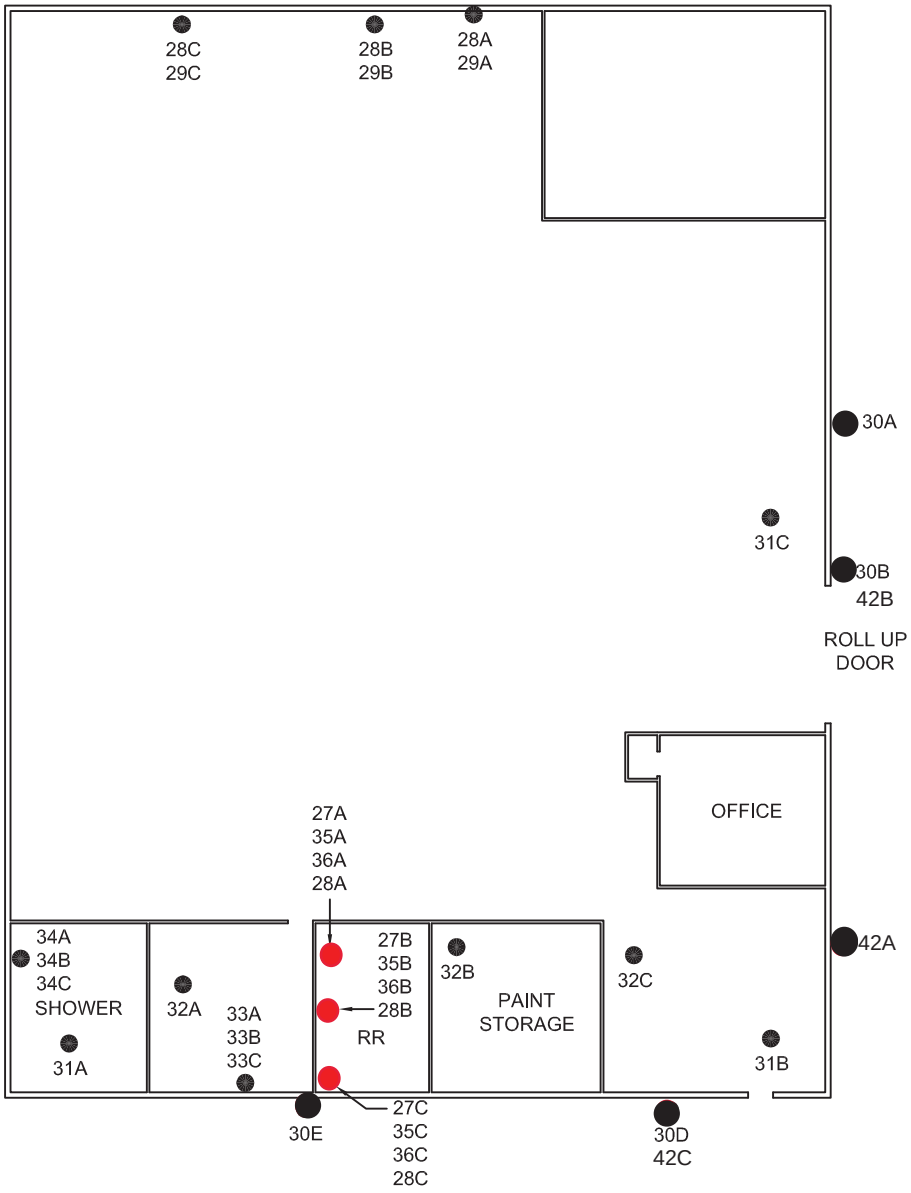


LEGEND

- ACM SUSPECT SAMPLE LOCATION
- ACM POSITIVE SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

PRE-DEMOLITION ACM AND LBP SURVEY

STORAGE BUILDING SAMPLE LOCATION MAP

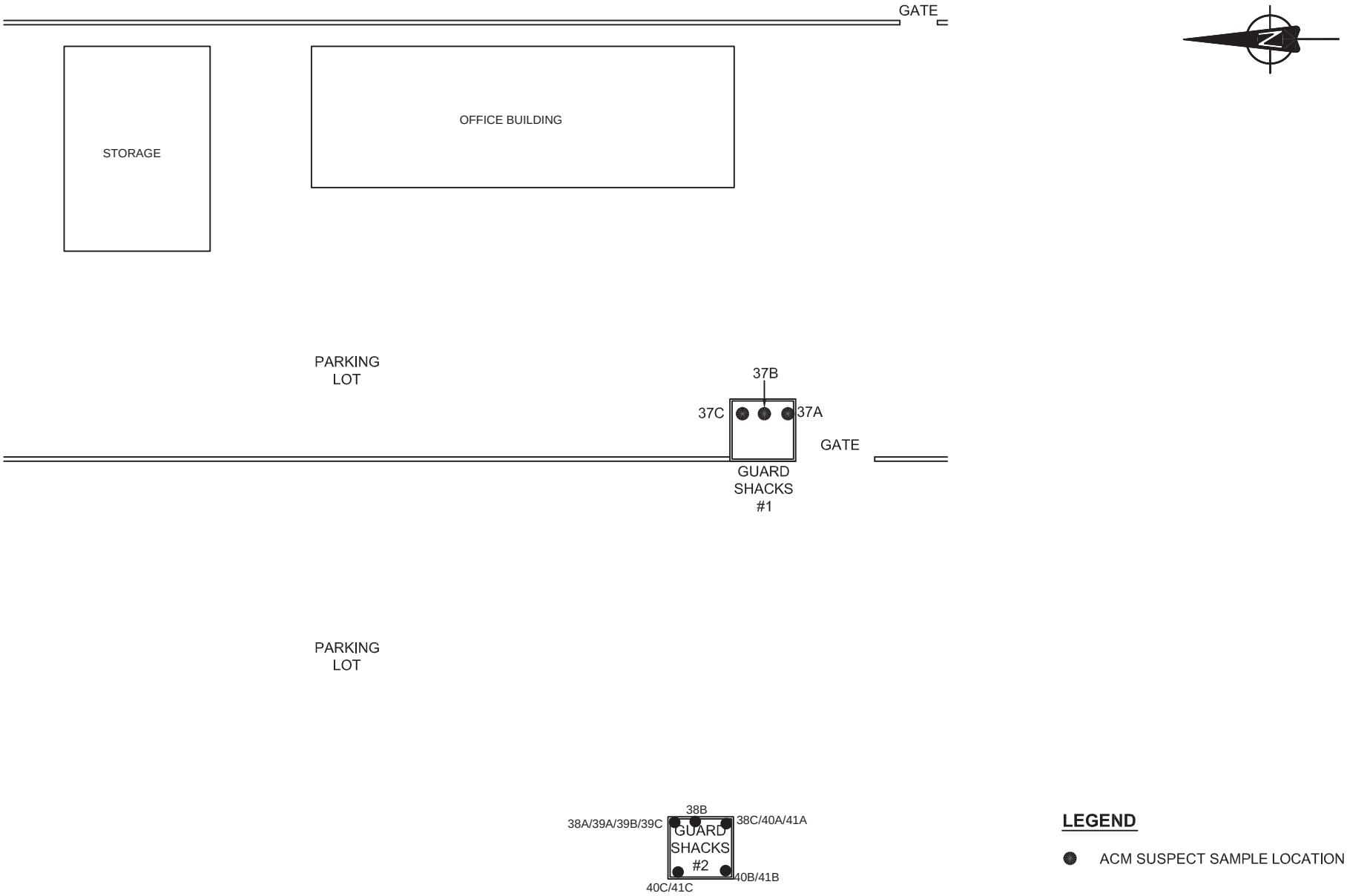
1017 WEST 141ST STREET, GARDENA, CA

Client: KB HOME SOUTHERN CALIFORNIA

Project No.:	185804137
Scale:	AS SHOWN
Date:	18/06/04
Dwn. By:	CD VM SC2018060005
App'd By:	KE

Fig. No.: 2

Stantec



LEGEND

● ACM SUSPECT SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

PRE-DEMOLITION ACM AND LBP SURVEY

GUARD SHACKS SAMPLING LOCATION MAP

1017 WEST 141ST STREET, GARDENA, CA

Client: KB HOME SOUTHERN CALIFORNIA

Project No.:	185804137
Scale:	AS SHOWN
Date:	18/06/04
Dwn. By:	CD VM SC2018060006
App'd By:	KE

Fig. No.: 3

Stantec

June 25, 2018

Attachment C
Personnel Certifications and Laboratory Accreditations

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
Asbestos Unit
2424 Arden Way, Suite 495
Sacramento, CA 95825-2417
(916) 574-2993 Office (916) 483-0572 Fax
http://www.dir.ca.gov/dirdatabases.html actu@dir.ca.gov

Edmund G. Brown, Jr. *Governor*

502095379C 396 398

Stantec Consulting Services, Inc.
Alicia R Jansen
25864-F Business Center Drive
Redlands CA 92374

February 21, 2018

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please contact our office at the above address, fax number or email; of any changes in your contact/mailing information within 15 days of the change.

Sincerely,

Jeff Ferrell
Senior Safety Engineer

Attachment: Certification Card

cc: File

Renewal – Card Attached (Revised 10/24/2012)


State of California Department of Public Health
Lead-Related Construction Certificate
Certificate Type
Expiration Date
Inspector/Assessor
04/03/2019
Alicia R. Jansen
ID #: 19526

Accredited Laboratory

A2LA has accredited

EMSL ANALYTICAL, INC.

Cinnaminson, NJ

for technical competence in the field of

Environmental Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of A2LA R207 – *Specific Requirements - Environmental Lead Testing Laboratory Accreditation Program.* This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 8th of May 2017.

President and CEO
For the Accreditation Council
Certificate Number 2845.01
Valid to May 31, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL ANALYTICAL, INC.
200 Route 130 North
Cinnaminson, NJ 08077
Oommen Kappil Phone: 856 303 2550

ENVIRONMENTAL

Valid To: May 31, 2019 Certificate Number: 2845.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below; for the test methods applicable to the National Environmental Lead Laboratory Accreditation Program (NLLAP).

ENVIRONMENTAL LEAD	
Test	**Test Method(s)**
Total Lead (Pb) in Soil	EMSL Analytical, Inc. LM-007A (Modified EPA 7000B - (FLAA), 3050 Hotblock Digestion)
Total Lead (Pb) in Paint Chips	EMSL Analytical, Inc. LM-007B (Modified EPA 7000B - (FLAA), 3050 Hotblock Digestion)
Total Lead (Pb) in Dust Wipes	EMSL Analytical, Inc. LM-007C (Modified EPA 7000B - (FLAA), 3050 Hotblock Digestion)
AIR MATRIX*	
Test	**Test Method(s)**
Total Lead (Pb) in Air	NIOSH 7082 - (FLAA)
Total Lead (Pb) in Air	NIOSH 7105 - (GFAA)
Total Metals in Air	EMSL Analytical, Inc. LM-003 (Modified NIOSH 7300 for ICP/ICP-MS)
Inorganic Fibrous Particles by SEM method	German VDI 3492
Inorganic Fibrous Particles by SEM method	ISO 14966
Combustion-by-Products (black carbon/soot, char, and ash	ASTM D6602

BULK MATRIX*	
Test	**Test Method(s)**
Determination of Asbestos in Technical Products by SEM method	German VDI 3866 Part 5
Combustion-by-Products (black carbon/soot, char and ash	ASTM D6602

*Not NLLAP program

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on Children's Products: [1]

CHEMICAL	
Test	**Test Method(s)**
Lead in Paint and Surface Coatings	16 CFR 1303 (using ASTM E1613 and E1645); CPSC-CH-E1003-09.1
Total Lead in Children's Metal Jewelry	CPSC-CH-E1001-08.1
Total Lead in Children's Metal Products	CPSC-CH-E1001-08.1
Total Lead in Children's Non-Metal Products	CPSC-CH-E1002-08
Phthalates	CPSC-CH-C1001-09.3 (using EPA SW-846 8270)
Soluble Heavy Metals Content (As, Ba, Cd, Cr, Pb, Hg, Sb, Se)	ASTM F 963-11 Section 4.3.5.1 & Section 4.3.5.2
Total Cadmium in Children's Metal Products Including Children's Metal Jewelry	EMSL Analytical, Inc. LM-016, (Modified CPSC-CH-E1001-08.1)
Total Cadmium in Children's Non Metal Products	EMSL Analytical, Inc. LM-016, (Modified CPSC-CH-E1002-08)

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on Brake Friction Materials:

ASBESTOS ANALYSIS	
Test	**Test Method(s)**
Sample Preparation by Drilling	SAE J2975
Polarized Light Microscopy	SAE J2975, EPA 600/R-93/116
Transmission Electron Microscopy	ISO 10312 (direct method)
Transmission Electron Microscopy	ISO 13794 (indirect method)

[1] The Consumer Product Safety Improvement Act (CPSIA) requires that every children's product subject to a federal consumer product safety requirement be tested by a Consumer Product Safety Commission (CPSC) accepted laboratory for compliance with the applicable federal children's product safety requirements. Accreditation by A2LA does not infer acceptance by the CPSC. Please verify this organization's acceptance status by using the CPSC's searchable database, located at http://www.cpsc.gov/cgi-bin/labsearch/.

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Laboratory ID: 100194

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: September 01, 2018
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: September 01, 2018
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: September 01, 2018
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

William Walsh, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 15: 03/30/2016

Date Issued: 08/31/2016

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077

Laboratory ID: **100194**
Issue Date: 02/06/2017

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Environmental Microbiology Laboratory Accreditation Program (EMLAP)

Initial Accreditation Date: 09/01/2002

EMLAP Category	Field of Testing (FoT)	Method	Method Description (*for internal methods only*)
Fungal	Air - Culturable	M005	Detection and Enumeration of Culturable Fungi from Environmental Samples
	Bulk - Culturable	M005	Detection and Enumeration of Culturable Fungi from Environmental Samples
	Surface - Culturable	M005	Detection and Enumeration of Culturable Fungi from Environmental Samples
	Air - Direct Examination	05-TP-003.7	Standard Operating Procedure for the Analysis of Airborne Fungal Spores, Hyphal Fragments, Pollen, Insect Fragments, Skin Fragments and Fibrous Particulate by Optical Microscopy of Spore Trap Samples
	Bulk - Direct Examination	M041	Standard Operating Procedure for the Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, Pollen, Insect Fragments, and Fibrous Material from Surface Samples
	Surface - Direct Examination	M041	Standard Operating Procedure for the Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, Pollen, Insect Fragments, and Fibrous Material from Surface Samples
Bacterial	Air - Culturable	M009	Detection and Enumeration of Culturable Bacteria from Environmental Samples
	Bulk - Culturable	M009	Detection and Enumeration of Culturable Bacteria from Environmental Samples
	Surface - Culturable	M009	Detection and Enumeration of Culturable Bacteria from Environmental Samples

EMLAP Category	Field of Testing (FoT)	Method	Method Description (*for internal methods only*)
Bacterial	Legionella	05-TP-002	Recovery of Legionella from the Environment Using the Center for Disease Control and Prevention's Culture Method
		MICRO-SOP-105	ISO 11731:1998 and ISO 11731-2:2004 Methods

A complete listing of currently accredited Environmental Microbiology laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-0

EMSL Analytical, Inc.

Cinnaminson, NJ

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2017-07-01 through 2018-06-30

Effective Dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Voluntary Laboratory Accreditation Program

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Mr. Ben Ellis
Phone: 800-220-3675 Fax: 856-786-5973
Email: bellis@emsl.com
http://www.emsl.com

ASBESTOS FIBER ANALYSIS — NVLAP LAB CODE 101048-0

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- Appendix E to Subpart E of Part 763 -- Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

Effective 2017-07-01 through 2018-06-30

June 25, 2018

Attachment D
Photographic Log

Photographs of the Property and Vicinity
Site Name: **1017 West 141ST Street, Gardena, CA**
Photographer: **Alicia Jansen**
Date: **June 1, 2018**

Photo #1 View of the asbestos containing red/brown vinyl floor tile (HA#12) and associated black mastic (HA#13) beneath the carpet in the reception area of the office building.

Photo #2 View of the asbestos containing black mastic beneath the vinyl floor tiles in the restroom of the storage building (HA#36).

June 25, 2018

Attachment E
CDPH Form 8552

LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation 6/1/2018

Section 2 — Type of Lead Hazard Evaluation (Check one box only)

☐ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☑ Other (specify) lead-paint survey

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
1017 West 141st Street	Gardena	Los Angeles	90247

Construction date (year) of structure	Type of structure	Children living in structure?
unknown	☐ Multi-unit building ☐ School or daycare ☐ Single family dwelling ☑ Other Office bldg and Storage	☐ Yes ☑ No ☐ Don't Know

Section 4 — Owner of Structure (if business/agency, list contact person)

Name	Telephone number
Garden LF, LLC	310-352-3400

Address [number, street, apartment (if applicable)]	City	State	Zip Code
1017 West 141st Street	Gardena	CA	90247

Section 5 — Results of Lead Hazard Evaluation (check all that apply)

☑ No lead-based paint detected ☐ Intact lead-based paint detected ☐ Deteriorated lead-based paint detected

☐ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead-contaminated soil found ☐ Other

Section 6 — Individual Conducting Lead Hazard Evaluation

Name	Telephone number
Stantec Consulting Services, Inc. / Alicia Jansen	909-255-8213

Address [number, street, apartment (if applicable)]	City	State	Zip Code
25864-F Business Center Drive	Redlands	CA	92374

CDPH certification number	Signature	Date
LRCIA # 19526	Alicia Jansen	6/12/18

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Section 7 — Attachments

A. A foundation diagram or sketch of the structure indicating the specifc locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

Kimley»Horn

MEMORANDUM

To: Ray Barragan
City of Gardena

From: Karina Fidler, AICP
Jason Sheasley, P.G

Date: October 31, 2018

RE: Review of Revised Phase I ESA and LBP/ACM Reports;1017 West 141st Street and 14031 South Vermont Avenue, Gardena, California

Kimley-Horn and Associates, Inc. (Kimley-Horn) reviewed the following documents prepared by Stantec for the property located at 1017 West 141st Street and 14031 South Vermont Avenue, Gardena, California:

- *Revised Phase I Environmental Site Assessment* dated October 4, 2018
- *Revised Pre-Demolition Asbestos and Lead-Based Paint Survey* dated October 26, 2018

The revised Phase I ESA and Pre-Demolition Asbestos and Lead-Based Paint Survey are acceptable and may be used for CEQA purposes.

Appendix G

Hydrology and Water Quality Studies

Preliminary Hydrology & LID Report

Tract 082263
Stonefield
In the City of Gardena

Prepared for:

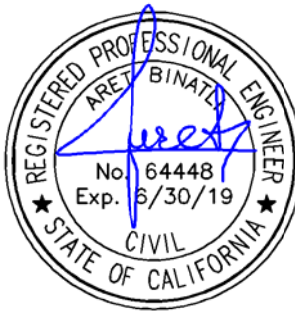
KB Home
25152 Springfield Ct, Suite 180
Valencia, CA 91355
(661) 219-6852

Prepared by:

FORMA ENGINEERING INC.
CIVIL ENGINEERING SERVICES

Telephone: (818) 832-1710

Prepared under the supervision of



Aret Binatli Date
R.C.E. 64448 (Exp. 30 Jun 19)

October 4, 2018

Table of Contents

1. INTRODUCTION

Tract 082263 is located within the City of Gardena, and includes the addresses 14031 S. Vermont Avenue & 1017 W. 141st Street, 90247. The site is bound by Vermont Avenue to the east, West 141st Street to the southeast, Commercial property to the north and southwest and residential tracts, tracts 28241 and Mesalita Tract to the west. 63 attached condominia are proposed to be constructed on the site. The residences are three stories in height and of wood and stucco construction. The site is currently occupied by 2 commercial/light industrial buildings and the remaining area consists of paved parking. The general area is shown in Figure 1. Greater detail is available in Figures 2 and 3, in the pocket at 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.

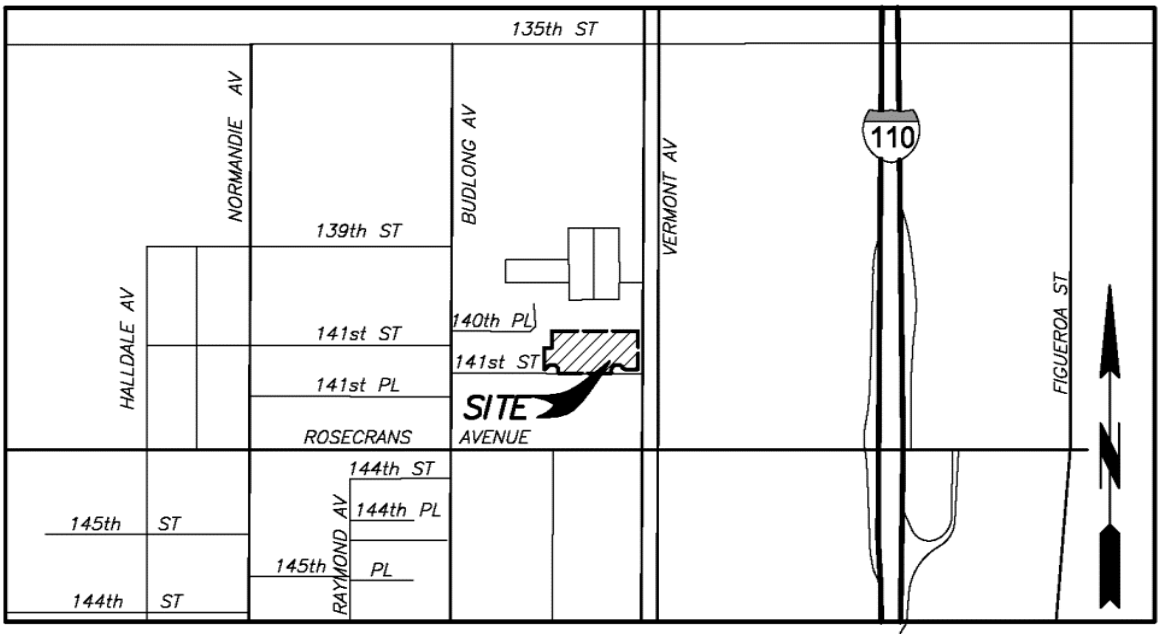


Figure 1. Vicinity map.

