.00	0.33
30.85	0.59	0.78	0.76*	0.32	0.00	0.32
30.90	0.63	0.78	0.81*	0.32	0.00	0.32
30.95	0.63	0.78	0.81*	0.31	0.00	0.31
31.00	0.63	0.78	0.81*	0.31	0.00	0.31
31.05	0.63	0.78	0.81*	0.30	0.00	0.30
31.10	0.63	0.78	0.81*	0.30	0.00	0.30
31.15	0.63	0.78	0.81*	0.30	0.00	0.30
31.20	0.63	0.78	0.81*	0.29	0.00	0.29
31.25	0.63	0.78	0.81*	0.29	0.00	0.29
31.30	0.63	0.78	0.81*	0.29	0.00	0.29
31.35	0.63	0.78	0.81*	0.29	0.00	0.29
31.40	0.63	0.78	0.81*	0.29	0.00	0.29
31.45	0.63	0.78	0.81*	0.29	0.00	0.29
31.50	0.63	0.78	0.81*	0.28	0.00	0.28
31.55	0.63	0.78	0.81*	0.28	0.00	0.28
31.60	0.63	0.78	0.81*	0.28	0.00	0.28
31.65	0.63	0.78	0.81*	0.28	0.00	0.28
31.70	0.63	0.78	0.81*	0.28	0.00	0.28
31.75	0.63	0.78	0.81*	0.28	0.00	0.28
31.80	0.63	0.78	0.81*	0.28	0.00	0.28
31.85	0.63	0.78	0.81*	0.28	0.00	0.28
31.90	0.63	0.78	0.81*	0.28	0.00	0.28
31.95	0.63	0.78	0.81*	0.28	0.00	0.28
32.00	0.63	0.78	0.81*	0.28	0.00	0.28
32.05	0.63	0.78	0.81*	0.28	0.00	0.28
32.10	0.63	0.78	0.81*	0.28	0.00	0.28
32.15	0.63	0.78	0.81*	0.28	0.00	0.28
32.20	0.63	0.78	0.81*	0.28	0.00	0.28
32.25	0.63	0.78	0.81*	0.28	0.00	0.28
32.30	0.63	0.78	0.81*	0.28	0.00	0.28
32.35	0.63	0.78	0.81*	0.28	0.00	0.28
32.40	0.63	0.78	0.81*	0.28	0.00	0.28
32.45	0.63	0.78	0.81*	0.28	0.00	0.28
32.50	0.63	0.78	0.81*	0.28	0.00	0.28
32.55	0.63	0.78	0.81*	0.28	0.00	0.28
32.60	0.63	0.78	0.81*	0.28	0.00	0.28
32.65	0.63	0.78	0.81*	0.28	0.00	0.28
32.70	0.63	0.78	0.81*	0.28	0.00	0.28
32.75	0.63	0.78	0.81*	0.28	0.00	0.28
32.80	0.63	0.78	0.81*	0.28	0.00	0.28
32.85	0.63	0.78	0.81*	0.28	0.00	0.28
32.90	0.63	0.78	0.81*	0.28	0.00	0.28
32.95	0.63	0.78	0.81*	0.28	0.00	0.28
33.00	0.63	0.78	0.81*	0.28	0.00	0.28
33.05	0.63	0.78	0.81*	0.28	0.00	0.28
33.10	0.63	0.78	0.81*	0.28	0.00	0.28
33.15	0.62	0.77	0.81*	0.28	0.00	0.28
33.20	0.62	0.77	0.81*	0.28	0.00	0.28
33.25	0.62	0.77	0.81*	0.28	0.00	0.28
33.30	0.62	0.77	0.81*	0.28	0.00	0.28
33.35	0.62	0.77	0.81*	0.28	0.00	0.28
33.40	0.62	0.77	0.81*	0.28	0.00	0.28
33.45	0.62	0.77	0.81*	0.28	0.00	0.28
33.50	0.62	0.77	0.81*	0.28	0.00	0.28

33.55	0.62	0.77	0.81*	0.28	0.00	0.28
33.60	0.62	0.77	0.81*	0.28	0.00	0.28
33.65	0.62	0.77	0.81*	0.28	0.00	0.28
33.70	0.62	0.77	0.81*	0.28	0.00	0.28
33.75	0.62	0.77	0.81*	0.28	0.00	0.28
33.80	0.62	0.77	0.81*	0.28	0.00	0.28
33.85	0.62	0.77	0.81*	0.28	0.00	0.28
33.90	0.62	0.77	0.81*	0.28	0.00	0.28
33.95	0.62	0.77	0.81*	0.28	0.00	0.28
34.00	0.62	0.77	0.81*	0.28	0.00	0.28
34.05	0.62	0.77	0.81*	0.28	0.00	0.28
34.10	0.62	0.77	0.81*	0.28	0.00	0.28
34.15	0.62	0.77	0.81*	0.28	0.00	0.28
34.20	0.62	0.77	0.81*	0.28	0.00	0.28
34.25	0.62	0.77	0.81*	0.28	0.00	0.28
34.30	0.62	0.77	0.80*	0.28	0.00	0.28
34.35	0.62	0.77	0.80*	0.28	0.00	0.28
34.40	0.62	0.77	0.80*	0.28	0.00	0.28
34.45	0.62	0.77	0.80*	0.28	0.00	0.28
34.50	0.62	0.77	0.80*	0.28	0.00	0.28
34.55	0.62	0.77	0.80*	0.28	0.00	0.28
34.60	0.62	0.77	0.80*	0.28	0.00	0.28
34.65	0.62	0.77	0.80*	0.28	0.00	0.28
34.70	0.62	0.77	0.80*	0.28	0.00	0.28
34.75	0.62	0.77	0.80*	0.28	0.00	0.28
34.80	0.62	0.77	0.80*	0.28	0.00	0.28
34.85	0.62	0.77	0.80*	0.28	0.00	0.28
34.90	0.62	0.77	0.80*	0.28	0.00	0.28
34.95	0.62	0.77	0.80*	0.28	0.00	0.28
35.00	0.62	0.77	0.80*	0.28	0.00	0.28
35.05	0.62	0.77	0.80*	0.28	0.00	0.28
35.10	0.62	0.77	0.80*	0.28	0.00	0.28
35.15	0.62	0.77	0.80*	0.28	0.00	0.28
35.20	0.62	0.77	0.80*	0.28	0.00	0.28
35.25	0.62	0.77	0.80*	0.28	0.00	0.28
35.30	0.62	0.77	0.80*	0.28	0.00	0.28
35.35	0.62	0.77	0.80*	0.28	0.00	0.28
35.40	0.62	0.77	0.80*	0.28	0.00	0.28
35.45	0.62	0.77	0.80*	0.28	0.00	0.28
35.50	0.62	0.77	0.80*	0.28	0.00	0.28
35.55	0.62	0.77	0.80*	0.28	0.00	0.28
35.60	0.62	0.77	0.80*	0.28	0.00	0.28
35.65	0.62	0.77	0.80*	0.28	0.00	0.28
35.70	0.62	0.77	0.80*	0.28	0.00	0.28
35.75	0.62	0.77	0.80*	0.28	0.00	0.28
35.80	0.62	0.77	0.80*	0.28	0.00	0.28
35.85	0.62	0.77	0.80*	0.28	0.00	0.28
35.90	0.62	0.77	0.80*	0.28	0.00	0.28
35.95	0.62	0.77	0.80*	0.28	0.00	0.28
36.00	0.62	0.77	0.80*	0.28	0.00	0.28
36.05	0.62	0.77	0.80*	0.28	0.00	0.28
36.10	0.62	0.77	0.80*	0.28	0.00	0.28
36.15	0.62	0.77	0.80*	0.28	0.00	0.28
36.20	0.61	0.77	0.80*	0.28	0.00	0.28
36.25	0.61	0.77	0.80*	0.28	0.00	0.28
36.30	0.61	0.77	0.80*	0.28	0.00	0.28
36.35	0.61	0.76	0.80*	0.28	0.00	0.28
36.40	0.61	0.76	0.80*	0.28	0.00	0.28
36.45	0.61	0.76	0.80*	0.28	0.00	0.28
36.50	0.61	0.76	0.80*	0.28	0.00	0.28
36.55	0.61	0.76	0.80*	0.28	0.00	0.28
36.60	0.61	0.76	0.80*	0.28	0.00	0.28
36.65	0.61	0.76	0.80*	0.28	0.00	0.28

36.70	0.61	0.76	0.80*	0.28	0.00	0.28
36.75	0.61	0.76	0.80*	0.28	0.00	0.28
36.80	0.61	0.76	0.80*	0.28	0.00	0.28
36.85	0.61	0.76	0.80*	0.28	0.00	0.28
36.90	0.61	0.76	0.80*	0.28	0.00	0.28
36.95	0.61	0.76	0.80*	0.28	0.00	0.28
37.00	0.61	0.76	0.80*	0.28	0.00	0.28
37.05	0.61	0.76	0.80*	0.28	0.00	0.28
37.10	0.61	0.76	0.80*	0.28	0.00	0.28
37.15	0.61	0.76	0.80*	0.28	0.00	0.28
37.20	0.61	0.76	0.80*	0.28	0.00	0.28
37.25	0.61	0.76	0.80*	0.28	0.00	0.28
37.30	0.61	0.76	0.80*	0.28	0.00	0.28
37.35	0.61	0.76	0.80*	0.28	0.00	0.28
37.40	0.61	0.76	0.80*	0.28	0.00	0.28
37.45	0.61	0.76	0.80*	0.28	0.00	0.28
37.50	0.61	0.76	0.80*	0.28	0.00	0.28
37.55	0.61	0.76	0.80*	0.28	0.00	0.28
37.60	0.61	0.76	0.80*	0.28	0.00	0.28
37.65	0.61	0.76	0.80*	0.28	0.00	0.28
37.70	0.61	0.76	0.80*	0.28	0.00	0.28
37.75	0.61	0.76	0.80*	0.28	0.00	0.28
37.80	0.61	0.76	0.80*	0.28	0.00	0.28
37.85	0.61	0.76	0.80*	0.28	0.00	0.28
37.90	0.61	0.76	0.80*	0.28	0.00	0.28
37.95	0.61	0.76	0.80*	0.28	0.00	0.28
38.00	0.61	0.76	0.80*	0.28	0.00	0.28
38.05	0.61	0.76	0.80*	0.28	0.00	0.28
38.10	0.61	0.76	0.80*	0.28	0.00	0.28
38.15	0.61	0.76	0.80*	0.28	0.00	0.28
38.20	0.61	0.76	0.80*	0.28	0.00	0.28
38.25	0.61	0.76	0.80*	0.28	0.00	0.28
38.30	0.61	0.76	0.80*	0.28	0.00	0.28
38.35	0.61	0.76	0.80*	0.28	0.00	0.28
38.40	0.61	0.76	0.80*	0.28	0.00	0.28
38.45	0.61	0.76	0.80*	0.28	0.00	0.28
38.50	0.61	0.76	0.80*	0.28	0.00	0.28
38.55	0.61	0.76	0.80*	0.28	0.00	0.28
38.60	0.61	0.76	0.80*	0.28	0.00	0.28
38.65	0.61	0.76	0.80*	0.28	0.00	0.28
38.70	0.61	0.76	0.80*	0.28	0.00	0.28
38.75	0.61	0.76	0.80*	0.28	0.00	0.28
38.80	0.61	0.76	0.80*	0.28	0.00	0.28
38.85	0.61	0.76	0.80*	0.28	0.00	0.28
38.90	0.61	0.76	0.80*	0.28	0.00	0.28
38.95	0.61	0.75	0.80*	0.28	0.00	0.28
39.00	0.61	0.75	0.80*	0.28	0.00	0.28
39.05	0.61	0.75	0.80*	0.28	0.00	0.28
39.10	0.61	0.75	0.80*	0.28	0.00	0.28
39.15	0.61	0.75	0.80*	0.28	0.00	0.28
39.20	0.61	0.75	0.80*	0.28	0.00	0.28
39.25	0.61	0.75	0.80*	0.28	0.00	0.28
39.30	0.61	0.75	0.80*	0.28	0.00	0.28
39.35	0.61	0.75	0.80*	0.28	0.00	0.28
39.40	0.60	0.75	0.80*	0.28	0.00	0.28
39.45	0.60	0.75	0.80*	0.28	0.00	0.28
39.50	0.60	0.75	0.80*	0.28	0.00	0.28
39.55	0.60	0.75	0.80*	0.28	0.00	0.28
39.60	0.60	0.75	0.80*	0.28	0.00	0.28
39.65	0.60	0.75	0.80*	0.28	0.00	0.28
39.70	0.60	0.75	0.80*	0.28	0.00	0.28
39.75	0.60	0.75	0.80*	0.28	0.00	0.28
39.80	0.60	0.75	0.80*	0.28	0.00	0.28

