AMENDMENT 01

Project Name:

Brookhurst Place Phase II
PROJECT No: 22-2729

TRACT: 11702

Prepared for:

Kam Sang Company, Inc.
411 E. Huntington Drive #305

Arcadis, Ca 91006

626-446-2988

Prepared by:

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Project Manager: Mark S. Oskorus, PE, QSP
07/20/2023

Section I

Preparer (Engineer):			
Title	Mark S. Oskorus	PE Registration #	C-62159
Company	David Evans and Associates, Inc		
Address	17542 17th Street, Suite 150 , Tustin, CA 92780		
Email	moskorus@deainc.com		
Telephone #	714-336-6495		
I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Garden Grove Regional Water Quality Control Board.			
Preparer Signature		Date	
Place Stamp Here			

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Attachments

Attachment A . ..... **Vicinity Map, WQMP site plan, and Calculations**
Attachment B . ..... **Construction Materials**
Attachment C . ..... **BMP Maintenance Supplement O&M**
Attachment E . ..... **BMPs Devices Details**
Attachment F . ..... **Geotechnical Study**

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

- Project areas;
- Land uses;
- Land cover;
- Design elements;
- A general description not broken down by drainage management areas (DMAs).

Include attributes relevant to determining applicable source controls. *Refer to Section 2.2 in the Technical Guidance Document (TGD) for information that must be included in the project description.*

<table>
<tr><th colspan="4">Description of Proposed Project</th></tr>
<tr><td>Development Category (From Model WQMP, Table 7.11-2; or -3):</td><td colspan="3">Based upon City of Garden Grove Water Quality Management Plan checklist, Table 7.11-2, the following categories are applied:

Category No. 1:
New development project that create 10,000 SF or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use and public projects on private or public property that falls under the planning and building authority or the permittees.

Category No. 6
Parking lots 5,000 square feet or more including associated drive aisle, and potentially exposed to urban stormwater runoff. A parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

Category No. 7
Streets, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.</td></tr>
<tr><td>Project Area (ft²): 37,462</td><td colspan="2">Number of Dwelling Units: 112</td><td>SIC Code: N/A</td></tr>
<tr><td>Project Area</td><td>Pervious</td><td colspan="2">Impervious</td></tr>
</table>

	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	1.293 acres	100%	0 acres	0%
Post-Project Conditions	0.127 acres	9.4%	1.223 acres	90.7%
Drainage Patterns/Connections	The study sites are characterized by flat sloping topography from the middle of the site flows east (to Brookhurst Street), west (to Brookhurst Way) and south (on-site) directions. Site elevations range from approximately 80 feet above sea level to approximately 73 feet above sea level as shown on the hydrology map – existing site condition. Under the development condition, underground piping system intercepts all roof drain storm runoff and discharges into the proposed storm drain system. It includes grate inlets, pipes, Contech biofiltration modular wetland, Contech underground storage devices, catch basin and outlet storm drain RCP pipe to the existing storm drain main within Brookhurst Street. The storm drains line flows south in Brookhurst Street, east in Garden Grove Boulevard and then south in Flower Street. Surface runoff along the Brookhurst Way, along the westerly tract boundary flows southerly direction to Garden Grove Boulevard, then west along the Garden Grove Boulevard until intercepts by an existing catch basin, which is located at the northeast corner or Garden Grove Boulevard and Galway Street. Underground storm drain system carries the storm runoff westerly direction within the Garden Grove Boulevard and then turns south to Gilbert Street. Both systems connect with the Westminster channel and continue flows to the Bolsa Chica Channel and through Huntington Harbor and Anaheim Bay, finally discharges into the Pacific Ocean.			

Narrative Project Description: (Use as much space as necessary.)	The is a redevelopment project that will remove the existing open space and construct a residential apartment building. Brookhurst Triangle Phase II is located on the middle west portion of the Brookhurst Triangle site and has a total of 1.35 acres. A total of 112 residential units within new building No. 2. Which will be constructed within the tract 17702, Lot 1 boundary. Parking stalls, asphalt pavement, concrete curbs, concrete curb & gutter, drainage gutters, concrete sidewalk, underground utilities, and landscape will be installed on the site. Brookhurst Triangle site is located by Brookhurst Street on the east, Garden Grove Boulevard on the south, Brookhurst Way on the west and existing office site on the north. The Brookhurst Triangle contains an approximately of 13.944 acres as shown on exhibit A-Vicinity map The project proposes to install one underground detention basin and one biofiltration system on the south side of the project underneath a paved roadway and landscape area to address water quality needs of the project due to the expected increase in pollutant loads from redevelopment. Referring to the WQMP Exhibit, the projects drainage management areas P1 and P2 that combined into a 90.7% impervious composed of the sidewalks and the large apartment complex.

II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the Technical Guidance Document (TGD).*

The project proposes to install one underground detention basin and one biofiltration modular wetland system on the south side of the project underneath a paved roadway to address water quality needs of the project due to the expected increase in pollutant loads from redevelopment. Referring to the WQMP Exhibit, the projects drainage management areas P1 and P2 that combined into a 90.7% impervious composed of the sidewalks and the large apartment complex.

Under the post development condition, new storm drainpipes, grated inlets and catch basins will be installed within the project site to carry the 100-year on-site storm runoff generates from the project site.

Underground detention / infiltration Contech system will be installed within the project site. The purposes of the Contech system are:

- Service as an underground retention basin to maintain the existing 100-year storm runoff from the site, under the post-development condition, which will be either equal or less than the pre-development condition.
- Service as structural infiltration Best Management Practices (BMP) per Water Quality Management Plan (WQMP).

All on-site storm runoff will drain into the on-site underground Contech system. An overflow pipe, also known as regular release storm drainpipe for 100-year storm event, will be installed in between the Contech device and the outlet storm drainpipe. Another pipe coordinated with the plumbing engineer shall be used for groundwater release and will bypass the Contech system.

All storm drain generates from the project site flows to the underground storm drain system along the south easternly street that then shall be released into the existing storm drain system along Brookhurst street. It continues flows to the Bolsa Chica Channel and through Huntington Harbor and Anaheim Bay, finally discharges into the Pacific Ocean.

Section III Site Description

III.1 Physical Setting

Fill out table with relevant information. *Refer to Section 2.3.1 in the Technical Guidance Document (TGD).*

Planning Area/ Community Name	Tentative Tract Map 17702; Zoning: Planned Unit Development No. PUD-123-09 (Mixed Use)
Location/Address	Brookhurst Triangle Phase II
	APN: TBD
Land Use	Planned Unit Development No. PUD-123-09 (Mixed Use)
Zoning	Planned Unit Development No. PUD-123-09 (Mixed Use)
Acreage	1.353 total acres - 1.293 Acres (56,323 SF) – Lot 1 and .06 acres (2,625 SF) lot C of Tract Map 17702
Predominant Soil Type	"B"

III.2 Site Characteristics

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.2 in the Technical Guidance Document (TGD).*

Site Characteristics	
Precipitation Zone	Approximately 0.77 inches at 24-hours-85th percentile rainfall per Technical Guidance Document Figure XVI-1.
Topography	The study sites are characterized by flat sloping topography from the middle of the site flows east (to Brookhurst Street) and west (to Brookhurst Way) directions. Site elevations range from approximately 80 feet above sea level to approximately 73 feet above sea level as shown on the hydrology map – existing site condition.

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Describe project performance criteria. Several steps must be followed in order to determine what performance criteria will apply to a project. These steps include:

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. (Please ask your assigned planner or plan checker regarding whether your project is part of an approved WIHMP or equivalent.)
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II-2.4.2.2 of the Model WQMP.*
- Determine applicable LID performance criteria. *Refer to Section 7.II-2.4.3 of the Model WQMP.*
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-*3.2.2 *of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP.*

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	N/A	

Project Performance Criteria	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	N/A
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Per 7.II-2.4.3of the Model WQMP, the available LID Treatment BMPs to be utilized in reducing the post-development impacts include shallow infiltration, harvest and use, evapotranspiration, or biotreat/biofilter, of the 85th percentile of a 24-hour storm. event. The project will implement Modular Wetland BMPs due to infiltration infeasibility from a high ground water table.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Per 7.II-3.2.2 of the Model WQMP, if the LID performance criteria is not feasibly met by retention and/or biotreatment, then sizing of onsite treatment control BMPs are required. Sizing of these treatment control BMPs will include, if applicable, any Water Quality credits as calculated per the Technical Guidance Document. If the additional required volume can be met, and has a medium to high effectiveness for reducing the primary POCs, the project is considered to be in compliance; a waiver application and participation in an alternative program is not required. If the cost of providing treatment control BMPs greatly outweighs the pollution control benefits, a waiver of treatment control and LID requirements can be requested
Calculate LID design storm capture volume for Project.	Refer to Appendix A.

IV.2. Site Design and Drainage

Describe site design and drainage including

- A narrative of site design practices utilized or rationale for not using practices;
- A narrative of how site is designed to allow BMPs to be incorporated to the MEP
- A table of DMA characteristics and list of LID BMPs proposed in each DMA.
- Reference to the WQMP "BMP Exhibit."
- Calculation of Design Capture Volume (DCV) for each drainage area.
- A listing of GIS coordinates for LID and Treatment Control BMPs.

Refer to Section 2.4.2 in the Technical Guidance Document (TGD).

The first step in the LID BMP selection process is to consider HSCs. There are no significant HSCs proposed for this project.

The next step is to consider infiltration BMPs or harvest and use BMPs. Area P1 and P2 uses proprietary Modular Wetlands System Biofiltration BMP, no other LID BMPs were used in the calculations. The Modular Wetlands System was designed using volume-based bmp design. Project has proposed one underground storm drain storage basins are for the HCOC requirements.

The attached map in Section VI (WQMP Drainage/Site Plan) describes the stormwater drainage management area (DMA) and proposed BMPs. The BMP Sizing Table 1.1 in Section VI includes the Design Capture Volume (DCV) calculations.

GIS coordinate for the BMP is as follows:

Modular Wetlands System (Subarea P1 and P2): 33°46'32.2"N 117°57'27.8"W

IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. If design volume cannot be met, state why.

(No infiltration BMPs used)

Name	Included?
Bioretention without underdrains	☒
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☒
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with infiltration BMPs. If not, document how much can be met with infiltration and document why it is not feasible to meet the full volume with infiltration BMPs.

IV.3.4 Biotreatment BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, and/or evapotranspiration and rainwater harvesting BMPs, describe biotreatment BMPs included. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with infiltration, evapotranspiration, rainwater harvesting and/or biotreatment BMPs. If not, document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

The project site (P1 and P2) uses proprietary Modular Wetlands System Biofiltration BMP. The Modular Wetland System was designed using volume-based bmp design. Project has proposed one underground storm drain storage basins are for the HCOC requirements.

(A) Required:

Design Capture Volume (DCV) = 3405 CF (Per calculation sheet)

Design flow rate =0.325 cfs (per calculation sheet)

(B) Provide:

Capture Volume:

Approximately 3,500 CF capture volume will be provided by the on-site underground detention basin for the Brookhurst Phase II – Building No. 2 development which is greater than the Design Capture Volume (3,405 CF). Therefore, it is OK.

IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. *See Section 5 of the Technical Guidance Document (TGD).* Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval (if applicable).

Hydromodification Control BMPs	
BMP Name	**BMP Description**

IV.3.6 Regional/Sub-Regional LID BMPs

Describe regional/sub-regional LID BMPs in which the project will participate. *Refer to Section 7.II-2.4.3.2 of the Model WQMP*.

Regional/Sub-Regional LID BMPs

Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan. Identify the funding mechanism through which BMPs will be maintained. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies. *Refer to Section 7.II 4.0 in the Model WQMP.*

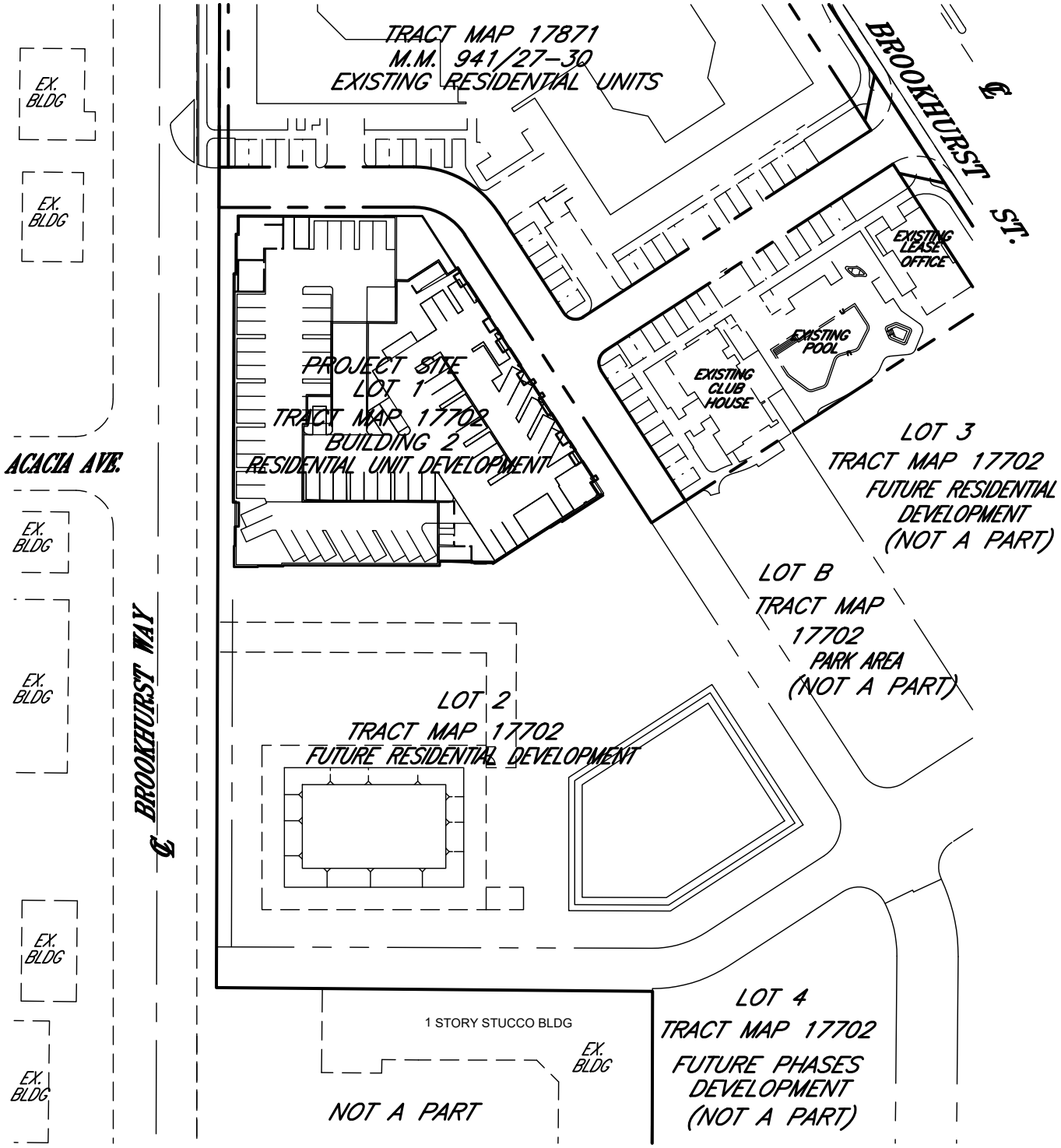
BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
BIO-7 Proprietary Biotreatment: Modular Wetland Systems (MWS)	HOA and Property Management Associates	The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes removing trash & debris from the catch basin screening filter (by hand), removal of sediment and solids in the settlement chamber (vacuum truck), replacement of the BioMediaGREENTM filter cartridge, and replacement of the BioMediaGREENTM drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used in this chamber. Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement. If prior treatment stages are properly maintained, the life of the wetland media can be up to 20 years.	2x per year

Underground storm drain storage basins (HCOC)	HOA and Property Management Associates	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Inspection and reveal accumulated sediment, trash and prevent the clogging the discharge orifice. Ensure the underground pipe system used for storm water storage function.	Annually
Catch Basin & Insert Filter	HOA and Property Management Associates	Inspect catchment area for an excessive sediment, trash, and/or debris accumulation on surface. Inspect inlet for excessive sediment, trash, and/or debris accumulation. Litter leaves and debris should be removed from inlet to reduce risk of outlet clogging. Change the insert Filter as needed	Prior to wet season and as needed
Common Area Litter Control	HOA and Property Management Associates	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly
Employee Training	HOA and Property Management Associates	The Owner shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be utilized on BMP maintenance are included in Appendix D.	Annually
Street Sweeping Private Streets and Parking Lots	HOA and Property Management Associates	On-site parking lots and drive aisles will be swept on a monthly basis, at minimum.	Monthly
Provide storm drain system stenciling and signage	HOA and Property Management Associates	Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible, once every 5 years at minimum.	Annually
Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	HOA and Property Management Associates	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur	2x per year

		twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system.	

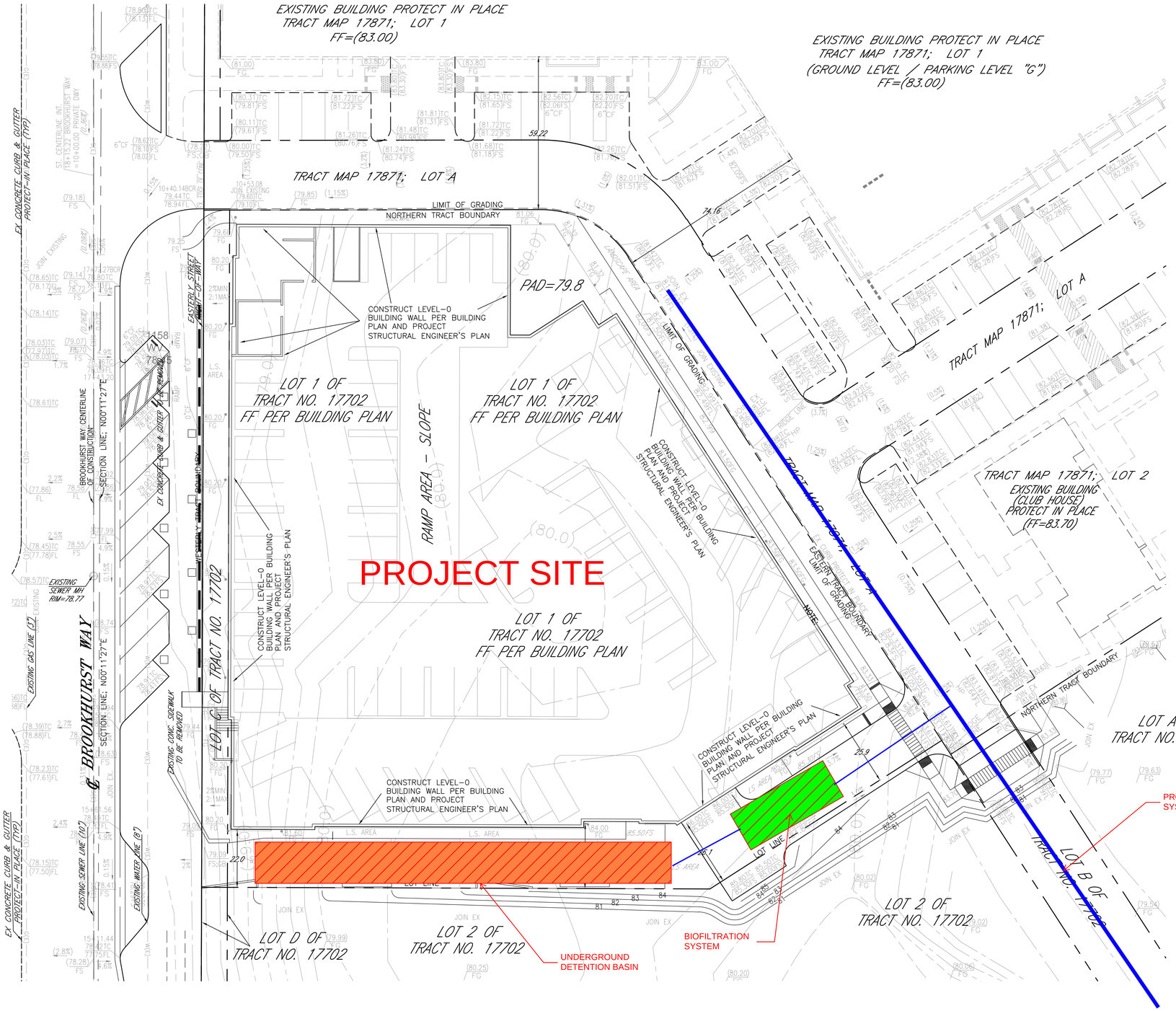
APPENDIX A -AMENDMENT 1

VICINITY MAP AND WQMP SITE PLAN & HYDROLOGY CALCULATIONS



SITE PLAN

SCALE: NTS



SCALE: 1"=20'
10 0 10 20 30

DIG ALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE
811
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