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 5.8-inch; the project is located entirely within soil type 020. A copy of the 50-year, 24-hr rain event Isohyet Map is located in Appendix E of this report.

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

2.2 Predeveloped Site Drainage Condition

In the pre-developed condition, approximately 29% of the site drains to the southeast towards Vermont Ave., while the remaining 71% of area drains southwest to 141st and eventually to Budlong Avenue.

Subarea 1 defines the easterly portion of the site that drains toward Vermont Ave; it is further divided into 2 subareas, subareas 1A and 1B. The northerly portion of subarea 1, subarea 1A, drains easterly on paved surface and discharges through a parkway drain to Vermont Avenue. The southerly portion of subarea 1, subarea 1B, drains on paved surface and discharges onto West 141st Street through an opening in a wall along property line. Once in the street, storm water generated by both subareas drain towards the intersection of 141st and Vermont where it is intercepted by an existing Los Angeles County Flood Control District (LACFCD) catch basin.

Subarea 2 defines the westerly portion of the site. Storm flow travels via surface flow and underground pipes to the southwest corner of the site and discharges into 141st Street. Once in the street, storm water travels to the west in the street gutter along West 141st Street into an existing Los Angeles County Flood Control District (LACFCD) catch basin near Budlong ave interstection.

Small portion of the neighboring parking lot on the south drains towards the project site into an existing concrete gutter. The concrete gutter drains west towards an existing catch basin and parkway drain at West 141st St. No stom water runon is observed along westerly, northerly and easterly property lines.

2.3 Developed Site Drainage Condition

In the developed condition, the drainage pattern remains genearally the same as the predeveloped condition. However, storm water from the easterly portion of the project site, subarea 1, drain to a single outlet to West 141st Street via a parkway culvert. Storm water then travels to the east in the street gutter and is intercepted by an LACFCD catch basin, same as the predeveloped condition.

Storm flows from the westerly portion of the project site, subarea 2, outlets to 141st Street via a parkway culvert; drains west as in the preveloped condition to the existing LACFCD catch basin.

Offsite storm water runon from the neighboring property to the south is captured by a new concrete ribbon gutter to be constructed along the property line and discharge to 141st Street via the existing catch basin and parkway culvert as in the preveloped condition.

2.4 Results

Tables 1A, 1B, and 1C summarize the developed condition runoff flowrates for the 25-year and the 50-year storm event will be less than the existing. The Stormwater Quality Design Flowrate, Q_{PM}, is used for LID design. The 100-year storm flow-rate has also been determined for developed condition flood hazard analysis. HydroCalc Reports are located in Appendix B of this report.

Subarea	Area (Ac)	Q_{25} (ft^3/s)	Q_{50} (ft^3/s)	Outfall Location
1A	0.47	1.28	1.46	Vermont
1B	0.53	1.44	1.64	Vermont (via 141st)
2	2.44	5.31	6.44	Budlong (via 141st)

Table 1A. Pre Developed Runoff Flowrate Results.

Subarea	Area (Ac)	Q_{PM} (ft^3/s)	Q_{25} (ft^3/s)	Q_{50} (ft^3/s)	Q_{100} (ft^3/s)	Outfall Location
1	1.01	0.22	2.40	2.75	3.39	Vermont (via 141st)
2	2.43	0.47	4.74	5.75	6.92	Budlong (via 141st)

Table 1B. Developed Runoff Flowrate Results.

Subarea	Q_{25} (ft^3/s)	Q_{50} (ft^3/s)	Outfall Location
Tributary to Vermont Catch Basin Subarea 1	-0.31	-0.35	Vermont (via 141st)
Tributary to Budlong Catch Basin, Subarea 2	-1.70	-0.69	Budlong (via 141st)

Table 1C. Pre & Post Development Discharge Flowrate Differences

Tables 2A, 2B, and 2C summarize the developed condition runoff volumes for the 25-year and the 50-year storm event will be less than the existing. 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)	V_{25} (ft^3)	V_{50} (ft^3)	Outfall Location
1A	0.47	7,626	8,688	Vermont
1B	0.53	8,600	9,797	Vermont (via 141st)
2	2.44	39,591	45,103	Budlong (via 141st)

Table 2A. Pre Developed Runoff Flowrate Results.

Subarea	Area (Ac)	$SWQD_V$ (ft^3)	V_{25} (ft^3)	V_{50} (ft^3)	Outfall Location
1	1.01	2,694	14,597	16,654	Vermont (via 141st)
2	2.43	6,482	35,113	40,065	Budlong (via 141st)

Table 2B. Developed Runoff Volume Results.

Subarea	V_{25} (ft^3)	V_{50} (ft^3)	Outfall Location
Tributary to Vermont Catch Basin Subarea 1	-1,629	-1,831	Vermont (via 141st)
Tributary to Budlong Catch Basin, Subarea 2	-4,478	-5,038	Budlong (via 141st)

Table 2C. Pre & Post Development Discharge Volume Differences

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 E. No levees, reservoirs, rivers or flood control channels are observed in the vicinity that could potential cause onsite inundation

The outlets to each drainage area are located at dead end drive aisles. To protect onsite buildings from flooding during the 100-year event, parkway drains outletting to the public street have been sized for a 100-yr event. The 100-yr design flowrates are listed in Table 1B. Rectangular parkway drains per Standard Plans for Public Works Construction (SPPWC) No. 151 have been sized using Bentley FlowMaster to carry the 100-yr flow. FlowMaster reports and copy of the SPPWC Std Plan No. 151 are available in Appendix C. Parkway Drain sizing is summarized in Table 3 below.

			SPPWC STD NO 151 Design Criteria			
Subarea	Q_{100} (ft3/s)	Outfall Location	S (in)	B (in)	Slope (ft/ft)	Flow Depth, d (in)
1	3.39	Vermont (via 141st)	24	4	0.02	3.5
2	6.92	Budlong (via 141st)	48	4	0.02	3.5

Table 3. Parkway Drain Design Criteria for the 100-year Storm

3. LOW IMPACT DEVLOPMENT

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 0.95 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 63 attached condominia, is 3.44 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 (2) subareas as illustrated in Figure 3, Developed Condition Hydrology Map, located in Appendix E. Each subarea is treated using a separate LID BMPs to maintain the predeveloped drainage patterns. Overflow from the proposed BMP(s) will be directed to the street via parkway drain. 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 4.

Subarea	Area (Ac)	$SWQD_V$ (ft^3)	Q_{PM} (ft^3/s)	Outfall Location
1	1.01	2,694	0.22	Vermont (via 141st)
2	2.43	6,482	0.47	Budlong (via 141st)

Table 4. 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. In contrary effective imperviousness of the site will be decreased from 98% to 85% once the site is developed.
2) The project decreases the runoff from the site as compared to the pre-project conditions. For the 50 year event, Subarea 1 decreased the runoff rate and volume by -0.35 cfs and -1,831 ft^3, respectively; Subarea 2 decreased the runoff rate and volume by -0.69 cfs and -5,038 ft^3, respectively.
3) The project discharges into a LA County Flood Control storm drain.

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. However, there were no hazard identified during initial explorations that would disallow infiltration onsite such as liquefaction, clay or expansive soils, high ground water, landslides, or polluted soils, etc.

Due to the lack of testing, an underground infiltration trench has been designed using the minimum infiltration rate that is feasible per the County of Los Angeles Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration, GS200.1. GS200.1 recommends 0.3 inches per hour (in/hr) as the minimum corrected infiltration rate. 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-3, Infiltration Trench. Setbacks are based upon GS200.1. The infiltration trench is a StormTech system, a proprietary infiltration system by Advanced Drainage Systems, Inc. (ADS), which utilized HDPE chambers surrounded by open graded gravel. The system incorporates an isolator row that serves as a settling basin for silt and debris and accessible for maintenance. The locations of the proposed BMPs are shown on Figure 3, Developed Condition Hydrology Map, located in Appendix E. The BMPs are located within fairly open areas of the site, which allow for the BMP footprints as necessary during final design after percolation testing is performed. Sizing of the RET-3 Infiltration 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 1 and 2 are listed in Table 4 above.

Step 2: Determine the design infiltration rate

Infiltration testing has not yet been performed. For preliminary design, assuming feasibility, a corrected infiltration rate equal to or greater than 0.3 inches per hour (in/hr) is selected per 3.4.1.

Step 3: Calculate the bioretention area

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:

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

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 preliminary design infiltration rate, 0.3 in/hr, was specified for the project site. The maximum allowable drawdown time for underground infiltration is 96 hrs. Determine the maximum depth of water that can be infiltrated.

$$d_{max} = \frac{0.3}{12} \times 96$$

$$= 2.4 \text{ ft}$$

Select the infiltration trench 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 infiltration trenches were designed to be filled with gravel with a void ratio of 40% (0.40) and plastic chamber. d_{max} was determined to be 2.4 feet for all trenches. Calculate the maximum allowable depth of gravel filled trench.

$$d_t \leq \frac{2.4}{0.4}$$

$\leq$ 6 ft (trenches for this site were designed to be 4 ft high per ADS StormTech drawings locted in Appendix D)

Calculate the infiltration surface area (bottom of the infiltration trench) required:

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

where: A = Surface area of the bottom of the infiltration trench (ft^2),
SWQDv = Stormwater quality design volume (ft^3),
dt = Depth of infiltration trench (ft),
nt = Infiltration trench gravel void ratio.

Subarea 1 SWQDv is 2,694 ft^3 and subarea 2 SWQDv is 6,482 ft^3. The depth of gravel fill allowed is 6 ft. Calculate the infiltration surface area (bottom of the infiltration trench) required:

$$A_{SUBAREA\ 1} = \frac{2{,}694}{6X0.4}$$

= 1,123 ft^2 (1,240 ft^2 provided, See Appendix D for Drawings by ADS)

$$A_{SUBAREA\ 2} = \frac{6482}{6X0.4}$$

= 2,701 ft^2 (2,836 ft^2 provided, See Appendix D for Drawings by ADS)

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)
1	StormTech Infiltration Trench (RET-3)	1,123	1,240	2,694	2,756
2	StormTech Infiltration Trench (RET-3)	2,701	2,836	6,482	6,550

Table 5. Low Impact Development BMP Design Summary

The detention volumes provided by the computer-generated drawings are verified below by approximating the combined storage volume of the gravel and chambers. As the results are similar, the volumes provided on the drawings are used. Design check for the detention volumes provided by StormTech are summarized below:

Subarea 1 Design Check:

- Excavation:
  Bottom Area of System, A = 1,240 ft^2 *
  Height of Gravel, H = 4.0 ft *
  Volume of Excavation = A x H = 1,240 ft^2 x 4.0 ft = <u>4,960 ft^3</u>
- SC740 Chambers:
  End Cap Quantity = 14 ea*
  End Cap Storage Volume = 0 ft^3/unit* x 14 = 0 ft^3 (Storage in end caps is ignored)
  Chamber Quantity = 28 ea*
  Chamber Storage Volume = 45.9 ft^3/unit* x 28 = 1,285 ft^3
  SC740 Storage Volume = End Cap + Chamber = 0 ft^3 + 1,285 ft^3 = <u>1,285 ft^3</u>
- Gravel:
  Gravel Storage Volume = n x (Volume of Excavation - MC4500 Storage Volume)
  = 0.4 x (4,960 ft^3 - 1,285 ft^3) = <u>1,470 ft^3</u>

→ **BMP 1 Detention Volume:**
BMP Storage Volume = Gravel Storage Volume +MC4500 Storage Volume
= 1,470 ft^3 + 1,285 ft^3 = <u>2,755 ft^3</u>

<u>2,755 ft^3 is approximately equal to the volume generated by ADS, 2,756 ft^3</u>

Subarea 2 Design Check:

- Excavation:
  Bottom Area of System, A = 2,836 ft^2 *
  Height of Gravel, H = 4.0 ft *
  Volume of Excavation = A x H = 2,836 ft^2 x 4.0 ft = <u>11,344 ft^3</u>
- SC740 Chambers:
  End Cap Quantity = 14 ea*
  End Cap Storage Volume = 0 ft^3/unit* x 14 = 0 ft^3 (Storage in end caps is ignored)
  Chamber Quantity = 73 ea*
  Chamber Storage Volume = 45.9 ft^3/unit* x 73 = 3,350.7 ft^3
  MC4500 Storage Volume = End Cap + Chamber = 0 ft^3 + 3,350.7 ft^3 = <u>3,351 ft^3</u>
- Gravel:
  Gravel Storage Volume = n x (Volume of Excavation - MC4500 Storage Volume)
  = 0.4 x (11,344 ft^3 – 3,350.7 ft^3) = <u>3,197 ft^3</u>

→ **BMP 1 Detention Volume:**
BMP Storage Volume = Gravel Storage Volume +MC4500 Storage Volume
= 3,197 ft^3 + 3,351 ft^3 = <u>6,548 ft^3</u>

<u>6,548 ft^3 is approximately equal to the volume generated by ADS, 6,550 ft^3</u>

**Refer to StormTech Design for information*

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. Rather than continue to the next option in the LID Feasibility screening process, which is biofiltration, a combination harvest and use and biofiltration system is recommended.

3.6 Alternate Compliance 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 combination harvest and reuse and biofiltration system is proposed.

Capturing and storing stormwater is feasible onsite as the ADS infiltration system can be converted to a detention system by installing an impermeable liner around the gravel, or by installing equivalent tank storage for a smaller footprint. The preliminary design and layout for infiltration demonstrates there is sufficient storage area.

Reuse of stormwater within 96 hrs after a rain event is infeasible per section 3.5. However, a dual BMP system can be utilized to take advantage of stored water during the dry season. Two (2) separate pump systems will be installed in the upstream manhole of the detention system for each subarea. One (1) pump will provide provide water for irrigation during the dry summer months (April 16 through October 14) when irrigation demands are higher and rain events are infrequent. A second small pump will operate only during the rainy season (October 15 through April 15) 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 the street. In this way, the system satisfies the requirement of retaining 100% of the volume from the 85th percentile onsite during the period when landscape needs water the most and having space available for runoff during the rainy season.

Conclusion

The proposed development improves the hydrology of the site by reducing runoff flow rates and volume from pre developed conditions without signaficantly altering the existing drainage pattern. As a result, the proposed development will not have any adverse impacts to the surrounding streets or storm drain facilities. There are also no observable structures in the vicinity that would cause inundation from outside sources. The project is located in a minimal flood risk zone according to FEMA.

Infiltration has been identified as the most likely method for satisfying Los Angeles County Low Impact Development requirements. Initial geotechnical explorations did not include percolation testing, but did not eliminate infiltration as a feasible LID BMP. Percolation testing is required prior to final engineering. However, infiltration BMPs have been designed based on the minimum allowable infiltration rate as proof of concept. If infiltration is determined to be infeasible during final engineering, than an alternate compliance methods shall be implemented to harvest and reuse stormwater for irrigation during the dry-season, and pumped into a biofiltration sytem during the wet-season. By combining harvest and use BMP with a biofiltration BMP, the proposed project will be able to retain water onsite for use during the dry season and filter water

Appendix A
Raw Hydrology Data

Subarea	Area (Ac)	Soil Type	% Imp	Isohyet	Length (ft)	Slope	Area (sq ft)	D z
1A	0.47	000	**98**	5.80	245.0	0.011	20658.76	2.62
1B	0.53	000	**98**	5.80	189.0	0.016	22986.13	2.95
2	2.44	000	**98**	5.80	583.0	0.012	106152.26	7.14
						Sum sub-areas	149797.15	3.44
						Total study area (ft2)	149797.15	3.44

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
1	1.01	000	**85**	5.80	363.0	0.010	44009.27	3.74
2	2.43	000	**85**	5.80	605.0	0.012	105787.88	7.43
						Sum sub-areas (ft2)	149797.15	3.44
						Total study area (ft2)	149797.15	3.44

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

Appendix B
HydroCalc Reports

Peak Flow Hydrologic Analysis

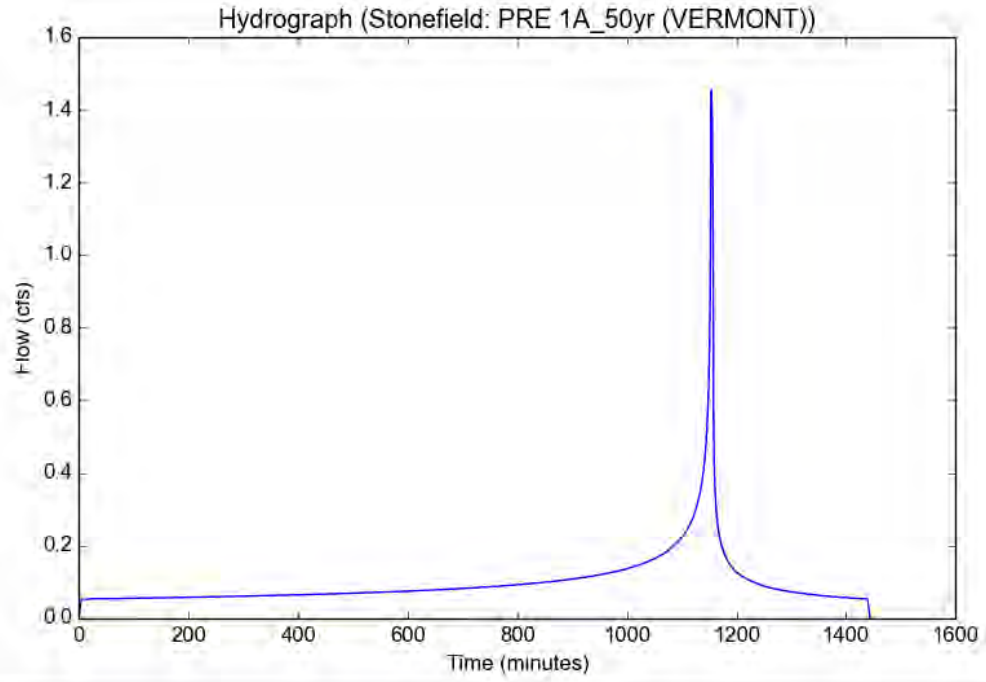
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 1A_50yr (VERMONT)
Area (ac)	0.47
Flow Path Length (ft)	245.0
Flow Path Slope (vft/hft)	0.0107
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.4604
Undeveloped Runoff Coefficient (Cu)	0.6321
Developed Runoff Coefficient (Cd)	0.8946
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4551
Burned Peak Flow Rate (cfs)	1.4551
24-Hr Clear Runoff Volume (ac-ft)	0.1994
24-Hr Clear Runoff Volume (cu-ft)	8688.0113



Peak Flow Hydrologic Analysis

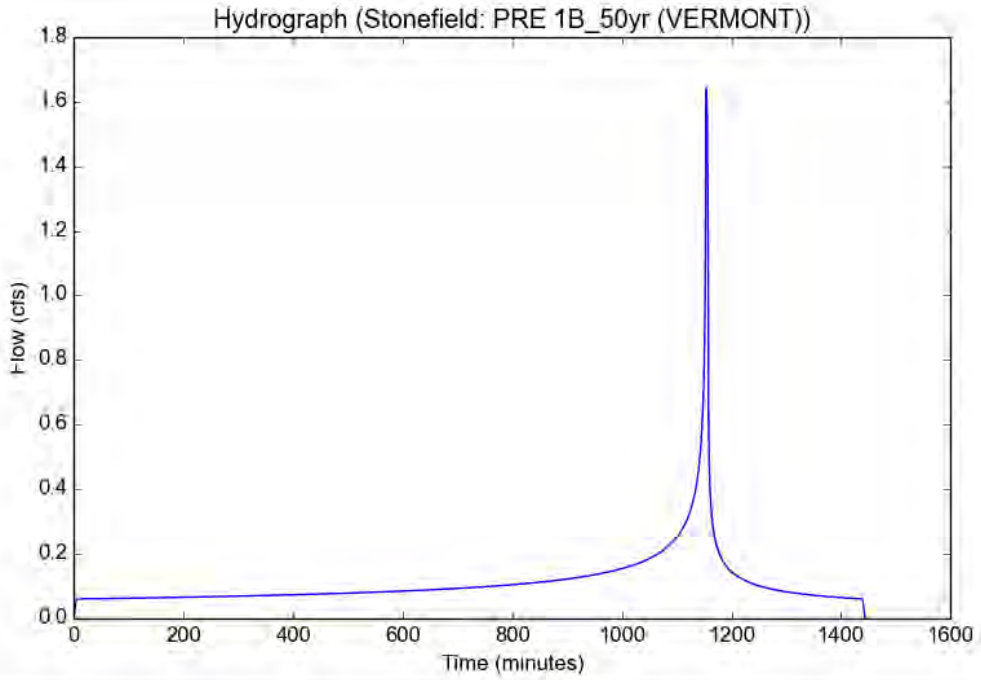
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 1B_50yr (VERMONT)
Area (ac)	0.53
Flow Path Length (ft)	189.0
Flow Path Slope (vft/hft)	0.0156
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.4604
Undeveloped Runoff Coefficient (Cu)	0.6321
Developed Runoff Coefficient (Cd)	0.8946
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.6408
Burned Peak Flow Rate (cfs)	1.6408
24-Hr Clear Runoff Volume (ac-ft)	0.2249
24-Hr Clear Runoff Volume (cu-ft)	9797.1192