39.85	0.60	0.75	0.80*	0.28	0.00	0.28
39.90	0.60	0.75	0.80*	0.28	0.00	0.28
39.95	0.60	0.75	0.80*	0.28	0.00	0.28
40.00	0.60	0.75	0.80*	0.28	0.00	0.28
40.05	0.60	0.75	0.80*	0.28	0.00	0.28
40.10	0.60	0.75	0.80*	0.28	0.00	0.28
40.15	0.60	0.75	0.80*	0.28	0.00	0.28
40.20	0.60	0.75	0.80*	0.28	0.00	0.28
40.25	0.60	0.75	0.80*	0.28	0.00	0.28
40.30	0.60	0.75	0.80*	0.28	0.00	0.28
40.35	0.60	0.75	0.80*	0.28	0.00	0.28
40.40	0.60	0.75	0.80*	0.28	0.00	0.28
40.45	0.60	0.75	0.81*	0.28	0.00	0.28
40.50	0.60	0.75	0.81*	0.28	0.00	0.28
40.55	0.60	0.75	0.81*	0.28	0.00	0.28
40.60	0.60	0.75	0.81*	0.28	0.00	0.28
40.65	0.60	0.75	0.81*	0.28	0.00	0.28
40.70	0.60	0.75	0.81*	0.28	0.00	0.28
40.75	0.60	0.75	0.81*	0.28	0.00	0.28
40.80	0.60	0.75	0.81*	0.28	0.00	0.28
40.85	0.60	0.74	0.81*	0.28	0.00	0.28
40.90	0.60	0.74	0.81*	0.28	0.00	0.28
40.95	0.60	0.74	0.81*	0.28	0.00	0.28
41.00	0.60	0.74	0.81*	0.28	0.00	0.28
41.05	0.60	0.74	0.81*	0.28	0.00	0.28
41.10	0.60	0.74	0.81*	0.28	0.00	0.28
41.15	0.60	0.74	0.81*	0.28	0.00	0.28
41.20	0.60	0.74	0.81*	0.28	0.00	0.28
41.25	0.60	0.74	0.81*	0.28	0.00	0.28
41.30	0.60	0.74	0.81*	0.28	0.00	0.28
41.35	0.60	0.74	0.81*	0.28	0.00	0.28
41.40	0.60	0.74	0.81*	0.28	0.00	0.28
41.45	0.60	0.74	0.81*	0.28	0.00	0.28
41.50	0.60	0.74	0.81*	0.28	0.00	0.28
41.55	0.60	0.74	0.81*	0.28	0.00	0.28
41.60	0.60	0.74	0.81*	0.28	0.00	0.28
41.65	0.60	0.74	0.81*	0.28	0.00	0.28
41.70	0.60	0.74	0.81*	0.28	0.00	0.28
41.75	0.60	0.74	0.81*	0.28	0.00	0.28
41.80	0.60	0.74	0.81*	0.28	0.00	0.28
41.85	0.60	0.74	0.81*	0.28	0.00	0.28
41.90	0.60	0.74	0.81*	0.28	0.00	0.28
41.95	0.60	0.74	0.81*	0.28	0.00	0.28
42.00	0.60	0.74	0.81*	0.28	0.00	0.28
42.05	0.60	0.74	0.81*	0.28	0.00	0.28
42.10	0.60	0.74	0.81*	0.28	0.00	0.28
42.15	0.60	0.74	0.81*	0.28	0.00	0.28
42.20	0.60	0.74	0.81*	0.28	0.00	0.28
42.25	0.60	0.74	0.81*	0.28	0.00	0.28
42.30	0.60	0.74	0.81*	0.28	0.00	0.28
42.35	0.60	0.74	0.81*	0.28	0.00	0.28
42.40	0.60	0.74	0.81*	0.28	0.00	0.28
42.45	0.59	0.73	0.81*	0.28	0.00	0.28
42.50	0.59	0.73	0.81*	0.28	0.00	0.28
42.55	0.59	0.73	0.81*	0.28	0.00	0.28
42.60	0.59	0.73	0.81*	0.28	0.00	0.28
42.65	0.59	0.73	0.81*	0.28	0.00	0.28
42.70	0.59	0.73	0.81*	0.28	0.00	0.28
42.75	0.59	0.73	0.81*	0.28	0.00	0.28
42.80	0.59	0.73	0.81*	0.28	0.00	0.28
42.85	0.59	0.73	0.81*	0.28	0.00	0.28
42.90	0.59	0.73	0.81*	0.28	0.00	0.28
42.95	0.59	0.73	0.81*	0.28	0.00	0.28

43.00	0.59	0.73	0.81*	0.28	0.00	0.28
43.05	0.59	0.73	0.81*	0.28	0.00	0.28
43.10	0.59	0.73	0.81*	0.28	0.00	0.28
43.15	0.59	0.73	0.81*	0.28	0.00	0.28
43.20	0.59	0.73	0.81*	0.28	0.00	0.28
43.25	0.59	0.73	0.81*	0.28	0.00	0.28
43.30	0.59	0.73	0.81*	0.28	0.00	0.28
43.35	0.59	0.73	0.81*	0.28	0.00	0.28
43.40	0.59	0.73	0.81*	0.28	0.00	0.28
43.45	0.59	0.73	0.81*	0.28	0.00	0.28
43.50	0.59	0.73	0.81*	0.28	0.00	0.28
43.55	0.59	0.73	0.81*	0.28	0.00	0.28
43.60	0.59	0.73	0.81*	0.28	0.00	0.28
43.65	0.59	0.73	0.81*	0.28	0.00	0.28
43.70	0.59	0.73	0.81*	0.28	0.00	0.28
43.75	0.59	0.73	0.81*	0.28	0.00	0.28
43.80	0.59	0.73	0.81*	0.28	0.00	0.28
43.85	0.59	0.73	0.81*	0.28	0.00	0.28
43.90	0.59	0.72	0.81*	0.28	0.00	0.28
43.95	0.59	0.72	0.81*	0.28	0.00	0.28
44.00	0.59	0.72	0.81*	0.28	0.00	0.28
44.05	0.59	0.72	0.81*	0.28	0.00	0.28
44.10	0.59	0.72	0.81*	0.28	0.00	0.28
44.15	0.59	0.72	0.81*	0.28	0.00	0.28
44.20	0.59	0.72	0.81*	0.28	0.00	0.28
44.25	0.59	0.72	0.82*	0.28	0.00	0.28
44.30	0.59	0.72	0.82*	0.28	0.00	0.28
44.35	0.59	0.72	0.82*	0.28	0.00	0.28
44.40	0.59	0.72	0.82*	0.28	0.00	0.28
44.45	0.59	0.72	0.82*	0.28	0.00	0.28
44.50	0.59	0.72	0.82*	0.28	0.00	0.28
44.55	0.59	0.72	0.82*	0.28	0.00	0.28
44.60	0.59	0.72	0.82*	0.28	0.00	0.28
44.65	0.59	0.72	0.82*	0.28	0.00	0.28
44.70	0.59	0.72	0.82*	0.28	0.00	0.28
44.75	0.59	0.72	0.82*	0.28	0.00	0.28
44.80	0.59	0.72	0.82*	0.28	0.00	0.28
44.85	0.59	0.72	0.82*	0.28	0.00	0.28
44.90	0.59	0.72	0.82*	0.28	0.00	0.28
44.95	0.59	0.72	0.82*	0.28	0.00	0.28
45.00	0.59	0.72	0.82*	0.28	0.00	0.28
45.05	0.59	0.72	0.82*	0.28	0.00	0.28
45.10	0.59	0.72	0.82*	0.28	0.00	0.28
45.15	0.59	0.72	0.82*	0.28	0.00	0.28
45.20	0.59	0.72	0.82*	0.28	0.00	0.28
45.25	0.59	0.72	0.82*	0.28	0.00	0.28
45.30	0.59	0.71	0.82*	0.28	0.00	0.28
45.35	0.59	0.71	0.82*	0.28	0.00	0.28
45.40	0.59	0.71	0.82*	0.28	0.00	0.28
45.45	0.58	0.71	0.82*	0.28	0.00	0.28
45.50	0.58	0.71	0.82*	0.28	0.00	0.28
45.55	0.58	0.71	0.82*	0.28	0.00	0.28
45.60	0.58	0.71	0.82*	0.28	0.00	0.28
45.65	0.58	0.71	0.82*	0.28	0.00	0.28
45.70	0.58	0.71	0.82*	0.28	0.00	0.28
45.75	0.58	0.71	0.82*	0.28	0.00	0.28
45.80	0.58	0.71	0.82*	0.28	0.00	0.28
45.85	0.58	0.71	0.82*	0.28	0.00	0.28
45.90	0.58	0.71	0.82*	0.28	0.00	0.28
45.95	0.58	0.71	0.82*	0.28	0.00	0.28
46.00	0.58	0.71	0.82*	0.28	0.00	0.28
46.05	0.58	0.71	0.82*	0.28	0.00	0.28
46.10	0.58	0.71	0.82*	0.28	0.00	0.28

46.15	0.58	0.71	0.82*	0.28	0.00	0.28
46.20	0.58	0.71	0.82*	0.28	0.00	0.28
46.25	0.58	0.71	0.82*	0.28	0.00	0.28
46.30	0.58	0.71	0.82*	0.28	0.00	0.28
46.35	0.58	0.71	0.82*	0.28	0.00	0.28
46.40	0.58	0.71	0.82*	0.28	0.00	0.28
46.45	0.58	0.71	0.82*	0.28	0.00	0.28
46.50	0.58	0.71	0.82*	0.28	0.00	0.28
46.55	0.58	0.71	0.82*	0.28	0.00	0.28
46.60	0.58	0.71	0.82*	0.28	0.00	0.28
46.65	0.58	0.71	0.82*	0.28	0.00	0.28
46.70	0.58	0.70	0.82*	0.28	0.00	0.28
46.75	0.58	0.70	0.82*	0.28	0.00	0.28
46.80	0.58	0.70	0.82*	0.28	0.00	0.28
46.85	0.58	0.70	0.82*	0.28	0.00	0.28
46.90	0.58	0.70	0.83*	0.28	0.00	0.28
46.95	0.58	0.70	0.83*	0.28	0.00	0.28
47.00	0.58	0.70	0.83*	0.28	0.00	0.28
47.05	0.58	0.70	0.83*	0.28	0.00	0.28
47.10	0.58	0.70	0.83*	0.28	0.00	0.28
47.15	0.58	0.70	0.83*	0.28	0.00	0.28
47.20	0.51	0.70	0.73*	0.27	0.00	0.27
47.25	0.40	0.70	0.57*	0.27	0.00	0.27
47.30	0.36	0.70	0.51*	0.26	0.00	0.26
47.35	0.32	0.70	0.46*	0.25	0.00	0.25
47.40	0.29	0.70	0.42*	0.25	0.00	0.25
47.45	0.27	0.70	0.38*	0.24	0.00	0.24
47.50	0.24	0.70	0.35*	0.23	0.00	0.23
47.55	0.25	0.70	0.35*	0.22	0.00	0.22
47.60	0.25	0.70	0.36*	0.21	0.00	0.21
47.65	0.26	0.70	0.37*	0.20	0.00	0.20
47.70	0.26	0.70	0.38*	0.19	0.00	0.19
47.75	0.27	0.70	0.39*	0.19	0.00	0.19
47.80	0.27	0.70	0.39*	0.18	0.00	0.18
47.85	0.28	0.70	0.40*	0.17	0.00	0.17
47.90	0.29	0.70	0.41*	0.16	0.00	0.16
47.95	0.29	0.70	0.42*	0.15	0.00	0.15
48.00	0.30	0.69	0.43*	0.15	0.00	0.15
48.05	0.30	0.69	0.44*	0.14	0.00	0.14
48.10	0.31	0.69	0.45*	0.13	0.00	0.13
48.15	0.32	0.69	0.46*	0.12	0.00	0.12
48.20	0.32	0.69	0.47*	0.12	0.00	0.12
48.25	0.33	0.69	0.48*	0.11	0.00	0.11
48.30	0.34	0.69	0.49*	0.10	0.00	0.10
48.35	0.35	0.69	0.50*	0.09	0.00	0.09
48.40	0.36	0.69	0.52*	0.09	0.00	0.09
48.45	0.37	0.69	0.53*	0.08	0.00	0.08
48.50	0.38	0.69	0.54*	0.07	0.00	0.07
48.55	0.39	0.69	0.56*	0.07	0.00	0.07
48.60	0.40	0.69	0.58*	0.06	0.00	0.06
48.65	0.41	0.69	0.60*	0.06	0.00	0.06
48.70	0.43	0.69	0.62*	0.05	0.00	0.05
48.75	0.45	0.69	0.65*	0.05	0.00	0.05
48.80	0.48	0.69	0.69*	0.04	0.00	0.04
48.85	0.55	0.69	0.80*	0.04	0.00	0.04
48.90	0.57	0.69	0.83*	0.03	0.00	0.03
48.95	0.57	0.69	0.83*	0.03	0.00	0.03
49.00	0.57	0.69	0.83*	0.02	0.00	0.02
49.05	0.57	0.69	0.83*	0.02	0.00	0.02
49.10	0.57	0.69	0.83*	0.02	0.00	0.02
49.15	0.57	0.69	0.83*	0.01	0.00	0.01
49.20	0.57	0.69	0.83*	0.01	0.00	0.01
49.25	0.57	0.69	0.84*	0.01	0.00	0.01

49.30	0.57	0.69	0.84*	0.01	0.00	0.01
49.35	0.57	0.68	0.84*	0.01	0.00	0.01
49.40	0.57	0.68	0.84*	0.01	0.00	0.01
49.45	0.57	0.68	0.84*	0.00	0.00	0.00
49.50	0.57	0.68	0.84*	0.00	0.00	0.00
49.55	0.57	0.68	0.84*	0.00	0.00	0.00
49.60	0.57	0.68	0.84*	0.00	0.00	0.00
49.65	0.57	0.68	0.84*	0.00	0.00	0.00
49.70	0.57	0.68	0.84*	0.00	0.00	0.00
49.75	0.57	0.68	0.84*	0.00	0.00	0.00
49.80	0.57	0.68	0.84*	0.00	0.00	0.00
49.85	0.57	0.68	0.84*	0.00	0.00	0.00
49.90	0.57	0.68	0.84*	0.00	0.00	0.00
49.95	0.57	0.68	0.84*	0.00	0.00	0.00
50.00	0.57	0.68	0.84*	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.