LEGEND:

HP	HIGH POINT
TC	TOP OF CURB
FL	FLOW LINE
FS	FINISHED SURFACE
FG	FINISHED GRADE
FF	FINISHED FLOOR
GF	GARAGE FLOOR
PAD	PAD
TW	TOP OF WALL
TF	TOP OF FOOTING
H	HEIGHT
L	LENGTH
℄	PROPERTY LINE
R/W	RIGHT-OF-WAY
▬ · ▬ · ▬	SUBDRAIN PIPE
- - - - - -	SUBDRAIN COLLECTION SYSTEM
——SD——	PROPOSE STORM DRAIN
——S——	PROPOSE SEWER LINE
——W——	PROPOSE WATER LINE

(120)	EXISTING ELEVATION
120	PROPOSED ELEVATION
TBM	TEMPORARY BENCH MARK
BM	BENCH MARK
C	CUT
F	FILL
N	NATURAL
PP	POWER POLE
FH	FIR HYDRANT
BW	BACK OF WALK
—— - - —— - - ——	PROPERTY LINE
— — — — —	EXISTING CONTOURS
————	PROPOSED CONTOURS
—o—o—o—o—	CUT/FILL DAYLIGHT LINE
—x—x—x—x—	CHAIN LINK FENCE
- - -CATV(E)- - - -	EX. CATV LINE
- - - -G(E)- - - -	EX. GAS LINE
- -SD(E)- - - - - -	EX. STORM DRAIN LINE
- - - - -S(E)- - - -	EX. SEWER LINE
- -W(E)- - - - - -	EX. WATER LINE

WDID #: TBD

BASIS OF BEARINGS:
THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 3011 AND STATION GPS NO. 3031 BEING NORTH 45°19'17" EAST PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

BENCH MARK
STANDARD G.G. CITY B.M. (GG-J-7-72) AT THE INTERSECTION OF GARDEN GROVE BOULEVARD AND GILBERT STREET, IN THE NW QUADRANT, 43.5' N OF CENTERLINE OF GARDEN GROVE BOULEVARD & 80' W OF CENTERLINE INTERSECTION OF GARDEN GROVE BOULEVARD & GILBERT STREET, SET IN PARKWAY 1.5' BEHIND CURB.
ELEVATION=70.470 FEET (1972 ADJUSTMENT)

OWNER:
KAM SANG COMPANY, INC.
411 E. HUNTINGTON DRIVE, #305
ARCADIA, CA 91006
TEL: (626) 446-2988
FAX: (626) 446-3392
E-MAIL: www.kamsangcompany.com

SOIL ENGINEER:
CAL LAND ENGINEERING, INC.
GEOTECHNICAL
576 E. LAMBERT ROAD
BREA, CA 92821
TEL. (714) 671-1050
FAX. (714) 671-1090
EMAIL: www.callandeng.com

PREPARED BY:
FOCUS ENGINEERING, INC.
8 CORPORATE PARK, SUITE 300
IRVINE, CA 92606
TEL: (949) 450-0590
E-MAIL: focusengring@sbcglobal.net

CHIA LIN LIU
No. 41497
EXP. 12/31/23

REVISIONS

	NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

PRECISE GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
BUILDING #2 - L0 LEVEL

G-1558

PRINT: 2023-05-03

SHEET
7
OF
12

DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

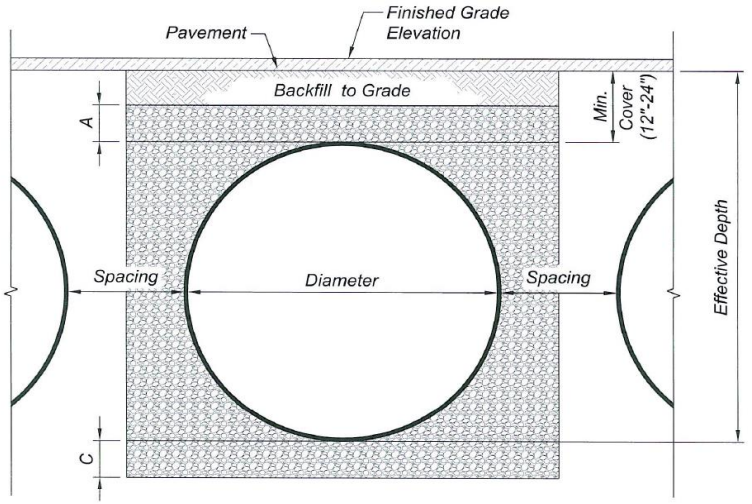
For design assistance, drawings,
and pricing send completed worksheet to:
dyods@contech-cpi.com

Project Summary

Date:		
Project Name:		
City / County:		
State:		
Designed By:		
Company:		**Enter Information in Blue Cells**
Telephone:		

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	3,140	
Limiting Width (ft):	16.00	
Invert Depth Below Asphalt (ft):	9.00	
Solid or Perforated Pipe:	Solid	
Shape Or Diameter (in):	60	19.63 ft^2 Pipe Area
Number Of Headers:	1	
Spacing between Barrels (ft):	2.50	
Stone Width Around Perimeter of System (ft):		
Depth A: Porous Stone Above Pipe (in):		
Depth C: Porous Stone Below Pipe (in):		
Stone Porosity (0 to 40%):		



System Sizing

Pipe Storage:	3,151	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	3,151	cf	100.4% Of Required Storage
Number of Barrels:	2	barrels	
Length per Barrel:	74.0	ft	
Length Per Header:	12.5	ft	
Rectangular Footprint (W x L):	12.5 ft x 79. ft		

CONTECH Materials

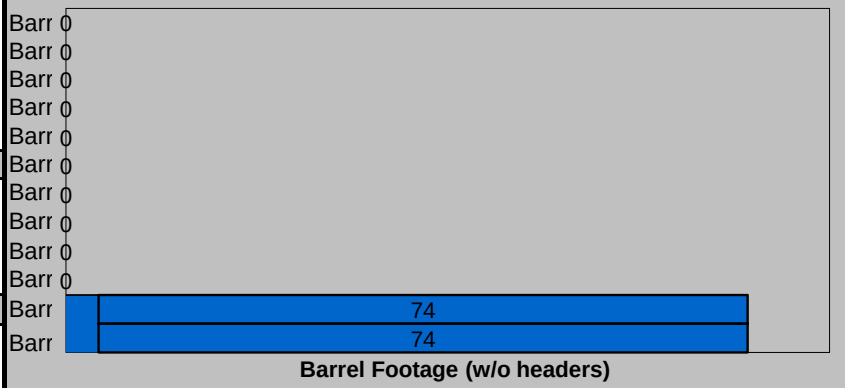
Total CMP Footage:	161	ft
Approximate Total Pieces:	9	pcs
Approximate Coupling Bands:	8	bands
Approximate Truckloads:	3	trucks

Construction Quantities**

Total Excavation:	330	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	213	cy fill

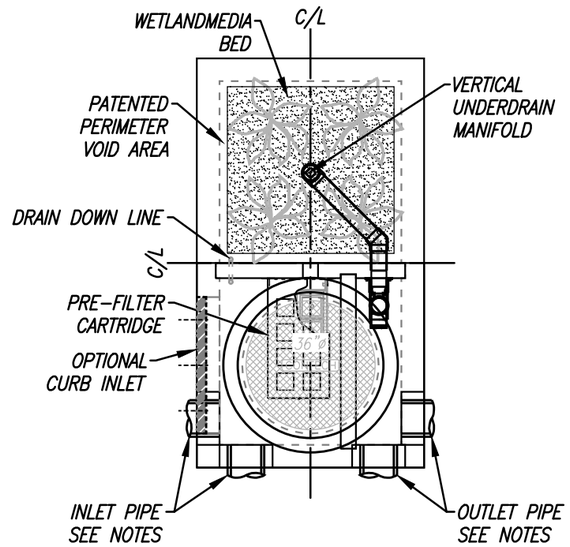
***Construction quantities are approximate and should be verified upon final design*

System Layout

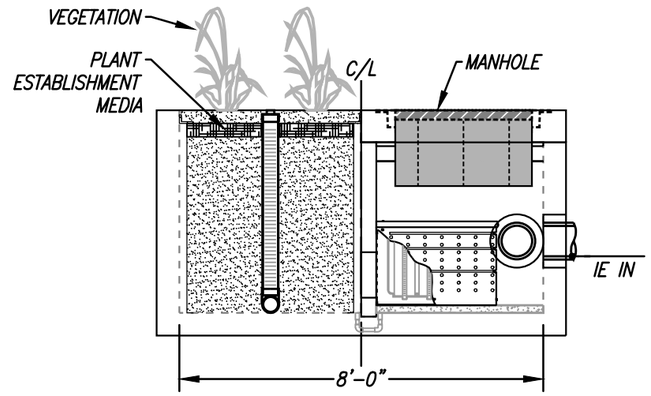


Barrel Footage (w/o headers)

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			
OPERATING HEAD (FT)			
PRETREATMENT LOADING RATE (GPM/SF)			
WETLAND MEDIA LOADING RATE (GPM/SF)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD			
NOTES:			



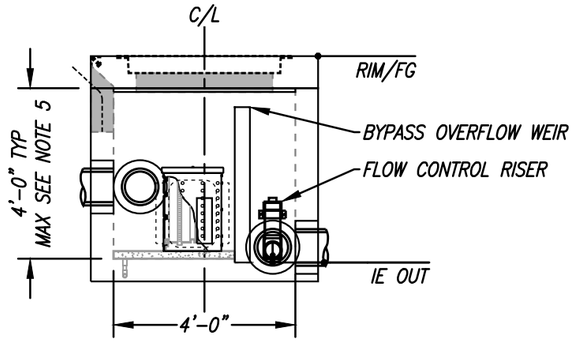
PLAN VIEW



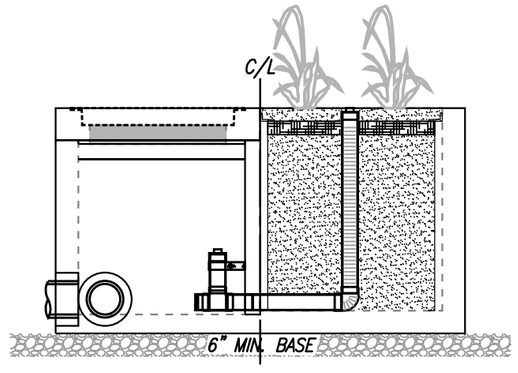
LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
4. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.
5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



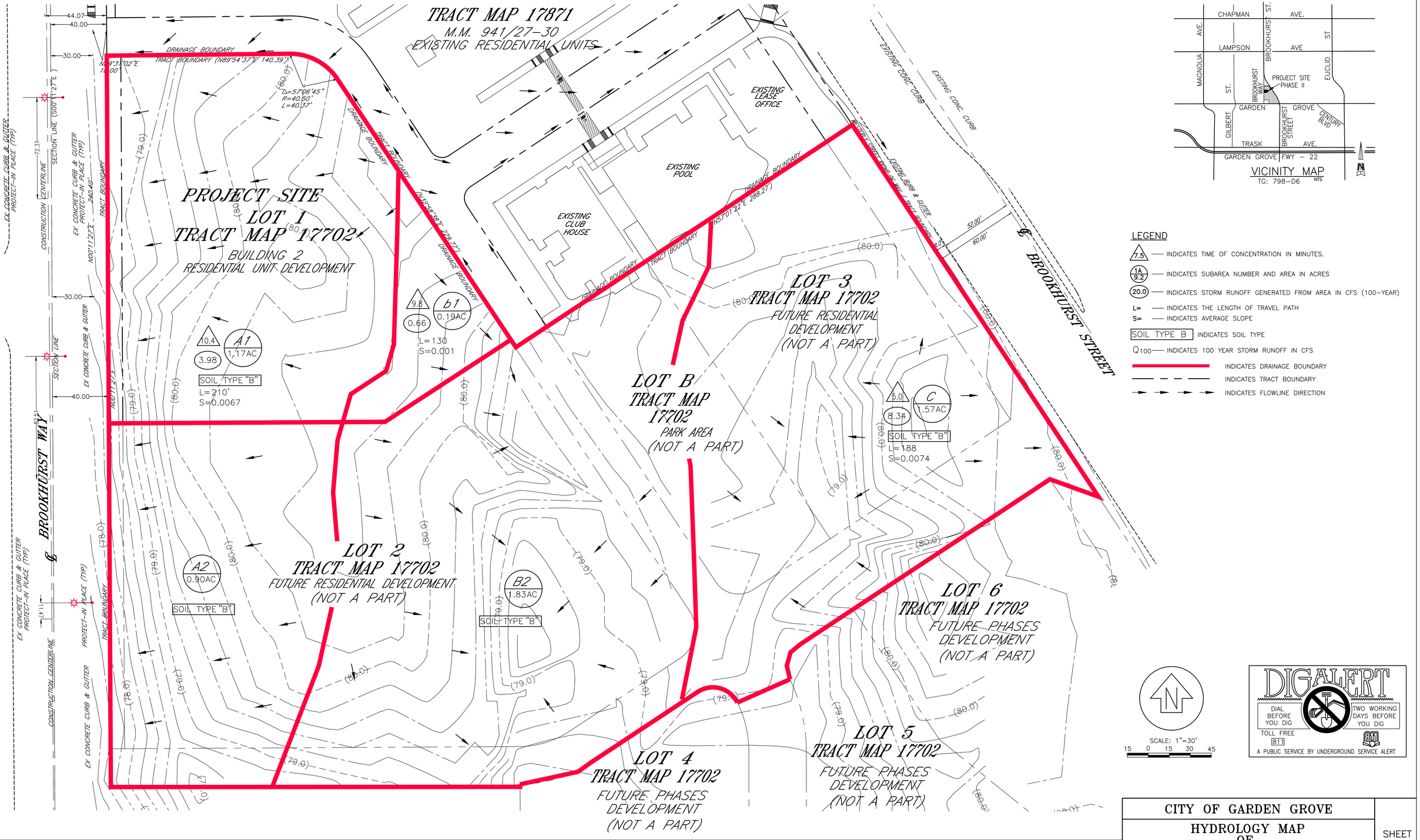
RIGHT END VIEW

MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DCV Calculation Table:		DMA :	A1 *	
PR				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	.77	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	.77	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.353	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	90.6	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.83	
4	Calculate runoff volume, $V_{design} = (C \times d_{remainder} \times A \times 43560 \times (1/12))$	V_{design}=	3,126	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	*Infiltration not deemed feasible*	in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=		
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=		in/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	*Refer to Worksheet D*	hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=		feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=		sq-ft

*

DMA A1 _including Park, Basketball court & Alley areas



LEGEND

- 7.5 — INDICATES TIME OF CONCENTRATION IN MINUTES.
- 1A / 9.2 — INDICATES SUBAREA NUMBER AND AREA IN ACRES
- 20.0 — INDICATES STORM RUNOFF GENERATED FROM AREA IN CFS (100-YEAR)
- L= — INDICATES THE LENGTH OF TRAVEL PATH
- S= — INDICATES AVERAGE SLOPE
- SOIL TYPE B — INDICATES SOIL TYPE
- Q_{100} — INDICATES 100 YEAR STORM RUNOFF IN CFS
- INDICATES DRAINAGE BOUNDARY
- INDICATES TRACT BOUNDARY
- INDICATES FLOWLINE DIRECTION

SCALE: 1"=30'
15 0 15 30 45

DIGALERT
DIAL BEFORE YOU DIG — TOLL FREE 811 — TWO WORKING DAYS BEFORE YOU DIG
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

OWNER:
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411 E. HUNTINGTON DRIVE, #305
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E-MAIL: www.kamsangcompany.com

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GEOTECHNICAL
576 E. LAMBERT ROAD
BREA, CA 92821
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PREPARED BY:
FOCUS ENGINEERING, INC.
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IRVINE, CA 92606
TEL: (949) 450-0590
E-MAIL: focusengring@sbcglobal.net

REGISTERED PROFESSIONAL ENGINEER — CHIA LIN LIU — No. 41497 EXP. 12/31/23 — CIVIL — STATE OF CALIFORNIA
2023-07-20

REVISIONS

NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

HYDROLOGY MAP
OF
TRACT MAP 17702, LOT 1
(PHASE II OF GARDEN GROVE TRIANGLE)
PRE-DEVELOPMENT CONDITION

G-0000 | EXHIBIT "H"

SHEET 1 OF 2

GG-2 PRE-DEVELOPMENT CONDITION-AREAS-B - middle portion of the site

	Area		Duration	intensity	loss rate	impervious														
	sub-area	A-total	TC	I (FIG B-3)	Fp (table C.2)	Aj (Fig. C-4)	Ap (=1-Aj)	Fm (=Fp*Ap)	Fm (total)	Fm (Avg)	Q (cfs) (EQ. D.4)		slope	Upper Elevation	Lower Elevation	H-DIFF	V	L	T (travel)	T(initial) (Fig D-1)	T-total	
													0.0100	80.80	79.50	1.30		**130**		9.8	9.8	Initial area
B1	**0.19**	**0.188**	**9.75**	**4.20**	0.30	0.00	1.00	**0.30**	0.06	**0.30**	**0.66**											
													0.0043	79.50	78.60	0.90	**1.10**	**208**	3.2		12.9	Lot 2
B2	**1.83**	**2.020**	**12.90**	**3.70**	0.30	0.00	1.00	**0.30**	0.61	**0.30**	**6.18**											

NOTE:

ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

Soil type:	B
Dev. Type	Natural

GG-2 PRE-DEVELOPMENT CONDITION-AREAS-A - West to Brookhurst Way

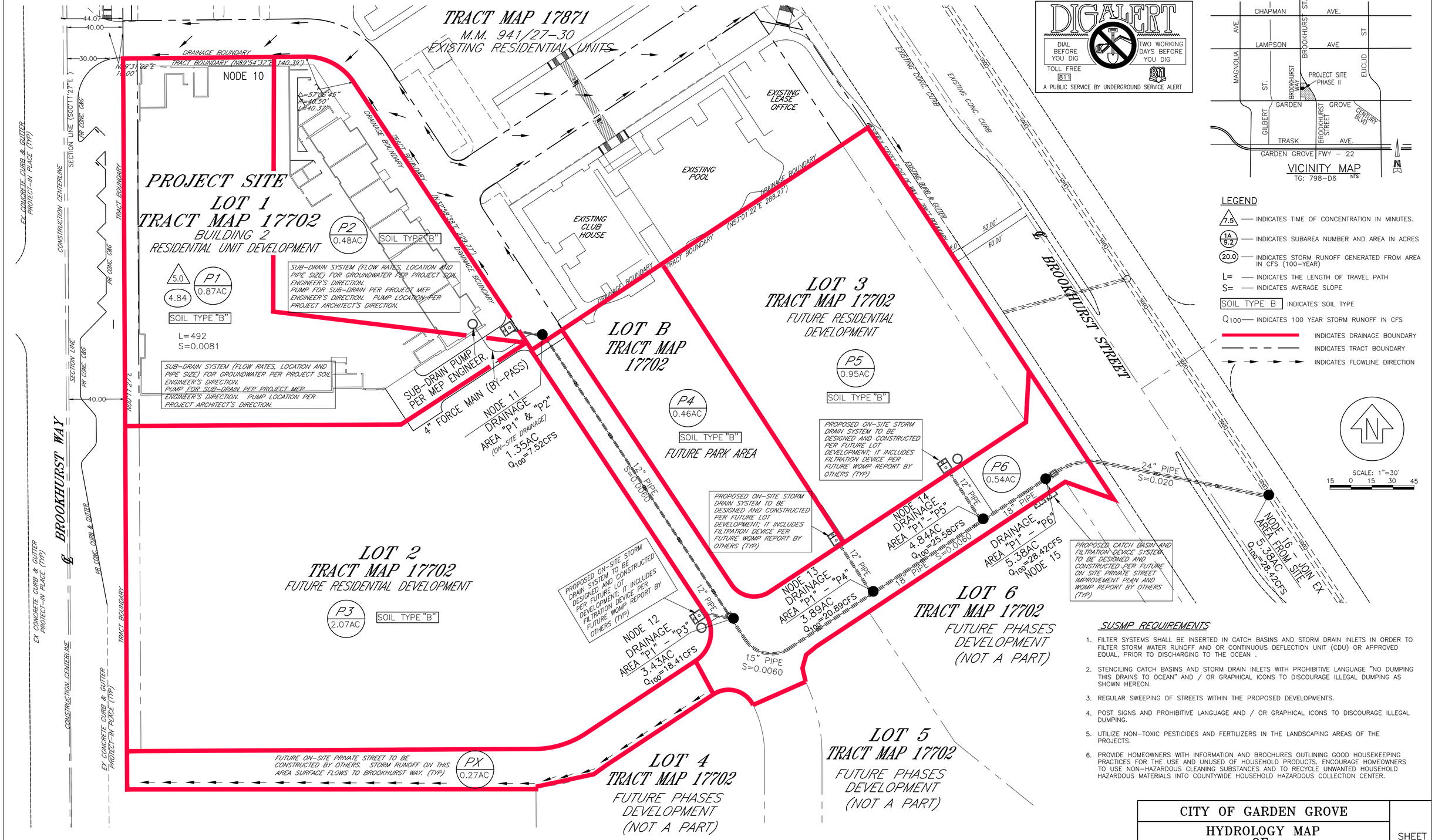
area

	Area		Duration	intensity	loss rate	impervious														
	sub-area	A-total	TC	I	Fp	Aj	Ap	Fm	Fm	Fm	Q (cfs)	slope	Upper	Lower	H-DIFF	V	L	T (travel)	T(initial)	T-total	
				(FIG B-3)	(table C.2)	(Fig. C-4)	(=1-Aj)	(=Fp*Ap)	(total)	(Avg)	(EQ. D.4)		Elevation						(Fig D-1)		
												0.0140	80.80	77.85	2.95		**210**		10.4	10.4	Initial area
A1	**1.17**	**1.165**	**10.40**	**4.10**	0.30	0.00	1.00	**0.30**	0.35	**0.30**	**3.98**										
												0.0032	77.80	76.63	1.17	**1.25**	**364**	4.9		15.3	Lot 2
A2	**0.90**	**2.069**	**15.27**	**3.40**	0.30	0.00	1.00	**0.30**	0.62	**0.30**	**5.77**										

NOTE:

ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

Soil type:	B
Dev. Type	Natural



SUSMP REQUIREMENTS

1. FILTER SYSTEMS SHALL BE INSERTED IN CATCH BASINS AND STORM DRAIN INLETS IN ORDER TO FILTER STORM WATER RUNOFF AND OR CONTINUOUS DEFLECTION UNIT (CDU) OR APPROVED EQUAL, PRIOR TO DISCHARGING TO THE OCEAN .
2. STENCILING CATCH BASINS AND STORM DRAIN INLETS WITH PROHIBITIVE LANGUAGE "NO DUMPING THIS DRAINS TO OCEAN" AND / OR GRAPHICAL ICONS TO DISCOURAGE ILLEGAL DUMPING AS SHOWN HEREON.
3. REGULAR SWEEPING OF STREETS WITHIN THE PROPOSED DEVELOPMENTS.
4. POST SIGNS AND PROHIBITIVE LANGUAGE AND / OR GRAPHICAL ICONS TO DISCOURAGE ILLEGAL DUMPING.
5. UTILIZE NON-TOXIC PESTICIDES AND FERTILIZERS IN THE LANDSCAPING AREAS OF THE PROJECTS.
6. PROVIDE HOMEOWNERS WITH INFORMATION AND BROCHURES OUTLINING GOOD HOUSEKEEPING PRACTICES FOR THE USE AND UNUSED OF HOUSEHOLD PRODUCTS. ENCOURAGE HOMEOWNERS TO USE NON-HAZARDOUS CLEANING SUBSTANCES AND TO RECYCLE UNWANTED HOUSEHOLD HAZARDOUS MATERIALS INTO COUNTYWIDE HOUSEHOLD HAZARDOUS COLLECTION CENTER.

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REGISTERED PROFESSIONAL ENGINEER — GHIA T. LIN — No. 41497 EXP. 12/31/23 — CIVIL — STATE OF CALIFORNIA

2023-07-13

REVISIONS

NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

HYDROLOGY MAP
OF
TRACT MAP 17702, LOT 1
(PHASE II OF GARDEN GROVE TRIANGLE)
POST-DEVELOPMENT CONDITION

G-0000 | EXHIBIT "I"

SHEET 2 OF 2

Tract No. 17702 - GG-2 Line A - Building #2 to existing SD at Brookhurst Street

	Node #	A (drainage area) SF	A (drainage area) AC	A-total	Duration TC	intensity I (FIG B-3)	loss rate Fp (table C.2)	impervious Aj (Fig. C-4)	Ap (=1-Aj)	Fm (=Fp*Ap)	Fm (total)	Fm (Avg)	Q (cfs) (EQ. D.4)	Pipe size (inches)	slope	Upper Elevation	Lower Elevation	H-DIFF (ft)	V (fps)	L (ft)	T-pipe flow (min)	T-total (min)
	10														**0.020**	77.57	77.11	0.47		**93.00**		**5.00**
P1 - Initial area (portion Lot 1)	**11**	**37990**	**0.872**	**0.872**	**5.00**	**6.20**	0.30	0.90	0.10	**0.03**	0.03	**0.03**	**4.84**									
P2 - add area (portion Lot 1)	**11**	**20966**	**0.481**	**1.353**	**5.00**	**6.20**	0.30	0.90	0.10	**0.03**	0.04	**0.03**	**7.52**									5.00
Pipe flow														12	0.006	**74.18**	**72.74**	1.44	6.06	**240.08**	0.7	5.7
P3 - add area (Lot 2)	**12**	**90289**	**2.073**	**3.426**	**5.66**	**6.00**	0.30	0.90	0.10	**0.03**	0.10	**0.03**	**18.41**									
Pipe flow														15	0.006	**72.49**	**71.74**	0.75	7.05	**124.44**	0.3	6.0
P4 - add area (Lot A)	**13**	**20152**	**0.463**	**3.889**	**5.95**	**6.00**	0.30	0.85	0.15	**0.05**	0.12	**0.03**	**20.89**									
Pipe flow														18	0.006	**71.49**	**70.93**	0.56	7.92	**93.89**	0.2	6.2
P5 - add area (Lot 3)	**14**	**41569**	**0.954**	**4.843**	**6.15**	**5.90**	0.30	0.90	0.10	**0.03**	0.15	**0.03**	**25.58**									
Pipe flow														18	0.006	**70.93**	**70.57**	0.36	7.97	**59.56**	0.1	6.3
P6 - Portion private road	**15**	**23399**	**0.537**	**5.380**	**6.28**	**5.90**	0.30	0.90	0.10	**0.03**	0.17	**0.03**	**28.42**									
Pipe flow														24	0.020	**70.07**	**66.91**	3.16	17.55	**158.24**	0.2	6.4
P7 - JOIN EX 63" SD	**16**	**0**	**0.000**	**5.380**	**6.43**	**5.90**	0.30	0.65	0.35	**0.11**	0.17	**0.03**	**28.42**									

NOTE:
ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

TRACT MAP 17702 - LOT 1 - BUILDING NO.2				
WQMP - BMP DCV CALCUATION SHEET				
1	Drainage Area (A)	58956	SF	
		1.353	AC	
2	Impervious area	53428	SF	
3	LS area	5528	SF	
4	% of Impervious area	90.6%		
5	% of pervious area	9.4%		
6	Design Storm Depth (D)	0.77	inches	
7	Time of Concentration (TC)	5	Min	
8	Rainfall intensite (I)	0.265	in/hr	
9	Runoff Coefficient (C)	0.9		
10	Design DCV (Demand)	**3405**	CF	
11	Design QDCV (Demand)	**0.325**	CFS	

APPENDIX B -AMENDMENT 1

CONSTRUCTION MATERIALS

ROUGH GRADING PLAN
BROOKHURST TRIANGLE PHASE II
GARDEN GROVE, CA

GRADING GENERAL NOTES:

48 HOUR ADVANCE NOTICE IS REQUIRED PRIOR TO THE START OF ANY WORK (714) 741-5887

1. ALL WORK SHALL CONFORM TO THE CITY OF GARDEN GROVE LATEST ORDINANCE NO. 2835, STANDARD PLANS AND SPECIFICATIONS, THE 2021 STANDARD SPECIFICATIONS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION, THE CITY OF GARDEN GROVE ORDINANCE NO. 2590, THE 2022 CALIFORNIA BUILDING CODE, AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK) 2021 EDITION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY THE CITY OF GARDEN GROVE WATER DEPARTMENT AND ALL OTHER UTILITY COMPANIES A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL PHASES OF CONSTRUCTION WITH THE VARIOUS UTILITY COMPANIES INVOLVED.
3. SUBMITTAL DOCUMENT REQUIREMENTS SHALL AT A MINIMUM, CONFORM TO ALL REQUIREMENTS OF SECTIONS 107 AND 110 OF THE CALIFORNIA BUILDING CODE, INCLUDING THE FOLLOWING:

   A. GRADING PLAN WITH SITE PLAN SHOWING TO SCALE THE SIZE AND LOCATION OF NEW CONSTRUCTION AND EXISTING STRUCTURES ON THE SITE AND ADJACENT TO THE SITE A MINIMUM OF THIRTY FEET (30') FROM THE PROPERTY BOUNDARY;

   B. HORIZONTAL AND VERTICAL DISTANCES AND ELEVATIONS IN RELATION TO THE PROPERTY LOT LINES AND NEAREST CITY BENCHMARKS FOR TOPOGRAPHIC CONTROL. (TEMPORARY BENCH MARKS SHALL NOT BE USED FOR TOPOGRAPHIC CONTROL);

   C. EXISTING STREET GRADES AND PROPOSED DESIGN GRADES FOR ALL PROJECT FRONTAGES AND ADJACENT ACCESS IMPROVEMENTS.

   D. ALL SITE/GRADING PLANS SHALL BE BASED UPON AN ACCURATE BOUNDARY LINE SURVEY WITH MONUMENT AND HORIZONTAL/VERTICAL CONTROL DISPOSITION SHOWN ON THE PLANS;(SECTION 107.2.S CALIFORNIA BUILDING CODE);

   E. DEMOLITION WORK FOR IMPROVEMENTS TO BE REMOVED AND/OR PROTECTED IN PLACE;

   F. ANY PHASING OF IMPROVEMENTS AS ALLOWED BY THE CITY.
4. THE CONTRACTOR SHALL OBTAIN A SEPARATE PERMIT FOR ALL WORK WITHIN THE STREET RIGHT-OF-WAY. TEMPORARY A.C. PAVING SHALL BE PLACED WHERE SIDEWALK REMOVALS EXTEND LONGER THAN (24) TWENTY-FOUR HOURS AS DIRECTED BY THE CITY INSPECTOR.
5. DUST SHALL BE CONTROLLED BY WATERING AND IN FULL CONFORMANCE WITH THE REQUIREMENTS OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT GUIDELINES.
6. SANITARY FACILITIES SHALL BE MAINTAINED ON SITE. FACILITIES SHALL BE LOCATED SUCH THAT SPILLS SHALL BE CONTAINED AND AT NO TIME ENTER A PUBLIC OR PRIVATE STORM DRAIN.
7. PRIOR TO THE POURING OF ANY FOUNDATION MATERIALS, THE PAD ELEVATION AND THE BUILDING CORNERS MUST BE VERIFIED IN WRITING TO THE BUILDING SECTION BY THE REGISTERED CIVIL ENGINEER OR THE LICENSED LAND SURVEYOR IN CONFORMANCE WITH SECTION 1612 OF THE CALIFORNIA BUILDING CODE.
8. NO FILL SHALL BE PLACED UNTIL THE BUILDING OFFICIAL AND THE SOILS ENGINEER APPROVE PREPARATION OF GROUND.
9. FILLS SHALL BE COMPACTED THROUGHOUT TO 90% DENSITY AS DETERMINED BY A.S.T.M. D1557, A.S.T.M. D1556 (SAND CONE), AND/OR A.S.T.M. D2922, (NUCLEAR). SAND CONE METHOD MUST REPRESENT NO MORE THAN 20% OF TESTING. DRIVE TUBE TESTING IS NOT PERMITTED.
10. FILL SLOPES SHALL BE NO STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL AND SHALL HAVE NOT LESS THAN 90% COMPACTION OUT TO THE FINISH SURFACE.
11. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE UTILITIES OF EVERY NATURE WHETHER SHOWN HEREON OR NOT AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR TOTAL COST OF REPAIR OR REPLACEMENT OF SAID UTILITIES DAMAGED BY OPERATIONS.
12. IN ACCORDANCE WITH SPECIFICATIONS AND CODES REFERENCED IN PARAGRAPH 1; CONSTRUCTION DOCUMENTS AND A SCHEDULE FOR DEMOLITION SHALL BE SUBMITTED WHERE REQUIRED BY THE CITY ENGINEERING DIVISION AND OR BUILDING SERVICES DIVISION. WHERE SUCH INFORMATION IS REQUIRED, NO WORK SHALL BE DONE UNTIL SUCH CONSTRUCTION DOCUMENTS OR SCHEDULE, OR BOTH, ARE APPROVED.
13. THE CONTRACTOR SHALL MAKE PROVISIONS TO HAVE ALL EXISTING ON-SITE SEWER, WATER, GAS, ELECTRIC, IRRIGATION OR TELEPHONE LINES REMOVED, ABANDONED, OR RELOCATED IF THEY ARE INTERFERING WITH THE PROPOSED CONSTRUCTION.
14. THE CONTRACTOR SHALL REMOVE, CAP, AND ABANDON ALL EXISTING ON-SITE WATER WELLS, CESSPOOLS, OR SEPTIC TANKS ENCOUNTERED DURING GRADING IN ACCORDANCE WITH THE LATEST EDITION OF THE UNIFORM PLUMBING CODE, THE DEPARTMENT OF HEALTH AND THE CITY MUNICIPAL CODE.
15. ANY BROKEN OR DAMAGED IMPROVEMENTS ON ADJACENT PRIVATE PROPERTY OR PUBLIC RIGHT-OF-WAY SHALL BE REPLACED OR REPAIRED IN KIND AS DIRECTED BY THE CITY ENGINEER.
16. TEMPORARY TRAFFIC CONTROL AND PEDESTRIAN ACCESS AND PROTECTION DURING CONSTRUCTION SHALL CONFORM TO THE DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT'S LATEST "PUBLIC CONVENIENCE AND TRAFFIC CONTROL SPECIFICATION" SHEET, AND THE "WATCH MANUAL" AS PUBLISHED BY THE APWA, CHAPTER 33 OF THE CALIFORNIA BUILDING CODE AND THE REQUIREMENTS OF THE CITY ENGINEER.
17. ALL TRAFFIC CONTROL DEVICES SHALL BE INSTALLED, RELOCATED, OR REMOVED TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
18. THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEER PRIOR TO THE REMOVAL, PARTIAL REMOVAL OR TRIMMING OF TREES OVERHANGING OR LYING PARTIALLY OR FULLY WITHIN EXISTING RIGHT-OF-WAY.
19. THE SOILS REPORT PREPARED BY CAL LAND ENGINEERING, INC., DATED OCTOBER 17, 2013; GEOTECHNICAL SOLUTIONS, INC., DATED SEPTEMBER 12, 2017; GEOCON WEST, INC., DATED MAY 10, 2023 AND ALL RECOMMENDATIONS CONTAINED THEREIN, SHALL BE MADE A PART OF THESE PLANS. SOILS REPORTS AND TESTING SHALL BE DONE BY A CIVIL OR GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.
20. PRIOR TO THE IMPORTATION OF ANY SOIL MATERIAL TO THIS SITE, AN INVESTIGATION SHALL BE MADE AND A REPORT FILED WITH THE BUILDING OFFICIAL. USE OF THE SOIL WILL NOT BE PERMITTED IF IT IS DETERMINED BY THE TEST RESULTS THAT THE EXPANSION INDEX IS IN EXCESS OF TWENTY (20). AN "R" VALUE TEST SHALL ALSO BE PERFORMED ON IMPORT SOIL AND RESULTS SUBMITTED TO THE GRADING ENGINEER. IMPORT SOIL SHALL BE CLEAN AND FREE OF ANY DEBRIS. FAILURE TO CONFORM TO THESE REQUIREMENTS SHALL BE CAUSE FOR REMOVAL AND REPLACEMENT OF SAID SOIL.
21. STATEMENT OF QUANTITIES - INCLUDING ALL REMEDIAL GRADING AS RECOMMENDED IN THE SOILS REPORT;

RAW CUT	23600 CUBIC YARDS (GROSS)
RAW FILL	900 CUBIC YARDS (GROSS)
OVER EXCAVATION:	5000 CUBIC YARDS (GROSS)