Peak Flow Hydrologic Analysis

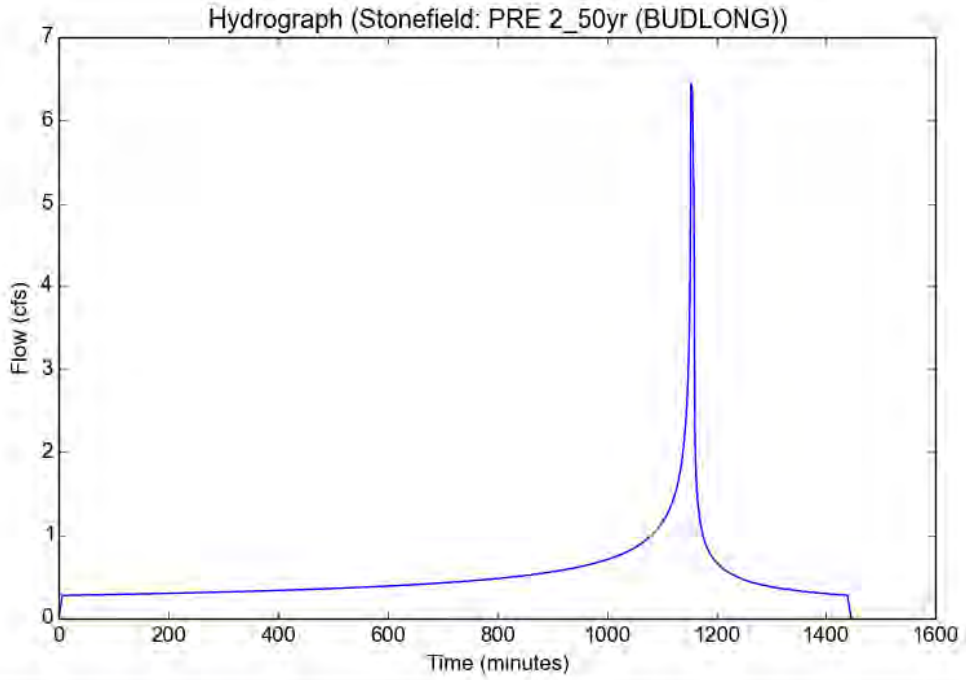
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 2_50yr (BUDLONG)
Area (ac)	2.44
Flow Path Length (ft)	583.0
Flow Path Slope (vft/hft)	0.0122
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.9543
Undeveloped Runoff Coefficient (Cu)	0.6024
Developed Runoff Coefficient (Cd)	0.894
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	6.4447
Burned Peak Flow Rate (cfs)	6.4447
24-Hr Clear Runoff Volume (ac-ft)	1.0354
24-Hr Clear Runoff Volume (cu-ft)	45103.1658



Peak Flow Hydrologic Analysis

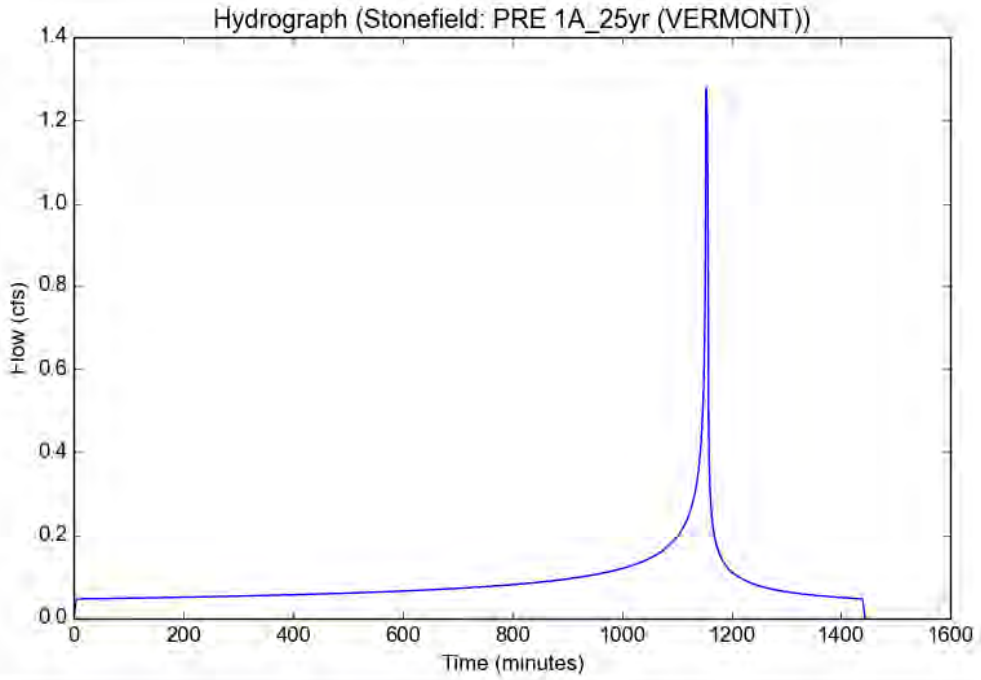
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 1A_25yr (VERMONT)
Area (ac)	0.47
Flow Path Length (ft)	245.0
Flow Path Slope (vft/hft)	0.0107
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0924
Peak Intensity (in/hr)	3.0383
Undeveloped Runoff Coefficient (Cu)	0.6087
Developed Runoff Coefficient (Cd)	0.8942
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2769
Burned Peak Flow Rate (cfs)	1.2769
24-Hr Clear Runoff Volume (ac-ft)	0.1751
24-Hr Clear Runoff Volume (cu-ft)	7626.4816



Peak Flow Hydrologic Analysis

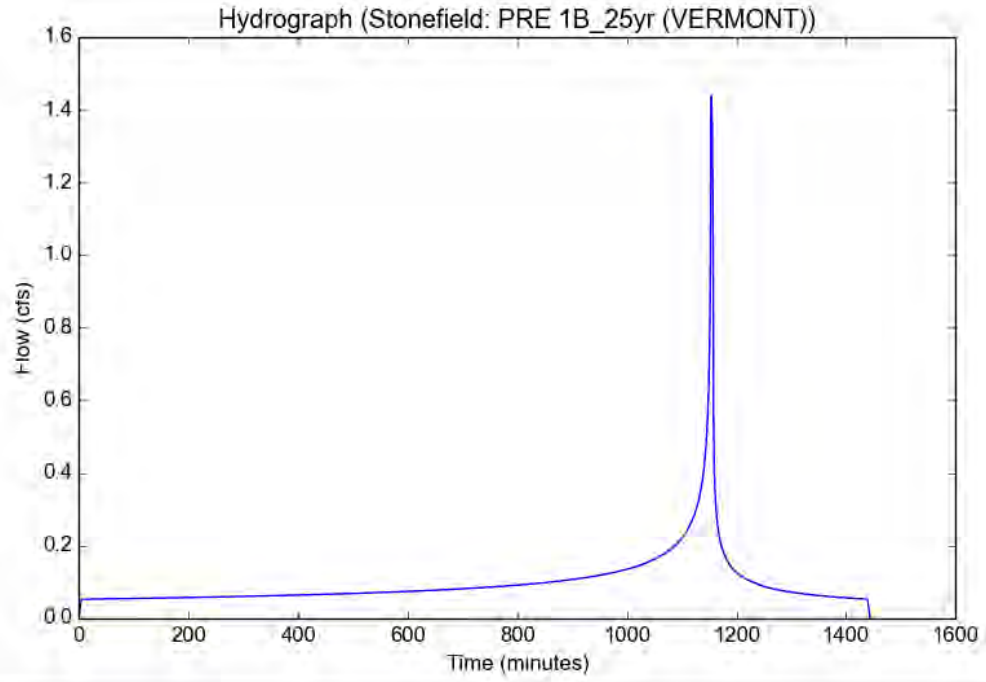
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 1B_25yr (VERMONT)
Area (ac)	0.53
Flow Path Length (ft)	189.0
Flow Path Slope (vft/hft)	0.0156
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0924
Peak Intensity (in/hr)	3.0383
Undeveloped Runoff Coefficient (Cu)	0.6087
Developed Runoff Coefficient (Cd)	0.8942
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4399
Burned Peak Flow Rate (cfs)	1.4399
24-Hr Clear Runoff Volume (ac-ft)	0.1974
24-Hr Clear Runoff Volume (cu-ft)	8600.075



Peak Flow Hydrologic Analysis

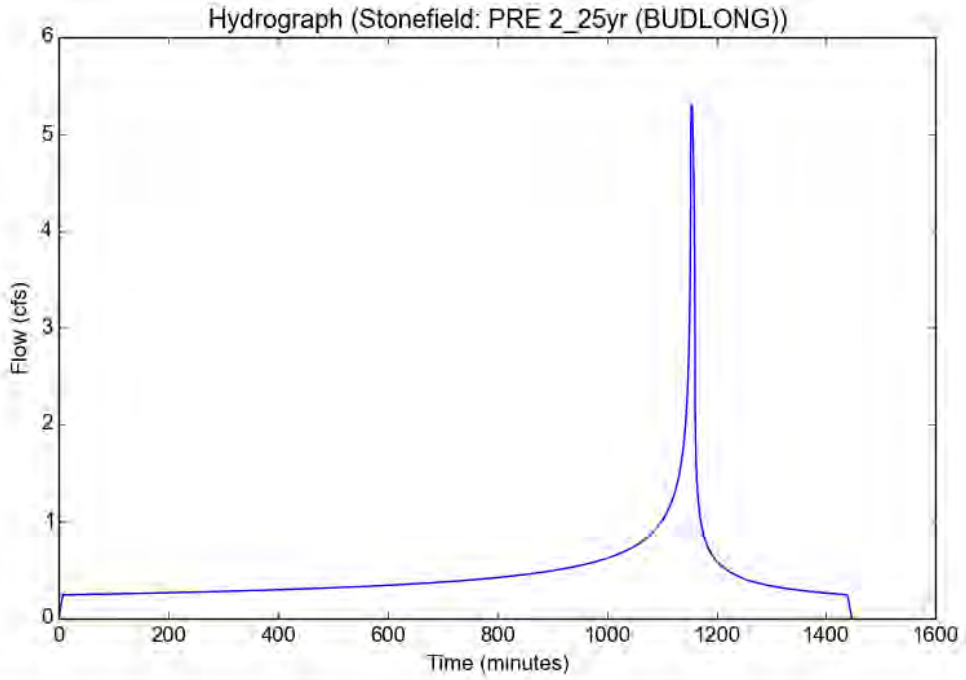
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	PRE 2_25yr (BUDLONG)
Area (ac)	2.44
Flow Path Length (ft)	583.0
Flow Path Slope (vft/hft)	0.0122
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.98
Soil Type	20
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0924
Peak Intensity (in/hr)	2.4361
Undeveloped Runoff Coefficient (Cu)	0.5555
Developed Runoff Coefficient (Cd)	0.8931
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	5.3087
Burned Peak Flow Rate (cfs)	5.3087
24-Hr Clear Runoff Volume (ac-ft)	0.9089
24-Hr Clear Runoff Volume (cu-ft)	39591.9011



Peak Flow Hydrologic Analysis

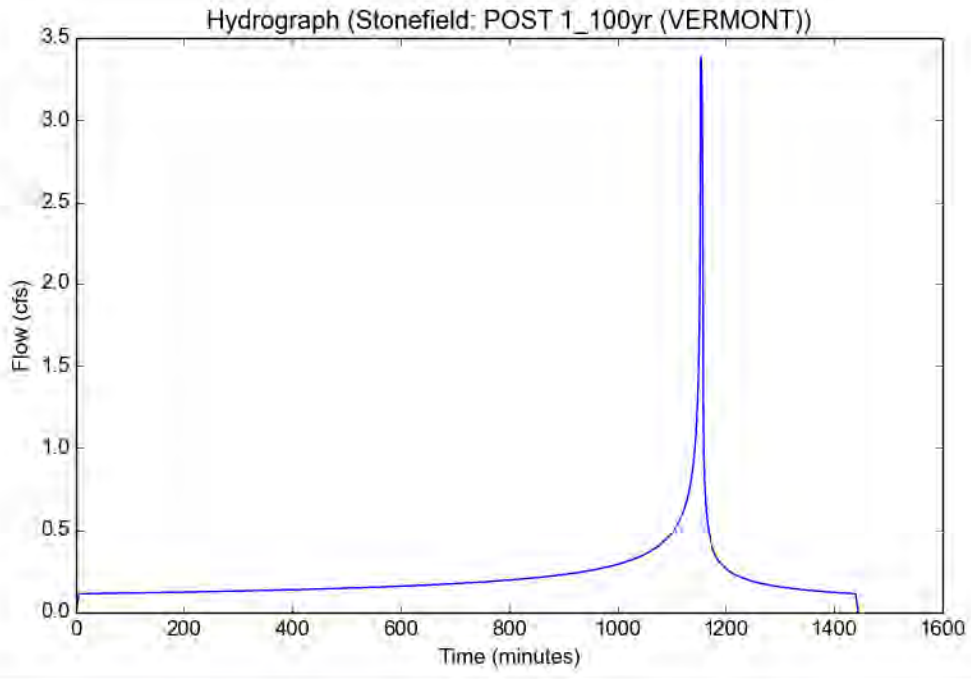
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-10-02.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 1_100yr (VERMONT)
Area (ac)	1.01
Flow Path Length (ft)	363.0
Flow Path Slope (vft/hft)	0.0103
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.5076
Peak Intensity (in/hr)	3.8826
Undeveloped Runoff Coefficient (Cu)	0.6555
Developed Runoff Coefficient (Cd)	0.8633
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.3855
Burned Peak Flow Rate (cfs)	3.3855
24-Hr Clear Runoff Volume (ac-ft)	0.4298
24-Hr Clear Runoff Volume (cu-ft)	18720.6577



Peak Flow Hydrologic Analysis

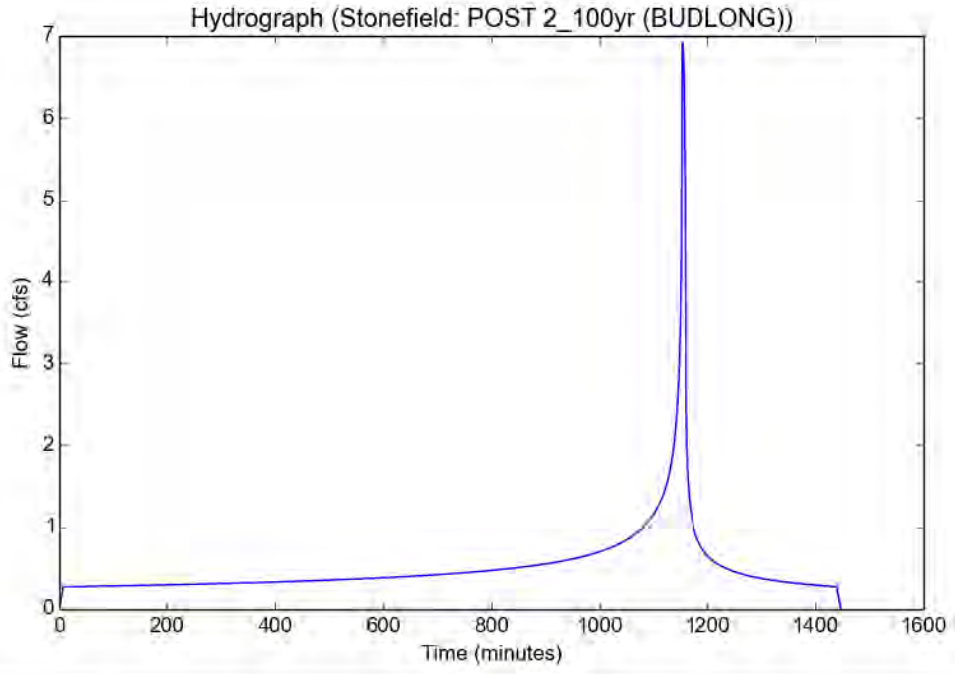
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-10-02.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 2_100yr (BUDLONG)
Area (ac)	2.43
Flow Path Length (ft)	605.0
Flow Path Slope (vft/hft)	0.0123
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.5076
Peak Intensity (in/hr)	3.3147
Undeveloped Runoff Coefficient (Cu)	0.624
Developed Runoff Coefficient (Cd)	0.8586
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	6.9158
Burned Peak Flow Rate (cfs)	6.9158
24-Hr Clear Runoff Volume (ac-ft)	1.0339
24-Hr Clear Runoff Volume (cu-ft)	45036.5047



Peak Flow Hydrologic Analysis

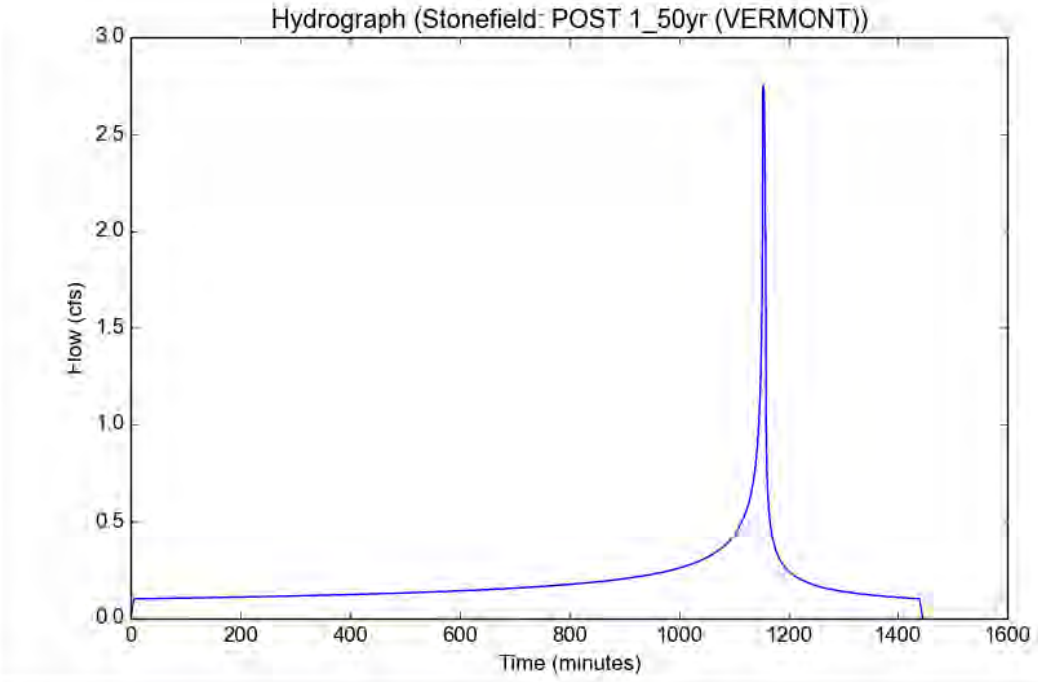
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 1_50yr (VERMONT)
Area (ac)	1.01
Flow Path Length (ft)	363.0
Flow Path Slope (vft/hft)	0.0103
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.1763
Undeveloped Runoff Coefficient (Cu)	0.6163
Developed Runoff Coefficient (Cd)	0.8574
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	2.7507
Burned Peak Flow Rate (cfs)	2.7507
24-Hr Clear Runoff Volume (ac-ft)	0.3823
24-Hr Clear Runoff Volume (cu-ft)	16654.5718



Peak Flow Hydrologic Analysis

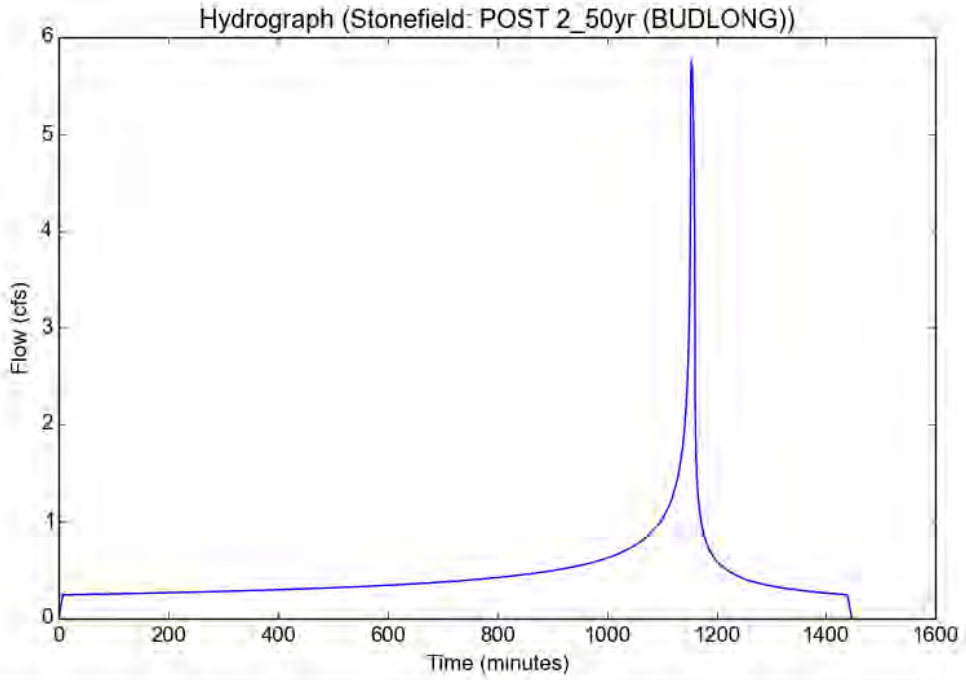
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 2_50yr (BUDLONG)
Area (ac)	2.43
Flow Path Length (ft)	605.0
Flow Path Slope (vft/hft)	0.0123
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.7746
Undeveloped Runoff Coefficient (Cu)	0.5862
Developed Runoff Coefficient (Cd)	0.8529
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	5.7506
Burned Peak Flow Rate (cfs)	5.7506
24-Hr Clear Runoff Volume (ac-ft)	0.9198
24-Hr Clear Runoff Volume (cu-ft)	40064.8885