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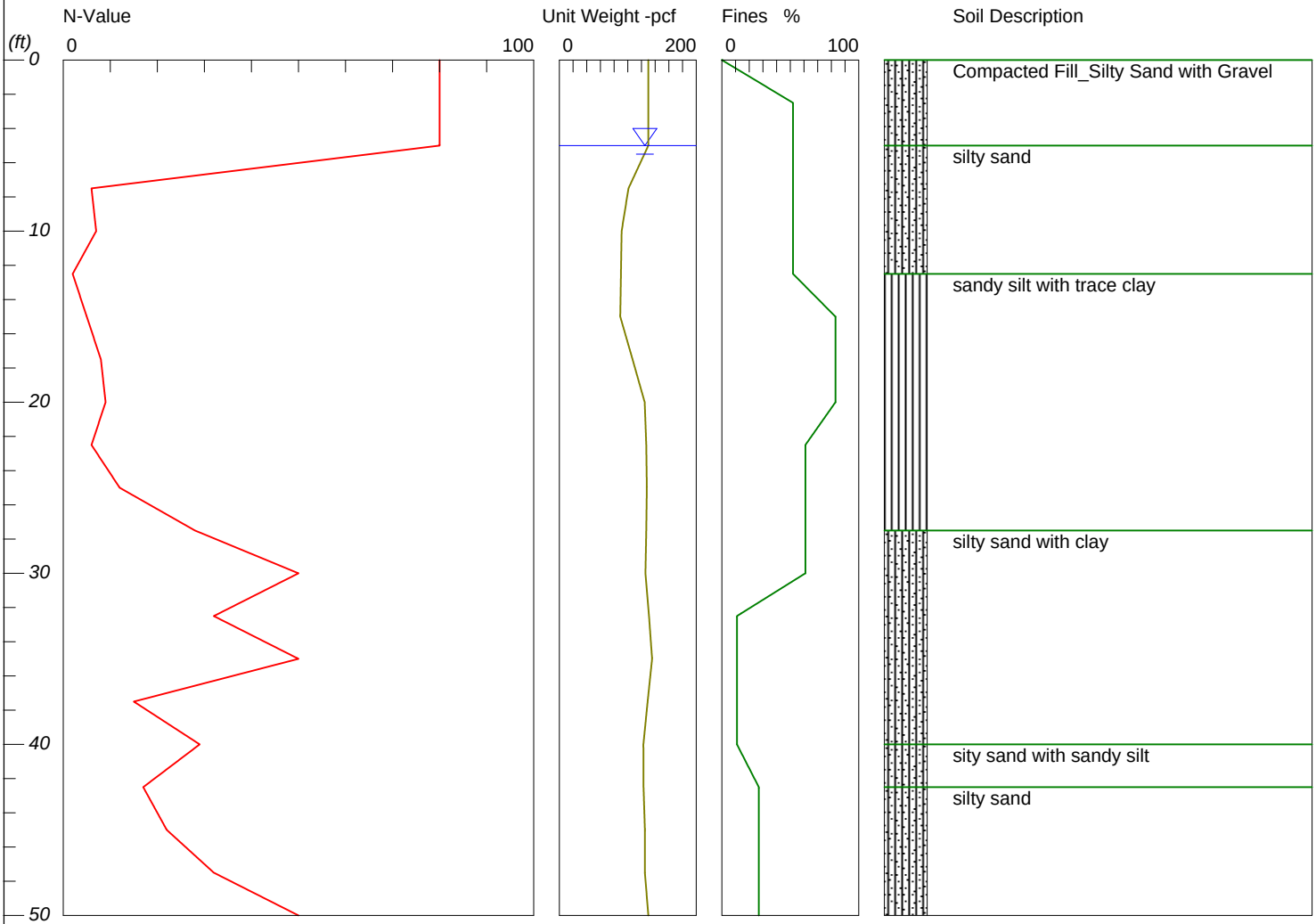
1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated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

LIQUEFACTION ANALYSIS

Solemo 13 Acres

Hole No.=B-6 Water Depth=5 ft Surface Elev.=244

Magnitude=6.81
Acceleration=0.656g

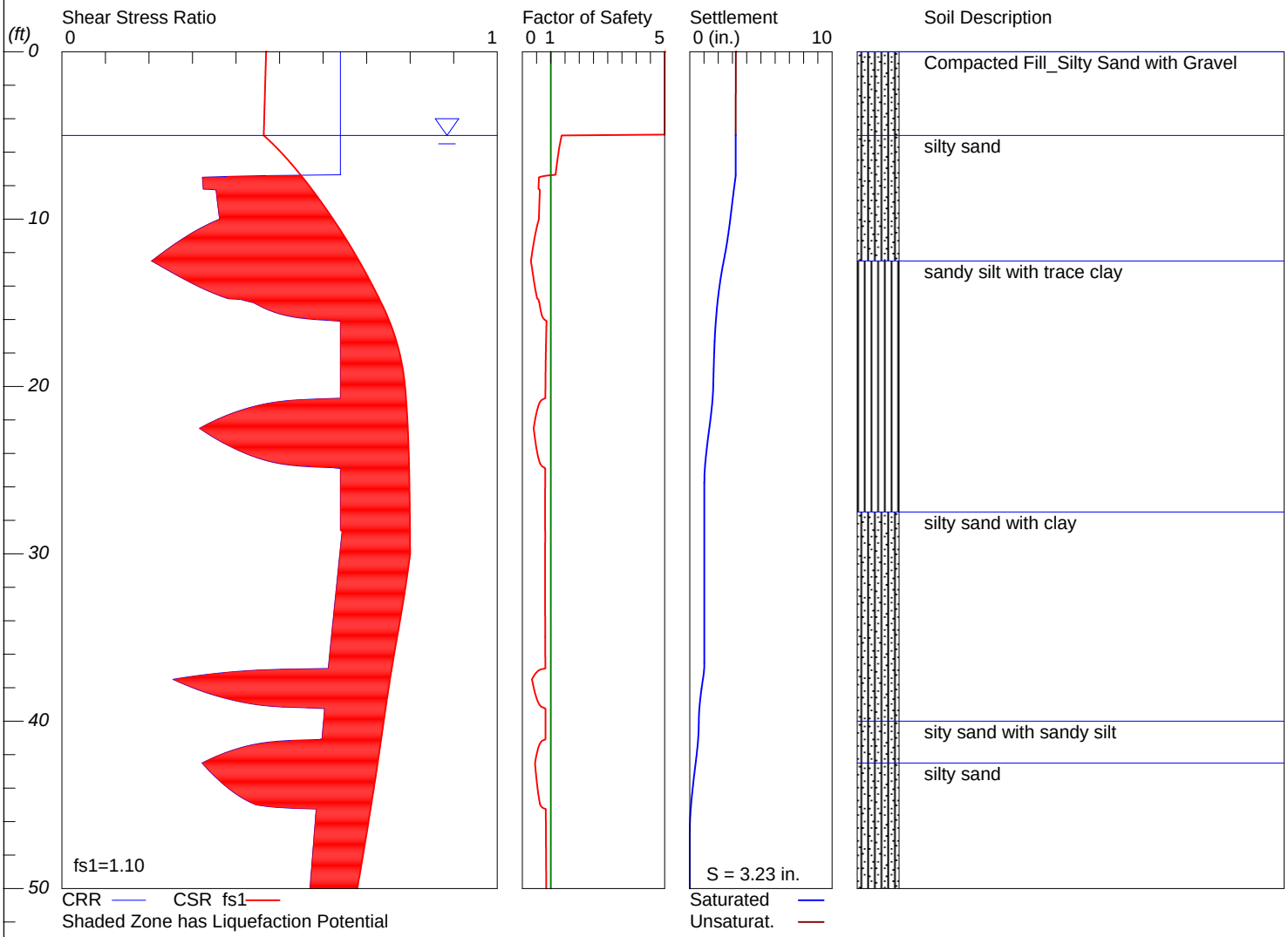


LIQUEFACTION ANALYSIS

Solemo 13 Acres

Hole No.=B-6 Water Depth=5 ft Surface Elev.=244

Magnitude=6.81
Acceleration=0.656g



Liquefy.sum

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********************************************************************************
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                                    LIQUEFACTION ANALYSIS SUMMARY

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        Input File Name: G:\_Projects\2020\20G-0418\Liqefaction Analysis\20G-0418
b6.liq
        Title:  Solemo 13 Acres
        Subtitle:  20G-0418-0

        Surface Elev.=244
        Hole No.=B-6
        Depth of Hole= 50.00 ft
        Water Table during Earthquake= 5.00 ft
        Water Table during In-Situ Testing= 60.00 ft
        Max. Acceleration= 0.66 g
        Earthquake Magnitude= 6.81

 Input Data:
        Surface Elev.=244
        Hole No.=B-6
        Depth of Hole=50.00 ft
        Water Table during Earthquake= 5.00 ft
        Water Table during In-Situ Testing= 60.00 ft
        Max. Acceleration=0.66 g
        Earthquake Magnitude=6.81
        No-Liquefiable Soils:   Based on Analysis

        1. SPT or BPT Calculation.
        2. Settlement Analysis Method: Tokimatsu, M-correction
        3. Fines Correction for Liquefaction: Modify Stark/Olson
        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= 1.1
           Plot one CSR curve (fs1=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options

        In-Situ Test Data:
        Depth   SPT     gamma   Fines
        ft              pcf     %
        _____________________________________
        0.00    80.00   130.00  0.00
        2.50    80.00   130.00  52.00
        5.00    80.00   130.00  52.00
        7.50    6.00    101.00  52.00
        10.00   7.00    91.00   52.00
        12.50   2.00    90.00   52.00
        15.00   5.00    89.00   83.00
        17.50   8.00    107.00  83.00
        20.00   9.00    124.70  83.00
        22.50   6.00    127.00  61.00
                                        Page 1
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25.00	12.00	127.80	61.00
27.50	28.00	127.00	61.00
30.00	50.00	125.80	61.00
32.50	32.00	131.00	11.00
35.00	50.00	135.50	11.00
37.50	15.00	129.00	11.00
40.00	29.00	122.80	11.00
42.50	17.00	123.00	27.00
45.00	22.00	125.00	27.00
47.50	32.00	125.00	27.00
50.00	50.00	130.00	27.00

Output Results:

Settlement of Saturated Sands=3.23 in.
Settlement of Unsaturated Sands=0.01 in.
Total Settlement of Saturated and Unsaturated Sands=3.23 in.
Differential Settlement=1.616 to 2.133 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.64	0.47	5.00	3.23	0.01	3.23
0.05	0.64	0.47	5.00	3.23	0.01	3.23
0.10	0.64	0.47	5.00	3.23	0.01	3.23
0.15	0.64	0.47	5.00	3.23	0.01	3.23
0.20	0.64	0.47	5.00	3.23	0.01	3.23
0.25	0.64	0.47	5.00	3.23	0.01	3.23
0.30	0.64	0.47	5.00	3.23	0.01	3.23
0.35	0.64	0.47	5.00	3.23	0.01	3.23
0.40	0.64	0.47	5.00	3.23	0.01	3.23
0.45	0.64	0.47	5.00	3.23	0.01	3.23
0.50	0.64	0.47	5.00	3.23	0.01	3.23
0.55	0.64	0.47	5.00	3.23	0.01	3.23
0.60	0.64	0.47	5.00	3.23	0.01	3.23
0.65	0.64	0.47	5.00	3.23	0.01	3.23
0.70	0.64	0.47	5.00	3.23	0.01	3.23
0.75	0.64	0.47	5.00	3.23	0.01	3.23
0.80	0.64	0.47	5.00	3.23	0.01	3.23
0.85	0.64	0.47	5.00	3.23	0.01	3.23
0.90	0.64	0.47	5.00	3.23	0.01	3.23
0.95	0.64	0.47	5.00	3.23	0.01	3.23
1.00	0.64	0.47	5.00	3.23	0.01	3.23
1.05	0.64	0.47	5.00	3.23	0.01	3.23
1.10	0.64	0.47	5.00	3.23	0.01	3.23
1.15	0.64	0.47	5.00	3.23	0.01	3.23
1.20	0.64	0.47	5.00	3.23	0.01	3.23
1.25	0.64	0.47	5.00	3.23	0.01	3.23
1.30	0.64	0.47	5.00	3.23	0.01	3.23
1.35	0.64	0.47	5.00	3.23	0.01	3.23
1.40	0.64	0.47	5.00	3.23	0.01	3.23
1.45	0.64	0.47	5.00	3.23	0.01	3.23
1.50	0.64	0.47	5.00	3.23	0.01	3.23
1.55	0.64	0.47	5.00	3.23	0.01	3.23
1.60	0.64	0.47	5.00	3.23	0.01	3.23
1.65	0.64	0.47	5.00	3.23	0.01	3.23
1.70	0.64	0.47	5.00	3.23	0.01	3.23
1.75	0.64	0.47	5.00	3.23	0.01	3.23
1.80	0.64	0.47	5.00	3.23	0.00	3.23
1.85	0.64	0.47	5.00	3.23	0.00	3.23
1.90	0.64	0.47	5.00	3.23	0.00	3.23
1.95	0.64	0.47	5.00	3.23	0.00	3.23
2.00	0.64	0.47	5.00	3.23	0.00	3.23

2.05	0.64	0.47	5.00	3.23	0.00	3.23
2.10	0.64	0.47	5.00	3.23	0.00	3.23
2.15	0.64	0.47	5.00	3.23	0.00	3.23
2.20	0.64	0.47	5.00	3.23	0.00	3.23
2.25	0.64	0.47	5.00	3.23	0.00	3.23
2.30	0.64	0.47	5.00	3.23	0.00	3.23
2.35	0.64	0.47	5.00	3.23	0.00	3.23
2.40	0.64	0.47	5.00	3.23	0.00	3.23
2.45	0.64	0.47	5.00	3.23	0.00	3.23
2.50	0.64	0.47	5.00	3.23	0.00	3.23
2.55	0.64	0.47	5.00	3.23	0.00	3.23
2.60	0.64	0.47	5.00	3.23	0.00	3.23
2.65	0.64	0.47	5.00	3.23	0.00	3.23
2.70	0.64	0.47	5.00	3.23	0.00	3.23
2.75	0.64	0.47	5.00	3.23	0.00	3.23
2.80	0.64	0.47	5.00	3.23	0.00	3.23
2.85	0.64	0.47	5.00	3.23	0.00	3.23
2.90	0.64	0.47	5.00	3.23	0.00	3.23
2.95	0.64	0.47	5.00	3.23	0.00	3.23
3.00	0.64	0.47	5.00	3.23	0.00	3.23
3.05	0.64	0.47	5.00	3.23	0.00	3.23
3.10	0.64	0.47	5.00	3.23	0.00	3.23
3.15	0.64	0.47	5.00	3.23	0.00	3.23
3.20	0.64	0.47	5.00	3.23	0.00	3.23
3.25	0.64	0.47	5.00	3.23	0.00	3.23
3.30	0.64	0.47	5.00	3.23	0.00	3.23
3.35	0.64	0.47	5.00	3.23	0.00	3.23
3.40	0.64	0.47	5.00	3.23	0.00	3.23
3.45	0.64	0.47	5.00	3.23	0.00	3.23
3.50	0.64	0.47	5.00	3.23	0.00	3.23
3.55	0.64	0.47	5.00	3.23	0.00	3.23
3.60	0.64	0.47	5.00	3.23	0.00	3.23
3.65	0.64	0.47	5.00	3.23	0.00	3.23
3.70	0.64	0.46	5.00	3.23	0.00	3.23
3.75	0.64	0.46	5.00	3.23	0.00	3.23
3.80	0.64	0.46	5.00	3.23	0.00	3.23
3.85	0.64	0.46	5.00	3.23	0.00	3.23
3.90	0.64	0.46	5.00	3.23	0.00	3.23
3.95	0.64	0.46	5.00	3.23	0.00	3.23
4.00	0.64	0.46	5.00	3.23	0.00	3.23
4.05	0.64	0.46	5.00	3.23	0.00	3.23
4.10	0.64	0.46	5.00	3.23	0.00	3.23
4.15	0.64	0.46	5.00	3.23	0.00	3.23
4.20	0.64	0.46	5.00	3.23	0.00	3.23
4.25	0.64	0.46	5.00	3.23	0.00	3.23
4.30	0.64	0.46	5.00	3.23	0.00	3.23
4.35	0.64	0.46	5.00	3.23	0.00	3.23
4.40	0.64	0.46	5.00	3.23	0.00	3.23
4.45	0.64	0.46	5.00	3.23	0.00	3.23
4.50	0.64	0.46	5.00	3.23	0.00	3.23
4.55	0.64	0.46	5.00	3.23	0.00	3.23
4.60	0.64	0.46	5.00	3.23	0.00	3.23
4.65	0.64	0.46	5.00	3.23	0.00	3.23
4.70	0.64	0.46	5.00	3.23	0.00	3.23
4.75	0.64	0.46	5.00	3.23	0.00	3.23
4.80	0.64	0.46	5.00	3.23	0.00	3.23
4.85	0.64	0.46	5.00	3.23	0.00	3.23
4.90	0.64	0.46	5.00	3.23	0.00	3.23
4.95	0.64	0.46	5.00	3.23	0.00	3.23
5.00	0.64	0.46	1.38	3.23	0.00	3.23
5.05	0.64	0.47	1.37	3.23	0.00	3.23
5.10	0.64	0.47	1.37	3.23	0.00	3.23
5.15	0.64	0.47	1.36	3.23	0.00	3.23