22. ALL EARTHWORK AND OTHER QUANTITIES ARE ESTIMATED FOR BONDING AND PLAN CHECK FEE PURPOSES ONLY - NOT FOR BIDDING PURPOSES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE ACCURACY OF THE ESTIMATE.
23. WATER METER AND SERVICE TO BE INSTALLED BY CITY FORCES UPON PAYMENT OF APPLICABLE FEES.
24. PRIOR TO PLACEMENT OF PARKING LOT STRUCTURAL SECTION, DEVELOPER SHALL COMPACT SUB-GRADE TO 90% MM. RELATIVE COMPACTION. AGGREGATE BASE SHALL BE CLASS II 3/4" COMPACTED TO 90% RELATIVE COMPACTION. THE DEVELOPER'S GEOTECHNICAL ENGINEER SHALL SUBMIT COMPACTION TESTS TO THE CITY PER ASTM D1557 (METHOD C FOR AGGREGATE BASE). ASPHALT CONCRETE SHALL BE CLASS C2 DENSE MEDIUM ASPHALT CONCRETE MIX PER TABLE 203-6.4.3(A) (THE "GREENBOOK" 2021 EDITION CONFORMING TO PAGE 70-10.)
25. THE CONTRACTOR SHALL INSTALL AND MAINTAIN A SIX (6) FOOT HIGH CHAIN LINK FENCE TO SECURE THE PROJECT PERIMETER. THE FENCE SHALL BE REMOVED UPON CONSTRUCTION OF PERMANENT PERIMETER FENCING AND/OR COMPLETION OF THE PROJECT.
26. CONCRETE FORM ELEVATIONS FOR CURB AND DRAINAGE GUTTERS ARE TO BE VERIFIED FOR PLAN GRADE BY A LICENSED SURVEYOR PRIOR TO CONCRETE POUR. ANY DEVIATIONS FROM THESE APPROVED PLANS SHALL REQUIRE APPROVAL BY THE CITY ENGINEER OR CORRECTED PRIOR TO PLACEMENT OF CONCRETE BY SUBMITTAL OF A REQUEST FOR REVISION TO THE APPROVED PLAN.
27. UPON COMPLETION OF ALL WORK, THE REGISTERED CIVIL ENGINEER OF RECORD SHALL CERTIFY IN WRITING THAT THE PROJECT IS IN COMPLIANCE WITH THE LINES, GRADES, AND ELEVATIONS ON THE APPROVED GRADING PLAN. IF THE BUILDING IS IN A FLOOD ZONE HAZARD AREA, THE CIVIL ENGINEER SHALL SUPPLY ADDITIONAL CERTIFICATIONS VERIFYING THAT THE LOWEST FINISH FLOOR ELEVATION(S) COMPLY WITH THE FEMA FLOOD HAZARD ELEVATIONS AS REQUIRED UNDER 1612A OF THE CALIFORNIA BUILDING CODE. (CERTIFICATION FORMS SHALL BE OBTAINED FROM THE CITY AND WET-SIGNED BY THE ENGINEER OF RECORD).
28. ALL CONCRETE FOR CURBS, GUTTERS, AND SIDEWALKS SHALL BE 2500 PSI AT 28 DAYS. CATCH BASINS AND TRUCK WELLS SHALL BE 3000 PSI AT 28 DAYS.
29. PROVIDE THE FOLLOWING SIGNING AND STRIPING. EACH PARKING SPACE RESERVED FOR PERSONS WITH PHYSICAL DISABILITIES SHALL BE IDENTIFIED BY A REFLECTORIZED SIGN PERMANENTLY POSTED IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE, CONSISTING OF A PROFILE VIEW OF A WHEELCHAIR WITH OCCUPANT IN WHITE ON A DARK BLUE BACKGROUND. THE SIGN SHALL NOT BE SMALLER THAN 70 SQUARE INCHES IN AREA AND WHEN IN THE PATH OF TRAVEL, SHALL BE POSTED AT A MINIMUM HEIGHT OF 80 INCHES FROM THE BOTTOM OF THE SIGN TO THE PARKING SPACE FINISHED GRADE. SIGNS MAY ALSO BE CENTERED ON THE WALL AT THE INTERIOR END OF THE PARKING SPACE AT A MINIMUM HEIGHT OF 36 INCHES FROM THE PARKING SPACE FINISHED GRADE, GROUND OR SIDEWALK. PARKING STALL LAYOUT SHALL CONFORM TO TITLE 24 2022 CALIFORNIA BUILDING CODE, CHAPTERS HA AND 11B, AND THE DEPARTMENT OF JUSTICE STANDARDS, LATEST EDITION.
30. AN ADDITIONAL SIGN SHALL ALSO BE POSTED, IN A CONSPICUOUS PLACE, AT EACH ENTRANCE TO OFF-STREET PARKING FACILITIES, OR IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE. THE SIGN SHALL BE NOT LESS THAN 17 INCHES X 22 INCHES IN SIZE WITH LETTERING NOT LESS THAN ONE (1) INCH IN HEIGHT, WHICH CLEARLY AND CONSPICUOUSLY STATES THE FOLLOWING:
31. "UNAUTHORIZED VEHICLES PARKED IN DESIGNATED HANDICAPPED SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR LICENSE PLATES ISSUED FOR PHYSICALLY DISABLED PERSONS MAY BE TOWED AWAY AT OWNER'S EXPENSE. TOWED VEHICLE MAY BE RECLAIMED BY TELEPHONING (714) 741-5704

    *VERJFY NUMBER WITH POLICE DEPARTMENT PRIOR TO FABRICATION OF SIGNS.
32. IN ADDITION TO THE ABOVE-REQUIRED SIGNS, THE SURFACE OF EACH PARKING SPACE SHALL HAVE A SURFACE IDENTIFICATION OF EITHER OF THE FOLLOWING:

    A. OUTLINE THE STALL IN BLUE AND PROVIDE A PROFILE VIEW OF A WHEELCHAIR WITH OCCUPANT IN WHITE (OR OTHER CONTRASTING COLOR).

    B. PROVIDE A 36 INCHES X 36 INCHES PROFILE VIEW OF A WHEELCHAIR WITH OCCUPANT IN WHITE ON A BLUE BACKGROUND. SYMBOL SHALL BE LOCATED SUCH THAT IT IS VISIBLE TO A TRAFFIC ENFORCEMENT OFFICER WHEN THE VEHICLE IS PARKED.

    C. ALL COMPACT PARKING STALLS SHALL BE INDIVIDUALLY STRIPED AND MARKED ON THE PARKING SPACE SURFACE. ALL PARKING STALLS SHALL BE HAIRPIN STRIPED. ALL CURBS NOT ASSOCIATED WITH A PARKING STALL SHALL BE PAINTED RED.
33. ALL CURB RAMPS SHALL HAVE A GROOVED BORDER 12 INCHES WIDE, AT THE LEVEL SURFACE OR LANDING OF THE SIDEWALK ALONG THE TOP OF THE RISE AND EACH SIDE APPROXIMATELY SPACED 3/4 INCHES ON CENTER OF THE GROOVES. ALL CURB RAMPS CONSTRUCTED BETWEEN THE FACE OF THE CURB AND THE STREET RIGHT OF WAY SHALL HAVE A GROOVED BORDER AT THE LEVEL SURFACE OR LANDING OF THE SIDEWALK. RAMPS SHALL BE SHOWN ON THESE APPROVED PLANS AND IN CONFORMANCE WITH TITLE 24, 2022 CALIFORNIA BUILDING CODE, CHAPTER 11A AND 11B, AND THE DEPARTMENT OF JUSTICE STANDARDS, LATEST EDITION.
34. FOR EXTERIOR WALKWAYS AND PATHS OF TRAVEL, OBJECTS PROJECTING FROM WALLS (FOR EXAMPLE, TELEPHONES) WITH THEIR LEADING EDGES BETWEEN 27 INCHES AND 80 INCHES ABOVE THE FINISHED FLOOR SHALL PROTRUDE NO MORE THAN 4 INCHES INTO WALKS, HALLS, CORRIDORS, PASSAGEWAYS OR AISLES. OBJECTS MOUNTED WITH THEIR LEADING EDGES AT OR BELOW 27 INCHES ABOVE THE FINISHED FLOOR MAY NOT PROTRUDE ANY AMOUNT.
35. FREESTANDING OBJECTS MOUNTED ON POSTS OR PYLONS MAY OVERHANG 12 INCHES MAXIMUM FROM 27 INCHES TO 80 INCHES ABOVE THE GROUND OR FINISHED FLOOR. PROTRUDING OBJECTS SHALL NOT REDUCE THE CLEAR WIDTH OF AN ACCESSIBLE ROUTE OR MANEUVERING SPACE. ANY OBSTRUCTION OVERHANGING A PEDESTRIAN WAY SHALL BE A MINIMUM OF 80 INCHES ABOVE THE WALKING SURFACE AS MEASURED TO THE BOTTOM OF THE OBSTRUCTION.
36. WALKS, HALLS, CORRIDORS, PASSAGEWAYS, AISLES OR OTHER CIRCULATION SPACES SHALL HAVE 80 INCHES MINIMUM CLEAR HEADROOM. ABRUPT CHANGES IN LEVEL, EXCEPT BETWEEN A WALK OR SIDEWALK AND AN ADJACENT STREET OR DRIVEWAY, EXCEEDING 4 INCHES IN A VERTICAL DIMENSION, SUCH AS AT PLANTERS OR FOUNTAINS LOCATED IN OR ADJACENT TO WALKS, SIDEWALKS, OR OTHER PEDESTRIAN WAYS SHALL BE IDENTIFIED BY CURBS PROJECTING AT LEAST 6 INCHES IN HEIGHT ABOVE THE WALK OR SIDEWALK SURFACE TO WARN THE BLIND OF A POTENTIAL DROP-OFF.
37. WHEN A GUARDRAIL OR HANDRAIL IS PROVIDED, NO CURB IS REQUIRED WHEN A GUIDE RAIL IS PROVIDED CENTERED 3 INCHES PLUS OR MINUS ONE INCH ABOVE THE SURFACE OF THE WALK OR SIDEWALK. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF TITLE 24, 2022 CALIFORNIA BUILDING CODE, CHAPTER 11A AND 11B AND THE DEPARTMENT OF JUSTICE STANDARDS, LATEST EDITION.
38. ALL HANDICAP PARKING STALLS SHALL CONFORM TO THE DETAIL(S) SHOWN ON THE PLANS, AND TITLE 24, 2022 CALIFORNIA BUILDING CODE CHAPTER 11A AND 11B, AND THE DEPARTMENT OF JUSTICE STANDARDS, LATEST EDITION.
39. DRAINAGE SHALL BE CHECKED BY FLOODING OF PAVED AREAS AND CONCRETE GUTTERS. ANY CONCRETE AREAS HOLDING WATER SHALL BE REMOVED AND REPLACED. ANY PAVEMENT AREAS HOLDING WATER SHALL BE REMOVED AND REPLACED OR GROUND TO A UNIFORM DEPTH OF 1" AND CAPPED TO THE SATISFACTION OF THE CITY ENGINEER.
40. LANDSCAPE TREATMENT AND GROUND CONTOURING AS PER THE APPROVED LANDSCAPE PLAN, INCLUDING LIGHTING STANDARDS, SHALL BE SHOWN ON THE GRADING PLAN. LOCATION OF TREES SHALL ALSO BE SHOWN.
41. THE DEVELOPER SHALL SWEEP ALL STREETS IN THE AREA OF THE CONSTRUCTION SITE ON A DAILY BASIS AS REQUIRED BY THE CITY ENGINEER. WASHING DOWN OF ANY STREET SHALL NOT BE PERMITTED UNLESS SPECIFICALLY APPROVED BY THE CITY ENGINEER AFTER ALL DEBRIS AND SILT HAVE BEEN REMOVED. FAILURE TO COMPLY WITH THIS SECTION SHALL BE CAUSE FOR IMMEDIATE SUSPENSION OF ALL WORK ON THE DEVELOPMENT AS WELL AS SUSPENSION OF ALL PERMITS APPROVED TO DATE.
42. ALL WORK SHALL BE IN CONFORMANCE WITH THE LATEST NPDES PERMIT AND CITY OF GARDEN GROVE LOCAL IMPLEMENTATION PLAN (LIP) AND ADOPTED LOW IMPACT DEVELOPMENT (LID) REQUIREMENTS. COPIES OF APPROVED EROSION CONTROL PLANS AND STORM WATER POLLUTION PREVENTION PLAN (SWPPP) WHERE REQUIRED, SHALL BE AT THE CONSTRUCTION SITE AT ALL TIMES AND MADE AVAILABLE UPON REQUEST FOR REVIEW AND IMPLEMENTATION.
43. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL IMPORTED AND EXPORTED SOIL IS FREE OF THE RED IMPORTED FIRE ANT (RIFA).
44. ALL ON-SITE CATCH BASINS SHALL BE STENCILED NOTIFYING THE PUBLIC THAT NO DUMPING IS PERMITTED AND THAT ALL FLOWS DRAIN TO THE OCEAN. THE CONTRACTOR SHALL OBTAIN THE LATEST STENCIL FROM THE CITY STREETS DIVISION 714.741.5278.

REFERENCES

* GREEN BOOK TABLE 203-6.4.3 (A)
* PHASE I PRECISE GRADING PLAN - G-1301
* TRACT MAP 17871 STREET IMPROVEMENT PLAN - A-1857

SHEET INDEX

SHEET 1:	TITLE SHEET
SHEET 2:	NOTES & INDEX SHEET
SHEET 3:	QUANTITIES AND SECTIONS
SHEET 4:	ROUGH GRADING - BUILDING AREA
SHEET 5:	ROUGH GRADING - SOUTHERLY SITE
SHEET 6:	EROSION CONTROL SHEET
SHEET 7:	EROSION CONTROL DETAIL
SHEET 8:	EROSION CONTROL DETAIL (CONT)

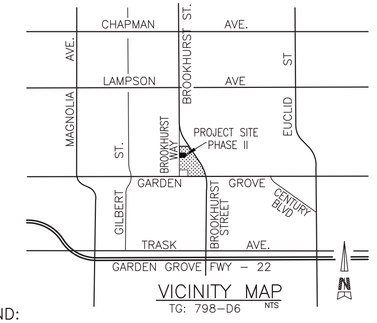
EARTHWORK CALCULATION:

CUT AREA:	1.36 ACRES
FILL AREA:	0.20 ACRES
CUT VOLUME:	23600 C.Y
FILL VOLUME:	900 C.Y.
3' OVER-EXCAVATION	5000 C.Y.
STOCKPILE (ONSITE)	1800 C.Y.
RAW EXPORT VOLUME:	15900 C.Y.

NOTE:
24 HOUR ADVANCE NOTICE IS REQUIRED PRIOR TO THE START OF ANY WORK (714) 741-5887

NOTE:
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUES BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE "811"
TWO WORKING DAYS BEFORE YOU DIG.

DIGALERT
DIAL BEFORE YOU DIG — TOLL FREE 811 — TWO WORKING DAYS BEFORE YOU DIG
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT



VICINITY MAP
TG: 798-D6 NTS

LEGEND:

HP	HIGH POINT	(120)	EXISTING ELEVATION
TC	TOP OF CURB	120	PROPOSED ELEVATION
FL	FLOW LINE	TBM	TEMPORARY BENCH MARK
FS	FINISHED SURFACE	BM	BENCH MARK
FG	FINISHED GRADE	C	CUT
FF	FINISHED FLOOR	F	FILL
GF	GARAGE FLOOR	N	NATURAL
PAD	PAD	PP	POWER POLE
TW	TOP OF WALL	FH	FIR HYDRANT
TF	TOP OF FOOTING	BW	BACK OF WALK
H	HEIGHT		
L	LENGTH		PROPERTY LINE
PL	PROPERTY LINE		EXISTING CONTOURS
R/W	RIGHT-OF-WAY		PROPOSED CONTOURS
	RETAINING WALL		CUT/FILL DAYLIGHT LINE
	SUBDRAIN PER SOIL ENGINEER'S DIRECTION		CHAIN LINK FENCE
	INDICATES BIO-TRENCH LOCATION		EX. CATV LINE
	SUBDRAIN PIPE		EX. GAS LINE
	SUBDRAIN COLLECTION SYSTEM		EX. STORM DRAIN LINE
			EX. SEWER LINE
			EX. WATER LINE
			PROPOSE STORM DRAIN
			PROPOSE SEWER LINE
			PROPOSE WATER LINE

UTILITY CONTACT LIST

UTILITY	CONTACT	ADDRESS	TEL	CELL	FAX	E-MAIL
AT&T	YVETTL MARTINES-GARAFANO MAP REQUEST	1265 N. VAN BUREN RM 180 ANAHEIM, CA. 92807	714.666.5692		714.630.6617	ym7532@att.com attsubstructureoct@att.com
AT&T (CONSTRUCTION & ENGINEERING)	ROBERT FLEISHER	5959 E. CORONADO ANAHEIM, CA 92807	714.237.6165			rt3259@att.com
CITY OF GARDEN GROVE SANITARY DIVISION	BRENT HAYES	13802 NEWHOPE STREET GARDEN GROVE, CA 92840	714.741.5976	714.290.9318	714.638.9906	brenth@ci.garden-grove.ca.us
CITY OF GARDEN GROVE WATER DIVISION	CARINA DAN	13802 NEWHOPE STREET GARDEN GROVE, CA 92840	714.741.5346	714.448.1456	714.638.9906	carinad@ci.garden-grove.ca.us
CITY OF GARDEN GROVE TRAFFIC DIV.n - FIBER OPTIC CONDUIT	DAI VU	11222 ACACIA PARKWAY GARDEN GROVE, CA 92840	714.741.5189		714.741.5578	daiv@ci.garden-grove.ca.us
EDISON	EDISON MAP REQUEST	MUST COMPLETE FORM				MapRequests@sce.com
EDISON	UTILITY NOTICES GAIL GARDNER	SCE ATTN: DESIGN SUPPORT / UND 9901 GEARY AVE,. SANTA FE SPRING, CA 90670	562.903.3167			UND@SCE.COM
EDISON	JOSIAH D. PURDY	1241 S. GRAND AVENUE SANTA ANA, CA 92705	714.796.9886	714.889.8621 PAX:626.221.4482		Josiah.D.Purdy@sce.com
MAPS OF EDISON FACILITIES	KIM GURULE	BUILDING D.P.O. BOX 11982 SANTA ANA, CA 92711-1982	714.796.9932			MapRequests@sce.com
GAS CO	SAUL SAENZ	1919 S. STATE COLLEGE BLVD ANAHEIM, CA 92806-6114	213.231.7273		714.634.7287	ssaenz@semprautilities.com
GAS CO - TRANSMISSION DEPT. MAP REQUEST	ROSALYN SQUIRES	SOUTHERN REGION TRANSMISSION 9400 OAKDALE AVENUE CHATSWORTH, CA 91313	818.701.4546			Rsquires@semprautilities.com socalgrastmsmissionutilityrequest@semprautilities.com
OCSD	QUYNH NGUYEN MAP REQUEST	10844 ELLIS AVENUE FOUNTAIN VALLEY, CA 92708				gnguyen@ocsd.com
REGIONAL PIPELINE MANAGER	GREG KERN		714.634.5005		714.634.3101	
TIME WARNER/AKA SPECTRUM/CHARTER COMMUNICATIONS	ROBERT JIMENEZ	12051 INDUSTRY AVE. GARDEN GROVE, CA 92843	714.591.4905	562.319.7846		robert.jomenze@charter.com
XO COMMUNICATIONS	LEE ARNOLD	1924 DEERE AVE.	949.417.7700		949.417.7762	lee.arnold@xo.com
FRONTIER / VERIZON	PHIL OLIVAS	7352 SLATER HUNTINGTON BEACH, 92647	626.331.0155		949.417.7762	philip.olivas@ftr.com
RED FLEX SYSTEM, INC.	JOE CHASE	5835 A UPLANDER WAY CULVER CITY, CA 90230	805.208.5348	805.208.5348		bchase@redflex.com
CRIMSON PIPELINE LAND DEPT	JENNIFER LONGVILLE	3760 KILROY AIRPORT WAY #300 LONG BEACH, CA 90806	562.285.4195			jlongville@crimsonpl.com
CONFLICT INQUIRY SPECIALIST CA ASSET MGMT CHEVRON PIPR LINE COMPANY	DAVE AERLER PASCUAL ALVAREZ	2600 HOMESTEAD PL LONG BEACH, CA 90806	310.669.4014	951.533.5444		davezerler@chevron.com PDZP@chevron.com
CROWN CASTLE	AHMAD R. SMITH	200 SPECTRUM CENTER DR SUITE 1900 IRVINE, CA 92618	949.936.0045	951.533.5444		ahmad.smith@crowncastle.com

ENGINEER'S NOTE:
THE PROJECT IS WITHIN ZONE "X" PER FEMA FIRM MAP, MAP NUMBER 06059C0139J, DATED DEC. 3, 2009. BUILDING FINISHED FLOOR ELEVATION SHALL BE MINIMUM 1.0' ABOVE THE ADJACENT LOWEST TOP OF CURB. PRIOR TO CONCRETE PLACEMENT THE PAD ELEVATION, CERTIFICATION BY A LICENSED SURVEYOR ACCEPTABLE TO THE BUILDING INSPECTOR MUST BE PROVIDED.

REFERENCE PLANS:

STREET: BW-66-06032-06035; A-995; D-17-70176; S-109-58-70120;
STREET: D-105-58-70124; D-200-097; A-1650-60232; A-1857
STORM DRAIN: C-4-9; D-270-9-60089
SEWER: S-TR-9834
WATER: W-575
GRADING: G-1301

GEOTECHNICAL ENGINEER'S STATEMENT:

THIS PLAN HAS BEEN REVIEWED BY GEOCON WEST, INC. AND DEEMED TO BE IN CONFORMANCE WITH ALL THE RECOMMENDATIONS IN OUR REPORT, PROJECT NUMBER W1771-88-01. REVIEW WAS LIMITED TO THE GEOTECHNICAL ASPECTS OF THE PLAN ONLY.