Peak Flow Hydrologic Analysis

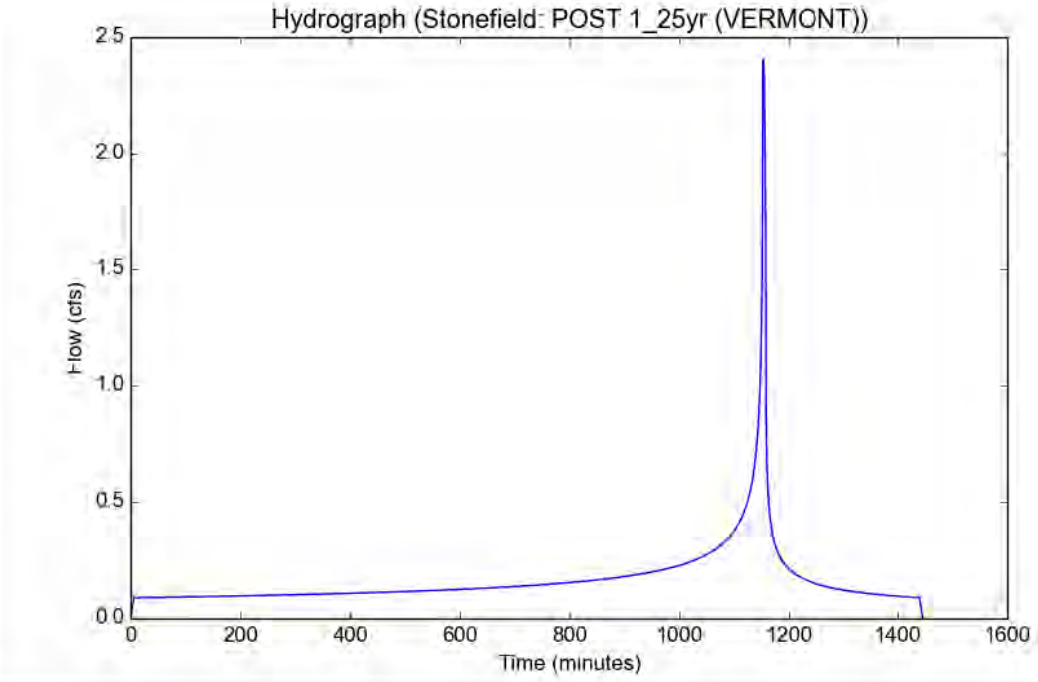
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 1_25yr (VERMONT)
Area (ac)	1.01
Flow Path Length (ft)	363.0
Flow Path Slope (vft/hft)	0.0103
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0924
Peak Intensity (in/hr)	2.7888
Undeveloped Runoff Coefficient (Cu)	0.5875
Developed Runoff Coefficient (Cd)	0.8531
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	2.4029
Burned Peak Flow Rate (cfs)	2.4029
24-Hr Clear Runoff Volume (ac-ft)	0.3351
24-Hr Clear Runoff Volume (cu-ft)	14596.5988



Peak Flow Hydrologic Analysis

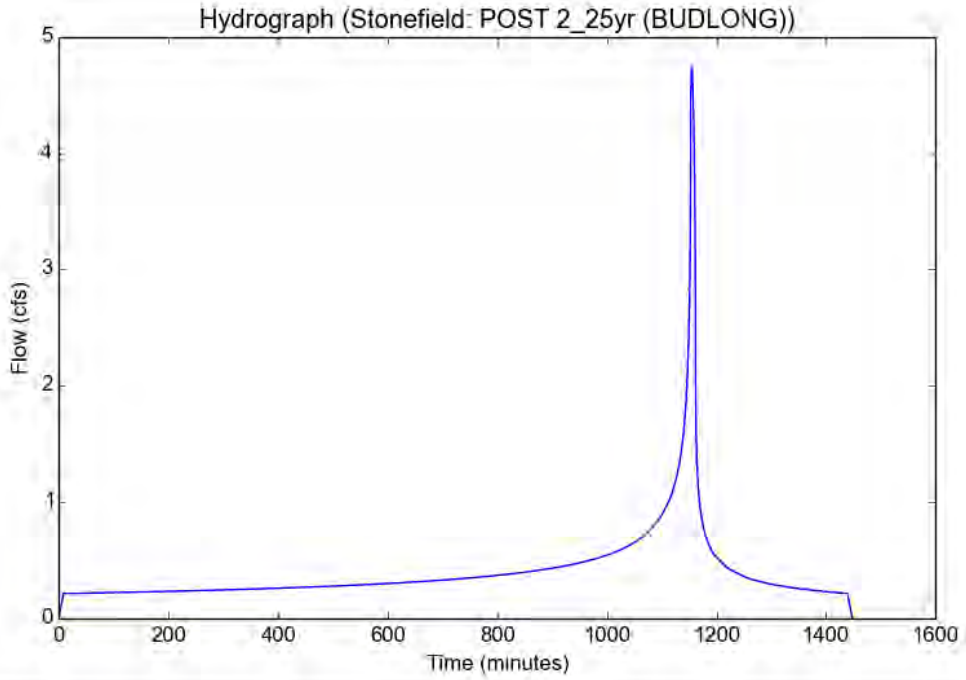
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 2_25yr (BUDLONG)
Area (ac)	2.43
Flow Path Length (ft)	605.0
Flow Path Slope (vft/hft)	0.0123
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0924
Peak Intensity (in/hr)	2.3049
Undeveloped Runoff Coefficient (Cu)	0.5437
Developed Runoff Coefficient (Cd)	0.8466
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	4.7414
Burned Peak Flow Rate (cfs)	4.7414
24-Hr Clear Runoff Volume (ac-ft)	0.8061
24-Hr Clear Runoff Volume (cu-ft)	35112.82



Peak Flow Hydrologic Analysis

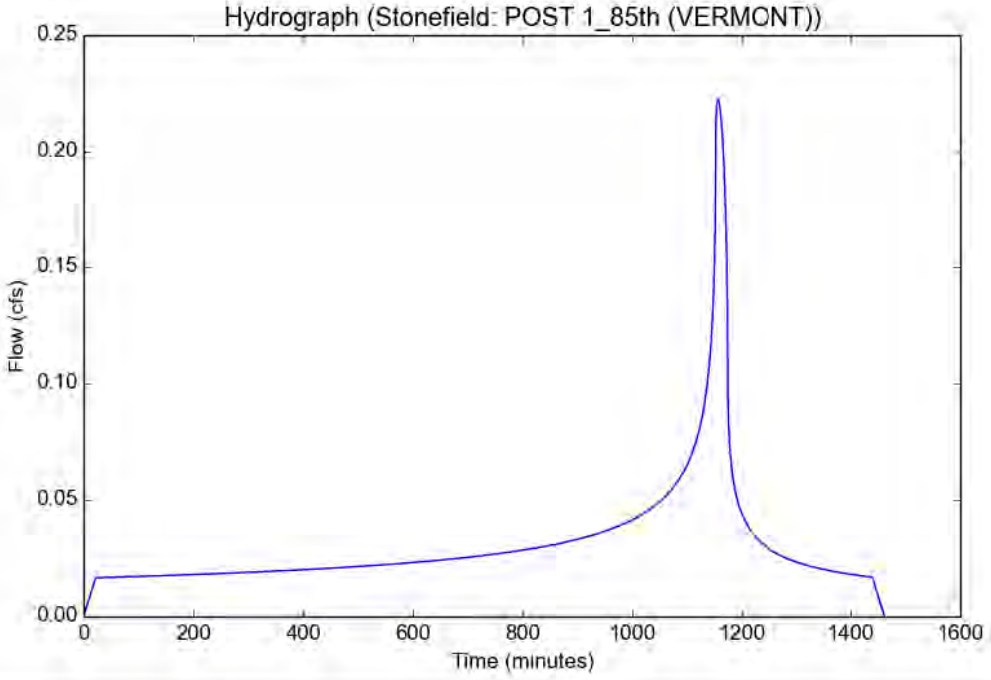
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Stonefield
Subarea ID	POST 1_85th (VERMONT)
Area (ac)	1.01
Flow Path Length (ft)	363.0
Flow Path Slope (vft/hft)	0.0103
85th Percentile Rainfall Depth (in)	0.95
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.95
Peak Intensity (in/hr)	0.2825
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.78
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	0.2225
Burned Peak Flow Rate (cfs)	0.2225
24-Hr Clear Runoff Volume (ac-ft)	0.0619
24-Hr Clear Runoff Volume (cu-ft)	2694.2925



Peak Flow Hydrologic Analysis

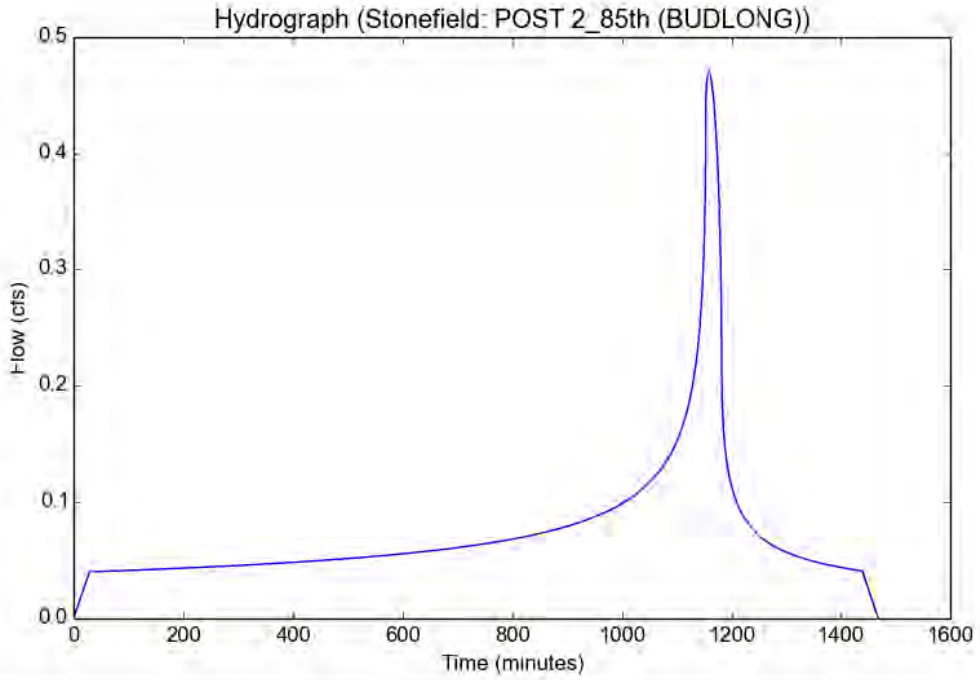
File location: L:/18006/Admin/Reports/HH/HydroCalc/Stonefield Report_2018-06-15.pdf
Version: HydroCalc 1.0.2

Input Parameters

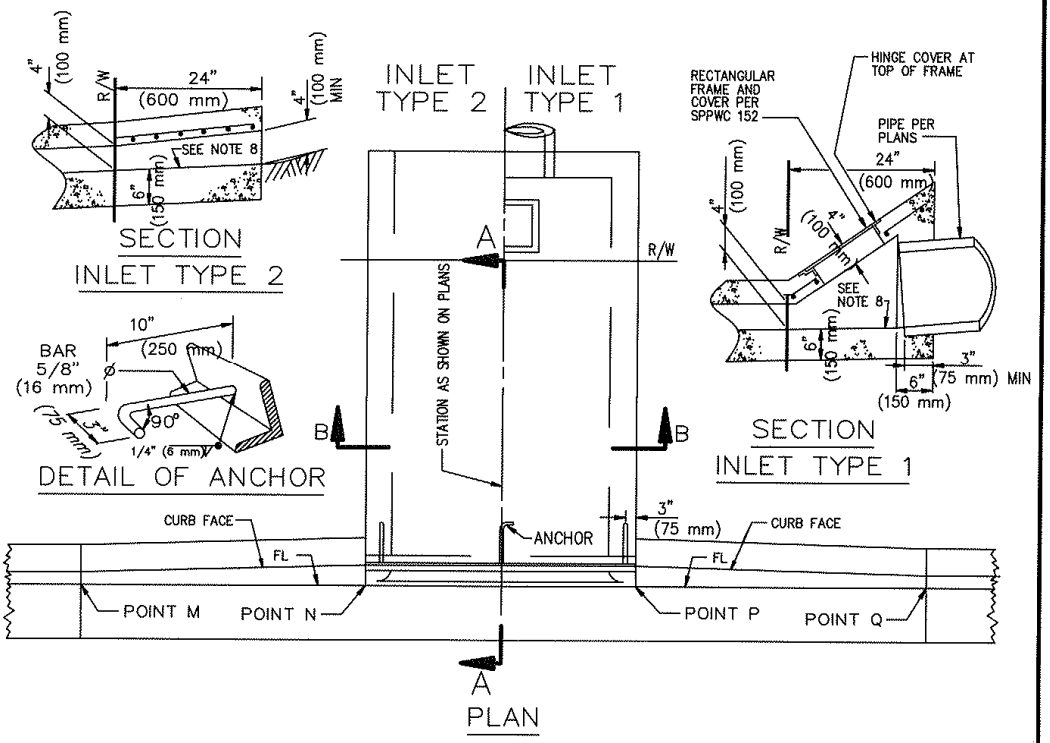
Project Name	Stonefield
Subarea ID	POST 2_85th (BUDLONG)
Area (ac)	2.43
Flow Path Length (ft)	605.0
Flow Path Slope (vft/hft)	0.0123
85th Percentile Rainfall Depth (in)	0.95
Percent Impervious	0.85
Soil Type	20
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.95
Peak Intensity (in/hr)	0.2481
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.78
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.4702
Burned Peak Flow Rate (cfs)	0.4702
24-Hr Clear Runoff Volume (ac-ft)	0.1488
24-Hr Clear Runoff Volume (cu-ft)	6482.3375



Appendix C
Parkway Drain Sizing



S, INCHES (mm)	J BAR SPACING
12" (300)	7" (240)
18" (450)	7" (240)
24" (600)	7" (240)
30" (750)	7" (240)
36" (900)	7" (240)
42" (1050)	6" (210)
48" (1200)	5" (180)
54" (1350)	6-1/2" (225)
60" (1500)	5" (180)
66" (1650)	4" (180)
72" (1800)	3-1/2" (120)

FOR S = 30" (750 mm) AND LESS, USE 2 ANCHORS. OTHERWISE, USE 3 ANCHORS.

FOR S = 48" (1200 mm) AND LESS, B = 3" (75 mm) USE 2-1/2"x2"x3/8" (64x51x9.5) GALVANIZED STEEL ANGLE.

OTHERWISE, B = 4" (100 mm).USE 3-1/2"x3"x1/2" (89x76x12.7) GALVANIZED STEEL ANGLE.

J BARS ARE #3 (#10M).

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1993 REV. 1996, 2009

PARKWAY DRAIN

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 151–2

SHEET 1 OF 2

NOTES

1. FLOOR OF BOX SHALL BE TROWELED SMOOTH.
2. IF THE TOE OF SLOPE IS ALLOWED WITHIN THE R/W, INLET TYPE 1 BEGINS AT THE TOE RATHER THAN AT THE R/W LINE.
3. FOR OPEN DITCH (TYPE 2), THE 24" (600 mm) EXTENSION BEYOND THE R/W LINE IS NOT REQUIRED WHEN BACK OF WALK IS 24" (600 mm) OR MORE FROM THE R/W LINE; HOWEVER, THE PIPE SHALL EXTEND TO THE R/W LINE IN ANY EVENT.
4. TOP OF INLET STRUCTURE (TYPE 1 & 2) SHALL BE FLUSH WITH ADJACENT SURFACE WHERE PRACTICAL.
5. A HEADED STEEL STUD 5/8" x 6-3/8" WITH A 1" HEAD (16 x 160 mm, 25 mm HEAD) ATTACHED BY A FULL PENETRATION BUTT WELD MAY BE USED AS AN ALTERNATE ANCHOR.
6. NORMAL CURB FACE AT POINT M AND Q. CURB FACE IS B + 5" (125 mm) AT POINT N AND P.
7. THE 3" (75 mm) LEG OF THE 5/8" (16 mm) DIA ANCHORS SHALL BE PARALLEL TO THE TOP OF SIDEWALK.
8. SLOPE = 2.0%.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PARKWAY DRAIN	**151-2**
	SHEET 2 OF 2

Cross Section for Subarea 1 Parkway Drain

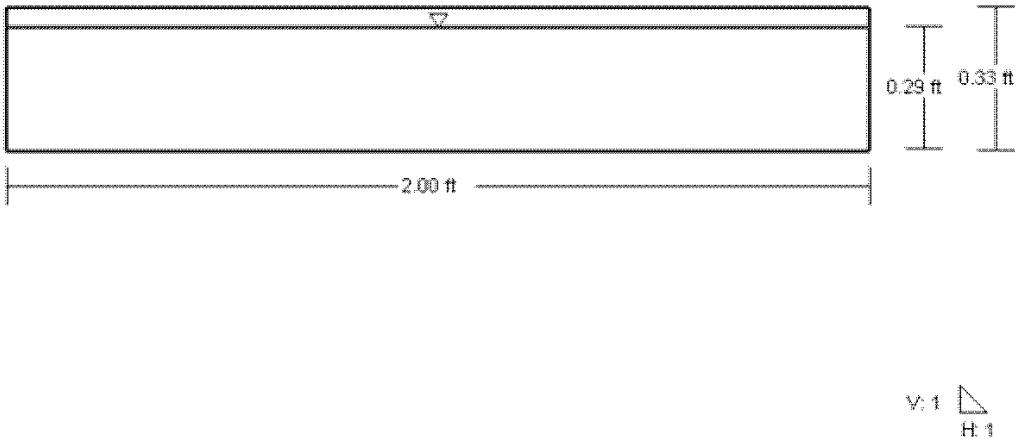
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	0.29	ft
Height	0.33	ft
Bottom Width	2.00	ft
Discharge	3.39	ft^3/s

Cross Section Image



Cross Section for Subarea 2 Parkway Drain

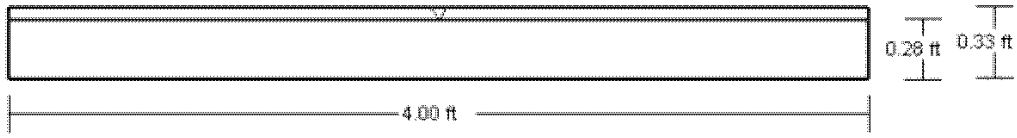
Project Description

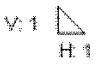
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	0.28	ft
Height	0.33	ft
Bottom Width	4.00	ft
Discharge	6.92	ft^3/s

Cross Section Image





Appendix D
BMP Design Details

ADVANCED DRAINAGE SYSTEMS, INC.