5.20	0.64	0.47	1.36	3.23	0.00	3.23
5.25	0.64	0.47	1.35	3.23	0.00	3.23
5.30	0.64	0.48	1.34	3.23	0.00	3.23
5.35	0.64	0.48	1.34	3.23	0.00	3.23
5.40	0.64	0.48	1.33	3.23	0.00	3.23
5.45	0.64	0.48	1.33	3.23	0.00	3.23
5.50	0.64	0.48	1.32	3.23	0.00	3.23
5.55	0.64	0.49	1.32	3.23	0.00	3.23
5.60	0.64	0.49	1.31	3.23	0.00	3.23
5.65	0.64	0.49	1.31	3.23	0.00	3.23
5.70	0.64	0.49	1.30	3.23	0.00	3.23
5.75	0.64	0.49	1.30	3.23	0.00	3.23
5.80	0.64	0.50	1.29	3.23	0.00	3.23
5.85	0.64	0.50	1.29	3.23	0.00	3.23
5.90	0.64	0.50	1.28	3.23	0.00	3.23
5.95	0.64	0.50	1.28	3.23	0.00	3.23
6.00	0.64	0.50	1.27	3.23	0.00	3.23
6.05	0.64	0.50	1.27	3.23	0.00	3.23
6.10	0.64	0.51	1.26	3.23	0.00	3.23
6.15	0.64	0.51	1.26	3.23	0.00	3.23
6.20	0.64	0.51	1.25	3.23	0.00	3.23
6.25	0.64	0.51	1.25	3.23	0.00	3.23
6.30	0.64	0.51	1.25	3.23	0.00	3.23
6.35	0.64	0.52	1.24	3.23	0.00	3.23
6.40	0.64	0.52	1.24	3.23	0.00	3.23
6.45	0.64	0.52	1.23	3.23	0.00	3.23
6.50	0.64	0.52	1.23	3.23	0.00	3.23
6.55	0.64	0.52	1.23	3.23	0.00	3.23
6.60	0.64	0.52	1.22	3.23	0.00	3.23
6.65	0.64	0.53	1.22	3.23	0.00	3.23
6.70	0.64	0.53	1.21	3.23	0.00	3.23
6.75	0.64	0.53	1.21	3.23	0.00	3.23
6.80	0.64	0.53	1.21	3.23	0.00	3.23
6.85	0.64	0.53	1.20	3.23	0.00	3.23
6.90	0.64	0.53	1.20	3.23	0.00	3.23
6.95	0.64	0.54	1.20	3.23	0.00	3.23
7.00	0.64	0.54	1.19	3.23	0.00	3.23
7.05	0.64	0.54	1.19	3.23	0.00	3.23
7.10	0.64	0.54	1.18	3.23	0.00	3.23
7.15	0.64	0.54	1.18	3.23	0.00	3.23
7.20	0.64	0.54	1.18	3.23	0.00	3.23
7.25	0.64	0.54	1.17	3.23	0.00	3.23
7.30	0.64	0.55	1.17	3.23	0.00	3.23
7.35	0.64	0.55	1.17	3.23	0.00	3.23
7.40	0.47	0.55	0.85*	3.22	0.00	3.22
7.45	0.38	0.55	0.69*	3.22	0.00	3.22
7.50	0.32	0.55	0.58*	3.21	0.00	3.21
7.55	0.32	0.55	0.58*	3.20	0.00	3.20
7.60	0.32	0.56	0.58*	3.20	0.00	3.20
7.65	0.32	0.56	0.58*	3.19	0.00	3.19
7.70	0.32	0.56	0.58*	3.18	0.00	3.18
7.75	0.32	0.56	0.58*	3.17	0.00	3.17
7.80	0.32	0.56	0.58*	3.17	0.00	3.17
7.85	0.32	0.56	0.57*	3.16	0.00	3.16
7.90	0.32	0.56	0.57*	3.15	0.00	3.15
7.95	0.32	0.57	0.57*	3.14	0.00	3.14
8.00	0.32	0.57	0.57*	3.13	0.00	3.13
8.05	0.32	0.57	0.57*	3.13	0.00	3.13
8.10	0.32	0.57	0.57*	3.12	0.00	3.12
8.15	0.32	0.57	0.57*	3.11	0.00	3.11
8.20	0.32	0.57	0.57*	3.10	0.00	3.10
8.25	0.35	0.57	0.62*	3.10	0.00	3.10
8.30	0.35	0.58	0.61*	3.09	0.00	3.09

8.35	0.35	0.58	0.61*	3.08	0.00	3.08
8.40	0.35	0.58	0.61*	3.07	0.00	3.07
8.45	0.35	0.58	0.61*	3.07	0.00	3.07
8.50	0.36	0.58	0.61*	3.06	0.00	3.06
8.55	0.36	0.58	0.61*	3.05	0.00	3.05
8.60	0.36	0.58	0.61*	3.05	0.00	3.05
8.65	0.36	0.59	0.61*	3.04	0.00	3.04
8.70	0.36	0.59	0.61*	3.03	0.00	3.03
8.75	0.36	0.59	0.60*	3.02	0.00	3.02
8.80	0.36	0.59	0.60*	3.02	0.00	3.02
8.85	0.36	0.59	0.60*	3.01	0.00	3.01
8.90	0.36	0.59	0.60*	3.00	0.00	3.00
8.95	0.36	0.59	0.60*	3.00	0.00	3.00
9.00	0.36	0.60	0.60*	2.99	0.00	2.99
9.05	0.36	0.60	0.60*	2.98	0.00	2.98
9.10	0.36	0.60	0.60*	2.97	0.00	2.97
9.15	0.36	0.60	0.60*	2.97	0.00	2.97
9.20	0.36	0.60	0.60*	2.96	0.00	2.96
9.25	0.36	0.60	0.59*	2.95	0.00	2.95
9.30	0.36	0.60	0.59*	2.95	0.00	2.95
9.35	0.36	0.61	0.59*	2.94	0.00	2.94
9.40	0.36	0.61	0.59*	2.93	0.00	2.93
9.45	0.36	0.61	0.59*	2.92	0.00	2.92
9.50	0.36	0.61	0.59*	2.92	0.00	2.92
9.55	0.36	0.61	0.59*	2.91	0.00	2.91
9.60	0.36	0.61	0.59*	2.90	0.00	2.90
9.65	0.36	0.61	0.59*	2.90	0.00	2.90
9.70	0.36	0.61	0.59*	2.89	0.00	2.89
9.75	0.36	0.62	0.59*	2.88	0.00	2.88
9.80	0.36	0.62	0.58*	2.87	0.00	2.87
9.85	0.36	0.62	0.58*	2.87	0.00	2.87
9.90	0.36	0.62	0.58*	2.86	0.00	2.86
9.95	0.36	0.62	0.58*	2.85	0.00	2.85
10.00	0.36	0.62	0.58*	2.85	0.00	2.85
10.05	0.36	0.62	0.57*	2.84	0.00	2.84
10.10	0.35	0.63	0.56*	2.83	0.00	2.83
10.15	0.35	0.63	0.56*	2.82	0.00	2.82
10.20	0.34	0.63	0.55*	2.82	0.00	2.82
10.25	0.34	0.63	0.54*	2.81	0.00	2.81
10.30	0.34	0.63	0.53*	2.80	0.00	2.80
10.35	0.33	0.63	0.53*	2.79	0.00	2.79
10.40	0.33	0.63	0.52*	2.79	0.00	2.79
10.45	0.32	0.63	0.51*	2.78	0.00	2.78
10.50	0.32	0.64	0.51*	2.77	0.00	2.77
10.55	0.32	0.64	0.50*	2.76	0.00	2.76
10.60	0.31	0.64	0.49*	2.75	0.00	2.75
10.65	0.31	0.64	0.49*	2.75	0.00	2.75
10.70	0.31	0.64	0.48*	2.74	0.00	2.74
10.75	0.30	0.64	0.47*	2.73	0.00	2.73
10.80	0.30	0.64	0.47*	2.72	0.00	2.72
10.85	0.30	0.64	0.46*	2.71	0.00	2.71
10.90	0.29	0.65	0.46*	2.70	0.00	2.70
10.95	0.29	0.65	0.45*	2.70	0.00	2.70
11.00	0.29	0.65	0.44*	2.69	0.00	2.69
11.05	0.28	0.65	0.44*	2.68	0.00	2.68
11.10	0.28	0.65	0.43*	2.67	0.00	2.67
11.15	0.28	0.65	0.43*	2.66	0.00	2.66
11.20	0.28	0.65	0.42*	2.65	0.00	2.65
11.25	0.27	0.65	0.42*	2.64	0.00	2.64
11.30	0.27	0.66	0.41*	2.63	0.00	2.63
11.35	0.27	0.66	0.41*	2.62	0.00	2.62
11.40	0.26	0.66	0.40*	2.62	0.00	2.62
11.45	0.26	0.66	0.40*	2.61	0.00	2.61

11.50	0.26	0.66	0.39*	2.60	0.00	2.60
11.55	0.26	0.66	0.39*	2.59	0.00	2.59
11.60	0.25	0.66	0.38*	2.58	0.00	2.58
11.65	0.25	0.66	0.38*	2.57	0.00	2.57
11.70	0.25	0.66	0.37*	2.56	0.00	2.56
11.75	0.24	0.67	0.37*	2.55	0.00	2.55
11.80	0.24	0.67	0.36*	2.54	0.00	2.54
11.85	0.24	0.67	0.36*	2.53	0.00	2.53
11.90	0.24	0.67	0.35*	2.52	0.00	2.52
11.95	0.23	0.67	0.35*	2.51	0.00	2.51
12.00	0.23	0.67	0.34*	2.50	0.00	2.50
12.05	0.23	0.67	0.34*	2.48	0.00	2.48
12.10	0.23	0.67	0.34*	2.47	0.00	2.47
12.15	0.22	0.67	0.33*	2.46	0.00	2.46
12.20	0.22	0.68	0.33*	2.45	0.00	2.45
12.25	0.22	0.68	0.32*	2.44	0.00	2.44
12.30	0.22	0.68	0.32*	2.43	0.00	2.43
12.35	0.21	0.68	0.31*	2.42	0.00	2.42
12.40	0.21	0.68	0.31*	2.41	0.00	2.41
12.45	0.21	0.68	0.31*	2.40	0.00	2.40
12.50	0.21	0.68	0.30*	2.38	0.00	2.38
12.55	0.21	0.68	0.31*	2.37	0.00	2.37
12.60	0.21	0.68	0.31*	2.36	0.00	2.36
12.65	0.22	0.69	0.32*	2.35	0.00	2.35
12.70	0.22	0.69	0.32*	2.34	0.00	2.34
12.75	0.22	0.69	0.32*	2.33	0.00	2.33
12.80	0.23	0.69	0.33*	2.32	0.00	2.32
12.85	0.23	0.69	0.33*	2.31	0.00	2.31
12.90	0.23	0.69	0.34*	2.30	0.00	2.30
12.95	0.24	0.69	0.34*	2.28	0.00	2.28
13.00	0.24	0.69	0.35*	2.27	0.00	2.27
13.05	0.24	0.69	0.35*	2.26	0.00	2.26
13.10	0.25	0.70	0.35*	2.25	0.00	2.25
13.15	0.25	0.70	0.36*	2.24	0.00	2.24
13.20	0.25	0.70	0.36*	2.23	0.00	2.23
13.25	0.26	0.70	0.37*	2.22	0.00	2.22
13.30	0.26	0.70	0.37*	2.21	0.00	2.21
13.35	0.26	0.70	0.38*	2.20	0.00	2.20
13.40	0.27	0.70	0.38*	2.20	0.00	2.20
13.45	0.27	0.70	0.39*	2.19	0.00	2.19
13.50	0.27	0.70	0.39*	2.18	0.00	2.18
13.55	0.28	0.70	0.39*	2.17	0.00	2.17
13.60	0.28	0.71	0.40*	2.16	0.00	2.16
13.65	0.29	0.71	0.40*	2.15	0.00	2.15
13.70	0.29	0.71	0.41*	2.14	0.00	2.14
13.75	0.29	0.71	0.41*	2.13	0.00	2.13
13.80	0.30	0.71	0.42*	2.12	0.00	2.12
13.85	0.30	0.71	0.42*	2.11	0.00	2.11
13.90	0.30	0.71	0.43*	2.11	0.00	2.11
13.95	0.31	0.71	0.43*	2.10	0.00	2.10
14.00	0.31	0.71	0.44*	2.09	0.00	2.09
14.05	0.32	0.72	0.44*	2.08	0.00	2.08
14.10	0.32	0.72	0.45*	2.07	0.00	2.07
14.15	0.32	0.72	0.45*	2.07	0.00	2.07
14.20	0.33	0.72	0.46*	2.06	0.00	2.06
14.25	0.33	0.72	0.46*	2.05	0.00	2.05
14.30	0.34	0.72	0.47*	2.04	0.00	2.04
14.35	0.34	0.72	0.47*	2.03	0.00	2.03
14.40	0.35	0.72	0.48*	2.03	0.00	2.03
14.45	0.35	0.72	0.48*	2.02	0.00	2.02
14.50	0.36	0.72	0.49*	2.01	0.00	2.01
14.55	0.36	0.72	0.50*	2.01	0.00	2.01
14.60	0.37	0.73	0.50*	2.00	0.00	2.00