DATE

GEOCON WEST, INC.
2807 McGAW AVENUE
IRVINE, CA 92618
TEL. (949) 491-6570
E-MAIL: WWW.GEOCONINC.COM

LEGAL DESCRIPTION & ASSESSOR'S PARCEL NUMBERS:

LOTS 1 AND 2, TOGETHER WITH LETTER LOTS A, B, C AND D, AS SHOWN ON THAT CERTAIN MAP ENTITLED TRACT NO. 17871, IN THE CITY OF GARDEN GROVE, COUNTY OF ORANGE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 941 PAGES 27 TO 30 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

APN#: 089-661-03, 089-661-04 AND PORTION OF 089-661-05, 089-071-05 AND 089-071-24.

NGVD 29 DATUM NOTE:

ADD 2.11 FEET TO THE ELEVATION SHOWN ON THE PLAN (NGVD 29 DATUM) IN ORDER TO ACHIEVE THE ELEVATION PER THE LISTED CITY BENCHMARK NO. GG-130 (NAVD 88 DATUM)

3 REVIEW - 7/12/23
NO EXCEPTION TAKEN
Robert Righetti
Land Use Review

WDID #: 563194

BASIS OF BEARINGS:
THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF BROOKHURST STREET N32°58'38"W PER TRACT NO. 17871, M.B. 941-29-30.

BENCH MARK
CITY B.M. NO. GG-130:
NORTHEAST QUADRANT OF LAMPSON AVE. & BROOKHURST ST., 15' EAST OF B.C.R., 1' NORTH OF CURB FACE, IN SOUTHEAST CORNER OF A 16' X 4' CATCH BASIN.

ELEVATION=85.727' (NAVD 1988)

OWNER:
KAM SANG COMPANY, INC.
411 E. HUNTINGTON DRIVE, #305
ARCADIA, CA 91006
TEL: (626) 446-2988
FAX: (626) 446-3392
E-MAIL: www.kamsangcompany.com

SOIL ENGINEER:
GEOCON WEST, INC.
GEOTECHNICAL
2807 McGAW AVENUE
IRVINE, CA 92618
TEL. (949) 491-6570
FAX.
EMAIL: OC@GEOCONINC.COM

PREPARED BY:
FOCUS ENGINEERING, INC.
8 CORPORATE PARK, SUITE 300
IRVINE, CA 92606
TEL: (949) 450-0590
E-MAIL: focusengring@sbcglobal.net

REGISTERED PROFESSIONAL ENGINEER CHIA LIN LIU No. 41497 EXP. 12/31/23 CIVIL STATE OF CALIFORNIA

REVISIONS

APPV'D	NO.	DATE	DESCRIPTION

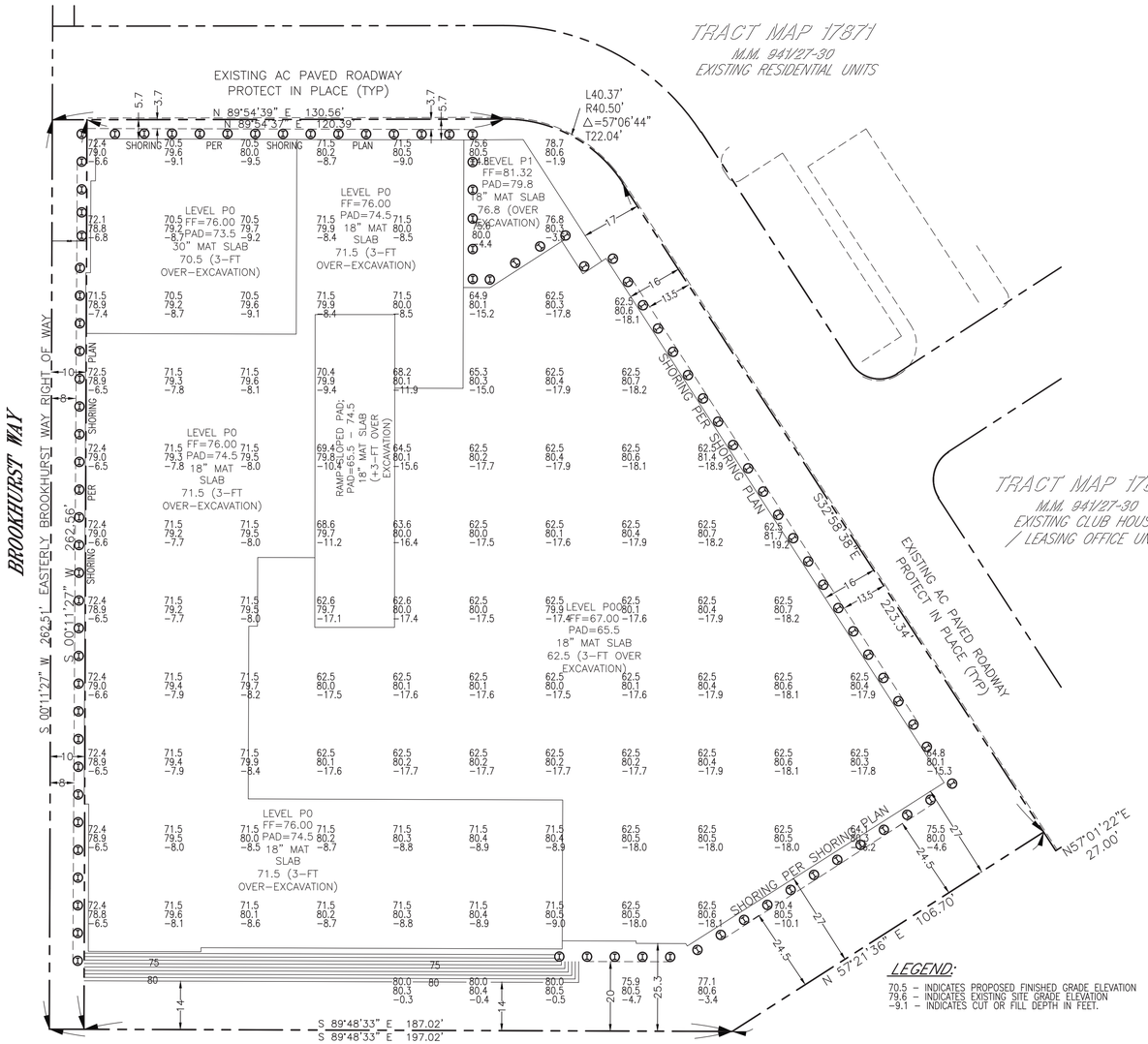
CITY OF GARDEN GROVE

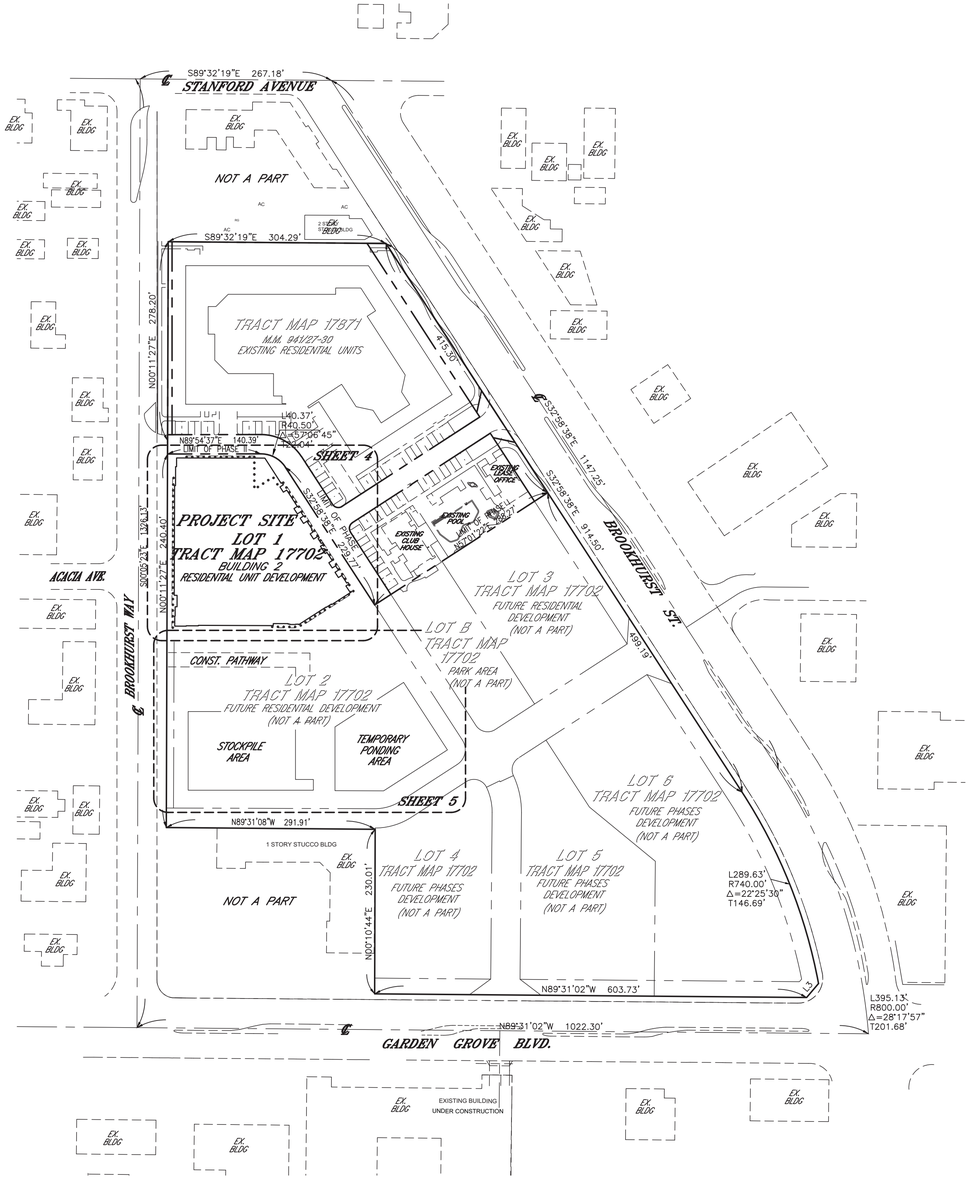
ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
TITLE SHEET

G-1558

PRINT: 2023-07-11

SHEET 1 OF 8





SCALE: NTS

SITE INDEX MAP

LEGEND:

70.5 – INDICATES PROPOSED FINISHED GRADE ELEVATION
79.6 – INDICATES EXISTING SITE GRADE ELEVATION
-9.1 – INDICATES CUT OR FILL DEPTH IN FEET.

ENGINEER'S NOTICE:

1. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
2. ALL UNDERGROUND UTILITIES OR STRUCTURES, REPORTED OR FOUND ON PUBLIC RECORDS, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER, BY ACCEPTING THESE PLANS OR PROCEEDING WITH THE IMPROVEMENTS HEREON, AGREES TO ASSUME LIABILITY AND HOLD THE ENGINEERS HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED OR INDICATED ON PUBLIC RECORDS, OR THOSE CONSTRUCTED AT VARIANCE WITH REPORTED OR RECORDED LOCATIONS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROJECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF ALL UTILITIES OR STRUCTURES CONCERNED BEFORE STARING WORK.
3. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USED OF THESE PLANS. ALL CHANGES TO THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARE OF THESE PLANS.
4. QUANTITIES SHOWN HEREON ARE PROVIDED FOR BONDING PURPOSES ONLY. CONTRACTORS SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES PRIOR TO BIDDING FOR CONSTRUCTION.

NGVD 29 DATUM NOTE:

ADD 2.11 FEET TO THE ELEVATION SHOWN ON THE PLAN (NGVD 29 DATUM) IN ORDER TO ACHIEVE THE ELEVATION PER THE LISTED CITY BENCHMARK NO. GG-130 (NAVD 88 DATUM)

CALIFORNIA COUNCIL OF CIVIL ENGINEERS AND LAND SURVEYORS:

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK IN THIS PROJECT, EXPECTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

NOTE:

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUES BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE "811"
TWO WORKING DAYS BEFORE YOU DIG.

DIGALERT
DIAL BEFORE YOU DIG
TOLL FREE 811
TWO WORKING DAYS BEFORE YOU DIG
811
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF BROOKHURST STREET N32°58'38"W PER TRACT NO. 17871, M.B. 941-29-30.

BENCH MARK

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EMAIL: OC@GEOCONINC.COM

PREPARED BY:
FOCUS ENGINEERING, INC.
8 CORPORATE PARK, SUITE 300
IRVINE, CA 92606
TEL: (949) 450-0590
E-MAIL: focusengring@sbcglobal.net

REGISTERED PROFESSIONAL ENGINEER
CHIA LIN C.T.O
No. 41497
EXP. 12/31/23
CIVIL
STATE OF CALIFORNIA

REVISIONS

NO.	DATE	DESCRIPTION

WDID #: 563194

CITY OF GARDEN GROVE

ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II

NOTES & INDEX SHEET

G-1558

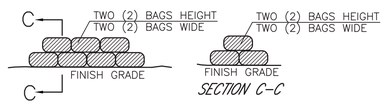
PRINT: 2023-07-11

SHEET 2 OF 8

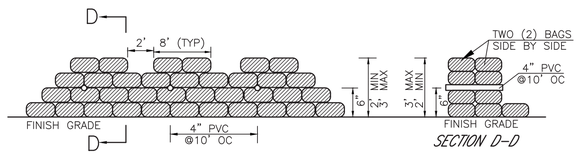
CONSTRUCTION NOTES

EROSION CONTROL CONSTRUCTION NOTES

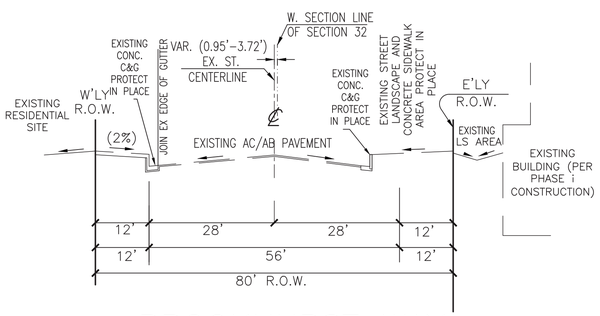
(71)	SE-1: INSTALL SILT FENCE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1660 LF
(72)	SE-5: INSTALL FIBER ROLLS PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1660 LF
(73)	TC-1 & TC-3: INSTALL STABILIZED CONSTRUCTION ENTRANCE AND TIRE WASH PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 EA
(74)	WM-1: INSTALL MATERIAL DELIVERY AND STORAGE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 EA
(75)	WM-8: INSTALL CONCRETE WASTE MANAGEMENT, CONCRETE WASHOUT CONTAINER, WATERPROOF, ABOVE GROUND METAL CONTAINER, CONSOLIDATED FABRICATORS OR EQUIVALENT AS SHOWN ON SHEET 8 AND PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION	1 EA
(76)	SE-6: INSTALL GRAVEL BAG BERM PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1350 LF
(77)	EC-5: APPLY REINFORCED PLASTIC COVER OR SOIL BINDERS OR OTHER EROSION CONTROL MEASUREMENT ON ENGINEERING SLOPE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 LS
(78)	SE-3: CONSTRUCT SEDIMENT TRAP (1-FT IN DEPTH) PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 EA
(79)	SE-4: INSTALL CHECK DAMS PER DETAIL ON SHEET 3 AND CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 EA
(80)	SE-7: PERFORM STREET SWEEPING AND VACUUMING PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 LS
(81)	WM-9: INSTALL TEMPORARY SANITARY / SEPTIC FACILITIES, PORTABLE TOILETS, PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.	1 LS



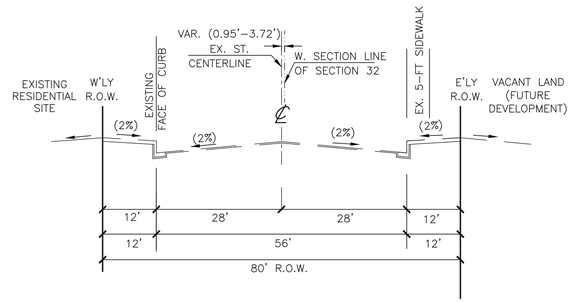
TYPICAL SECTION – GRAVEL BAG
NTS



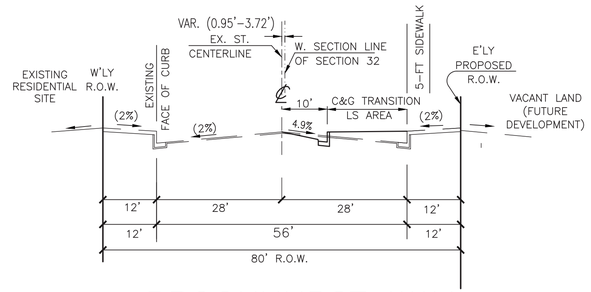
TYPICAL SECTION – CHECK DAM GRAVEL BAG
(TO BE USED AT FINAL STORM DRAIN RELEASE LOCATION) NTS



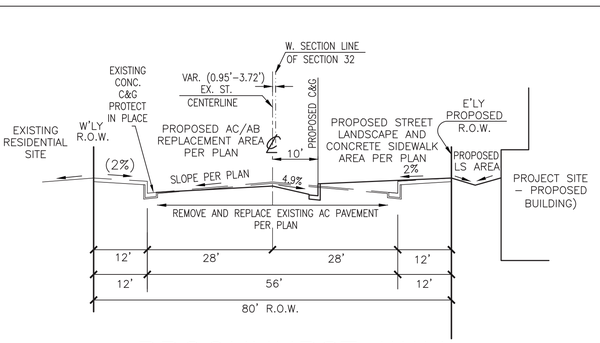
BROOKHURST WAY
(STA. 18+55 – 19+50) NTS



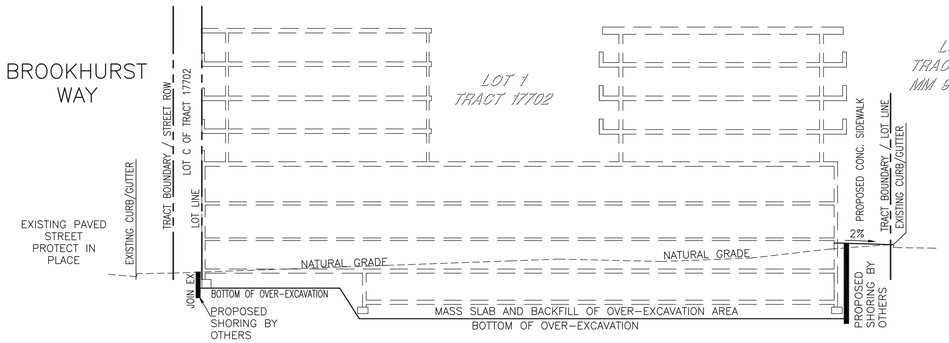
BROOKHURST WAY
(STA. 13+00.00 – 14+11.38) NTS



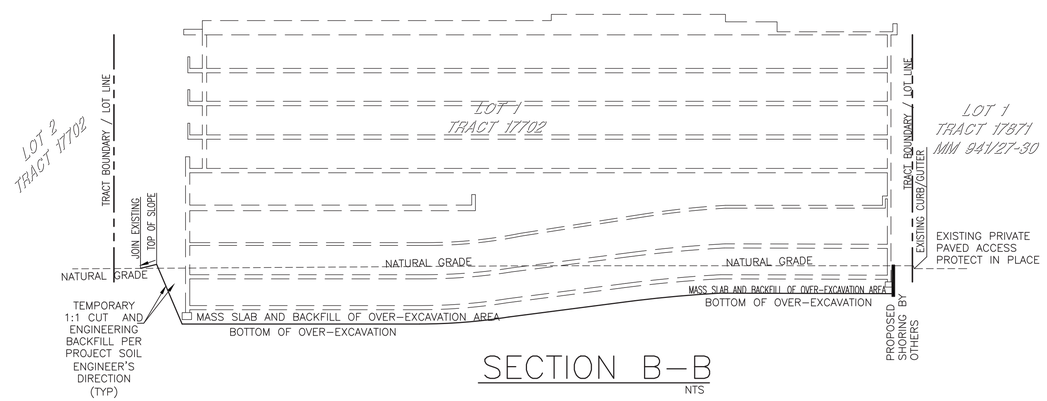
BROOKHURST WAY
(STA. 14+11.38 – 15+11.44) NTS



BROOKHURST WAY
(STA. 15+11.44 – 15+99.94) NTS
(STA. 17+43.50 – 17+72.27)



SECTION A–A
NTS



SECTION B–B
NTS

NGVD 29 DATUM NOTE:
ADD 2.11 FEET TO THE ELEVATION SHOWN ON THE PLAN (NGVD 29 DATUM) IN ORDER TO ACHIEVE THE ELEVATION PER THE LISTED CITY BENCHMARK NO. GG-130 (NAVD 88 DATUM)

NOTE:
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUES BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE "811"
TWO WORKING DAYS BEFORE YOU DIG.