TR 082263 Stonefield - Subarea 1

City of Gardena

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740, SC-310, OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310/SC-740 SYSTEM

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN 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 - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. 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 SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

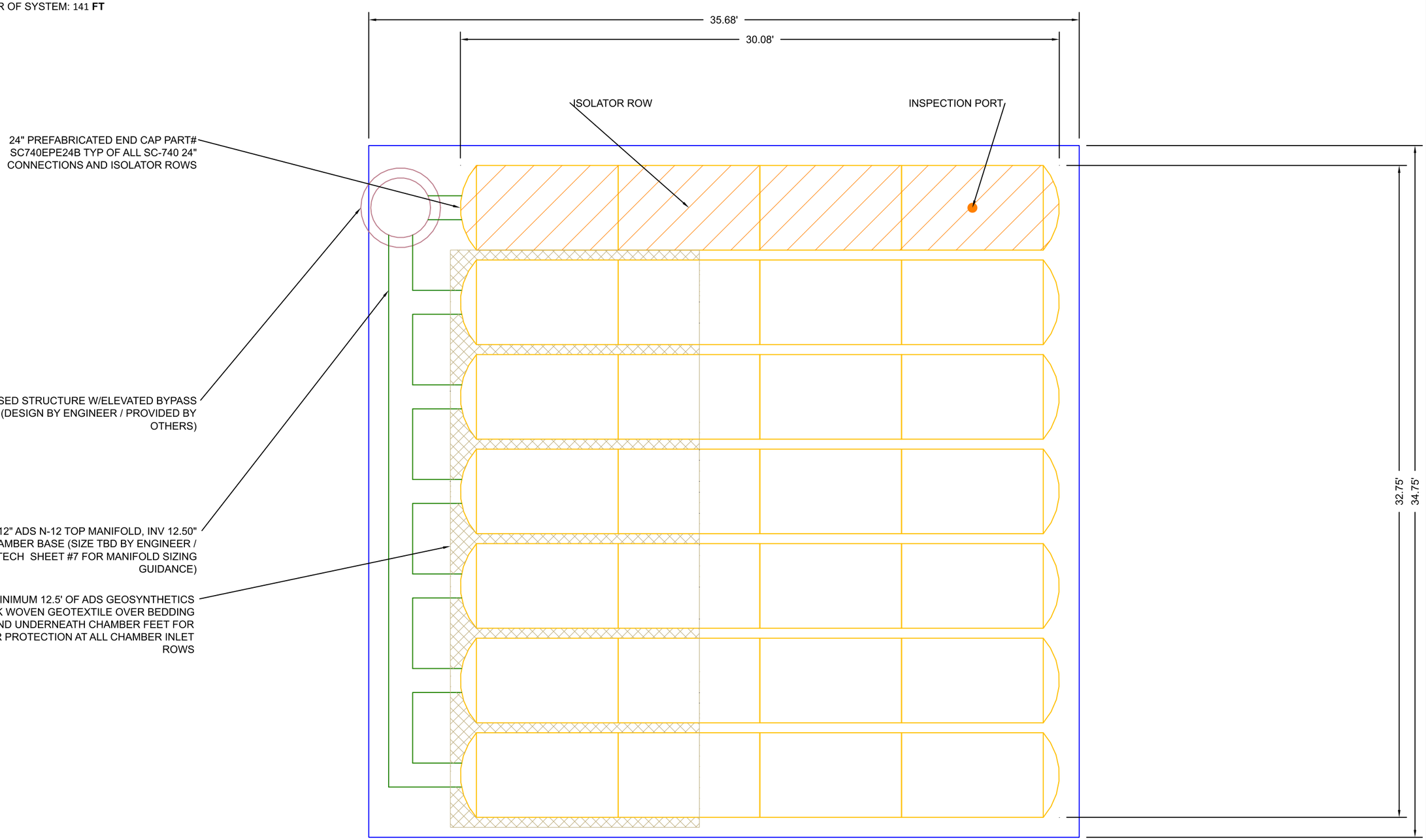
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

CONCEPTUAL LAYOUT

(28) STORMTECH SC-740 CHAMBERS
(14) STORMTECH SC-740 END CAPS
INSTALLED WITH 9 " COVER STONE, 9 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 2756 CF
AREA OF SYSTEM: 1240 **FT²**
PERIMETER OF SYSTEM: 141 **FT**

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



TR 082263 Stonefield - Subarea 1
City of Gardena

DATE: 10/04/2018 | DRAWN: JT | CHECKED: ---
PROJECT #: Tool

REV	DRW	CHK	DESCRIPTION

StormTech®
Detention- Retention- Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 |888-892-2694 | WWW.STORMTECH.COM

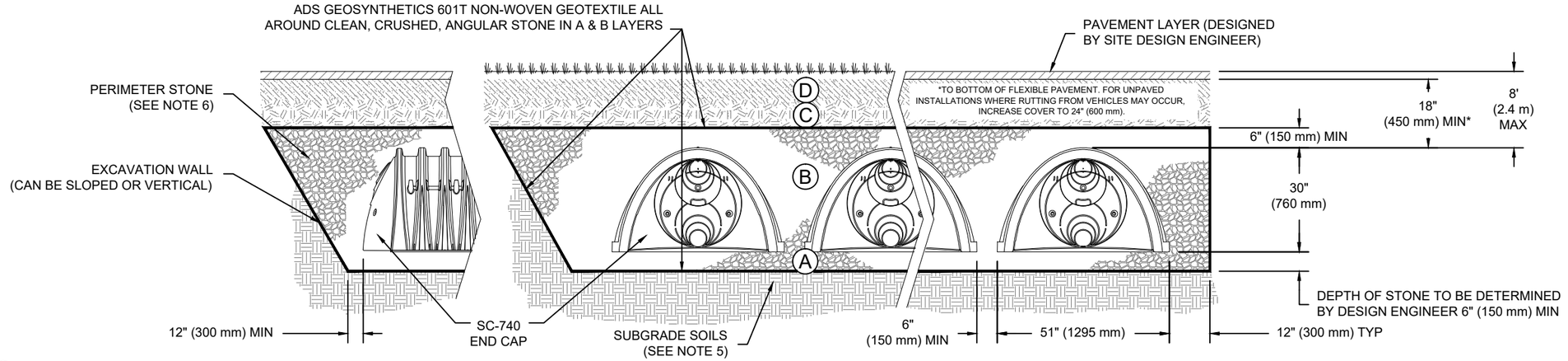
ADS®
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NOT TO SCALE

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 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 18" (450 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 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	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 6" (150 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.



NOTES:

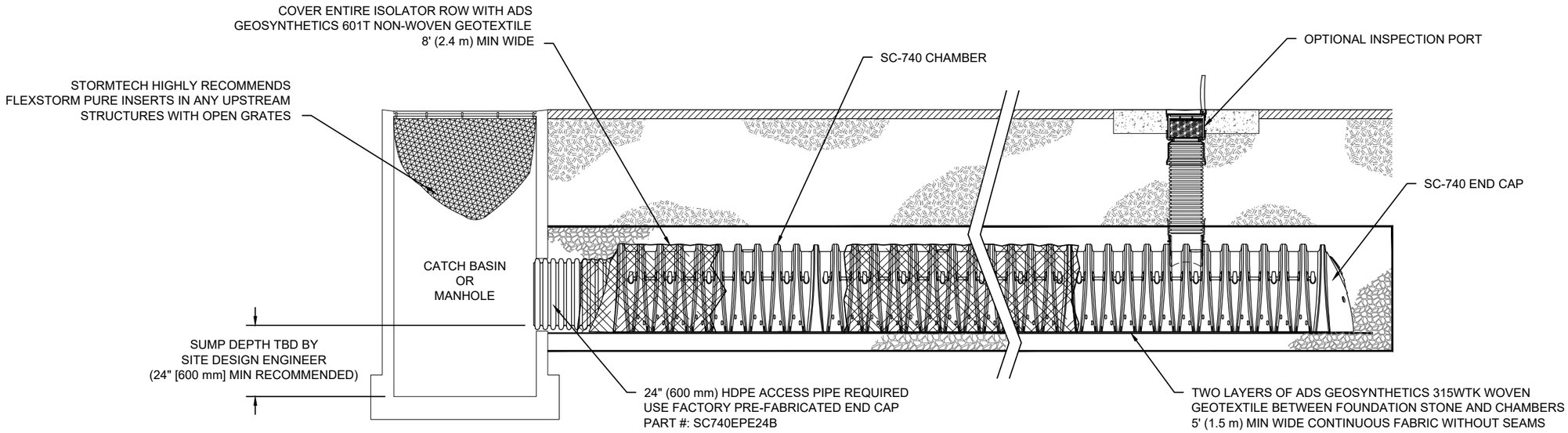
1. SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. 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.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. 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.

TR 082263 Stonefield - Subarea 1
City of Gardena
DATE: 10/04/2018 | DRAWN: JT | CHECKED: ---
PROJECT #: Tool

REV	DRW	CHK	DESCRIPTION

StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | 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



SC-740 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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 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

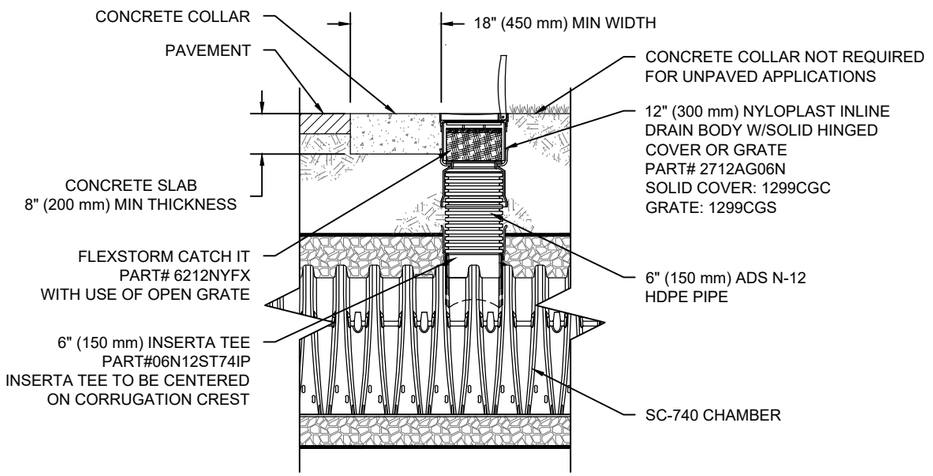
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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.



SC-740 6" INSPECTION PORT DETAIL
NTS

TR 082263 Stonefield - Subarea 1
City of Gardena

DATE: 10/04/2018 | DRAWN: JT | PROJECT #: Tool | CHECKED: ---

REV	DRW	CHK	DESCRIPTION

StormTech
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70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

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HILLIARD, OH 43026
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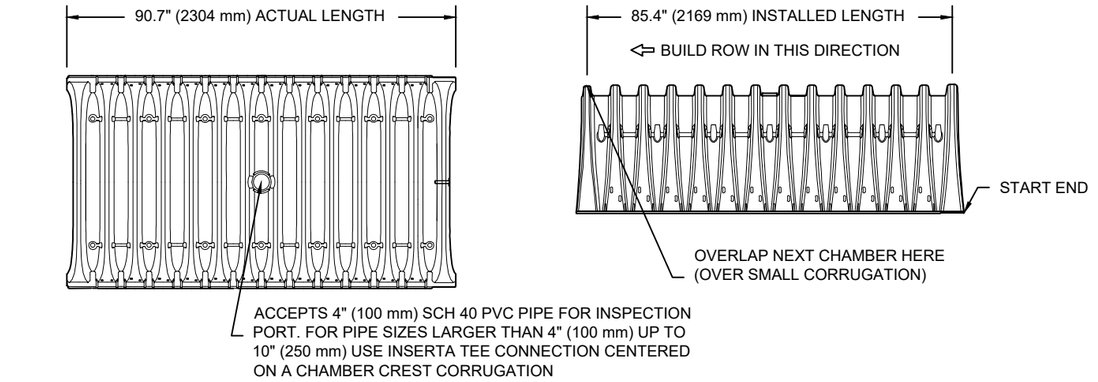
SC-740 TECHNICAL SPECIFICATION

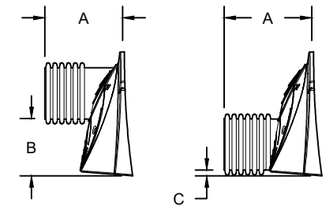
NTS



NOMINAL CHAMBER SPECIFICATIONS

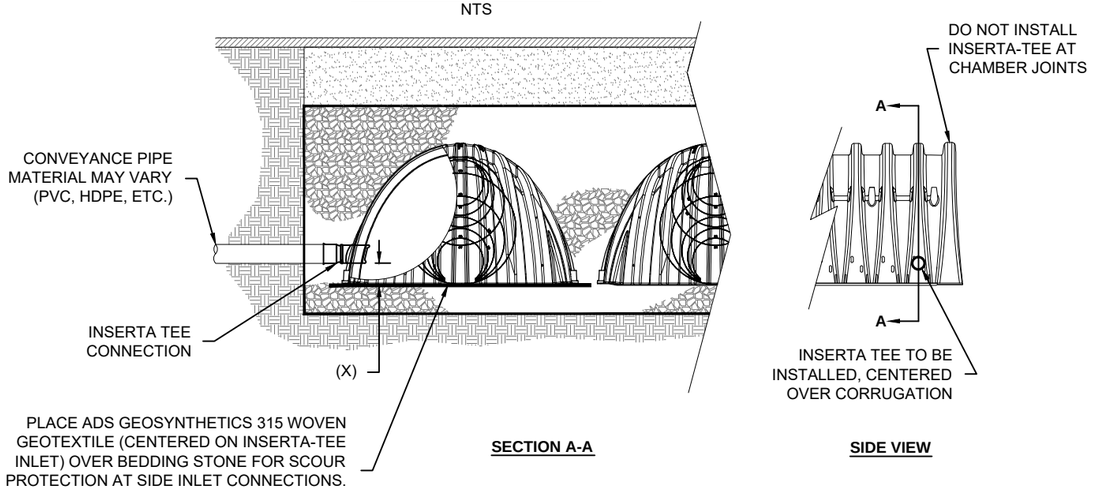
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



INSERTA TEE DETAIL

NTS



SECTION A-A

SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

TR 082263 Stonefield - Subarea 1
City of Gardena

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Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
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HILLIARD, OH 43026
1-800-733-7473

ADVANCED DRAINAGE SYSTEMS, INC.

TR 082263 Stonefield - Subarea 2

City of Gardena

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740, SC-310, OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310/SC-740 SYSTEM

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN 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 - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. 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 SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

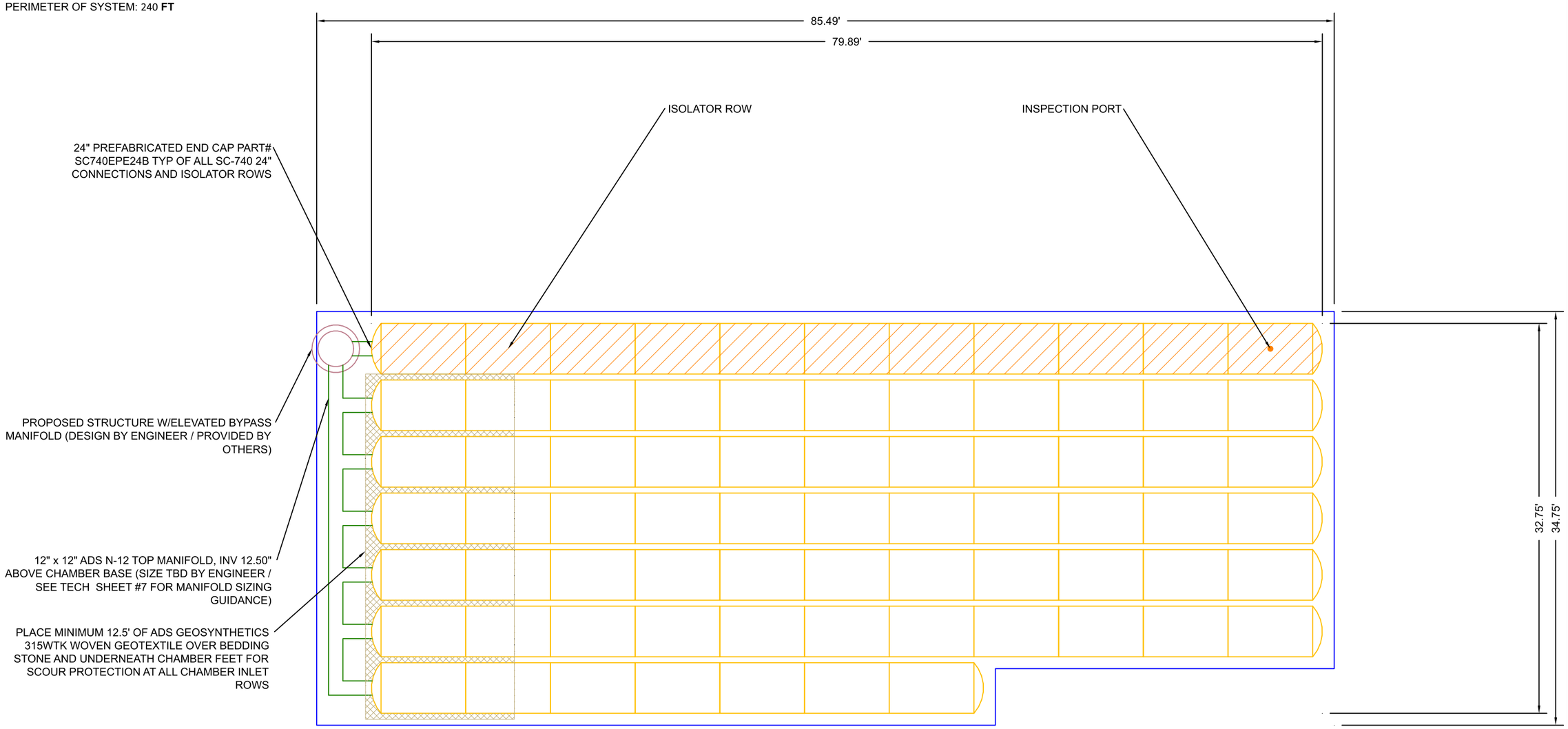
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

CONCEPTUAL LAYOUT

(73) STORMTECH SC-740 CHAMBERS
(14) STORMTECH SC-740 END CAPS
INSTALLED WITH 9 " COVER STONE, 9 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 6550 CF
AREA OF SYSTEM: 2836 **FT²**
PERIMETER OF SYSTEM: 240 **FT**

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



TR 082263 Stonefield - Subarea 2
City of Gardena

DATE: 10/04/2018 | DRAWN: JT | CHECKED: ---
PROJECT #: Tool

REV	DRW	CHK	DESCRIPTION

StormTech®
Detention- Retention- Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 |888-892-2694 | WWW.STORMTECH.COM

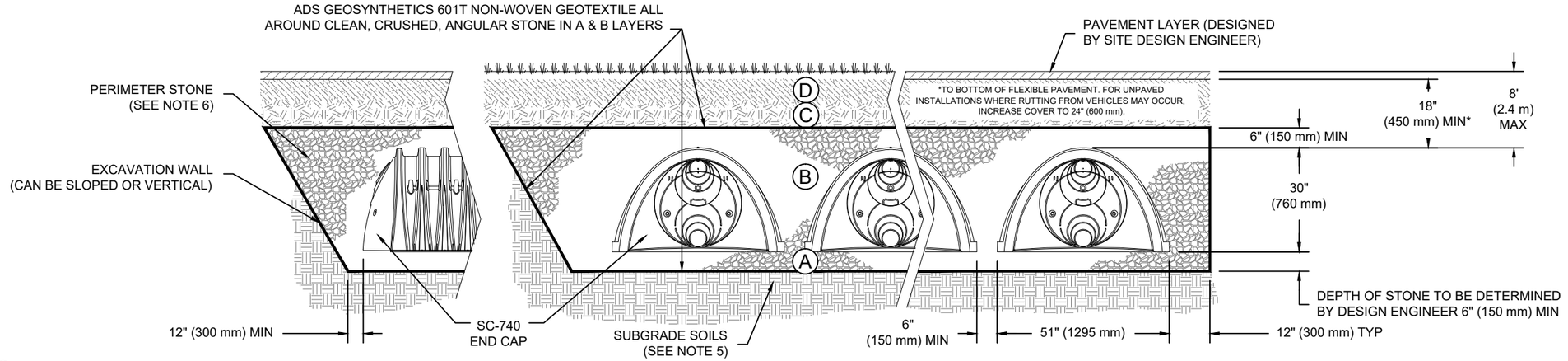
ADS.
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NOT TO SCALE

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 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 18" (450 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 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	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 6" (150 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.



NOTES:

1. SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. 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.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. 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.

TR 082263 Stonefield - Subarea 2
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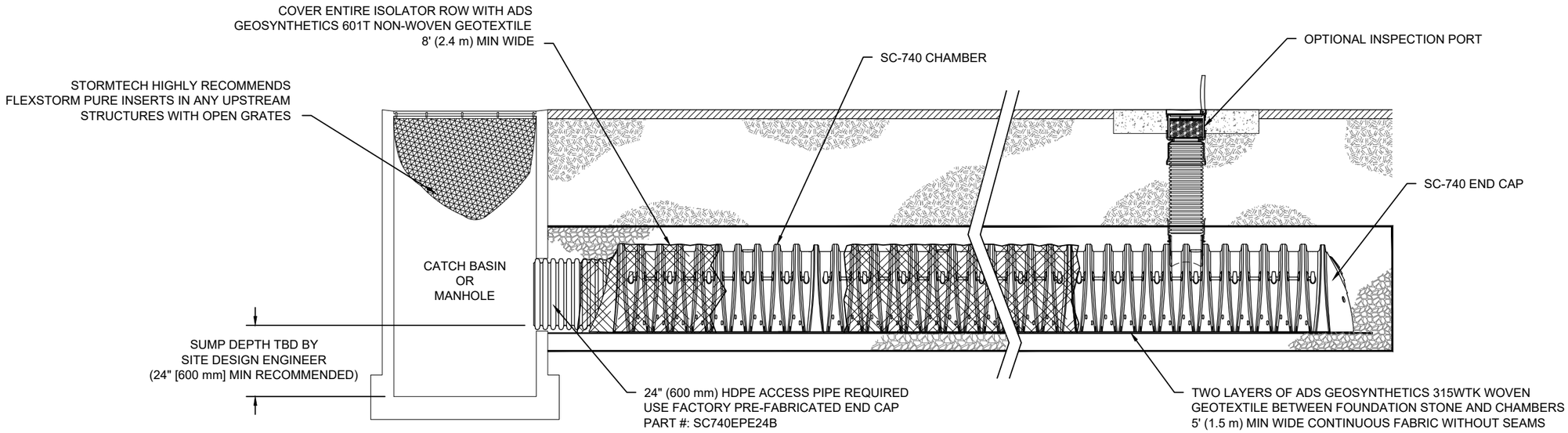


SC-740 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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 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

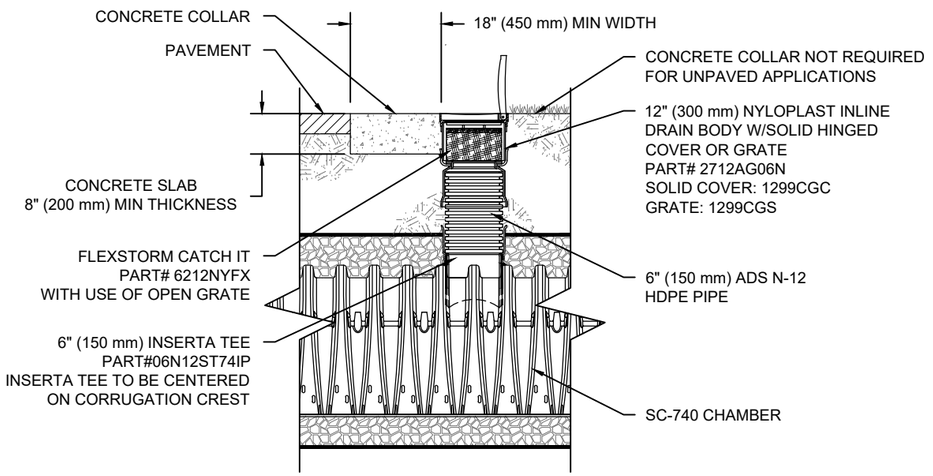
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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.