14.65	0.37	0.73	0.51*	1.99	0.00	1.99
14.70	0.38	0.73	0.52*	1.98	0.00	1.98
14.75	0.38	0.73	0.52*	1.98	0.00	1.98
14.80	0.41	0.73	0.56*	1.97	0.00	1.97
14.85	0.42	0.73	0.57*	1.96	0.00	1.96
14.90	0.42	0.73	0.58*	1.96	0.00	1.96
14.95	0.43	0.73	0.59*	1.95	0.00	1.95
15.00	0.44	0.73	0.60*	1.95	0.00	1.95
15.05	0.44	0.73	0.61*	1.94	0.00	1.94
15.10	0.45	0.74	0.61*	1.93	0.00	1.93
15.15	0.45	0.74	0.61*	1.93	0.00	1.93
15.20	0.46	0.74	0.62*	1.92	0.00	1.92
15.25	0.46	0.74	0.62*	1.92	0.00	1.92
15.30	0.46	0.74	0.63*	1.91	0.00	1.91
15.35	0.47	0.74	0.63*	1.91	0.00	1.91
15.40	0.47	0.74	0.64*	1.90	0.00	1.90
15.45	0.48	0.74	0.64*	1.89	0.00	1.89
15.50	0.48	0.74	0.65*	1.89	0.00	1.89
15.55	0.49	0.74	0.65*	1.88	0.00	1.88
15.60	0.49	0.74	0.66*	1.88	0.00	1.88
15.65	0.50	0.75	0.67*	1.87	0.00	1.87
15.70	0.51	0.75	0.68*	1.87	0.00	1.87
15.75	0.51	0.75	0.69*	1.86	0.00	1.86
15.80	0.52	0.75	0.70*	1.86	0.00	1.86
15.85	0.53	0.75	0.71*	1.85	0.00	1.85
15.90	0.54	0.75	0.73*	1.85	0.00	1.85
15.95	0.56	0.75	0.75*	1.84	0.00	1.84
16.00	0.58	0.75	0.78*	1.84	0.00	1.84
16.05	0.61	0.75	0.82*	1.84	0.00	1.84
16.10	0.64	0.75	0.85*	1.83	0.00	1.83
16.15	0.64	0.75	0.85*	1.83	0.00	1.83
16.20	0.64	0.75	0.85*	1.82	0.00	1.82
16.25	0.64	0.75	0.85*	1.82	0.00	1.82
16.30	0.64	0.76	0.85*	1.81	0.00	1.81
16.35	0.64	0.76	0.85*	1.81	0.00	1.81
16.40	0.64	0.76	0.85*	1.81	0.00	1.81
16.45	0.64	0.76	0.84*	1.80	0.00	1.80
16.50	0.64	0.76	0.84*	1.80	0.00	1.80
16.55	0.64	0.76	0.84*	1.79	0.00	1.79
16.60	0.64	0.76	0.84*	1.79	0.00	1.79
16.65	0.64	0.76	0.84*	1.79	0.00	1.79
16.70	0.64	0.76	0.84*	1.78	0.00	1.78
16.75	0.64	0.76	0.84*	1.78	0.00	1.78
16.80	0.64	0.76	0.84*	1.78	0.00	1.78
16.85	0.64	0.76	0.84*	1.77	0.00	1.77
16.90	0.64	0.76	0.84*	1.77	0.00	1.77
16.95	0.64	0.76	0.84*	1.77	0.00	1.77
17.00	0.64	0.76	0.84*	1.76	0.00	1.76
17.05	0.64	0.77	0.84*	1.76	0.00	1.76
17.10	0.64	0.77	0.84*	1.76	0.00	1.76
17.15	0.64	0.77	0.83*	1.75	0.00	1.75
17.20	0.64	0.77	0.83*	1.75	0.00	1.75
17.25	0.64	0.77	0.83*	1.75	0.00	1.75
17.30	0.64	0.77	0.83*	1.75	0.00	1.75
17.35	0.64	0.77	0.83*	1.74	0.00	1.74
17.40	0.64	0.77	0.83*	1.74	0.00	1.74
17.45	0.64	0.77	0.83*	1.74	0.00	1.74
17.50	0.64	0.77	0.83*	1.74	0.00	1.74
17.55	0.64	0.77	0.83*	1.73	0.00	1.73
17.60	0.64	0.77	0.83*	1.73	0.00	1.73
17.65	0.64	0.77	0.83*	1.73	0.00	1.73
17.70	0.64	0.77	0.83*	1.73	0.00	1.73
17.75	0.64	0.77	0.83*	1.72	0.00	1.72

17.80	0.64	0.77	0.83*	1.72	0.00	1.72
17.85	0.64	0.77	0.83*	1.72	0.00	1.72
17.90	0.64	0.77	0.83*	1.72	0.00	1.72
17.95	0.64	0.78	0.83*	1.72	0.00	1.72
18.00	0.64	0.78	0.83*	1.71	0.00	1.71
18.05	0.64	0.78	0.82*	1.71	0.00	1.71
18.10	0.64	0.78	0.82*	1.71	0.00	1.71
18.15	0.64	0.78	0.82*	1.71	0.00	1.71
18.20	0.64	0.78	0.82*	1.71	0.00	1.71
18.25	0.64	0.78	0.82*	1.70	0.00	1.70
18.30	0.64	0.78	0.82*	1.70	0.00	1.70
18.35	0.64	0.78	0.82*	1.70	0.00	1.70
18.40	0.64	0.78	0.82*	1.70	0.00	1.70
18.45	0.64	0.78	0.82*	1.70	0.00	1.70
18.50	0.64	0.78	0.82*	1.69	0.00	1.69
18.55	0.64	0.78	0.82*	1.69	0.00	1.69
18.60	0.64	0.78	0.82*	1.69	0.00	1.69
18.65	0.64	0.78	0.82*	1.69	0.00	1.69
18.70	0.64	0.78	0.82*	1.69	0.00	1.69
18.75	0.64	0.78	0.82*	1.69	0.00	1.69
18.80	0.64	0.78	0.82*	1.68	0.00	1.68
18.85	0.64	0.78	0.82*	1.68	0.00	1.68
18.90	0.64	0.78	0.82*	1.68	0.00	1.68
18.95	0.64	0.78	0.82*	1.68	0.00	1.68
19.00	0.64	0.78	0.82*	1.68	0.00	1.68
19.05	0.64	0.78	0.82*	1.68	0.00	1.68
19.10	0.64	0.78	0.82*	1.67	0.00	1.67
19.15	0.64	0.78	0.82*	1.67	0.00	1.67
19.20	0.64	0.78	0.82*	1.67	0.00	1.67
19.25	0.64	0.78	0.82*	1.67	0.00	1.67
19.30	0.64	0.79	0.82*	1.67	0.00	1.67
19.35	0.64	0.79	0.81*	1.67	0.00	1.67
19.40	0.64	0.79	0.81*	1.66	0.00	1.66
19.45	0.64	0.79	0.81*	1.66	0.00	1.66
19.50	0.64	0.79	0.81*	1.66	0.00	1.66
19.55	0.64	0.79	0.81*	1.66	0.00	1.66
19.60	0.64	0.79	0.81*	1.66	0.00	1.66
19.65	0.64	0.79	0.81*	1.66	0.00	1.66
19.70	0.64	0.79	0.81*	1.65	0.00	1.65
19.75	0.64	0.79	0.81*	1.65	0.00	1.65
19.80	0.64	0.79	0.81*	1.65	0.00	1.65
19.85	0.64	0.79	0.81*	1.65	0.00	1.65
19.90	0.64	0.79	0.81*	1.65	0.00	1.65
19.95	0.64	0.79	0.81*	1.65	0.00	1.65
20.00	0.64	0.79	0.81*	1.65	0.00	1.65
20.05	0.64	0.79	0.81*	1.64	0.00	1.64
20.10	0.64	0.79	0.81*	1.64	0.00	1.64
20.15	0.64	0.79	0.81*	1.64	0.00	1.64
20.20	0.64	0.79	0.81*	1.64	0.00	1.64
20.25	0.64	0.79	0.81*	1.64	0.00	1.64
20.30	0.64	0.79	0.81*	1.63	0.00	1.63
20.35	0.64	0.79	0.81*	1.63	0.00	1.63
20.40	0.64	0.79	0.81*	1.63	0.00	1.63
20.45	0.64	0.79	0.81*	1.62	0.00	1.62
20.50	0.64	0.79	0.81*	1.62	0.00	1.62
20.55	0.64	0.79	0.81*	1.62	0.00	1.62
20.60	0.64	0.79	0.81*	1.61	0.00	1.61
20.65	0.64	0.79	0.81*	1.61	0.00	1.61
20.70	0.64	0.79	0.81*	1.60	0.00	1.60
20.75	0.58	0.79	0.74*	1.60	0.00	1.60
20.80	0.54	0.79	0.68*	1.60	0.00	1.60
20.85	0.52	0.79	0.65*	1.59	0.00	1.59
20.90	0.50	0.79	0.63*	1.59	0.00	1.59

20.95	0.49	0.79	0.61*	1.58	0.00	1.58
21.00	0.47	0.79	0.60*	1.58	0.00	1.58
21.05	0.46	0.79	0.59*	1.57	0.00	1.57
21.10	0.46	0.79	0.58*	1.57	0.00	1.57
21.15	0.45	0.79	0.57*	1.56	0.00	1.56
21.20	0.44	0.79	0.56*	1.55	0.00	1.55
21.25	0.43	0.79	0.55*	1.55	0.00	1.55
21.30	0.43	0.79	0.54*	1.54	0.00	1.54
21.35	0.42	0.79	0.53*	1.54	0.00	1.54
21.40	0.41	0.79	0.52*	1.53	0.00	1.53
21.45	0.41	0.79	0.51*	1.52	0.00	1.52
21.50	0.40	0.79	0.51*	1.52	0.00	1.52
21.55	0.40	0.79	0.50*	1.51	0.00	1.51
21.60	0.39	0.79	0.49*	1.50	0.00	1.50
21.65	0.39	0.79	0.49*	1.50	0.00	1.50
21.70	0.38	0.79	0.48*	1.49	0.00	1.49
21.75	0.38	0.79	0.47*	1.48	0.00	1.48
21.80	0.37	0.79	0.47*	1.48	0.00	1.48
21.85	0.37	0.79	0.46*	1.47	0.00	1.47
21.90	0.36	0.79	0.46*	1.46	0.00	1.46
21.95	0.36	0.79	0.45*	1.46	0.00	1.46
22.00	0.35	0.79	0.45*	1.45	0.00	1.45
22.05	0.35	0.79	0.44*	1.44	0.00	1.44
22.10	0.35	0.79	0.44*	1.43	0.00	1.43
22.15	0.34	0.79	0.43*	1.43	0.00	1.43
22.20	0.34	0.79	0.43*	1.42	0.00	1.42
22.25	0.33	0.79	0.42*	1.41	0.00	1.41
22.30	0.33	0.79	0.42*	1.40	0.00	1.40
22.35	0.33	0.79	0.41*	1.40	0.00	1.40
22.40	0.32	0.79	0.41*	1.39	0.00	1.39
22.45	0.32	0.79	0.40*	1.38	0.00	1.38
22.50	0.32	0.79	0.40*	1.37	0.00	1.37
22.55	0.32	0.79	0.40*	1.36	0.00	1.36
22.60	0.32	0.79	0.40*	1.36	0.00	1.36
22.65	0.32	0.79	0.41*	1.35	0.00	1.35
22.70	0.33	0.79	0.41*	1.34	0.00	1.34
22.75	0.33	0.79	0.42*	1.33	0.00	1.33
22.80	0.33	0.80	0.42*	1.32	0.00	1.32
22.85	0.34	0.80	0.42*	1.32	0.00	1.32
22.90	0.34	0.80	0.43*	1.31	0.00	1.31
22.95	0.34	0.80	0.43*	1.30	0.00	1.30
23.00	0.35	0.80	0.43*	1.29	0.00	1.29
23.05	0.35	0.80	0.44*	1.29	0.00	1.29
23.10	0.35	0.80	0.44*	1.28	0.00	1.28
23.15	0.36	0.80	0.45*	1.27	0.00	1.27
23.20	0.36	0.80	0.45*	1.26	0.00	1.26
23.25	0.36	0.80	0.46*	1.26	0.00	1.26
23.30	0.37	0.80	0.46*	1.25	0.00	1.25
23.35	0.37	0.80	0.46*	1.24	0.00	1.24
23.40	0.37	0.80	0.47*	1.24	0.00	1.24
23.45	0.38	0.80	0.47*	1.23	0.00	1.23
23.50	0.38	0.80	0.48*	1.22	0.00	1.22
23.55	0.38	0.80	0.48*	1.22	0.00	1.22
23.60	0.39	0.80	0.49*	1.21	0.00	1.21
23.65	0.39	0.80	0.49*	1.20	0.00	1.20
23.70	0.40	0.80	0.50*	1.20	0.00	1.20
23.75	0.40	0.80	0.50*	1.19	0.00	1.19
23.80	0.40	0.80	0.51*	1.18	0.00	1.18
23.85	0.41	0.80	0.51*	1.18	0.00	1.18
23.90	0.41	0.80	0.52*	1.17	0.00	1.17
23.95	0.42	0.80	0.52*	1.16	0.00	1.16
24.00	0.42	0.80	0.53*	1.16	0.00	1.16
24.05	0.43	0.80	0.54*	1.15	0.00	1.15