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 811
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

WDID #: 563194

BASIS OF BEARINGS:
THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF BROOKHURST STREET N32°58'38"W PER TRACT NO. 17871, M.B. 941-29-30.

BENCH MARK
CITY B.M. NO. GG-130:
NORTHEAST QUADRANT OF LAMPSON AVE. & BROOKHURST ST., 15' EAST OF B.C.R., 1' NORTH OF CURB FACE, IN SOUTHEAST CORNER OF A 16' X 4' CATCH BASIN.

ELEVATION=85.727' (NAVD 1988)

OWNER:
KAM SANG COMPANY, INC.
411 E. HUNTINGTON DRIVE, #305
ARCADIA, CA 91006
TEL: (626) 446-2988
FAX: (626) 446-3392
E-MAIL: www.kamsangcompany.com

SOIL ENGINEER:
GEOCON WEST, INC.
GEOTECHNICAL
2807 McGAW AVENUE
IRVINE, CA 92618
TEL. (949) 491-6570
FAX.
EMAIL: OC@GEOCONINC.COM

PREPARED BY:
FOCUS ENGINEERING, INC.
8 CORPORATE PARK, SUITE 300
IRVINE, CA 92606
TEL: (949) 450-0590
E-MAIL: focusengring@sbcglobal.net

REGISTERED PROFESSIONAL ENGINEER
GUIA LIN LIU
No. 41497
EXP. 12/31/23
CIVIL
STATE OF CALIFORNIA

REVISIONS

NO.	DATE	DESCRIPTION

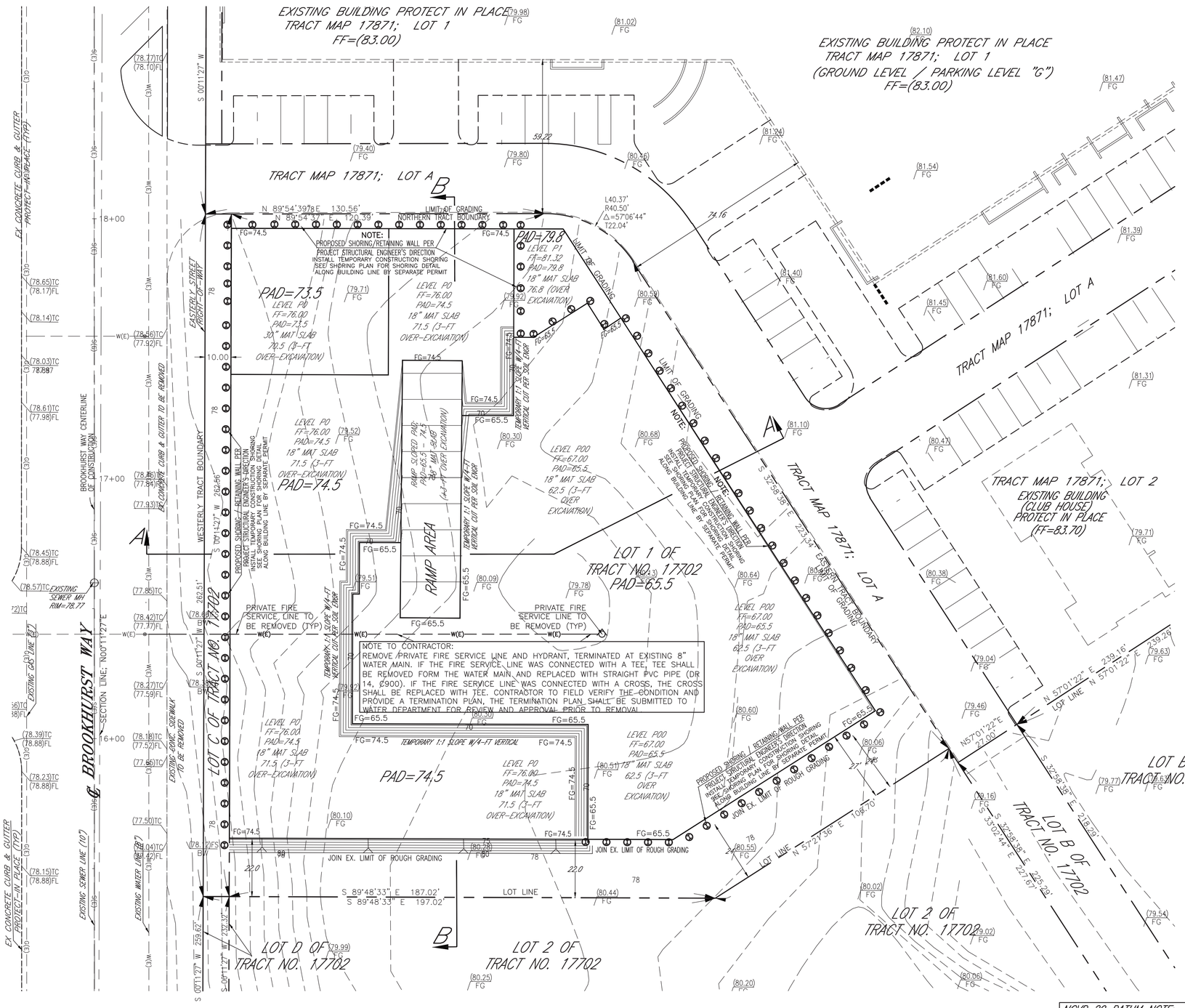
CITY OF GARDEN GROVE

ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
QUANTITIES, SECTIONS & DETAILS

G-1558

PRINT: 2023-07-11

SHEET 3 OF 8



SCALE: 1"=20'
10 0 10 20 30

DIGALERT
DIAL BEFORE YOU DIG — TOLL FREE 811 — TWO WORKING DAYS BEFORE YOU DIG
811
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

LEGEND:

HP	HIGH POINT
TC	TOP OF CURB
FL	FLOW LINE
FS	FINISHED SURFACE
FG	FINISHED GRADE
FF	FINISHED FLOOR
GF	GARAGE FLOOR
PAD	PAD
TW	TOP OF WALL
TF	TOP OF FOOTING
H	HEIGHT
L	LENGTH
PL	PROPERTY LINE
R/W	RIGHT-OF-WAY
▬·▬	SUBDRAIN PIPE
- - -	SUBDRAIN COLLECTION SYSTEM
——SD——	PROPOSE STORM DRAIN
——S——	PROPOSE SEWER LINE
——W——	PROPOSE WATER LINE

(120)	EXISTING ELEVATION
120	PROPOSED ELEVATION
TBM	TEMPORARY BENCH MARK
BM	BENCH MARK
C	CUT
F	FILL
N	NATURAL
PP	POWER POLE
FH	FIR HYDRANT
BW	BACK OF WALK
———	PROPERTY LINE
- - - -	EXISTING CONTOURS
———	PROPOSED CONTOURS
·-·-·-·	CUT/FILL DAYLIGHT LINE
-x-x-x-	CHAIN LINK FENCE
---CATV(E)---	EX. CATV LINE
---G(E)---	EX. GAS LINE
---SD(E)---	EX. STORM DRAIN LINE
---S(E)---	EX. SEWER LINE
---W(E)---	EX. WATER LINE

WDID #: 563194

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8 CORPORATE PARK, SUITE 300
IRVINE, CA 92606
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E-MAIL: focusengring@sbcglobal.net

REGISTERED PROFESSIONAL ENGINEER — CHIA LIN LIU — No. 41497 EXP. 12/31/23 — CIVIL — STATE OF CALIFORNIA

REVISIONS

NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

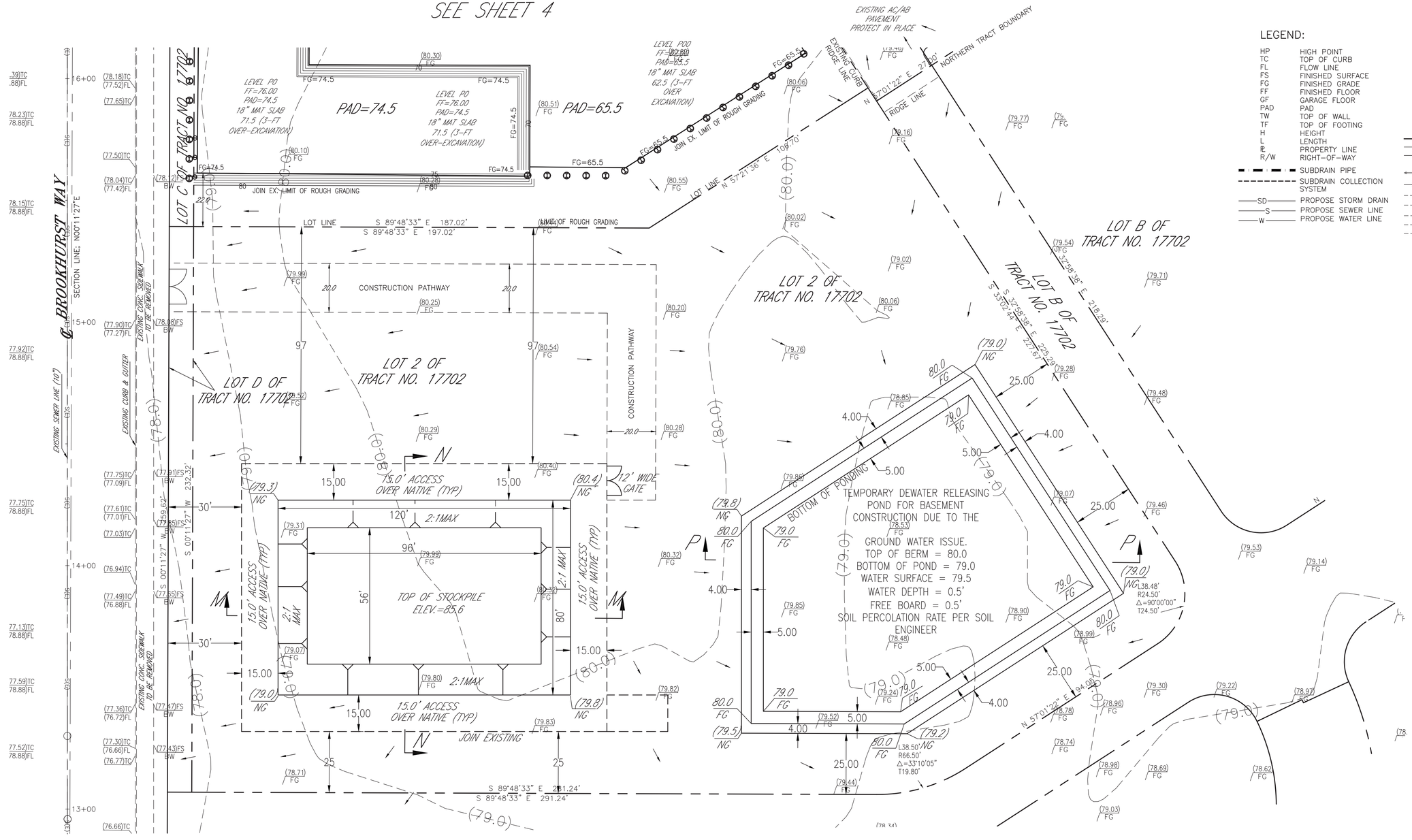
ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
ROUGH GRADING PLAN - BUILDING #2

G-1558

PRINT: 2023-07-11

SHEET 4 OF 8

SEE SHEET 4



LEGEND:

HP	HIGH POINT
TC	TOP OF CURB
FL	FLOW LINE
FS	FINISHED SURFACE
FG	FINISHED GRADE
FF	FINISHED FLOOR
GF	GARAGE FLOOR
PAD	PAD
TW	TOP OF WALL
TF	TOP OF FOOTING
H	HEIGHT
L	LENGTH
℄	PROPERTY LINE
R/W	RIGHT-OF-WAY
	SUBDRAIN PIPE
	SUBDRAIN COLLECTION SYSTEM
SD	PROPOSE STORM DRAIN
S	PROPOSE SEWER LINE
W	PROPOSE WATER LINE
(120)	EXISTING ELEVATION
120	PROPOSED ELEVATION
TBM	TEMPORARY BENCH MARK
BM	BENCH MARK
C	CUT
F	FILL
N	NATURAL
PP	POWER POLE
FH	FIR HYDRANT
BW	BACK OF WALK
	PROPERTY LINE
	EXISTING CONTOURS
	PROPOSED CONTOURS
	CUT/FILL DAYLIGHT LINE
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CATV(E)	EX. CATV LINE
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S(E)	EX. SEWER LINE
W(E)	EX. WATER LINE

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NOTE:
SECTIONS M-M, M-M & P-P
SEE SHEET 6 FOR DETAIL.

DIGALERT
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TWO WORKING DAYS BEFORE YOU DIG
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REVISIONS

NO.	DATE	DESCRIPTION

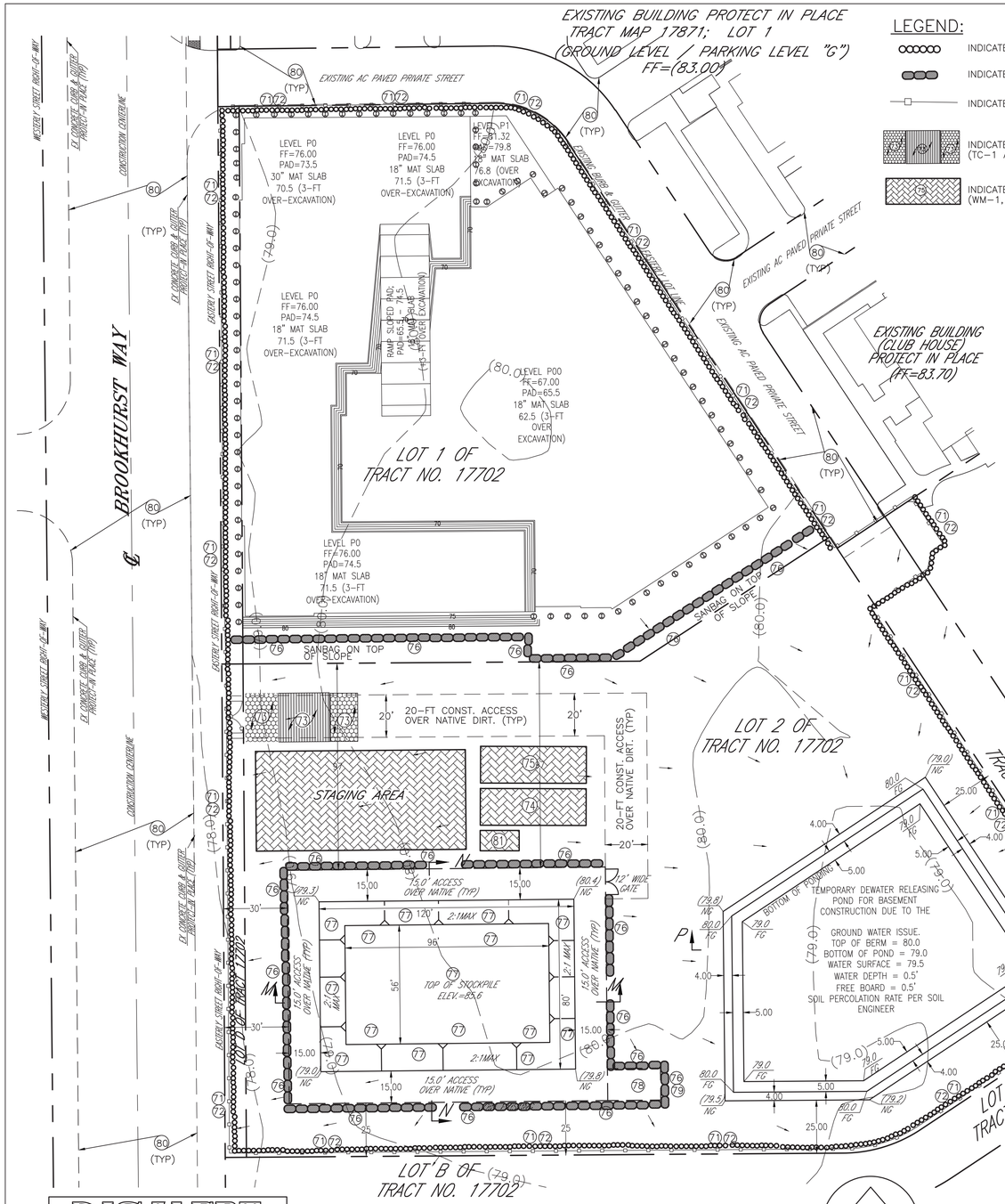
CITY OF GARDEN GROVE

ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
ROUGH GRADING PLAN - BUILDING #2

G-1558

PRINT: 2023-07-11

SHEET 5 OF 8



LEGEND:

- INDICATES FIBER ROLLS (SE-5)
- INDICATES GRAVEL BAG (SE-6)
- INDICATES SILT FENCE (SE-1)
- INDICATES ENTRANCE STABILIZED (TC-1 AND / OR TC-3)
- INDICATES SPECIAL AREAS (WM-1, WM-8 OR WM-9)

TEMPORARY STOCKPILE NOTES:

1. ALL TEMPORARY / ACTIVE STOCKPILE SHOULD BE COVERED AND PROTECTED WITH A TEMPORARY LINEAR SEDIMENT BARRIER PRIOR TO THE ONSET OF PRECIPITATION.
2. PLASTIC TRAPS WITH NYLON REINFORCEMENT SHALL BE USED WHERE PLASTIC SHEETING IS NEED PRIOR TO THE ONSET OF PRECIPITATION.
3. THE DOWNSTREAM PERIMETER OF AN ACTIVE STOCKPILE SHOULD BE PROTECTED WITH A LINEAR SEDIMENT BARRIER OR BERM AND RUNOFF SHOULD BE DIVERTED AROUND OR AWAY FROM THE STOCKPILE ON THE UPSTREAM PERIMETER.
4. STOCKPILE MUST BE INSPECTED IN ACCORDANCE WITH CITY OF GARDEN GROVE AND / OR GENERAL PERMIT REQUIREMENTS. BMP BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS AND AFTER THE CONCLUSION OF RAIN EVENTS.
5. THE STOCKPILE PLASTIC SHEETING MAY BE NECESSARY TO INSPECT MORE FREQUENTLY DURING HIGH WINDS OR EXTREME HEAT CONDITIONS.
6. REPAIR AND / OR REPLACE PERIMETER CONTROLS AND COVERS AS NEEDED IN ORDER TO KEEP IT FUNCTIONING PROPERLY.
7. SEDIMENT SHALL BE REMOVED.