SC-740 6" INSPECTION PORT DETAIL
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SC-740 TECHNICAL SPECIFICATION

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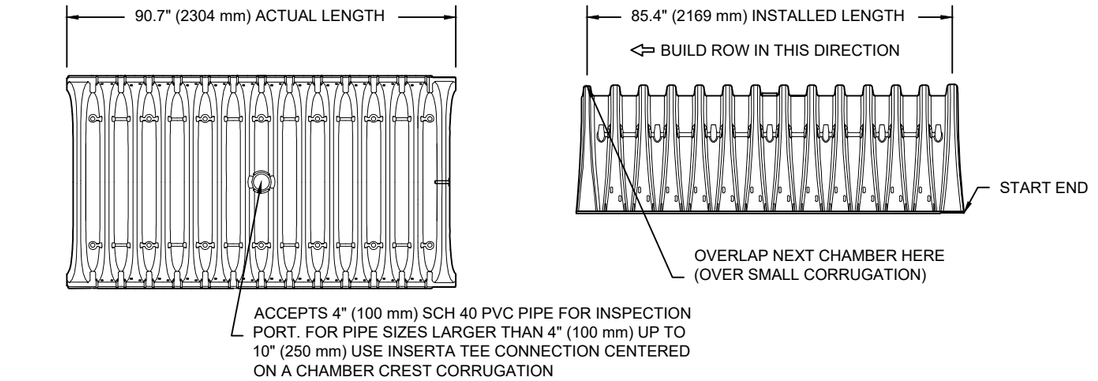
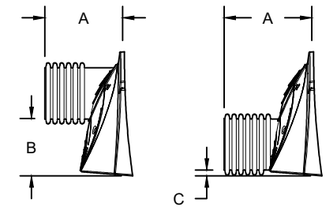


NOMINAL CHAMBER SPECIFICATIONS

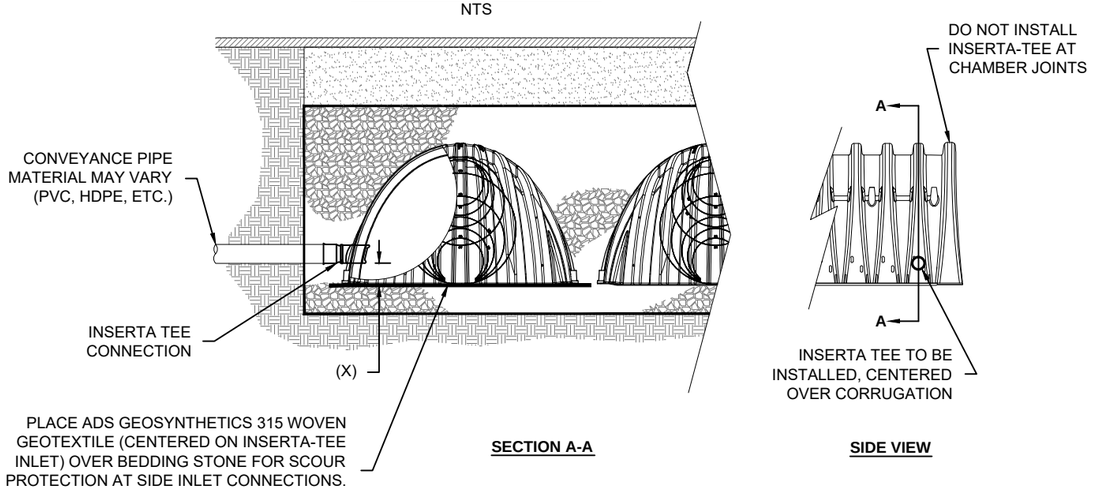
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



INSERTA TEE DETAIL

NTS



SECTION A-A

SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

TR 082263 Stonefield - Subarea 2
City of Gardena

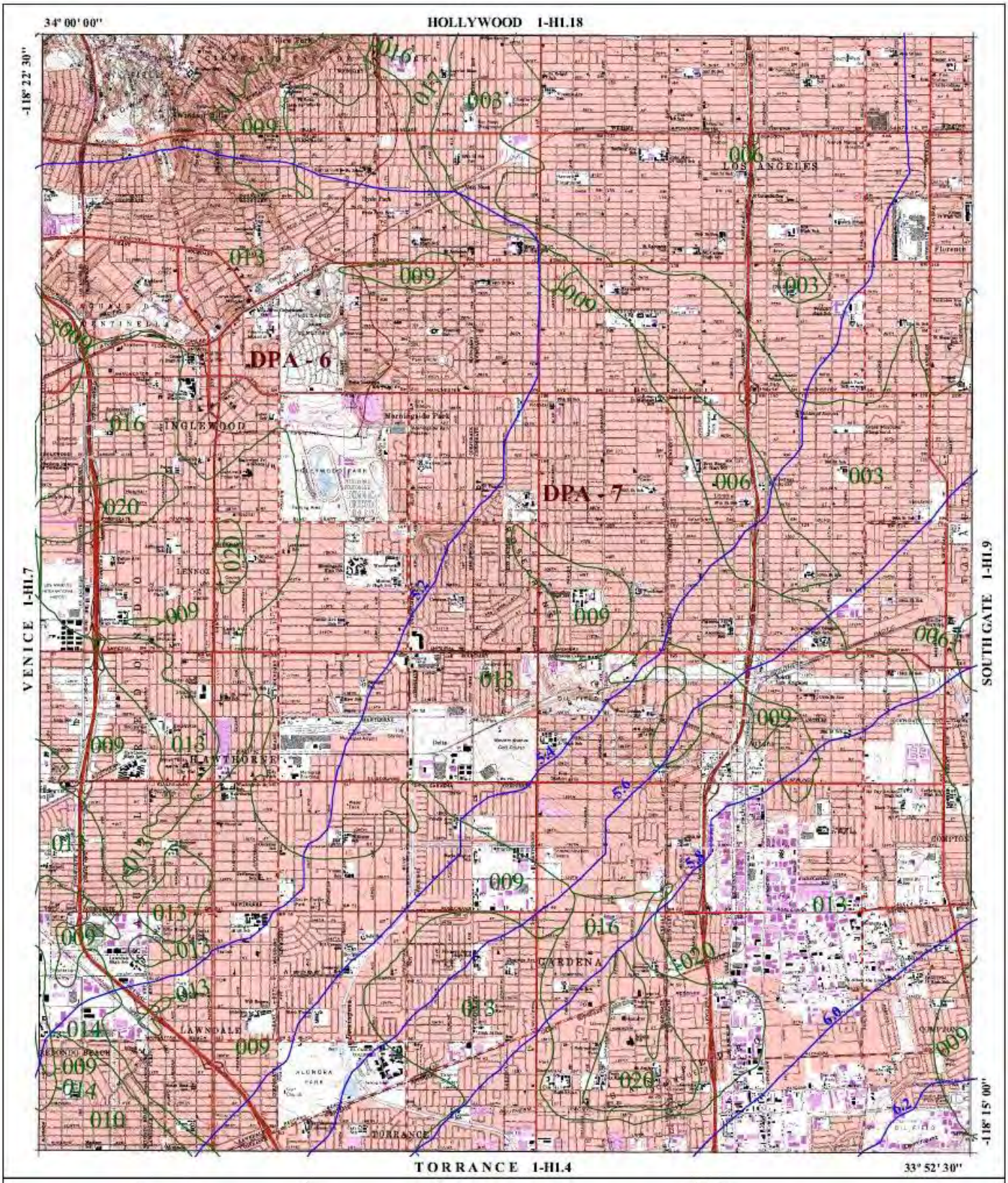
DATE: 10/04/2018 | DRAWN: JT | CHECKED: ---
PROJECT #: Tool

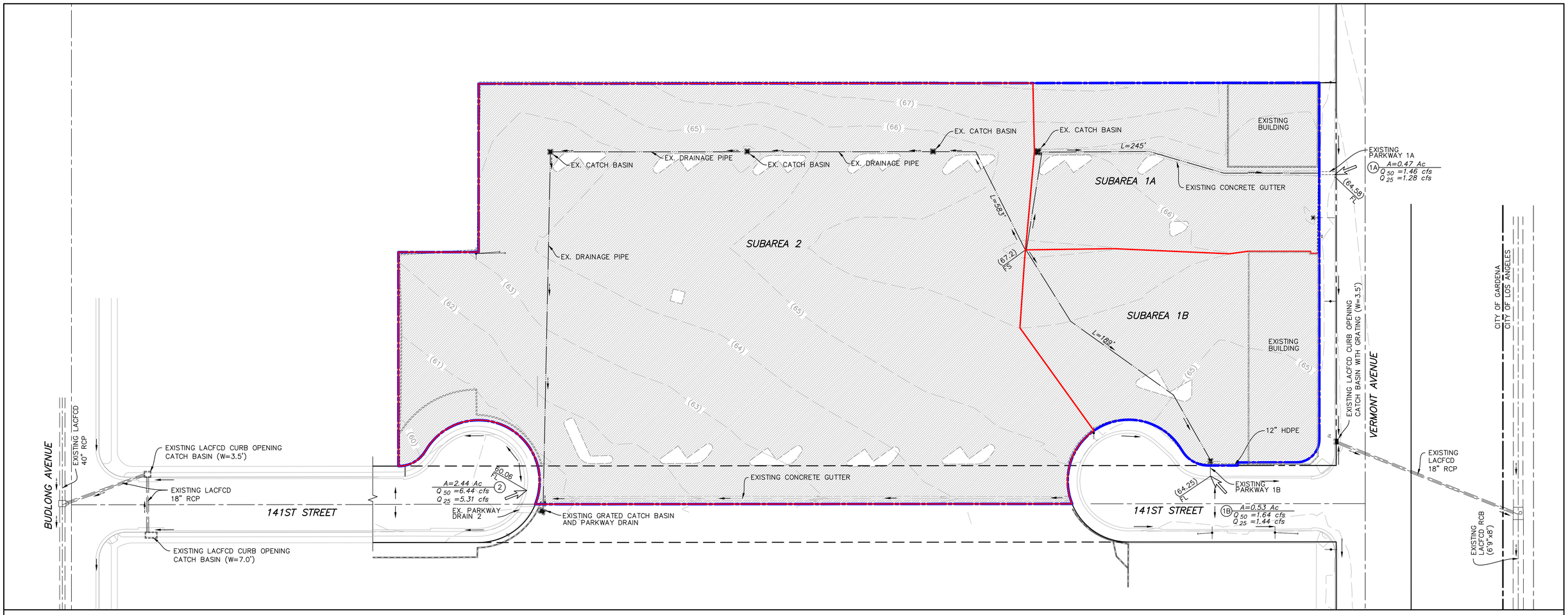
REV	DRW	CHK	DESCRIPTION

StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | 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

Appendix E
Referenced Material


34° 00' 00"
HOLLYWOOD 1-H1.18
-118° 22' 30"
VENICE 1-H1.7
SOUTH GATE 1-H1.9
-118° 15' 00"
TORRANCE 1-H1.4
33° 52' 30"
DPA - 6
DPA - 7
INGLEWOOD
LOS ANGELES
HAWTHORNE
LAWNDALE
GARDENA
TORRANCE
016
SOIL CLASSIFICATION AREA
7.2
INCHES OF RAINFALL
DPA - 6
DEBRIS POTENTIAL AREA
N
S
E
W
1 0 1 2 Miles
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
INGLEWOOD
50-YEAR 24-HOUR ISOHYET
1-H1.8
LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works



LEGEND

- STUDY AREA BOUNDARY
- EXISTING SUBAREA BOUNDARY
- EXISTING FLOW PATH
- (65) EXISTING CONTOUR
- EXISTING IMPERVIOUS AREA
- L=583' FLOW LENGTH
- POINT OF CONCENTRATION
- EXISTING SURFACE FLOW DIRECTION
- EXISTING PIPE FLOW DIRECTION
- (1) SUBAREA CONCENTRATION POINT

N

GRAPHIC SCALE 1"= 30'

0 30 60 90 120

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:

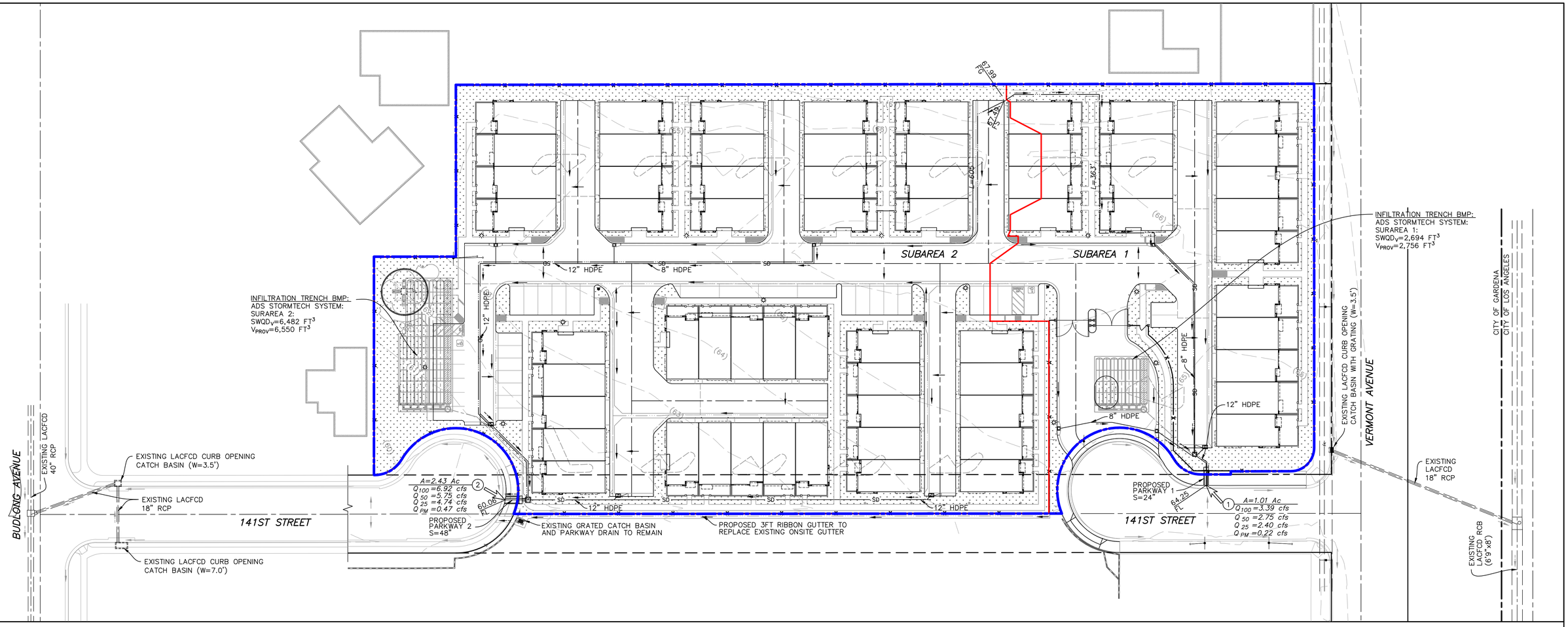
ARET BINATLI, P.E. R.C.E. 64448 DATE

Drawing Title:
Figure 2
TRACT 082263
PRE DEVELOPED CONDITION HYDROLOGY MAP

Prepared for:
KB HOME
25152 SPRINGFIELD CT, STE 180
VALENCIA, CA 91355
(661) 219-6843

Work Order	18006
Date:	6/15/2018
Scale:	1"= 30'
Designed:	JT
Drawn:	JT
Checked:	AB
Sheet	1 of 1 Sheets

Drawing Name: L:\18006\Eng\Final Plots\Hydrology\02_18006d.dwg
Last Opened: Jun 15, 2018 - 4:11pm by Joel



LEGEND

- STUDY AREA BOUNDARY
- PROPOSED SUBAREA BOUNDARY
- PROPOSED FLOW PATH
- SD — UNDERGROUND STORM DRAIN PIPE
- (65) — EXISTING CONTOURS
- PROPOSED PERVIOUS AREA
- L=605' — FLOW LENGTH
- POINT OF CONCENTRATION
- PROPOSED SURFACE (PIPE) FLOW DIRECTION
- PROPOSED PIPE FLOW DIRECTION
- EXISTING SURFACE FLOW DIRECTION
- EXISTING PIPE FLOW DIRECTION
- (1) SUBAREA CONCENTRATION POINT

N

GRAPHIC SCALE 1"= 30'
0 30 60 90 120

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
TRACT 082263
DEVELOPED CONDITION HYDROLOGY MAP

Prepared for:
KB HOME
25152 SPRINGFIELD CT, STE 180
VALENCIA, CA 91355
(661) 219-6843

Work Order	18006
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Designed:	JT
Drawn:	JT
Checked:	AB
Sheet	1 of 1 Sheets

Drawing Name: L:\18006\Eng\Final Plots\Hydrology\03_18006.dwg
Last Opened: Oct 04, 2018 - 5:46pm by Joel

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.

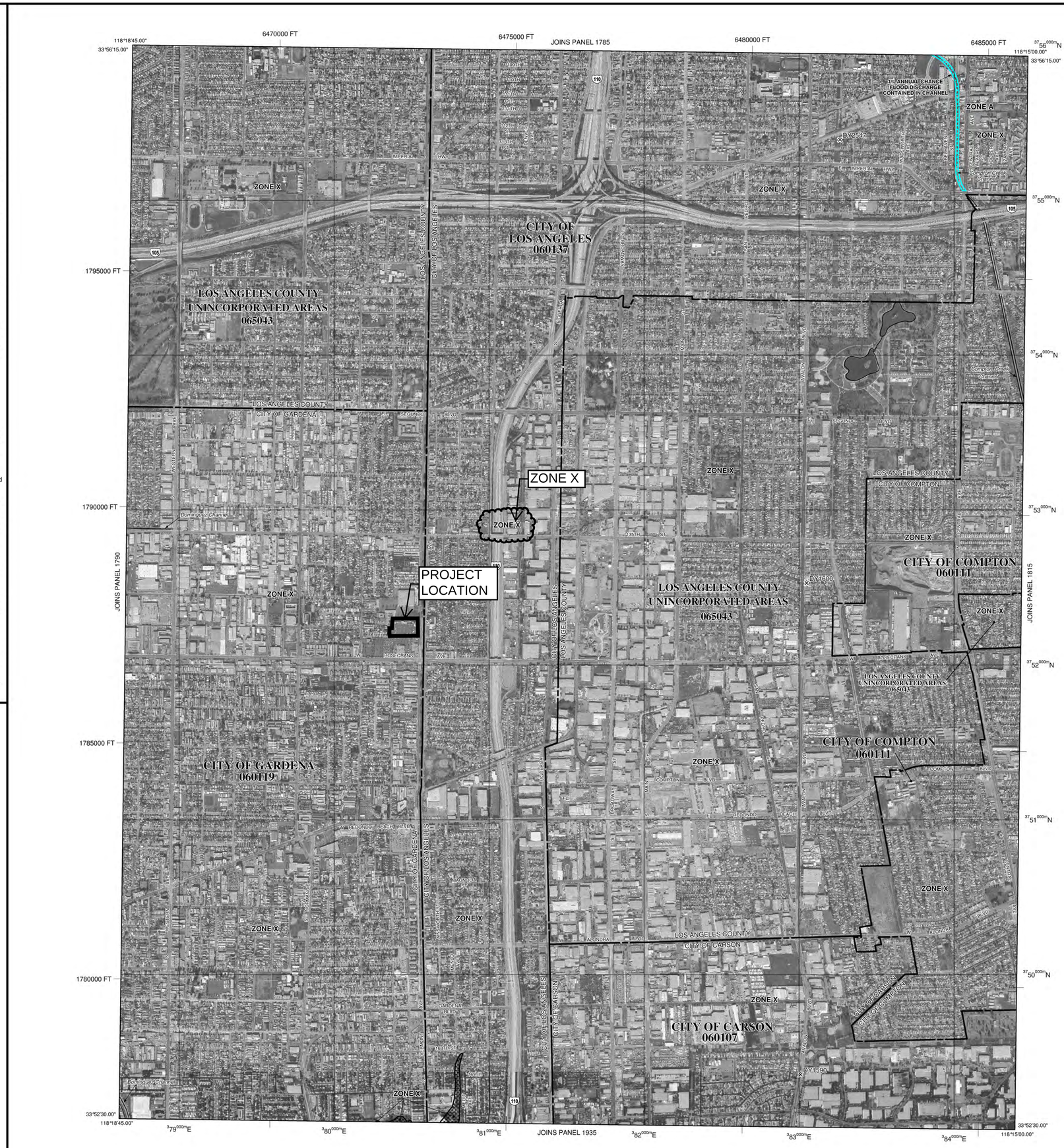
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, 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 1795F

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

PANEL 1795 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1795	F
CARSON, CITY OF	060107	1795	F
COMPTON, CITY OF	060111	1795	F
GARDENA, CITY OF	060119	1795	F
LOS ANGELES, CITY OF	060137	1795	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
06037C1795F
EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

FORMA ENGINEERING, INC.
400 San Fernando Mission Blvd. Suite 200
San Fernando, CA 91340
(818) 832-1710

Tract 082263, Stonefield 63
140031 S. Vermont Ave. & 1017 W. 141st St., Gardena, CA 90247
PCC 1 RESPONSES: Preliminary Hydrology & LID Report Peer Review

October 5, 2018

To: Kimley-Horn and Associates, Inc

Attn: Timothy Brown

From: Joel Thompson
(818) 832-1710 ext. 103
jthompson@formaeng.com

Re: Preliminary Hydrology & LID Report, Tract 082263

Plan Check Number: 1 Date: 9/17/2018

The following items address the plan review comments received from Kimley Horn and Associates, Inc. Responses to all corections to affected Report and Exhibits are addressed below.