24.10	0.43	0.80	0.54*	1.14	0.00	1.14
24.15	0.44	0.80	0.55*	1.14	0.00	1.14
24.20	0.44	0.80	0.55*	1.13	0.00	1.13
24.25	0.45	0.80	0.56*	1.13	0.00	1.13
24.30	0.45	0.80	0.57*	1.12	0.00	1.12
24.35	0.46	0.80	0.58*	1.11	0.00	1.11
24.40	0.47	0.80	0.58*	1.11	0.00	1.11
24.45	0.47	0.80	0.59*	1.10	0.00	1.10
24.50	0.48	0.80	0.60*	1.10	0.00	1.10
24.55	0.49	0.80	0.61*	1.09	0.00	1.09
24.60	0.50	0.80	0.63*	1.09	0.00	1.09
24.65	0.51	0.80	0.64*	1.08	0.00	1.08
24.70	0.52	0.80	0.66*	1.08	0.00	1.08
24.75	0.54	0.80	0.68*	1.07	0.00	1.07
24.80	0.57	0.80	0.72*	1.07	0.00	1.07
24.85	0.62	0.80	0.78*	1.06	0.00	1.06
24.90	0.64	0.80	0.80*	1.06	0.00	1.06
24.95	0.64	0.80	0.80*	1.06	0.00	1.06
25.00	0.64	0.80	0.80*	1.05	0.00	1.05
25.05	0.64	0.80	0.80*	1.05	0.00	1.05
25.10	0.64	0.80	0.80*	1.04	0.00	1.04
25.15	0.64	0.80	0.80*	1.04	0.00	1.04
25.20	0.64	0.80	0.80*	1.04	0.00	1.04
25.25	0.64	0.80	0.80*	1.03	0.00	1.03
25.30	0.64	0.80	0.80*	1.03	0.00	1.03
25.35	0.64	0.80	0.80*	1.03	0.00	1.03
25.40	0.64	0.80	0.80*	1.03	0.00	1.03
25.45	0.64	0.80	0.80*	1.03	0.00	1.03
25.50	0.64	0.80	0.80*	1.03	0.00	1.03
25.55	0.64	0.80	0.80*	1.03	0.00	1.03
25.60	0.64	0.80	0.80*	1.03	0.00	1.03
25.65	0.64	0.80	0.80*	1.02	0.00	1.02
25.70	0.64	0.80	0.80*	1.02	0.00	1.02
25.75	0.64	0.80	0.80*	1.02	0.00	1.02
25.80	0.64	0.80	0.80*	1.02	0.00	1.02
25.85	0.64	0.80	0.80*	1.02	0.00	1.02
25.90	0.64	0.80	0.80*	1.02	0.00	1.02
25.95	0.64	0.80	0.80*	1.02	0.00	1.02
26.00	0.64	0.80	0.80*	1.02	0.00	1.02
26.05	0.64	0.80	0.80*	1.02	0.00	1.02
26.10	0.64	0.80	0.80*	1.02	0.00	1.02
26.15	0.64	0.80	0.80*	1.02	0.00	1.02
26.20	0.64	0.80	0.80*	1.02	0.00	1.02
26.25	0.64	0.80	0.80*	1.02	0.00	1.02
26.30	0.64	0.80	0.80*	1.02	0.00	1.02
26.35	0.64	0.80	0.80*	1.02	0.00	1.02
26.40	0.64	0.80	0.80*	1.02	0.00	1.02
26.45	0.64	0.80	0.80*	1.02	0.00	1.02
26.50	0.64	0.80	0.80*	1.02	0.00	1.02
26.55	0.64	0.80	0.80*	1.02	0.00	1.02
26.60	0.64	0.80	0.80*	1.02	0.00	1.02
26.65	0.64	0.80	0.80*	1.02	0.00	1.02
26.70	0.64	0.80	0.80*	1.02	0.00	1.02
26.75	0.64	0.80	0.80*	1.02	0.00	1.02
26.80	0.64	0.80	0.80*	1.02	0.00	1.02
26.85	0.64	0.80	0.80*	1.02	0.00	1.02
26.90	0.64	0.80	0.80*	1.02	0.00	1.02
26.95	0.64	0.80	0.80*	1.02	0.00	1.02
27.00	0.64	0.80	0.80*	1.02	0.00	1.02
27.05	0.64	0.80	0.80*	1.02	0.00	1.02
27.10	0.64	0.80	0.80*	1.02	0.00	1.02
27.15	0.64	0.80	0.80*	1.02	0.00	1.02
27.20	0.64	0.80	0.80*	1.02	0.00	1.02

27.25	0.64	0.80	0.80*	1.02	0.00	1.02
27.30	0.64	0.80	0.80*	1.02	0.00	1.02
27.35	0.64	0.80	0.80*	1.02	0.00	1.02
27.40	0.64	0.80	0.80*	1.02	0.00	1.02
27.45	0.64	0.80	0.80*	1.02	0.00	1.02
27.50	0.64	0.80	0.80*	1.02	0.00	1.02
27.55	0.64	0.80	0.80*	1.02	0.00	1.02
27.60	0.64	0.80	0.80*	1.02	0.00	1.02
27.65	0.64	0.80	0.80*	1.02	0.00	1.02
27.70	0.64	0.80	0.80*	1.02	0.00	1.02
27.75	0.64	0.80	0.80*	1.02	0.00	1.02
27.80	0.64	0.80	0.80*	1.02	0.00	1.02
27.85	0.64	0.80	0.80*	1.02	0.00	1.02
27.90	0.64	0.80	0.80*	1.02	0.00	1.02
27.95	0.64	0.80	0.80*	1.02	0.00	1.02
28.00	0.64	0.80	0.80*	1.02	0.00	1.02
28.05	0.64	0.80	0.80*	1.02	0.00	1.02
28.10	0.64	0.80	0.80*	1.02	0.00	1.02
28.15	0.64	0.80	0.80*	1.02	0.00	1.02
28.20	0.64	0.80	0.80*	1.02	0.00	1.02
28.25	0.64	0.80	0.80*	1.02	0.00	1.02
28.30	0.64	0.80	0.80*	1.02	0.00	1.02
28.35	0.64	0.80	0.80*	1.02	0.00	1.02
28.40	0.64	0.80	0.80*	1.02	0.00	1.02
28.45	0.64	0.80	0.80*	1.02	0.00	1.02
28.50	0.64	0.80	0.80*	1.02	0.00	1.02
28.55	0.64	0.80	0.80*	1.02	0.00	1.02
28.60	0.64	0.80	0.80*	1.02	0.00	1.02
28.65	0.64	0.80	0.81*	1.02	0.00	1.02
28.70	0.64	0.80	0.80*	1.02	0.00	1.02
28.75	0.64	0.80	0.80*	1.02	0.00	1.02
28.80	0.64	0.80	0.80*	1.02	0.00	1.02
28.85	0.64	0.80	0.80*	1.02	0.00	1.02
28.90	0.64	0.80	0.80*	1.02	0.00	1.02
28.95	0.64	0.80	0.80*	1.02	0.00	1.02
29.00	0.64	0.80	0.80*	1.02	0.00	1.02
29.05	0.64	0.80	0.80*	1.02	0.00	1.02
29.10	0.64	0.80	0.80*	1.02	0.00	1.02
29.15	0.64	0.80	0.80*	1.02	0.00	1.02
29.20	0.64	0.80	0.80*	1.02	0.00	1.02
29.25	0.64	0.80	0.80*	1.02	0.00	1.02
29.30	0.64	0.80	0.80*	1.02	0.00	1.02
29.35	0.64	0.80	0.80*	1.02	0.00	1.02
29.40	0.64	0.80	0.80*	1.02	0.00	1.02
29.45	0.64	0.80	0.80*	1.02	0.00	1.02
29.50	0.64	0.80	0.80*	1.02	0.00	1.02
29.55	0.64	0.80	0.80*	1.02	0.00	1.02
29.60	0.64	0.80	0.80*	1.02	0.00	1.02
29.65	0.64	0.80	0.80*	1.02	0.00	1.02
29.70	0.64	0.80	0.80*	1.02	0.00	1.02
29.75	0.64	0.80	0.80*	1.02	0.00	1.02
29.80	0.64	0.80	0.80*	1.02	0.00	1.02
29.85	0.64	0.80	0.80*	1.02	0.00	1.02
29.90	0.64	0.80	0.80*	1.02	0.00	1.02
29.95	0.64	0.80	0.80*	1.02	0.00	1.02
30.00	0.64	0.80	0.80*	1.02	0.00	1.02
30.05	0.64	0.80	0.80*	1.02	0.00	1.02
30.10	0.64	0.80	0.80*	1.02	0.00	1.02
30.15	0.64	0.80	0.80*	1.02	0.00	1.02
30.20	0.64	0.80	0.80*	1.02	0.00	1.02
30.25	0.64	0.80	0.80*	1.02	0.00	1.02
30.30	0.64	0.80	0.80*	1.02	0.00	1.02
30.35	0.64	0.80	0.80*	1.02	0.00	1.02

30.40	0.64	0.80	0.80*	1.02	0.00	1.02
30.45	0.64	0.80	0.80*	1.02	0.00	1.02
30.50	0.64	0.80	0.80*	1.02	0.00	1.02
30.55	0.64	0.80	0.80*	1.02	0.00	1.02
30.60	0.64	0.80	0.80*	1.02	0.00	1.02
30.65	0.64	0.80	0.80*	1.02	0.00	1.02
30.70	0.64	0.80	0.80*	1.02	0.00	1.02
30.75	0.64	0.80	0.80*	1.02	0.00	1.02
30.80	0.64	0.80	0.80*	1.02	0.00	1.02
30.85	0.64	0.80	0.80*	1.02	0.00	1.02
30.90	0.63	0.80	0.80*	1.02	0.00	1.02
30.95	0.63	0.79	0.80*	1.02	0.00	1.02
31.00	0.63	0.79	0.80*	1.02	0.00	1.02
31.05	0.63	0.79	0.80*	1.02	0.00	1.02
31.10	0.63	0.79	0.80*	1.02	0.00	1.02
31.15	0.63	0.79	0.80*	1.02	0.00	1.02
31.20	0.63	0.79	0.80*	1.02	0.00	1.02
31.25	0.63	0.79	0.80*	1.02	0.00	1.02
31.30	0.63	0.79	0.80*	1.02	0.00	1.02
31.35	0.63	0.79	0.80*	1.02	0.00	1.02
31.40	0.63	0.79	0.80*	1.02	0.00	1.02
31.45	0.63	0.79	0.80*	1.02	0.00	1.02
31.50	0.63	0.79	0.80*	1.02	0.00	1.02
31.55	0.63	0.79	0.80*	1.02	0.00	1.02
31.60	0.63	0.79	0.80*	1.02	0.00	1.02
31.65	0.63	0.79	0.80*	1.02	0.00	1.02
31.70	0.63	0.79	0.80*	1.02	0.00	1.02
31.75	0.63	0.79	0.80*	1.02	0.00	1.02
31.80	0.63	0.79	0.80*	1.02	0.00	1.02
31.85	0.63	0.79	0.80*	1.02	0.00	1.02
31.90	0.63	0.79	0.80*	1.02	0.00	1.02
31.95	0.63	0.79	0.80*	1.02	0.00	1.02
32.00	0.63	0.79	0.80*	1.02	0.00	1.02
32.05	0.63	0.79	0.80*	1.02	0.00	1.02
32.10	0.63	0.79	0.80*	1.02	0.00	1.02
32.15	0.63	0.79	0.80*	1.02	0.00	1.02
32.20	0.63	0.79	0.80*	1.02	0.00	1.02
32.25	0.63	0.79	0.80*	1.02	0.00	1.02
32.30	0.63	0.79	0.80*	1.02	0.00	1.02
32.35	0.63	0.79	0.80*	1.02	0.00	1.02
32.40	0.63	0.79	0.80*	1.02	0.00	1.02
32.45	0.63	0.79	0.80*	1.02	0.00	1.02
32.50	0.63	0.79	0.80*	1.02	0.00	1.02
32.55	0.63	0.79	0.80*	1.02	0.00	1.02
32.60	0.63	0.79	0.80*	1.02	0.00	1.02
32.65	0.63	0.79	0.80*	1.02	0.00	1.02
32.70	0.63	0.78	0.80*	1.02	0.00	1.02
32.75	0.63	0.78	0.80*	1.02	0.00	1.02
32.80	0.63	0.78	0.80*	1.02	0.00	1.02
32.85	0.63	0.78	0.80*	1.02	0.00	1.02
32.90	0.63	0.78	0.80*	1.02	0.00	1.02
32.95	0.63	0.78	0.80*	1.02	0.00	1.02
33.00	0.63	0.78	0.80*	1.02	0.00	1.02
33.05	0.63	0.78	0.80*	1.02	0.00	1.02
33.10	0.63	0.78	0.80*	1.02	0.00	1.02
33.15	0.63	0.78	0.80*	1.02	0.00	1.02
33.20	0.63	0.78	0.80*	1.02	0.00	1.02
33.25	0.63	0.78	0.80*	1.02	0.00	1.02
33.30	0.63	0.78	0.80*	1.02	0.00	1.02
33.35	0.63	0.78	0.80*	1.02	0.00	1.02
33.40	0.63	0.78	0.80*	1.02	0.00	1.02
33.45	0.62	0.78	0.80*	1.02	0.00	1.02
33.50	0.62	0.78	0.80*	1.02	0.00	1.02