EROSION CONTROL CONSTRUCTION NOTES

(71) SE-1: INSTALL SILT FENCE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(72) SE-5: INSTALL FIBER ROLLS PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(73) TC-1 & TC-3: INSTALL STABILIZED CONSTRUCTION ENTRANCE AND TIRE WASH PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(74) WM-1: INSTALL MATERIAL DELIVERY AND STORAGE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(75) WM-8: INSTALL CONCRETE WASTE MANAGEMENT, CONCRETE WASHOUT CONTAINER, WATERPROOF, ABOVE GROUND METAL CONTAINER, CONSOLIDATED FABRICATORS OR EQUIVALENT AS SHOWN ON SHEET 8 AND PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION

(76) SE-6: INSTALL GRAVEL BAG BERM PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

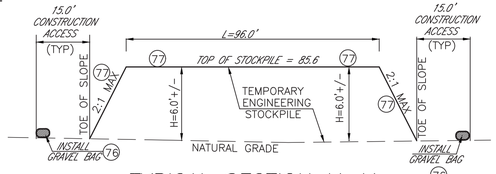
(77) EC-5: APPLY REINFORCED PLASTIC COVER OR SOIL BINDERS OR OTHER EROSION CONTROL MEASUREMENT ON ENGINEERING SLOPE PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(78) SE-3: CONSTRUCT SEDIMENT TRAP (1-FT IN DEPTH) PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

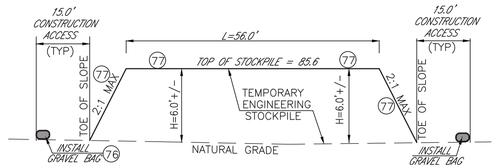
(79) SE-4: INSTALL CHECK DAMS PER DETAIL ON SHEET 3 AND CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(80) SE-7: PERFORM STREET SWEEPING AND VACUUMING PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.

(81) WM-9: INSTALL TEMPORARY SANITARY / SEPTIC FACILITIES, PORTABLE TOILETS, PER CALIFORNIA STORM WATER BMP HANDBOOK, LATEST EDITION.



TYPICAL SECTION M-M
(STOCKPILE AREA) NTS

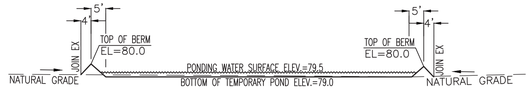


TYPICAL SECTION N-N
(STOCKPILE AREA) NTS

NOTE:

INSTALL REINFORCED PLASTIC COVER OR EQUAL FOR WIND EROSION CONTROL AND GRAVEL BAG AROUND THE PERIMETER OF STOCKPILES AREA.

DURING RAINY SEASON, COVERED OR PROTECTED THE SOIL STOCKPILES WITH SOIL STABILIZATION MEASURES AND A TEMPORARY PERIMETER SEDIMENT BARRIER AT ALL TIME.



TYPICAL SECTION P-P
(TEMPORARY DEWATER RELEASING POND AREA) NTS

EROSION CONTROL PLANS GENERAL NOTES

1. EROSION CONTROL IS REQUIRED FOR GRADING OPERATIONS DURING THE RAINY SEASON FROM OCTOBER 15TH TO APRIL 15TH APPROVED PLANS ARE REQUIRED FOR ALL ROUGH GRADING.
2. IN CASE OF EMERGENCY, CALL:

   JOHN L. HICKS — RESPONSIBLE PERSON
   KAM SANG COMPANY — FIRM
   AT (626) 226-2988X17 — 24 HOURS PHONE NUMBER
3. THE DESIGN CIVIL ENGINEER WILL SUPERVISE EROSION CONTROL WORK AND ENSURE THAT WORK IS IN ACCORDANCE WITH THE APPROVED PLAN (IF REQUIRED).
4. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE REPAIR CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
5. DEVICE SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY ENGINEER. REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.
6. ALL REMOVABLE PROTECTIVE DEVICES SHOWN SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40%.
7. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM GRAVEL BAGS, SILT FENCES, AND STABILIZING ENTRANCES AREA, ETC.
8. GRADED AREAS AROUND THE TRACT PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
9. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
10. DESILTING BASINS ARE TO BE CONSTRUCTED AS GRADING OF INDIVIDUAL GRADING AREAS ARE COMPLETE PER ROUGH GRADING PLANS.
11. THE CITY ENGINEER RESERVES THE RIGHT TO MAKE CHANGES OR MODIFICATIONS TO THIS PLAN AS DEEMED NECESSARY.
12. INFORMATION ON TIES PLAN IS FOR EROSION CONTROL ONLY. ALL OTHER INFORMATION IS SUBJECT TO CHANGE.
13. TEMPORARY EROSION PROTECTION IS REQUIRED FOR MANUFACTURED SLOPES PRIOR TO PERMANENT PLANTING.
14. AREAS SHALL BE MAINTAINED IN SUCH A STATE THAT FIRE ACCESS SHALL BE MAINTAINED AT ALL TIMES (INCLUDING ACCESS TO NEIGHBORING PROPERTIES).
15. NO OBSTRUCTION OR DISTURBANCE OF NATURAL DRAINAGE COURSES OR EXISTING STORM DRAIN INLETS SHALL OCCUR DURING THE RAINY SEASON, UNLESS ADEQUATE TEMPORARY/PERMANENT DRAINAGE FACILITIES HAVE BEEN APPROVED AND INSTALLED TO CARRY SURFACE WATER TO THE NEAREST PRACTICAL STREET, STORM DRAIN OR NATURAL WATER COURSE.
16. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER THAT STORM RUNOFF WILL BE CONTAINED WITHIN THE PROJECT OR CHANNELED INTO THE STORM DRAIN SYSTEM WHICH SERVES THE RUNOFF AREA. STORM RUNOFF FROM ONE AREA SHALL NOT BE ALLOWED TO DIVERT TO ANOTHER RUNOFF AREA.
17. CONFORMANCE WITH THE REQUIREMENTS OF THESE PLANS SHALL IN NO WAY RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITIES TO TIES SITE AND ADJACENT PROPERTIES. TEMPORARY EROSION CONTROL SHALL CONSIST OF, BUT NOT BE LIMITED TO, CONSTRUCTING SUCH FACILITIES AND TAKING SUCH MEASURES AS ARE NECESSARY TO PREVENT, CONTROL AND ABATE WATER, MUD AND EROSION DAMAGE TO PUBLIC AND PRIVATE PROPERTY AS A RESULT OF THE CONSTRUCTION OF THIS PROJECT.
18. SLOPES CONSTRUCTED PRIOR TO OCTOBER I SHALL BE TREATED FOR EROSION CONTROL PRIOR TO OCTOBER 15. SLOPES CONSTRUCTED AFTER OCTOBER I SHALL BE TREATED FOR EROSION CONTROL AS THE CONSTRUCTION OF SLOPE PROGRESSES IN INCREMENTS OF 25 FEET OR LESS MEASURED VERTICALLY.
19. FILL AREAS WHILE BEING BROUGHT UP TO GRADE AND DURING PERIODS OF COMPLETION PRIOR TO FINAL GRADE, SHALL BE PROTECTED BY VARIOUS MEASURES TO ELIMINATE EROSION AND THE SILTATION OF DOWNSTREAM FACILITIES AND ADJACENT AREAS. THESE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO: TEMPORARY DOWN DRAINS EITHER IN THE FORM OF PIPES OR PAVED DITCHES WITH PROTECTED OUTFALL AREAS; GRADED BERMS AROUND AREAS TO ELIMINATE EROSION OF FILL SLOPES BY SURFACE RUNOFF; CONFINED PONDING AREAS TO DESILT RUNOFF; TEMPORARY CHECK DAMS IN TOE OF SLOPE DITCHES TO DESILT RUNOFF; PROTECTION SUCH AS GRAVEL BAGS AROUND INLETS WHICH HAVE NOT BEEN BROUGHT UP TO GRADE; AND EARTH BERMS AND APPROPRIATE GRADING TO DIRECT DRAINAGE AWAY FROM THE EDGE OF THE TOP OF SLOPES SHALL BE CONSTRUCTED AND MAINTAINED ON THOSE FILL AREAS WHERE EARTH-WORK OPERATIONS ARE NOT IN PROGRESS.
20. TOP OF CUT BROW DITCHES, WHERE REQUIRED ON THE PLANS, SHALL BE CONSTRUCTED PRIOR TO EXCEEDING 12 FEET OF CUT MEASURED VERTICALLY.
21. CLEARING AND GRUBBING SHOULD BE LIMITED TO AREAS THAT WILL RECEIVE IMMEDIATE GRADING. EROSION CONTROL MEASURES WILL BE REQUIRED TO PROTECT AREAS THAT HAVE BEEN CLEARED AND GRUBBED PRIOR TO GRADING OPERATION, AND THAT ARE SUBJECT TO RUNOFF DURING TEE PERIOD FROM THE BEGINNING OF THE RAINY SEASON. THESE MEASURES MAY INCLUDE BUT SHALL NOT BE LIMITED TO: GRADED DITCHES; BRUSH BARRIERS AND SILT FENCES. CARE SHALL BE EXERCISED TO PRESERVE VEGETATION BEYOND THE LIMITS OF GRADING.
22. CITY APPROVAL OF PLANS DOES NOT RELIEVE THE DEVELOPER FROM RESPONSIBILITY FOR THE CORRECTION OF ERRORS AND OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST, THE REQUIRED PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.

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WDID #: 563194

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THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF BROOKHURST STREET N32°58'38"W PER TRACT NO. 17871, M.B. 941-29-30.

BENCH MARK
CITY B.M. NO. GG-130:
NORTHEAST QUADRANT OF LAMPSON AVE. & BROOKHURST ST., 15' EAST OF B.C.R., 1' NORTH OF CURB FACE, IN SOUTHEAST CORNER OF A 16' X 4' CATCH BASIN.

ELEVATION=85.727' (NAVD 1988)

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REGISTERED PROFESSIONAL ENGINEER — CHIA LIN LIU — No. 41497 EXP. 12/31/23 — CIVIL — STATE OF CALIFORNIA

REVISIONS

NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

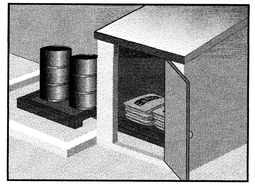
ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
EROSION CONTROL PLAN

G-1558

PRINT: 2023-07-11

SHEET 6 OF 8

Material Delivery and Storage WM-1



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ Primary Category
☑ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Material Delivery and Storage WM-1

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

Material Delivery and Storage WM-1

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

Material Delivery and Storage WM-1

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

Material Delivery and Storage WM-1

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

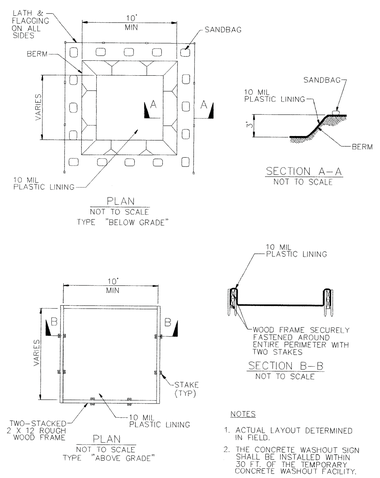
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

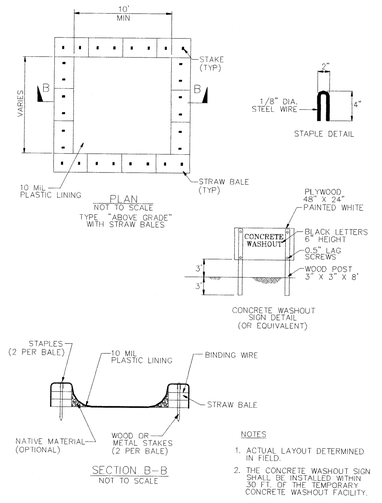
Concrete Waste Management WM-8



NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Concrete Waste Management WM-8



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REVISIONS

NO.	DATE	DESCRIPTION

CITY OF GARDEN GROVE

ROUGH GRADING PLAN
TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II

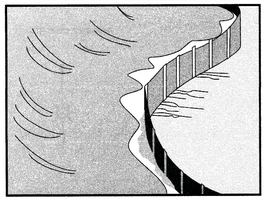
BMP'S DETAIL "A"

G-1558

PRINT: 2023-07-11

SHEET 7 OF 8

Silt Fence SE-1



Objectives

EC	Erosion Control	☑
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ Primary Objective
☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier

Description and Purpose

A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

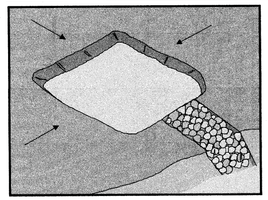
Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Below other small cleared areas.

Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.

Sediment Trap SE-3



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Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

Description and Purpose

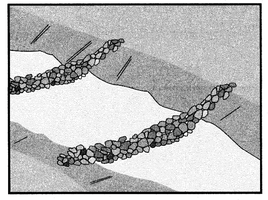
A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Check Dams SE-4



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Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion.

Suitable Applications

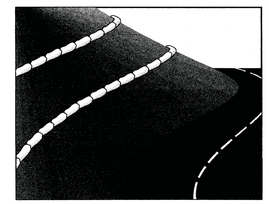
Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.

Limitations

- Not to be used in live streams or in channels with extended base flows.

Gravel Bag Berm SE-6



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Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence
SE-5 Fiber Roll
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier

Description and Purpose

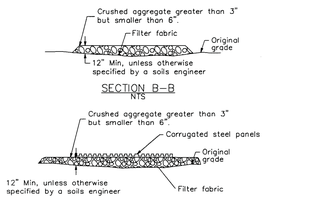
A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

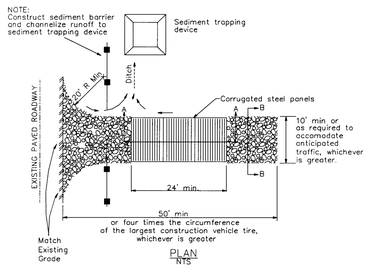
Suitable Applications

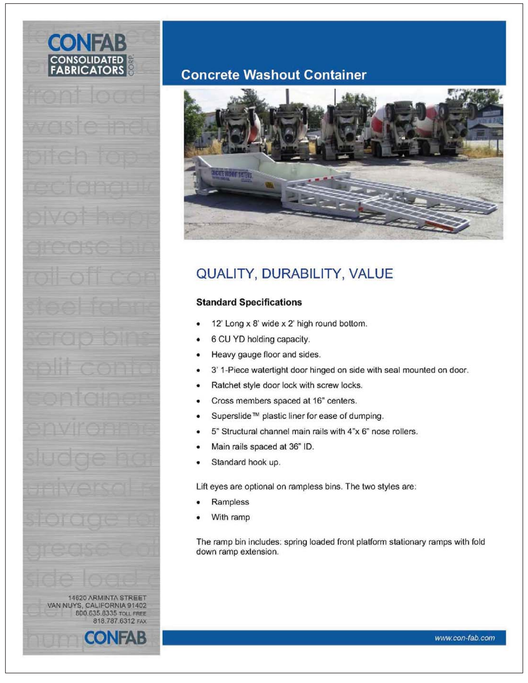
Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:

Stabilized Construction Entrance/Exit TC-1







TYPICAL CONCRETE WASHOUT CONTAINER
(CONSOLIDATED FAVRICATORS OR EQUIVALENT)

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TRACT NO. 17702, LOT 1
BROOKHURST TRIANGLE PHASE II
BMP DETAILS – B

G–1558

PRINT: 2023–07–11

SHEET 8 OF 8

HYDROLOGY / HYDRAULICS REPORT
FOR
BROOKHURST TRIANGLE PHASE II
LOT 1 OF TRACT NO. 17702
Kam Sang Company, Inc.
CITY OF GARDEN GROVE
COUNTY OF ORANGE

PREPARED FOR

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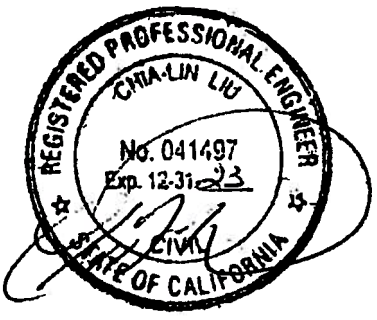


Prepared: October 18, 2022

1st Rev.
2/20/23
See comments inside.

TABLE OF CONTENTS

1. Introduction
2. Hydrology Analysis
3. WQMP analysis
4. Hydraulic Analysis
5. ACO Stormbrixx system & CDS Hydrodynamic Separator

1. INTRODUCTION:

Project Description

Tract Map 17702, lot 1 is the 2nd phase continue development project of the multi phases of residential, commercial and mix used project, also know as Garden Grove Triangle, in the City of Garden Grove.

Garden Grove Triangle site is boundary by Brookhurst Street on the east, Garden Grove Boulevard on the south, Brookhurst Way on the west and existing office site on the north. The Garden Grove Triangle contains an approximately of 13.944 acres as shown on Exhibit A, Vicinity Map

Lot 1 and Lot "C" of Tract Map 17702 is located on the middle westerly portion of the Garden Grove Triangle site and has a total of 1.353 acres. A total of 112 residential units with parking spaces will be constructed within the Tract 17702, Lot 1 boundary. Parking stalls, asphalt pavement, concrete curbs, concrete curb & gutter, drainage gutters, concrete sidewalk, underground utilities, and landscape will be installed on the site.

Under the current condition, north and northeast portion of the Garden Grove Triangle Site has been developed under Tract Map 17871 development project. Most of study area within Tract Map 17702 is vacant undeveloped land. Kia auto dealer and some existing commercial businesses are occupied on the southerly portion of the Garden Grove Triangle site.

The study sites are characterized by flat sloping topography from the middle of the site flows east (to Brookhurst Street), west (to Brookhurst Way) and south (on-site) directions. Site elevations range from approximately 82 feet above sea level to approximately 78 feet above sea level as shown on the hydrology map – existing site condition. Overall, the site will be covered by building, AC pavement and landscaped planting area at ultimate condition. It is no offsite flows that enter to the project site or study area.

Under the post development condition, new storm drainpipes, grated inlets and catch basins will be installed within the project site in order to carry the 100-year on-site storm runoff generates from the project site.

Underground detention / infiltration ACO Stormbrixx system will be installed within the project site. The purposes of the ACO Stormbrixx system are:

- Service as an underground retention basin to maintain the existing 100-year storm runoff from the site, under the post-development condition, which will be either equal or less than the pre-development condition.

- Service as structural infiltration Best Management Practices (BMP) per Water Quality Management Plan (WQMP).

All on-site storm runoff will drain into the on-site underground ACO Stormbrixx system. An overflow pipe, also known as regular release storm drainpipe for 100-year storm event, will be installed in between the ACO Stormbrixx device and the outlet storm drainpipe.

Storm runoff collected from the site flows into a proposed CDS unit (model CDS 5653-10) for treatment prior to discharge into the above proposed Underground detention / infiltration system.

2. HYDROLOGY ANALYSIS:

Hydrology maps showing the drainage patterns in the existing and ultimate conditions are presented in Exhibit H & I. Hydrologic computations were performed to determine the 100-year storm peak discharge. The procedure followed the Orange County Hydrology Manual. The variables taken into consideration in the computation include rainfall, soil type, and land use conditions characteristic of flow conveyance and time of concentration.

According to the Orange County Hydrology Manual, the Rational Method equation is being used to determine the 100-year storm runoff. The time of concentration for an initial subarea is estimated from the nomograph.

The soil map provided by the Manual indicates a type 'B" soil for the project site area as shown on Exhibit B.

The non-mountainous area precipitation intensity curves are used for the analysis of drainage areas below 2,000 feet in elevation, as shown on Exhibit C.

The hydrologic calculations are performed using the Rational Method indicated in the County Hydrology Manual. As per the approved hydrology analysis, the majority site storm runoff from the project site will be collected by inlets and storm drainpipes through the site. All storm runoff from the site, includes Lot 1 (current project) and Lots 2, 3 and B (future development) of Tract Map 17702 discharges into an existing storm drainpipe (63" RCP) which is located within the easterly portion of the Brookhurst Street as shown on the site improvement plans.

Under the development condition, underground piping system intercepts all roof drain storm runoff and discharges into the proposed storm drain system. It includes grate inlets, pipes, CDS treatment unit, ACO underground storage devices, catch basin and outlet storm drain RCP pipe to the existing 62" storm drain main within Brookhurst Street.