Low Impact Development		
ITEM NO.	**REPORT PG. NO.**	**DESCRIPTION:**
1	7-10, Appendix D,	Sections 3.4-3.6 for feasibility screening for LID BMP selection has been expanded to provide detailed design and sizing for infiltration using minimum feasible infiltration rates. Language updated for alternate BMPs if infiltration determined to be not feasible during detail design.
	Appendix E (Fig 3)	Fig 3, Post Development Hydrology Exhibit updated to include LID BMPs, and subsurface (pipe) flows.

State CEQA Guidelines		
ITEM NO.	**REPORT PG. NO.**	**DESCRIPTION:**
2	5, Appendix C, Appendix E	Flood Hazards discussion added as section 2.5 . Parkway drain sizing for 100 yr event to protect pads from 100 year event. See Parking Sizing and Details Appendix C and Hydrology Exhibit, Fig 3 App. E

Recommendations		
ITEM NO.	**REPORT PG. NO.**	**DESCRIPTION:**
3	Appendix E	See Preliminary Geotechnical Report attached to report. Preliminary explorations did not include infiltration testing. Design for infiltration based on findings from soils report and LA County minimum Guidelines.

Kimley»Horn

MEMORANDUM

To:	Mr. Ray Barragan & Ms. Lisa Kranitz City of Gardena
From:	Timothy Brown Kimley-Horn and Associates, Inc.
Date:	9/17/2018 Revised: 10/22/2018
Subject:	**Preliminary Hydrology & LID Report, Tract 082263, Stonecrest, in the City of Gardena Peer Review**

INTRODUCTION

This memorandum is prepared to present the findings and recommendations resulting from a review of the Preliminary Hydrology & LID Report (Report) prepared by Forma Engineering Inc. and dated June 2018 and October 4, 2018.

The purpose of this review is to assess the appropriateness and thoroughness of the Report's methodology and analysis, and to determine if the Report adequately addresses Project compliance with the State CEQA Guidelines. Locally, Los Angeles County has implemented the LID program to address CEQA requirements. The Report will be evaluated to verify compliance with local LID and State CEQA Guidelines requirements.

Existing Drainage Characteristics

The findings on existing drainage characteristics presented in the Report appear consistent with topography and storm drain system maps obtained from the Los Angeles County Department of Public Works and available imagery. Drainage area measurements appear to be accurate. The Report provides an adequate description of existing drainage patterns. No Report revisions are required.

Post-Developed Drainage Characteristics

The Report describes that overall site drainage patterns remain largely the same as the pre-developed condition with some minor changes. The post-developed drainage description is adequate, no revision is required.

Hydrology Methodology

The hydrology analysis used is consistent with guidance provided by the Los Angeles County Hydrology Manual. Modified Rational Method was used to calculate pre-development and post-development runoff totals. Calculations were performed with HydroCalc software and program output is included in the Report. The methodology is adequate, no revision is required.

Low Impact Development

The Report provides a Stormwater Quality Design flowrate and a Stormwater Quality Design Volume (SWQDV) to be mitigated. The report satisfies feasibility screening guidelines per the LA County Low Impact Development manual and proposes an underground infiltration system to treat the mitigated volume. As infiltration testing has not been completed at the time of the report, the design of the proposed infiltration system is based on the minimum feasible infiltration rate per county guidelines. (An initial Geotechnical Investigation (i.e., *Geotechnical Investigation Lady Luck Property, West 141st Street, Gardena, California* (RMA GeoScience, April 19, 2018)) (Geotechnical Investigation) has been prepared for the Project- the Report recommends use of infiltration if possible, pending site geotechnical analysis). Volume calculations, BMP sizing, and conceptual layout have been adequately completed based on these initial assumptions. No report revision is required.

CEQA Guidelines

The following is a review of the report's adequacy in addressing questions related to the California Environmental Quality Act:

Does the project violate any water quality standards or waste discharge requirements?

Does the project otherwise substantially degrade water quality?

Urban stormwater runoff is covered under the municipal permit for Los Angeles County, the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (MS4) Permit for stormwater and non-stormwater discharges from the MS4 within the Coastal Watershed of Los Angeles County (CAS004001, Order No. R4-2012-0175). Los Angeles

County uses its Low Impact Development ordinance to ensure projects comply with NPDES MS4 permit water quality requirements.

Waste discharge requirements are not discussed specifically in the report, but federal NPDES requirements are addressed through the Los Angeles County Low impact development ordinance.

This report provides a stormwater quality design volume that should be mitigated, and presents a suitable plan to satisfy LID requirements. No report revision is required.

Does the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

The Report concludes that the proposed drainage pattern on the developed site remains generally the same. Stormwater runoff from the site drains into concrete structures that are resistant to erosion or siltation. No Report revisions are required.

Does the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The Report compares the pre-development and post-development site runoff conditions. Overall, the runoff volume decreases in the post-development condition. The report addresses proposed project runoff adequately, no revisions are required.

Does the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

Does the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

The report adequately addresses flood hazards. The Project site is in Zone X, area of minimal flood risk, FIRM Panel 06037C1795F is attached to report (Appendix E). No report revisions are required.

Does the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

The report includes a discussion of nearby flood control structures or potential exposure to flooding from inundation. The Project site is not immediately downstream of any flood control structures or behind any levees. No Report revisions are required.

Recommendations

If necessary, LID calculations and BMP design should be updated pending infiltration results from further geotechnical testing. Final geotechnical investigation results should contain discussion about site's suitability for infiltration and minimum setback requirements for infiltration facilities, per LADBS P/BC 2017-118.

Appendix H

Noise Studies

Noise Study

Lady Luck, 63 Units Project (Gardena)

prepared for
KB Home
25152 Springfield Court, Suite 180
Valencia, California 91355
Contact: David Lelie, LEED AP, Forward Planning

prepared by
Rincon Consultants, Inc.
250 East 1st Street, Suite 301
Los Angeles, California 90012

October 2018

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers
www.rinconconsultants.com

Table of Contents

Tables

Figures

Appendices

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1 Project Description

1.1 Introduction

This study is an analysis of the potential construction and operational noise impacts of the proposed Lady Luck, 63 Units Project (Gardena) located at 1017 W. 141st Street in the City of Gardena, California. Rincon Consultants, Inc. prepared this study under contract to KB Home.

1.2 Project Summary

The following describes the project background and the proposed project, as well as the analytical approach taken to complete the noise study.

Project Background

The project site is located at 1017 W. 141st Street. The site is currently developed with a paved surface parking lot and approximately six ancillary structures/storage associated with the Larry Flynt's Lucky Lady Casino, located south of the project site. The project site vicinity is shown in Figure 1 and site photos of the project site and vicinity are shown in Figure 2.

Current Proposal

The proposed project would involve demolition of existing structures on the site, including a surface parking lot and two warehouse/storage buildings along the eastern boundary of the site, and construction of 63 condominium residential units, with internal roadways with vehicular access from S. Vermont Avenue. Each condominium unit is proposed with an uncovered patio. The proposed preliminary site plan is shown Figure 3.

Figure 1 Project Site Vicinity

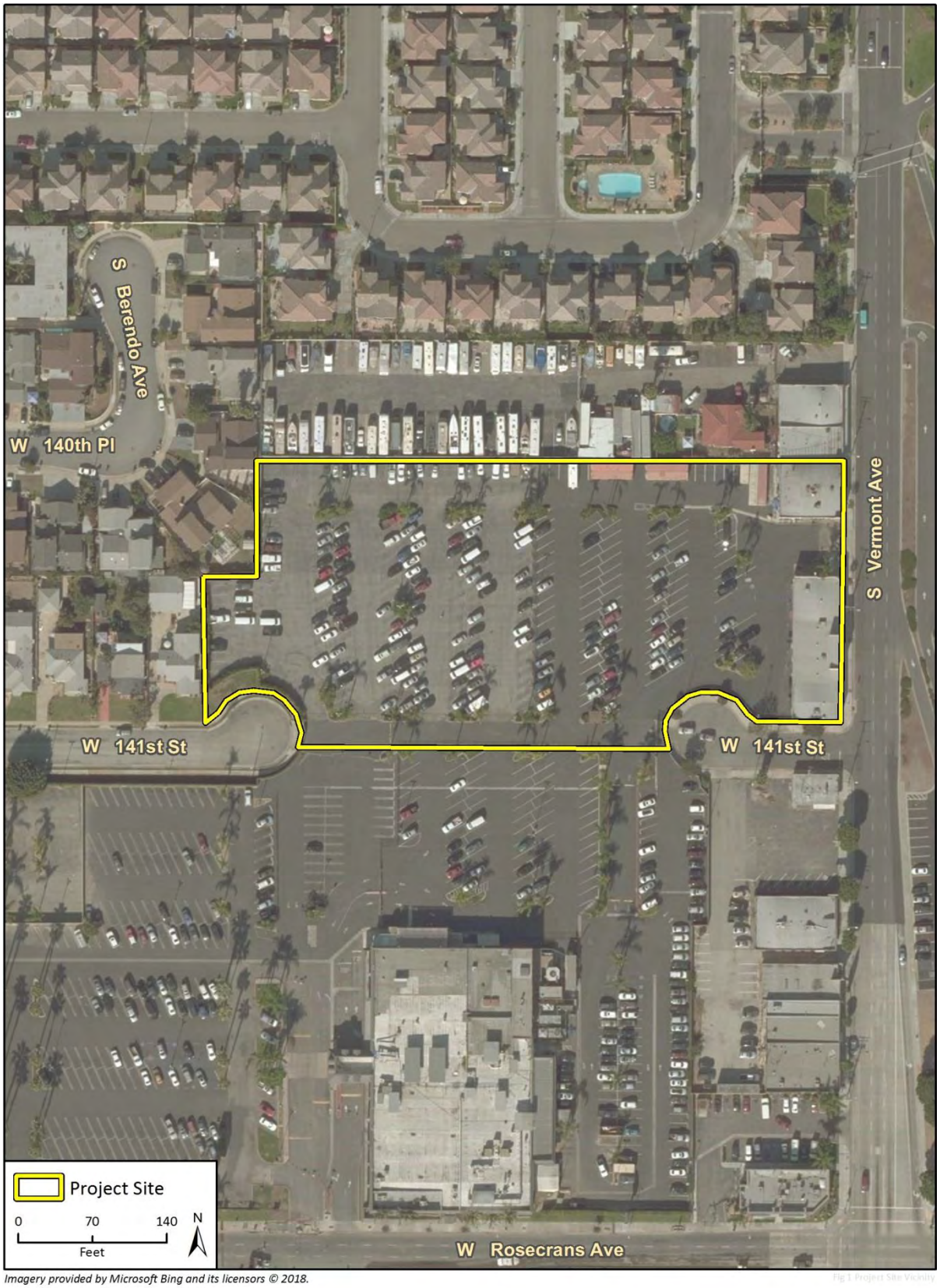

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Figure 2 Site Photos

Photograph A: View of existing security gate at the southwestern boundary of the project site.

Photograph B: View of the adjacent single-family residences northwest of the project site.

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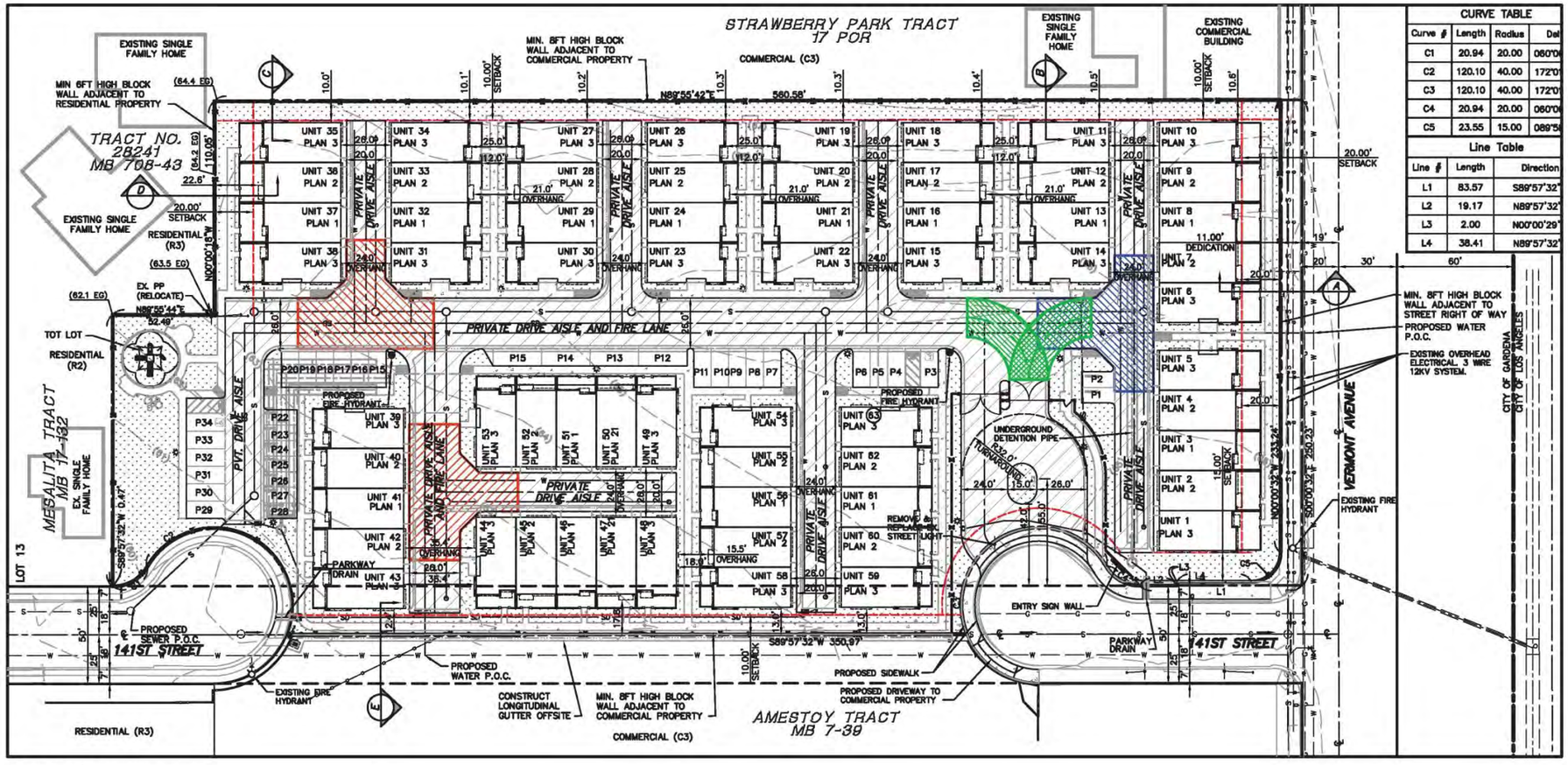
Figure 3 Preliminary Site Plan



Source: FORMA Engineering, 2018

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2 Background

2.1 Overview of Sound Measurement

Noise is defined as unwanted sound that disturbs human activity. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the ambient noise level to be judged as twice as loud. In general, a 3 dBA change in the ambient noise level is noticeable, while 1-2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while areas adjacent to arterial streets are typically in the 50-60+ dBA range. Normal conversational levels are usually in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels from point sources, such as those from individual pieces of machinery, typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from the noise source. Noise levels from lightly traveled roads typically attenuate at a rate of about 4.5 dBA per doubling of distance. Noise levels from heavily traveled roads typically attenuate at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces noise levels by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA (Federal Transit Administration [FTA] 2006). The manner in which homes in California are constructed generally provides a reduction of exterior-to-interior noise levels of approximately 20 to 25 dBA with closed windows (FTA 2006).

In addition to the instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest root mean squared (RMS) sound pressure level within the measurement period, and Lmin is the lowest RMS sound pressure level within the measurement period.

The time period in which noise occurs is also important since nighttime noise tends to disturb people more than daytime noise. Community noise is usually measured using the Day-Night Average Level (Ldn/DNL), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7:00 p.m. to

10:00 p.m. and a 10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. Noise levels described by Ldn and CNEL typically do not differ by more than 1 dBA. In practice, CNEL and Ldn are often used interchangeably. The relationship between peak hourly Leq values and associated Ldn or CNEL values depends on the distribution of traffic over the entire day. There is no precise way to convert a peak hourly Leq to Ldn or CNEL. However, in urban areas near heavy traffic, the peak hourly Leq is typically 2-4 dBA lower than the daily Ldn/CNEL (California State Water Resources Control Board [SWRCB] 1999).

2.2 Existing Noise Levels in the Site Vicinity

The most common and primary existing sources of noise in the project site vicinity are motor vehicles (i.e., automobiles and trucks) along S. Vermont Avenue and W. Rosecrans Avenue. Motor vehicle noise is of concern because it is characterized by a high number of individual events, which often create a sustained noise level, and because of its proximity to noise-sensitive uses. Additional sources of noise in the project site vicinity include activities associated with adjacent residential, retail, and commercial uses, including delivery trucks, landscaping equipment, and general conversations. Existing sources of noise on the project site are from vehicles parking and driving to and from the lot and general conversations.

In order to determine existing noise levels at the project site, three 15-minute noise measurements (Leq [15] dBA) were taken near the project site using an ANSI Type II integrating sound level meter on April 5, 2018. These measurements were taken between 4:00 p.m. and 6:00 p.m. to capture ambient noise levels at the project site and at surrounding noise-sensitive receptors during the PM peak hour traffic period. Measurement Location 1 is located adjacent to the southwestern boundary of the project site, near the existing cul-de-sac at W. 141st Street to capture ambient noise experienced by adjacent residences that are nearest the project site. This measurement is representative of the estimated peak ambient noise level to which future residences would be exposed along the western boundary of the project site. Measurement Location 2 is located adjacent to residences at the intersection of 140th Place and Berendo Avenue, northwest of the project site. This measurement location is furthest from the arterial roadways near the project site, W. Rosecrans Avenue and S. Vermont Avenue. Measurement Location 3 is approximately 160 feet east of the project site, across S. Vermont Avenue. This measurement is representative of the estimated ambient noise levels to which future residences would be exposed along the eastern boundary of the project site. The noise monitoring results are summarized in Table 1 and noise measurement locations are shown in Figure 4.

Figure 4 Noise Measurement and Sensitive Receptor Locations

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Table 1 Noise Level Measurement Results

Measurement and Location Number	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source	Leq[15] (dBA)[1]	Lmax (dBA)
1	W. 141st Street Cul-de-sac	4:36 p.m. – 4:51 p.m.	500 feet[2] 700 feet[3]	50.4	61.6
2	Corner of Berendo Avenue and 140th Place	5:29 p.m. – 5:44 p.m.	750 feet[2] 750 feet[3]	60.7	79.6
3	S. Vermont Avenue	5:52 p.m. – 6:07 p.m.	75 feet[3]	70.0	85.2

See Appendix A for noise monitoring data

See Figure 4 for a map of Noise Measurement Locations

[1] The equivalent noise level (Leq) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For this measurement, the Leq was over a 15-minute period (Leq[15]).

[2]Distance to centerline of W. Rosecrans Avenue

[3]Distance to centerline of S. Vermont Avenue

Source: Rincon Consultants, field measurements on April 5, 2018, using ANSI Type II Integrating sound level meter

The differences among measured noise levels shown in Table 1 are generally due to the attenuating effects of distance and structural obstacles on noise as it propagates from the source, combined with the additive properties of noise converging from multiple sources. For example, Measurement Location 2 has the lowest ambient noise level because it is located within an existing neighborhood with no through street, where residences block line-of-sight to nearby arterial roadways. By contrast, Measurement Location 3 is directly exposed to traffic noise from an adjacent arterial roadway, S. Vermont Avenue. As shown in Table 1, measured noise data indicates that noise levels are lower within the existing neighborhoods than along S. Vermont Avenue.