33.55	0.62	0.78	0.80*	1.02	0.00	1.02
33.60	0.62	0.78	0.80*	1.02	0.00	1.02
33.65	0.62	0.78	0.80*	1.02	0.00	1.02
33.70	0.62	0.78	0.80*	1.02	0.00	1.02
33.75	0.62	0.78	0.80*	1.02	0.00	1.02
33.80	0.62	0.78	0.80*	1.02	0.00	1.02
33.85	0.62	0.78	0.80*	1.02	0.00	1.02
33.90	0.62	0.78	0.80*	1.02	0.00	1.02
33.95	0.62	0.78	0.80*	1.02	0.00	1.02
34.00	0.62	0.78	0.80*	1.02	0.00	1.02
34.05	0.62	0.78	0.80*	1.02	0.00	1.02
34.10	0.62	0.78	0.80*	1.02	0.00	1.02
34.15	0.62	0.78	0.80*	1.02	0.00	1.02
34.20	0.62	0.78	0.80*	1.02	0.00	1.02
34.25	0.62	0.77	0.80*	1.02	0.00	1.02
34.30	0.62	0.77	0.80*	1.02	0.00	1.02
34.35	0.62	0.77	0.80*	1.02	0.00	1.02
34.40	0.62	0.77	0.80*	1.02	0.00	1.02
34.45	0.62	0.77	0.80*	1.02	0.00	1.02
34.50	0.62	0.77	0.80*	1.02	0.00	1.02
34.55	0.62	0.77	0.80*	1.02	0.00	1.02
34.60	0.62	0.77	0.80*	1.02	0.00	1.02
34.65	0.62	0.77	0.80*	1.02	0.00	1.02
34.70	0.62	0.77	0.80*	1.02	0.00	1.02
34.75	0.62	0.77	0.80*	1.02	0.00	1.02
34.80	0.62	0.77	0.80*	1.02	0.00	1.02
34.85	0.62	0.77	0.80*	1.02	0.00	1.02
34.90	0.62	0.77	0.80*	1.02	0.00	1.02
34.95	0.62	0.77	0.80*	1.02	0.00	1.02
35.00	0.62	0.77	0.80*	1.02	0.00	1.02
35.05	0.62	0.77	0.80*	1.02	0.00	1.02
35.10	0.62	0.77	0.80*	1.02	0.00	1.02
35.15	0.62	0.77	0.80*	1.02	0.00	1.02
35.20	0.62	0.77	0.80*	1.02	0.00	1.02
35.25	0.62	0.77	0.80*	1.02	0.00	1.02
35.30	0.62	0.77	0.80*	1.02	0.00	1.02
35.35	0.62	0.77	0.80*	1.02	0.00	1.02
35.40	0.62	0.77	0.80*	1.02	0.00	1.02
35.45	0.62	0.77	0.80*	1.02	0.00	1.02
35.50	0.62	0.77	0.80*	1.02	0.00	1.02
35.55	0.62	0.77	0.81*	1.02	0.00	1.02
35.60	0.62	0.77	0.81*	1.02	0.00	1.02
35.65	0.62	0.77	0.81*	1.02	0.00	1.02
35.70	0.62	0.77	0.81*	1.02	0.00	1.02
35.75	0.62	0.76	0.81*	1.02	0.00	1.02
35.80	0.62	0.76	0.81*	1.02	0.00	1.02
35.85	0.62	0.76	0.81*	1.02	0.00	1.02
35.90	0.62	0.76	0.81*	1.02	0.00	1.02
35.95	0.62	0.76	0.81*	1.02	0.00	1.02
36.00	0.62	0.76	0.81*	1.02	0.00	1.02
36.05	0.61	0.76	0.81*	1.02	0.00	1.02
36.10	0.61	0.76	0.81*	1.02	0.00	1.02
36.15	0.61	0.76	0.81*	1.02	0.00	1.02
36.20	0.61	0.76	0.81*	1.02	0.00	1.02
36.25	0.61	0.76	0.81*	1.02	0.00	1.02
36.30	0.61	0.76	0.81*	1.02	0.00	1.02
36.35	0.61	0.76	0.81*	1.02	0.00	1.02
36.40	0.61	0.76	0.81*	1.02	0.00	1.02
36.45	0.61	0.76	0.81*	1.02	0.00	1.02
36.50	0.61	0.76	0.81*	1.02	0.00	1.02
36.55	0.61	0.76	0.81*	1.02	0.00	1.02
36.60	0.61	0.76	0.81*	1.02	0.00	1.02
36.65	0.61	0.76	0.81*	1.02	0.00	1.02

36.70	0.61	0.76	0.81*	1.02	0.00	1.02
36.75	0.61	0.76	0.81*	1.02	0.00	1.02
36.80	0.61	0.76	0.81*	1.02	0.00	1.02
36.85	0.61	0.76	0.81*	1.01	0.00	1.01
36.90	0.50	0.76	0.66*	1.01	0.00	1.01
36.95	0.45	0.76	0.59*	1.00	0.00	1.00
37.00	0.42	0.76	0.55*	1.00	0.00	1.00
37.05	0.39	0.76	0.52*	0.99	0.00	0.99
37.10	0.37	0.76	0.49*	0.99	0.00	0.99
37.15	0.35	0.76	0.47*	0.98	0.00	0.98
37.20	0.34	0.76	0.44*	0.97	0.00	0.97
37.25	0.32	0.76	0.42*	0.96	0.00	0.96
37.30	0.31	0.75	0.40*	0.96	0.00	0.96
37.35	0.29	0.75	0.39*	0.95	0.00	0.95
37.40	0.28	0.75	0.37*	0.94	0.00	0.94
37.45	0.27	0.75	0.35*	0.93	0.00	0.93
37.50	0.25	0.75	0.34*	0.92	0.00	0.92
37.55	0.26	0.75	0.34*	0.91	0.00	0.91
37.60	0.26	0.75	0.35*	0.90	0.00	0.90
37.65	0.27	0.75	0.36*	0.90	0.00	0.90
37.70	0.27	0.75	0.36*	0.89	0.00	0.89
37.75	0.28	0.75	0.37*	0.88	0.00	0.88
37.80	0.28	0.75	0.37*	0.87	0.00	0.87
37.85	0.29	0.75	0.38*	0.86	0.00	0.86
37.90	0.29	0.75	0.39*	0.85	0.00	0.85
37.95	0.30	0.75	0.39*	0.84	0.00	0.84
38.00	0.30	0.75	0.40*	0.84	0.00	0.84
38.05	0.31	0.75	0.41*	0.83	0.00	0.83
38.10	0.31	0.75	0.41*	0.82	0.00	0.82
38.15	0.32	0.75	0.42*	0.81	0.00	0.81
38.20	0.32	0.75	0.43*	0.80	0.00	0.80
38.25	0.33	0.75	0.44*	0.80	0.00	0.80
38.30	0.33	0.75	0.44*	0.79	0.00	0.79
38.35	0.34	0.75	0.45*	0.78	0.00	0.78
38.40	0.34	0.75	0.46*	0.77	0.00	0.77
38.45	0.35	0.75	0.47*	0.77	0.00	0.77
38.50	0.36	0.75	0.48*	0.76	0.00	0.76
38.55	0.36	0.75	0.49*	0.75	0.00	0.75
38.60	0.37	0.75	0.50*	0.75	0.00	0.75
38.65	0.38	0.75	0.51*	0.74	0.00	0.74
38.70	0.39	0.75	0.52*	0.73	0.00	0.73
38.75	0.39	0.75	0.53*	0.73	0.00	0.73
38.80	0.40	0.75	0.54*	0.72	0.00	0.72
38.85	0.41	0.75	0.55*	0.71	0.00	0.71
38.90	0.42	0.75	0.56*	0.71	0.00	0.71
38.95	0.43	0.75	0.58*	0.70	0.00	0.70
39.00	0.44	0.74	0.60*	0.70	0.00	0.70
39.05	0.46	0.74	0.62*	0.69	0.00	0.69
39.10	0.48	0.74	0.64*	0.69	0.00	0.69
39.15	0.50	0.74	0.68*	0.68	0.00	0.68
39.20	0.56	0.74	0.76*	0.68	0.00	0.68
39.25	0.60	0.74	0.81*	0.67	0.00	0.67
39.30	0.60	0.74	0.81*	0.67	0.00	0.67
39.35	0.60	0.74	0.81*	0.66	0.00	0.66
39.40	0.60	0.74	0.81*	0.66	0.00	0.66
39.45	0.60	0.74	0.81*	0.66	0.00	0.66
39.50	0.60	0.74	0.81*	0.65	0.00	0.65
39.55	0.60	0.74	0.81*	0.65	0.00	0.65
39.60	0.60	0.74	0.81*	0.65	0.00	0.65
39.65	0.60	0.74	0.81*	0.65	0.00	0.65
39.70	0.60	0.74	0.81*	0.64	0.00	0.64
39.75	0.60	0.74	0.81*	0.64	0.00	0.64
39.80	0.60	0.74	0.81*	0.64	0.00	0.64

39.85	0.60	0.74	0.81*	0.64	0.00	0.64
39.90	0.60	0.74	0.81*	0.64	0.00	0.64
39.95	0.60	0.74	0.81*	0.64	0.00	0.64
40.00	0.60	0.74	0.81*	0.64	0.00	0.64
40.05	0.60	0.74	0.81*	0.63	0.00	0.63
40.10	0.60	0.74	0.81*	0.63	0.00	0.63
40.15	0.60	0.74	0.81*	0.63	0.00	0.63
40.20	0.60	0.74	0.81*	0.63	0.00	0.63
40.25	0.60	0.74	0.81*	0.63	0.00	0.63
40.30	0.60	0.74	0.81*	0.63	0.00	0.63
40.35	0.60	0.74	0.81*	0.63	0.00	0.63
40.40	0.60	0.74	0.81*	0.63	0.00	0.63
40.45	0.60	0.74	0.81*	0.63	0.00	0.63
40.50	0.60	0.74	0.81*	0.62	0.00	0.62
40.55	0.60	0.74	0.81*	0.62	0.00	0.62
40.60	0.60	0.74	0.81*	0.62	0.00	0.62
40.65	0.60	0.74	0.81*	0.62	0.00	0.62
40.70	0.60	0.74	0.81*	0.61	0.00	0.61
40.75	0.60	0.74	0.81*	0.61	0.00	0.61
40.80	0.60	0.73	0.81*	0.61	0.00	0.61
40.85	0.60	0.73	0.81*	0.60	0.00	0.60
40.90	0.60	0.73	0.81*	0.60	0.00	0.60
40.95	0.60	0.73	0.81*	0.60	0.00	0.60
41.00	0.60	0.73	0.81*	0.59	0.00	0.59
41.05	0.60	0.73	0.81*	0.59	0.00	0.59
41.10	0.59	0.73	0.80*	0.58	0.00	0.58
41.15	0.53	0.73	0.72*	0.58	0.00	0.58
41.20	0.50	0.73	0.68*	0.58	0.00	0.58
41.25	0.48	0.73	0.65*	0.57	0.00	0.57
41.30	0.46	0.73	0.63*	0.57	0.00	0.57
41.35	0.45	0.73	0.61*	0.56	0.00	0.56
41.40	0.44	0.73	0.60*	0.56	0.00	0.56
41.45	0.43	0.73	0.59*	0.55	0.00	0.55
41.50	0.42	0.73	0.58*	0.54	0.00	0.54
41.55	0.42	0.73	0.57*	0.54	0.00	0.54
41.60	0.41	0.73	0.56*	0.53	0.00	0.53
41.65	0.40	0.73	0.55*	0.53	0.00	0.53
41.70	0.40	0.73	0.54*	0.52	0.00	0.52
41.75	0.39	0.73	0.53*	0.51	0.00	0.51
41.80	0.38	0.73	0.53*	0.51	0.00	0.51
41.85	0.38	0.73	0.52*	0.50	0.00	0.50
41.90	0.37	0.73	0.51*	0.50	0.00	0.50
41.95	0.37	0.73	0.51*	0.49	0.00	0.49
42.00	0.36	0.73	0.50*	0.48	0.00	0.48
42.05	0.36	0.73	0.49*	0.48	0.00	0.48
42.10	0.35	0.73	0.49*	0.47	0.00	0.47
42.15	0.35	0.73	0.48*	0.46	0.00	0.46
42.20	0.35	0.73	0.48*	0.46	0.00	0.46
42.25	0.34	0.73	0.47*	0.45	0.00	0.45
42.30	0.34	0.73	0.46*	0.44	0.00	0.44
42.35	0.33	0.73	0.46*	0.43	0.00	0.43
42.40	0.33	0.73	0.45*	0.43	0.00	0.43
42.45	0.33	0.73	0.45*	0.42	0.00	0.42
42.50	0.32	0.73	0.44*	0.41	0.00	0.41
42.55	0.32	0.73	0.45*	0.41	0.00	0.41
42.60	0.33	0.72	0.45*	0.40	0.00	0.40
42.65	0.33	0.72	0.45*	0.39	0.00	0.39
42.70	0.33	0.72	0.45*	0.38	0.00	0.38
42.75	0.33	0.72	0.46*	0.38	0.00	0.38
42.80	0.33	0.72	0.46*	0.37	0.00	0.37
42.85	0.33	0.72	0.46*	0.36	0.00	0.36
42.90	0.34	0.72	0.46*	0.35	0.00	0.35
42.95	0.34	0.72	0.47*	0.35	0.00	0.35