2.3 Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with each of these uses. Potentially sensitive land uses in Gardena include uses that have associated human activities that may be subject to stress or significant interference from noise. These include residences (including residences for the elderly), transient lodging (e.g., motels and hotels), schools, churches, and libraries. The predominant noise-sensitive land uses in the City are residential areas.

The neighborhood surrounding the project site is characterized by a mix of commercial, retail, and residential uses. Figure 4 shows the existing noise-sensitive receptors closest to the project site, including existing single-family residences a minimum of 25 feet west of the project site, a church approximately 400 feet west of the project site, a church approximately 40 feet south of the project site, single-family residences across S. Vermont Avenue a minimum of 400 feet to the east, single-family residences approximately 100 feet north of the project site, a motel (Sea Rock Inn) located approximately 200 feet east of the project site, a nursing facility located approximately 700 feet south of the project site, multi-family residences located approximately 700 feet southwest of the project site, and single-family residences located approximately 800 feet southeast of the project site.

2.4 Fundamentals of Ground-borne Vibration

Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called ground-borne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the United States, is referenced as vibration decibels (VdB).

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. According to the FTA *Transit Noise and Vibration Impact Assessment*, a vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

The general human response to different levels of ground-borne vibration velocity levels is described in Table 2.

Table 2 Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many humans.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: FTA 2006

2.5 Regulatory Setting

2.5.1 City of Gardena General Plan Community Safety Element, Noise Plan

The City of Gardena General Plan (2006) sets noise policies in the Community Safety Element. These policies address transportation noise sources, non-transportation noise impacts, and policies to incorporate noise considerations into land use planning decisions. Table 3 shows the City's noise compatibility guidelines for various land uses.

Table 3 Noise and Land Use Compatibility Matrix

Land Use Categories	Community Noise Equivalent Levels (CNEL, dBA)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential (Single-Family, Multi-Family, Duplex)	50-60	60-65	65-75	75-85
Residential (Mobile Homes)	50-60	60-65	65-75	75-85
Transient Lodging (Motels, Hotels)	50-60	60-70	70-80	80-85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-65	65-75	75-85
Auditoriums, Concert Halls, Amphitheaters, Meeting Halls	N/A	50-60	60-70	70-85
Sports Arenas, Outdoor Spectator Sports, Amusement Parks	50-65	65-75	N/A	75-85
Playgrounds, Neighborhood Parks	50-65	65-70	70-75	75-85
Golf Courses, Riding Stables, Cemeteries	50-70	70-75	75-85	N/A
Office Buildings and Professional Buildings	50-65	65-75	75-80	80-85
Commercial Retail, Banks, Restaurants, Theaters	50-70	70-80	80-85	N/A
Industrial, Manufacturing, Utilities, Wholesale, Service Stations	50-70	70-85	N/A	N/A
Agriculture	50-85	N/A	N/A	N/A

Notes: CNEL = Community Noise Equivalent Level, dBA = A-weighted sound pressure level

[1]Normally Acceptable: Specified land uses is satisfactory based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[2]Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

[3]Normally Unacceptable: New construction or development should generally be discouraged. If it does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

[4]Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: City of Gardena 2006

2.5.2 City of Gardena Municipal Code

Sections 8.36.040 and 8.36.050 of the City of Gardena Municipal Code state the exterior and interior noise standards for the City in terms of Leq(15) and Lmax. The allowable noise levels at land uses receiving noise are summarized in Table 4 below. Also, Section 8.36.050(C) states that if the ambient noise level exceeds the noise standard, then the ambient noise level shall become the noise standard. Lastly, Section 8.36.080(G) states that noise associated with construction, repair, remodeling, grading or demolition between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday are exempt from these noise standards. In addition, Section 8.36.070 prohibits the operation of a device that generates vibration which is above the perception threshold of an individual at or beyond the property line if the source is on private property.

Table 4 City of Gardena Exterior and Interior Noise Standards

	Allowable Noise Levels			
	15-Minute Average Noise Level (Leq, dBA)		Maximum Noise Level (Lmax, dBA)	
Type of Land Use	7:00 a.m. – 10:00 p.m.	10:00 p.m. – 7:00 a.m.	7:00 a.m. – 10:00 p.m.	10:00 p.m. – 7:00 a.m.
Allowable Exterior Noise Level				
Residential	55	50	75	70
Residential portions of mixed-use	60	50	80	70
Commercial	65	60	85	80
Industrial or manufacturing	70	70	90	90
Allowable Interior Noise Level				
Residential	45	40	65	60
Residential portions of mixed-use	45	40	70	60

Source: City of Gardena Municipal Code Sections 8.36.040 and 8.36.050.

3 Impact Analysis

3.1 Methodology and Significance Thresholds

a Methodology

Construction Noise and Vibration

The analysis of noise impacts considers the effects of both temporary construction-related noise and long-term noise associated with operation of the project on sensitive receptors in the surrounding area. Construction noise estimates are based upon noise levels reported by the FTA; Office of Planning and Environment (FTA 2006); the University of Washington School of Public Health and Community Medicine, Department of Environmental and Occupational Health Sciences *Construction Industry Noise Exposures: Operating Engineers* brochure; and the distance to nearby sensitive receptors. A distance of 25 feet is assumed for the nearest residences, as a worst case exposure of construction equipment noise; however, the majority of the time construction equipment would be used is closer to the center of the project site. Reference noise levels from these sources were then used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dBA per doubling of distance (line-of-sight method of sound attenuation for point sources of noise). Construction noise level estimates do not account for the presence of intervening structures or topography, which could reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual construction noise.

Construction activities also have the potential to generate ground-borne vibration near sensitive receptors, especially from grading and excavation of the project site. It is assumed pile driving would not be required for construction of the proposed project as the height of development is below three to four stories and the location of the site is above soils with low liquefaction potential (California Geological Survey [CGS] 2016). The primary vibratory source during construction within the project area would likely be large bulldozers and loaded trucks. Construction vibration estimates are based upon vibration levels reported by the FTA in the *Transit Noise and Vibration Impact Assessment* (2006) with an assumed standard attenuation rate of 6 VdB per doubling of distance. The assumed construction equipment used[1] is summarized in Table 5 below.

[1] The assumed construction equipment used in this analysis is based on the project site acreage, proposed uses, and existing structure demolition. This information was derived from inputs in the California Air Pollution Control Officers Association California Emissions Estimator Model (CalEEMod), version 2016.3.2.

Table 5 Assumed Construction Equipment for Proposed Project

Equipment	Phase
Concrete/Industrial Saws	Demolition
Excavators	
Rubber Tired Dozers	
Tractors/Loaders/Backhoes	Site Preparation
Rubber Tired Dozers	
Excavators	Grading
Rubber Tired Dozers	
Tractors/Loaders/Backhoes	
Graders	
Cranes	Building Construction
Forklifts	
Tractors/Loaders/Backhoes	
Generator Sets	
Welders	
Cement and Mortar Mixers	Paving
Pavers	
Rollers	
Tractors/Loaders/Backhoes	
Paving Equipment	
Air Compressors	Architectural Coating

Source: California Air Pollution Control Officers Association 2017

Operational Noise

On-Site

Typical on-site residential noise sources include vehicular noise, landscaping equipment (e.g., lawnmower), general conversations, and heating, ventilation and air conditioning (HVAC) equipment. To determine ambient noise levels at the project site and at nearby sensitive receptors (including residential uses), Rincon Consultants took three 15-minute noise measurements (see Figure 4 above for noise measurement locations relative to the project site and Table 1 for noise measurement results; see Appendix A for noise measurement data). Noise levels at Noise

Measurement Location 1 (50.4 dBA, Leq[15]) and Noise Measurement Location 2 (60.7 dBA, Leq[15]) would be typical for residential uses in the vicinity of the project site as well as the ambient noise levels for the proposed residential uses along the western boundary. Noise Measurement Location 3 (70 dBA, Leq[15]) is the assumed ambient noise levels for the proposed residential uses along the eastern boundary of the project site. HVAC equipment noise levels were estimated by using the United States Environmental Protection Agency (USEPA 1971).

Off-Site

The proposed residences' long-term effect on traffic noise was analyzed by estimating daily vehicle trips associated with the existing surface parking lot on-site and the estimated daily trips to and from the proposed residences. New vehicle trips were estimated by using the *Institute of Transportation Engineers (ITE) 9th Edition Tip Generation Manual* rates for Residential Condominium/Townhouses. For this analysis the trip generation rate of 5.81 weekday daily trips per dwelling unit was used (ITE 2012). This equates to 372 daily trips total.

Daily traffic along S. Vermont Avenue and Rosecrans Avenue were gathered through traffic counts provided on the City of Gardena website. Based on City traffic counts dated July 2, 2015, S. Vermont Avenue at the segment closest to the project site carries 20,400 average daily trips and Rosecrans Avenue at the segment closest to the project site carries 34,200 average daily trips (City of Gardena 2015).

b Significance Thresholds

As discussed in the *Regulatory Setting*, by complying with the City's construction hour restrictions, temporary construction activities would be exempt from the City's noise standards. Additionally, as discussed in *Existing Project Area Noise Levels*, the ambient noise level at the existing residences is between approximately 50 dBA Leq(15) and 60 dBA Leq(15). Therefore, consistent with the City's Noise Plan and Municipal Code, operation of the project would have a significant impact if the project would result in:

- A proposed residential use with ambient noise levels exceeding the City's normally acceptable level of 60 dBA CNEL
- An average exterior noise level (Leq[15]) above 55 dBA between the hours of 7:00 a.m. and 10:00 p.m. or 50 dBA between the hours of 10:00 p.m. and 7:00 a.m. at nearby sensitive receptors
- A maximum exterior noise level (Lmax) above 75 dBA between the hours of 7:00 a.m. and 10:00 p.m. or 70 dBA between the hours of 10:00 p.m. and 7:00 a.m. at nearby sensitive receptors

However, this analysis serves as a detailed study to meet the City's noise requirements and the project would include conventional construction with air, heating, and ventilation systems allowing residences to keep windows closed for reduced noise. Therefore, the conditionally acceptable threshold of 65 dBA CNEL would apply to the project (see Table 3).

Temporary construction vibration impacts would be significant to nearby sensitive receptors if:

- Sensitive receptors experience infrequent events (fewer than 70 events per day) of vibration at 75 VdB
- Vibration levels exceed 100 VdB at nearby buildings, which would damage extremely fragile historic buildings

3.2 Project Impacts

a Temporary Construction Noise Impacts

Noise levels are based on the Federal Highway Administration (FHWA) *Highway Construction Noise Handbook*. Peak noise levels associated with the use of individual pieces of heavy equipment can range from about 70 to 89 dBA at 50 feet from the source, depending upon the types of equipment in operation at any given time and phase of construction (FHWA 2006) (see Appendix B for a construction equipment list).

Noise-sensitive receptors near the project site include:

- Single-family residences approximately 25 feet west of the project site
- Single-family residences approximately 100 feet north of the project site
- Motel approximately 200 feet east of the project site
- Single-family residences approximately 400 feet east of the project site
- Nursing Facility approximately 700 feet south of the project site
- Multi-family residences approximately 700 feet southwest of the project site
- Single-family residences approximately 800 feet southeast of the project site

The above receptors may experience a temporary increase in noise during construction activities on the project site. Table 6 shows the maximum expected noise levels at the residences nearest the project site during different phases of construction (see Appendix B for calculations).

Table 6 Construction Noise Levels During Different Phases of Construction

	Combined Maximum Hourly Noise Level (dBA, Leq)					
Phase	25 Feet Distance	100 Feet Distance	200 Feet Distance	400 Feet Distance	700 Feet Distance	800 Feet Distance
Demolition	92.5	80.4	74.4	68.4	63.5	62.4
Site Preparation	90.3	78.3	72.2	66.2	61.4	60.2
Grading	90.8	78.8	72.7	66.7	61.9	60.7
Building Construction	99.5	87.5	81.5	75.4	70.6	69.4
Paving	91.7	79.6	73.6	67.6	62.7	61.6
Architectural Coating	79.7	67.7	61.6	55.6	50.8	49.6

See Appendix B for calculations

As shown in Table 6, construction noise levels could be up to 99.5 dBA Leq at the nearest sensitive receptor, located 25 feet west of the project site, 87.5 dBA Leq at the sensitive receptor 100 feet north of the project site, 81.5 dBA Leq at the sensitive receptor 200 feet east from the project site, 75 dBA Leq at the sensitive receptor 400 feet east of the project site, 70.6 dBA Leq at the sensitive receptors 700 feet south and southwest of the project site, and approximately 69.4 dBA Leq at the sensitive receptor 800 feet southeast of the project site. However, construction noise levels at a distance of 25 feet would only occur when construction is occurring along the western boundary of the project site, while a majority of the construction would occur at a further distance. Ambient noise at the nearest sensitive receptor was measured at 50.4 dBA Leq (Noise Measurement 1 in Table 1). Construction-related noise at this and other sensitive receptor locations adjacent to the

project site would exceed ambient noise levels and could cause periodic disturbance during construction. However, modeled construction noise levels are highly conservative because they assume the use of equipment at the property line; typically, construction equipment would operate in the body of the project site, farther from sensitive receptors, and individual pieces of equipment may not operate simultaneously.

As discussed above, Section 8.36.080(G) of the City of Gardena Municipal Code exempts noise associated with construction, repair, remodeling, grading or demolition between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday from noise standards. Construction activities would be required to comply with construction hours established in the City of Gardena Municipal Code. Although exempt from noise standards, measures to reduce construction noise levels are described under *Recommendations* below.

b Temporary Construction Vibration Impacts

Table 7 identifies various vibration velocity levels for the types of construction equipment that would operate at the project site during construction activities, including bulldozers, loaded trucks, and vibratory rollers. Nearby sensitive receptors, including the residences located 25 feet west of the project site, the single-family residences located approximately 100 feet north, the motel located approximately 200 feet east, and the single-family residences located approximately 400 feet east of the project site, could be exposed to ground-borne vibrations during construction. As shown in Table 7, vibration levels could reach up to 94 VdB at receptors 25 feet away, up to 76 VdB at receptors 100 feet away, up to 67 VdB at receptors 200 feet away, and up to 58 VdB at receptors 400 feet away. Vibration levels would not reach a perceptible level at the sensitive receptors 700 and 800 feet distance from the project site. However, construction vibration levels at a distance of 25 feet would only occur when construction is occurring along the western boundary of the project site, while a majority of the construction would occur at a further distance.

Table 7 Vibration Levels for Construction Equipment

	Approximate Vibration Decibels (VdB) at Distance (Feet) from Construction			
Equipment	**25 Feet**	**100 Feet**	**200 Feet**	**400 Feet**
Large Bulldozer	87	69	60	51
Loaded Trucks	86	68	58	49
Vibratory Roller	94	76	67	58
Small Bulldozer	58	39	30	21

Source: FTA (2006)

Although construction of the project would generate vibration reaching an estimated 94 VdB at adjacent sensitive receptors, construction would not occur between the hours of 6:00 p.m. and 7:00 a.m. during weekdays nor between the hours of 6:00 p.m. and 9:00 a.m. on Saturday, nor Sunday or any federal holiday. These restrictions on the timing of construction would prevent vibration during normal sleeping hours. Therefore, vibration levels at nearby sensitive receptors would not exceed the FTA's guideline of 75 VdB for distinctly perceptible vibration during hours when people normally sleep. Additionally, vibration levels would not exceed 100 VdB, which is the vibration level which

would damage extremely fragile historic buildings. Therefore, vibration impacts would be less than significant.

c Long-Term Operational Noise Impacts

On-Site Noise Impacts

The project would introduce new residential land uses on the project site. Existing residences near the project site may periodically be subjected to noise associated with on-site vehicle traffic, use of landscaping equipment, as well as general conversations. It is assumed that there would be no sources of stationary noise from operations of the project. However, use of stationary equipment such as rooftop HVAC systems may be used.

Noise levels from commercial HVAC equipment can reach 90 dBA Leq at a distance of three feet (USEPA 1971). Typically, the shielding and location of HVAC units reduces noise levels to no greater than 55 dBA Leq at 50 feet from the source (USEPA 1971). Assuming that noise from this point source attenuates at 6 dBA per doubling of distance, estimated noise levels from HVAC equipment would not exceed 61 dBA Leq at a distance of 25 feet, 49 dBA Leq at 100 feet, 43 dBA Leq at 200 feet, and 36.9 dBA Leq at 400 feet. As discussed in the *Regulatory* Section, the measured ambient noise levels serve as the applicable exterior noise standard in the project area pursuant to Section 8.36.040(C) of the Gardena Municipal Code. As shown in Table 1, the measured ambient noise level in the project site vicinity is approximately 50-70 dBA. The estimated noise level from HVAC equipment at the nearest noise-sensitive receptors along the eastern boundary would exceed existing ambient noise levels. Therefore, shielding or enclosures around the HVAC units are recommended.

As described in Section 2.1, *Overview of Sound Measurement,* in urban areas near heavy traffic, the peak hourly Leq is typically 2-4 dBA lower than the daily Ldn or CNEL (SWRCB 1999). Consequently, this analysis estimates that CNEL in the vicinity of the project site ranges from 52 dBA to 74 dBA. However, the proposed project includes an 8-foot high block wall adjacent to the eastern boundary to the project site that breaks the line of site to S. Vermont Avenue (see Figure 3). Therefore, the proposed wall would reduce noise levels at the condominium unit patios along the eastern boundary of the project site by 7 dBA (see Appendix C). Conservatively assuming that the proposed wall would reduce noise levels by 7 dBA, resulting on-site noise levels would be 67 dBA CNEL along the eastern boundary of the project site. Proposed residences near the eastern boundary of the project site would experience noise levels that exceed the City's "conditionally acceptable" level of 65 dBA CNEL for new residential land uses, and would fall within the "normally unacceptable" level of 65-75 dBA, CNEL. Impacts to sensitive receptors at outdoor living areas are therefore considered potentially significant. Project recommendation to reduce noise impacts for outdoor living areas is provided in Section 3.3.

Because modern building construction techniques typically reduce interior ambient noise by about 25 dBA (FTA 2006), new residences on the project site would not be exposed to interior noise levels in excess of the City's 45 dBA Leq(15) interior noise standard described in Section 2.5.2, *City of Gardena Municipal Code* (70 dBA, Leq[15] – 25 dBA = 45 dBA, Leq[15]). Additionally, state law (specifically, Title 24 of the California Code of Regulations) requires interior noise levels, attributable to exterior noise sources, to not exceed 45 dBA, CNEL in any habitable room of a new building. Conformance with state standards would reduce interior noise-related impacts to a less than significant level.

Off-site Roadway Noise Impacts

The project would generate traffic on area roadways. Traffic generation for the project is based on ITE's trip generation for a residential condominium/townhouse use and estimated existing operational daily trips are based on a visual evaluation of the valet parking lot. Table 8 summarizes the average daily trips generated by the project.

Table 8 Estimated Project Trip Generation

Land Use	Units	ADT Generation	Size	ADT
Proposed Residential Condominiums/ Townhomes	Dwelling Unit	5.81	64 dwelling units	372

Notes: ADT = average daily trip.

[1]Assumed weekday average daily traffic

Source: ITE 2012

The proposed project would have access (ingress and egress) provided by S. Vermont Avenue. Although proposed project daily trips would use nearby roadways, such as S. Vermont Avenue and W. Rosecrans Avenue, the expected increase of 372 trips would increase the average daily trips to those roadways by approximately two percent and one percent, respectively. (S. Vermont Avenue average daily trips [ADT] is 20,400 and W. Rosecrans Avenue ADT is 34,200; 372/20,400 = 0.018 * 100 = 1.8 percent; 372/34,200 = 0.010 * 100 = 1.0 percent).

Per the California Department of Transportation (Caltrans) *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, traffic volumes would need to double to result in a noticeable (3.0 dBA) noise increase (Caltrans 2013).This slight increase in traffic would not increase ambient noise levels by more than 3 dBA, and would therefore not be audible.

3.3 Recommendations

Temporary construction activities would result in noise levels up to an estimated 99.5 dBA at the residences nearest the site, approximately 25 feet to the west, approximately 87.5 dBA at residences approximately 100 feet to the north, and approximately 81.5 dBA to the residences 400 feet to the east. Per the City's Municipal Code Section 8.36.080(G), temporary construction noise is exempt from City noise standards. However, because of the proximity to sensitive receptors and the high level of noise to adjacent noise-sensitive receptors, the following construction noise attenuating measures and practices are recommended:

- **Mufflers or Engine Shrouds.** Use power construction equipment with properly operating state-of-the-art noise shielding and muffling devices, consistent with manufacturers' standards.
- **Construction Scheduling.** Schedule construction activities to avoid operating several pieces of equipment simultaneously, to the extent feasible.
- **Construction Hours.** In adherence with the City of Gardena Municipal Code, Section 8.36.080(G), limit construction to between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday, and at no time on Sundays, federal holidays, or between the hours of 6:00 p.m. and 7:00 a.m. on weekdays.
- **Solid Noise Attenuation Barrier.** Locate a temporary sound attenuation barrier capable of reducing noise by at least 15 dBA between the construction site and sensitive receptors to the