43.00	0.34	0.72	0.47*	0.34	0.00	0.34
43.05	0.34	0.72	0.47*	0.33	0.00	0.33
43.10	0.34	0.72	0.48*	0.33	0.00	0.33
43.15	0.35	0.72	0.48*	0.32	0.00	0.32
43.20	0.35	0.72	0.48*	0.31	0.00	0.31
43.25	0.35	0.72	0.48*	0.31	0.00	0.31
43.30	0.35	0.72	0.49*	0.30	0.00	0.30
43.35	0.35	0.72	0.49*	0.29	0.00	0.29
43.40	0.36	0.72	0.49*	0.28	0.00	0.28
43.45	0.36	0.72	0.50*	0.28	0.00	0.28
43.50	0.36	0.72	0.50*	0.27	0.00	0.27
43.55	0.36	0.72	0.50*	0.26	0.00	0.26
43.60	0.36	0.72	0.51*	0.26	0.00	0.26
43.65	0.37	0.72	0.51*	0.25	0.00	0.25
43.70	0.37	0.72	0.51*	0.25	0.00	0.25
43.75	0.37	0.72	0.52*	0.24	0.00	0.24
43.80	0.37	0.72	0.52*	0.23	0.00	0.23
43.85	0.37	0.72	0.52*	0.23	0.00	0.23
43.90	0.38	0.72	0.53*	0.22	0.00	0.22
43.95	0.38	0.72	0.53*	0.21	0.00	0.21
44.00	0.38	0.72	0.53*	0.21	0.00	0.21
44.05	0.38	0.72	0.54*	0.20	0.00	0.20
44.10	0.39	0.72	0.54*	0.19	0.00	0.19
44.15	0.39	0.72	0.54*	0.19	0.00	0.19
44.20	0.39	0.72	0.55*	0.18	0.00	0.18
44.25	0.39	0.72	0.55*	0.18	0.00	0.18
44.30	0.40	0.71	0.56*	0.17	0.00	0.17
44.35	0.40	0.71	0.56*	0.16	0.00	0.16
44.40	0.40	0.71	0.56*	0.16	0.00	0.16
44.45	0.41	0.71	0.57*	0.15	0.00	0.15
44.50	0.41	0.71	0.57*	0.15	0.00	0.15
44.55	0.41	0.71	0.58*	0.14	0.00	0.14
44.60	0.42	0.71	0.58*	0.13	0.00	0.13
44.65	0.42	0.71	0.59*	0.13	0.00	0.13
44.70	0.42	0.71	0.59*	0.12	0.00	0.12
44.75	0.43	0.71	0.60*	0.12	0.00	0.12
44.80	0.43	0.71	0.60*	0.11	0.00	0.11
44.85	0.43	0.71	0.61*	0.11	0.00	0.11
44.90	0.44	0.71	0.61*	0.10	0.00	0.10
44.95	0.44	0.71	0.62*	0.09	0.00	0.09
45.00	0.45	0.71	0.63*	0.09	0.00	0.09
45.05	0.46	0.71	0.64*	0.08	0.00	0.08
45.10	0.47	0.71	0.67*	0.08	0.00	0.08
45.15	0.49	0.71	0.69*	0.07	0.00	0.07
45.20	0.53	0.71	0.74*	0.07	0.00	0.07
45.25	0.58	0.71	0.82*	0.07	0.00	0.07
45.30	0.58	0.71	0.82*	0.06	0.00	0.06
45.35	0.58	0.71	0.82*	0.06	0.00	0.06
45.40	0.58	0.71	0.82*	0.05	0.00	0.05
45.45	0.58	0.71	0.82*	0.05	0.00	0.05
45.50	0.58	0.71	0.82*	0.05	0.00	0.05
45.55	0.58	0.71	0.82*	0.04	0.00	0.04
45.60	0.58	0.71	0.83*	0.04	0.00	0.04
45.65	0.58	0.71	0.83*	0.03	0.00	0.03
45.70	0.58	0.71	0.83*	0.03	0.00	0.03
45.75	0.58	0.71	0.83*	0.03	0.00	0.03
45.80	0.58	0.71	0.83*	0.03	0.00	0.03
45.85	0.58	0.71	0.83*	0.02	0.00	0.02
45.90	0.58	0.70	0.83*	0.02	0.00	0.02
45.95	0.58	0.70	0.83*	0.02	0.00	0.02
46.00	0.58	0.70	0.83*	0.02	0.00	0.02
46.05	0.58	0.70	0.83*	0.02	0.00	0.02
46.10	0.58	0.70	0.83*	0.01	0.00	0.01

46.15	0.58	0.70	0.83*	0.01	0.00	0.01
46.20	0.58	0.70	0.83*	0.01	0.00	0.01
46.25	0.58	0.70	0.83*	0.01	0.00	0.01
46.30	0.58	0.70	0.83*	0.01	0.00	0.01
46.35	0.58	0.70	0.83*	0.01	0.00	0.01
46.40	0.58	0.70	0.83*	0.01	0.00	0.01
46.45	0.58	0.70	0.83*	0.01	0.00	0.01
46.50	0.58	0.70	0.83*	0.01	0.00	0.01
46.55	0.58	0.70	0.83*	0.01	0.00	0.01
46.60	0.58	0.70	0.83*	0.00	0.00	0.00
46.65	0.58	0.70	0.83*	0.00	0.00	0.00
46.70	0.58	0.70	0.83*	0.00	0.00	0.00
46.75	0.58	0.70	0.83*	0.00	0.00	0.00
46.80	0.58	0.70	0.83*	0.00	0.00	0.00
46.85	0.58	0.70	0.83*	0.00	0.00	0.00
46.90	0.58	0.70	0.83*	0.00	0.00	0.00
46.95	0.58	0.70	0.83*	0.00	0.00	0.00
47.00	0.58	0.70	0.83*	0.00	0.00	0.00
47.05	0.58	0.70	0.83*	0.00	0.00	0.00
47.10	0.58	0.70	0.83*	0.00	0.00	0.00
47.15	0.58	0.70	0.83*	0.00	0.00	0.00
47.20	0.58	0.70	0.83*	0.00	0.00	0.00
47.25	0.58	0.70	0.83*	0.00	0.00	0.00
47.30	0.58	0.70	0.83*	0.00	0.00	0.00
47.35	0.58	0.70	0.83*	0.00	0.00	0.00
47.40	0.58	0.70	0.83*	0.00	0.00	0.00
47.45	0.58	0.70	0.83*	0.00	0.00	0.00
47.50	0.58	0.69	0.83*	0.00	0.00	0.00
47.55	0.58	0.69	0.83*	0.00	0.00	0.00
47.60	0.58	0.69	0.83*	0.00	0.00	0.00
47.65	0.58	0.69	0.83*	0.00	0.00	0.00
47.70	0.58	0.69	0.83*	0.00	0.00	0.00
47.75	0.58	0.69	0.83*	0.00	0.00	0.00
47.80	0.58	0.69	0.83*	0.00	0.00	0.00
47.85	0.58	0.69	0.83*	0.00	0.00	0.00
47.90	0.58	0.69	0.83*	0.00	0.00	0.00
47.95	0.58	0.69	0.83*	0.00	0.00	0.00
48.00	0.58	0.69	0.83*	0.00	0.00	0.00
48.05	0.58	0.69	0.83*	0.00	0.00	0.00
48.10	0.58	0.69	0.83*	0.00	0.00	0.00
48.15	0.58	0.69	0.83*	0.00	0.00	0.00
48.20	0.58	0.69	0.83*	0.00	0.00	0.00
48.25	0.58	0.69	0.83*	0.00	0.00	0.00
48.30	0.57	0.69	0.83*	0.00	0.00	0.00
48.35	0.57	0.69	0.83*	0.00	0.00	0.00
48.40	0.57	0.69	0.83*	0.00	0.00	0.00
48.45	0.57	0.69	0.83*	0.00	0.00	0.00
48.50	0.57	0.69	0.83*	0.00	0.00	0.00
48.55	0.57	0.69	0.83*	0.00	0.00	0.00
48.60	0.57	0.69	0.83*	0.00	0.00	0.00
48.65	0.57	0.69	0.83*	0.00	0.00	0.00
48.70	0.57	0.69	0.83*	0.00	0.00	0.00
48.75	0.57	0.69	0.84*	0.00	0.00	0.00
48.80	0.57	0.69	0.84*	0.00	0.00	0.00
48.85	0.57	0.69	0.84*	0.00	0.00	0.00
48.90	0.57	0.69	0.84*	0.00	0.00	0.00
48.95	0.57	0.69	0.84*	0.00	0.00	0.00
49.00	0.57	0.69	0.84*	0.00	0.00	0.00
49.05	0.57	0.68	0.84*	0.00	0.00	0.00
49.10	0.57	0.68	0.84*	0.00	0.00	0.00
49.15	0.57	0.68	0.84*	0.00	0.00	0.00
49.20	0.57	0.68	0.84*	0.00	0.00	0.00
49.25	0.57	0.68	0.84*	0.00	0.00	0.00

49.30	0.57	0.68	0.84*	0.00	0.00	0.00
49.35	0.57	0.68	0.84*	0.00	0.00	0.00
49.40	0.57	0.68	0.84*	0.00	0.00	0.00
49.45	0.57	0.68	0.84*	0.00	0.00	0.00
49.50	0.57	0.68	0.84*	0.00	0.00	0.00
49.55	0.57	0.68	0.84*	0.00	0.00	0.00
49.60	0.57	0.68	0.84*	0.00	0.00	0.00
49.65	0.57	0.68	0.84*	0.00	0.00	0.00
49.70	0.57	0.68	0.84*	0.00	0.00	0.00
49.75	0.57	0.68	0.84*	0.00	0.00	0.00
49.80	0.57	0.68	0.84*	0.00	0.00	0.00
49.85	0.57	0.68	0.84*	0.00	0.00	0.00
49.90	0.57	0.68	0.84*	0.00	0.00	0.00
49.95	0.57	0.68	0.84*	0.00	0.00	0.00
50.00	0.57	0.68	0.84*	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.

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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 E

REFERENCES

REFERENCES

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5. Kramer, S.L., "Geotechnical Earthquake Engineering," Prentice Hall, 1996.

6. NETR Online Historic Aerials and Topographic Maps, www.historicaerials.com, Aerial Photographs 1952-2014, Topographic Maps 1896-2012.

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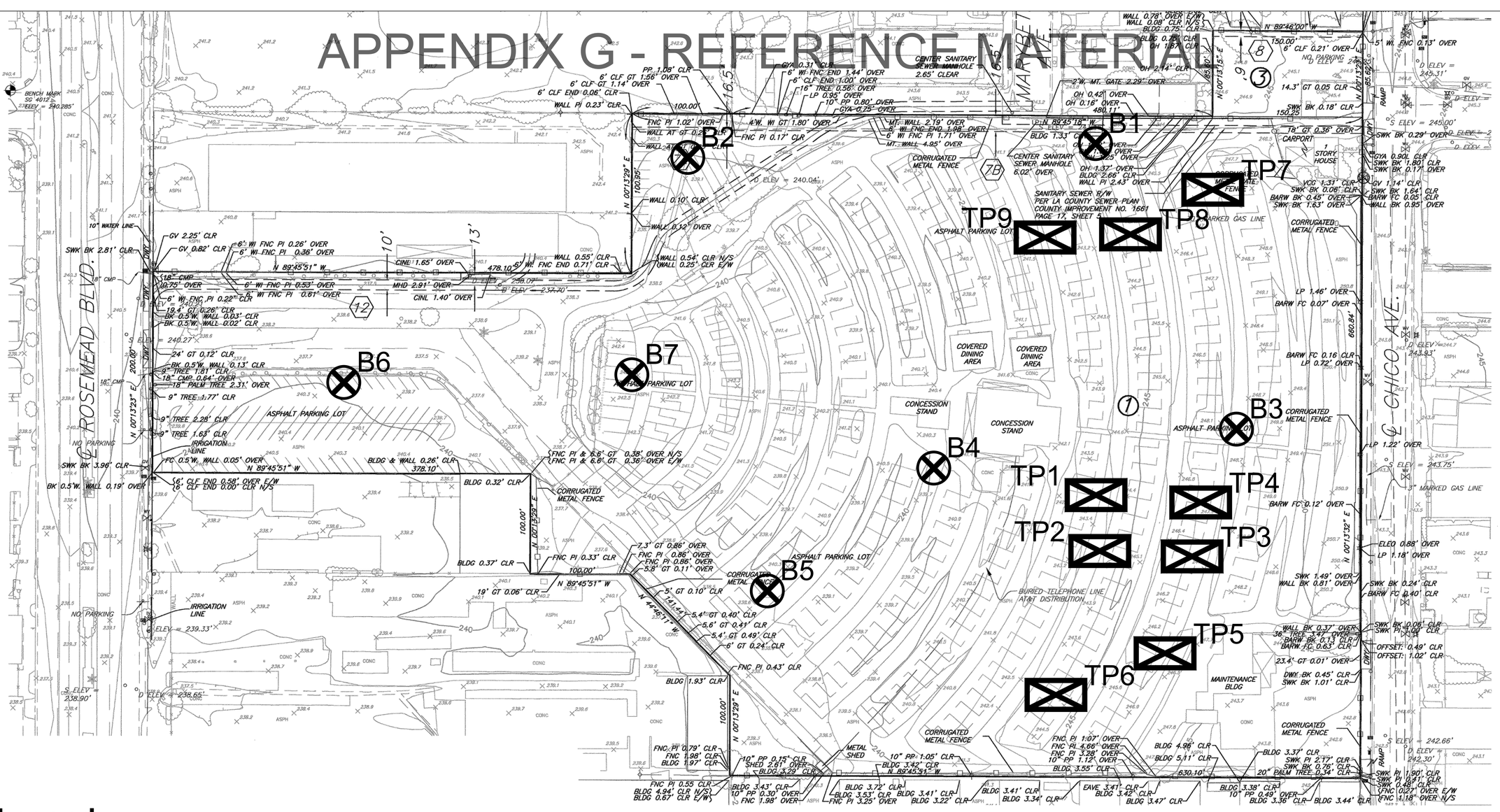
9. Applied Technology Council (ATC) Hazards by Location https://hazards.atcouncil.org

10. Seismic Earth Pressures on Retaining Walls, S004.0, Rev. 1/6/2020, Geotechnical and Materials Engineering Division, Administrative Manual, County of Los Angeles, Department of Public Works.



Legend

B4 — Approximate Boring Location

TP6 — Approximate Test Pit Location

NO.	DATE	DESCRIPTION	BY
1	10/23/15	TITLE REPORT UPDATE 2 – DATED SEPTEMBER 24, 2015	RCJ

B & E ENGINEERS
CIVIL ENGINEERS SURVEYING LAND PLANNING
20 E. FOOTHILL BLVD., STE 230, ARCADIA, CA 91006-2375
TEL: (626) 446-4449 FAX: (626) 446-6566

ALTA / ACSM LAND TITLE SURVEY

LOTS 29 - 30, TRACT 621, M.B. 15 - 182-183
& LOTS 5, 6, 7, 8, 9, 12, 13, 15 & 16 TRACT 11104, MAP 195 - 14
CITY OF SOUTH EL MONTE, COUNTY OF LOS ANGELES

SCALE: 1" = 50'	DRAWN: RCJ	DATE: 10-23-15
JN: 2015208	CHECKED: JL	SHEET: 2 OF: 3

RMA GeoScience

Boring and Test Pit Location Map

2540 Rosemead Boulevard
South El Monte, CA

Plate 1

RMA Job No:	20G-0418
Report Date:	8/2020
Prepared By:	MRM