The main storm runoff (100-year event) will collect flows through the underground piping system to the storm drain system as shown on the plan. Following treatment through the onsite BMP's. The flows will outlet to the public storm drain system in the adjacent streets.

Following is the sub-drainage areas information for the post development site condition:

(a) Sub-drainage areas "P1" and "P2" – building #2 area (Lot 1 of Tract Map 17702):

The proposed residential building (Building #2) has been divided into two sub-drainage areas, as shown as "P1"and "P2" on the proposed hydrology map. Rain falls on the roof and / or deck area flows into the drainage pipes around the building. Storm runoff flows south and south east direction to the southeast building corner through the drainpipes. A total of 1.35 acres with Q100=7.50 cfs @ Tc=5.0 min will be anticipated as shown on the hydrology map.

(b) Sub-drainage areas "P3" – Future building #3 area (Lot 2 of Tract Map 17702):

Future residential building (Building #3) has been planned to be constructed within the Lot 2. Storm runoff shall be collected by proposed yard drainpipe around the future building and flows easterly direction. It joins the storm drain system from building #2 at east side of lot 2, than flows easterly to the proposed CDS treatment device prior to discharge into the ACO stormbrixx device. A total of 3.82 acres with Q100=19.84 cfs will be anticipated as shown on the hydrology map.

(c) Sub-drainage areas "P4" – Future building #4 area (Lot 3 of Tract Map 17702):

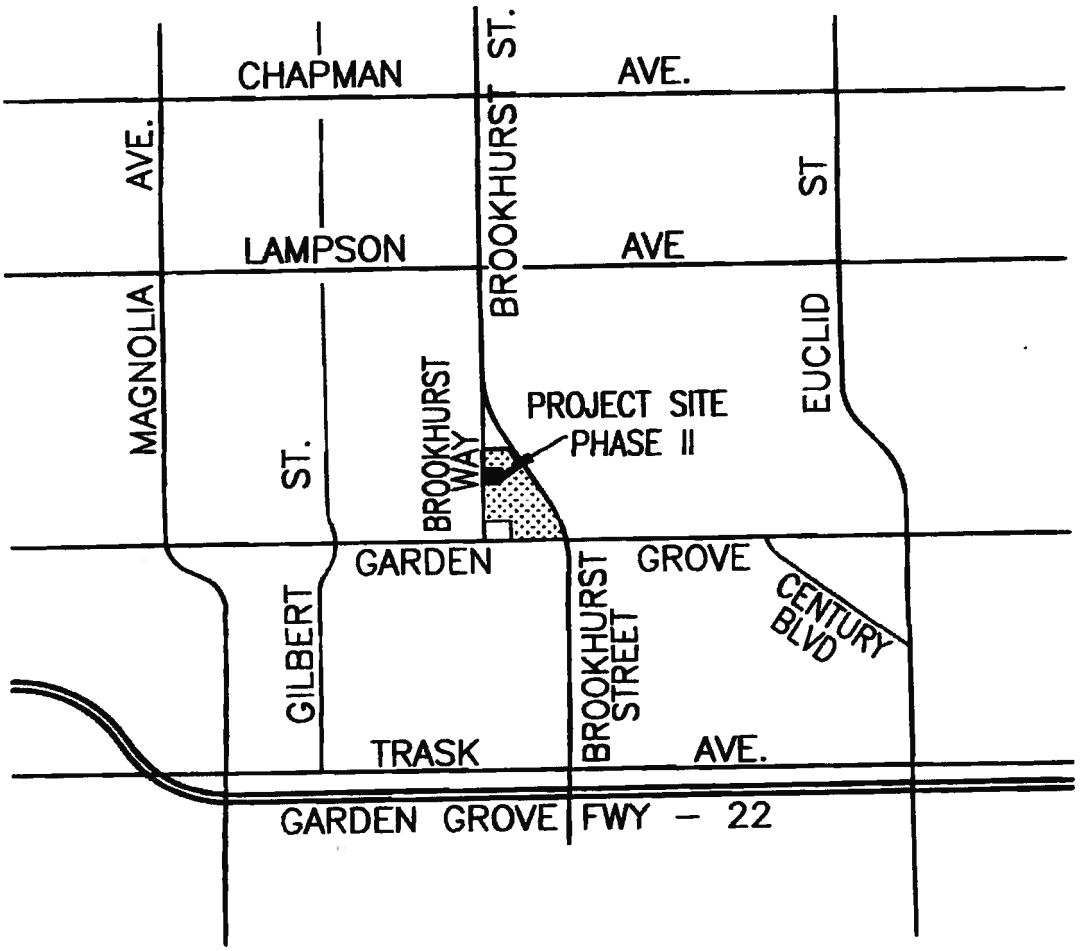
Future residential building (Building #4) has been planned to be constructed within the Lot 3. Storm runoff shall be collected by proposed yard drainpipe around the future building and flows westerly direction and discharges into the proposed CDS treatment device prior to discharge into the ACO stormbrixx device.

(d) Sub-drainage areas "P5" – Future Open Space Park area (Lot B of Tract Map 17702):

Future City's park / Open space has been planned and reserved within the Lot B. Proposed landscape and yard drain system will be installed within the Lot B. All storm runoff will flows into the proposed CDS treatment device prior to discharge into the ACO stormbrixx device.

A total of 5.65 acres site with 28.31 cfs storm runoff will be carried by a new 18" storm drain pipeline from the ACO Stormbrixx unit to a new catch basin at the southeast portion of the project site. All drainage runoff from the areas "P1" to "P5" will be carried by a new 24" RCP and discharge into the existing 63" RCP storm drain pipe within the east side of Brookhurst Street.

Based upon this study, the total storm runoff from the site at 100-year storm event, is 28.31 cfs due to the site development VS 30.01 cfs at pre-development condition, therefore, there is no impact or to a level of insignificant to the existing storm drain system due to this development is expected.



VICINITY MAP

TG: 798–D6 NTS

N

3. WQMP ANALYSIS:

Based upon the Water Quality Management Plan (WQMP), a total of 0.311 cfs capture Volume (Qdcv) of the proposed area is required. A CDS hydrodynamic Separator system, model CDS 4040 which has a treatment flow capacity of 8.4 cfs for trash / debris and 4.1 cfs for 78 microns, will be used for the project.

Following is the comparison chart of new Katchall system and previous approved planter Boxes system for the project.

Description	New proposed Katchall underground system
Function - filtration	Storm runoff from roof drain and landscape area flows to the underground piping system around the building and drain to the CDS unit and ACO Stormbrixx underground system prior to release to the storm drain system. CDS hydrodynamic Separator system, model CDS 4040 has a treatment flow capacity of 8.4 cfs for trash / debris and 4.1 cfs for 78 microns, will be used for the project. (Filter flow capacity is 4.1 cfs > 0.311 cfs demand)

	TRACT MAP 17701 - LOT 1 - BUILDING NO.2		
	WQMP - BMP DCV CALCUATION SHEET		
1	Drainage Area (A)	56323	SF
		1.293	AC
2	Impervious area	49479	SF
3	LS area	6844	SF
4	% of Impervious area	87.8%	
5	% of pervious area	12.2%	
6	Design Storm Depth (D)	0.77	inches
7	Time of Concentration (TC)	5	Min
8	Rainfall Intensite (I)	0.265	in/hr
9	Runoff Coefficient (C)	0.9	
10	Design DCV (Demand)	3253	CF
11	Design QDCV (Demand)	0.311	CFS

BMP APPEARS TO BE SIZED FOR BLDG. 2 ONLY.

4. HYDRAULIC ANALYSIS:

CivilCadd / CivilDesign software has been used to verify the water surface and energy grade line for all underground piping system and inlets.

According to the attached hydraulic analysis, the proposed storm drain system has an adequate capacity to carry the ultimate storm runoff for the site. All proposed water surface elevations and energy grade elevation will below the top of inlet grate elevation.

HYDROLOGY STUDY

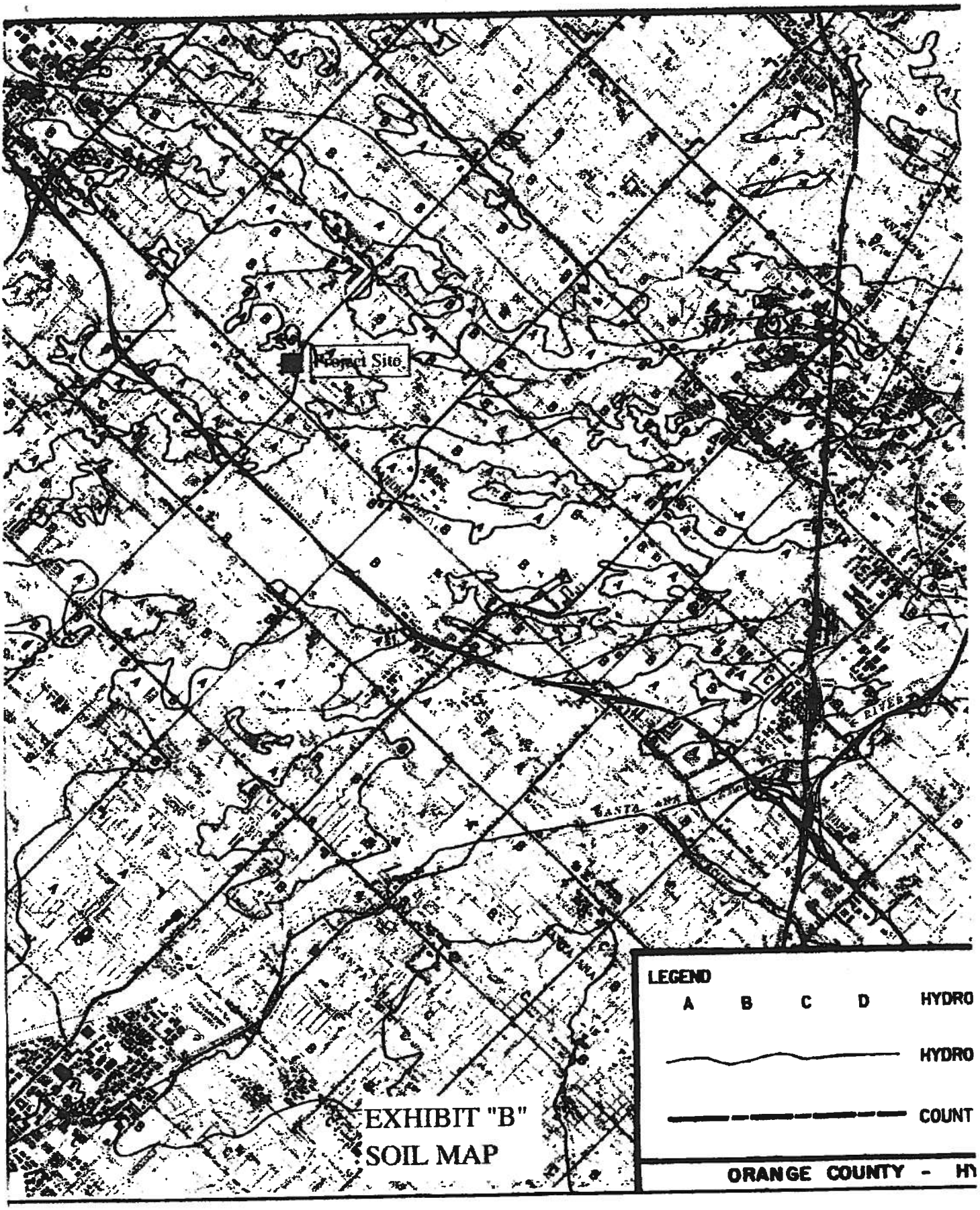
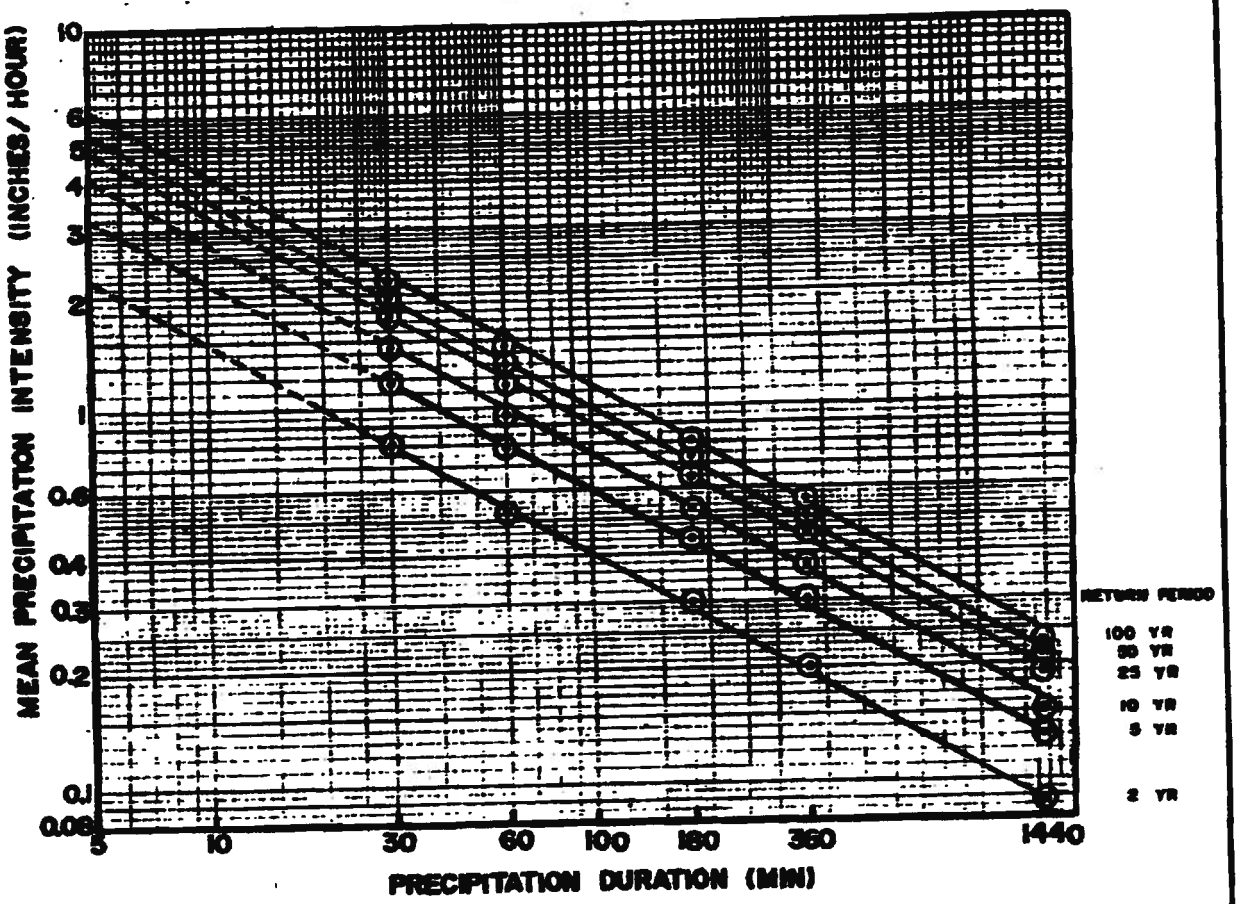


EXHIBIT "B"
SOIL MAP

Regression Equations: $I(t) = at^b$

(I= Intensity in inches/hour, t= duration in minutes)

Return Frequency (years)	a	b
2	5.702	-0.574
5	7.870	-0.562
10	10.209	-0.573
25	11.995	-0.566
50	13.521	-0.566
100	15.560	-0.573



ORANGE COUNTY
HYDROLOGY MANUAL

MEAN PRECIPITATION INTENSITIES FOR NONMOUNTAINOUS AREAS

Figure B-3

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

ORANGE COUNTY
HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS

Figure C-4

C.6.4. Estimation of Maximum Loss Rates for Pervious Areas, F_p

Table C.2 lists the maximum loss rates (inch/hour), F_p, for pervious area as a function of soil group.

TABLE C.2.
MAXIMUM EFFECTIVE PERVIOUS AREA LOSS RATES (inch/hour), F_p

SOIL GROUP:	A	B	C	D
F_p:	0.40	0.30	0.25	0.20

Table C.2 reflects the model calibration assuming an F_p of 0.30 in/hr. for all the considered catchments and storm return frequencies. This mean value of F_p of 0.30 in/hr. was assigned to Hydrologic Soil Group B due to the actual average soil conditions in the reconstitution study areas. The F_p values for Hydrologic Soil Groups A, C, and D, were assigned to account for the different soil types that may be found in Orange County.

C.6.5. Estimation of Catchment Maximum Loss Rates, F_m

The maximum loss rate selected from Table C.2 applies to the pervious area fraction of the watershed. The loss rate assumed for an impervious surface is 0.0 inch/hour. The maximum loss rate, F_m, for a catchment is therefore given by

$$F_m = a_p F_p \qquad \text{(C.7)}$$

where a_p is the pervious area fraction and F_p is the maximum loss rate for the pervious area (Section C.6.4).

Should a catchment contain several F_m values, the composite F_m value is determined as a simple area average of the several F_m values.

GO-2 PRE-DEVELOPMENT CONDITION-AREAS-A - BROOKHURST WAY

	A	A-total	TQ	I (FIG B-3)	Fp (table C.2)	Ai (Fig. C-4) (see below)	Ap	Fm	Fm (total)	Fm (Avg)	Q (cfs)	slope	Upper Elevation	Lower Elevation	H-DIFF	V	L	T		T-total	
												0.0087	80.80	77.40	3.40		810		5.0	5.0	initial area
A	2.06	2,060	5.00	0.30	0.30	0.00	1.00	0.30	0.62	0.30	10.84	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	10
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	12
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.62	0.30	-0.86	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2,060	#DIV/0!	0.00	0.00	0.00	1.00	0.30	0.62	0.30	-0.86	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2,060	#DIV/0!	0.00	0.30	0.00	1.00	0.30	0.62	0.30	-0.86	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	

NOTE:
ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

GG-2 PRE-DEVELOPMENT CONDITION-AREAS-B-SOUTHERLY DIRECTION

	A	A-total	TC	I (FIG B-3)	Fp (table C.2)	Ai (Fig. C-4) (see below)	Ap	Fm	Fm (total)	Fm (Avg)	Q (cfs)	slope	Upper Elevation	Lower Elevation	H-DIFF	V	L	T		T-total	
												0.0084	80.80	78.60	2.20		468		5.0	5.0	initial area
B	2.02	2.020	5.00	5.20	0.30	0.00	1.00	0.30	0.61	0.30	10.73	0.0060			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	10
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0060			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	12
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0060			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0060			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	16
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0060			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2.020	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.61	0.30	-0.55	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	18
	0	2.020	#DIV/0!	0.00	0.30	0.00	1.00	0.30	0.61	0.30	-0.55	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	

NOTE:
ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

GO-2 PRE-DEVELOPMENT CONDITION-AREAS-C-BROOKHURST STREET

	A	A-total	TC	I (FIG B-3)	Fp (table C.3)	Al (Fig. C-4) (see below)	Ap	Fm	Fm (total)	Fm (Avg)	Q (cfs)	slope	Upper Elevation	Lower Elevation	H-DIFF	V	L	T		T-total	
												0.0074	80.60	79.20	1.40		188		5.0	5.0	initial area
C	1.67	1.670	5.00	5.20	0.30	0.00	1.00	0.30	0.47	0.30	5.34	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	10
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	12
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0050			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	15
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.42	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	16
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	16
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	16
	0	1.670	#DIV/0!	0.00	0.00	0.00	1.00	0.00	0.47	0.30	-0.43	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	16
	0	1.670	#DIV/0!	0.00	0.30	0.00	1.00	0.30	0.47	0.30	-0.43	0.0000			0.00	0.00	0	#DIV/0!	0.0	#DIV/0!	

NOTE:
ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

GG-2 Line A - Building #2-SITE-ACC-OUTLET

	A	A-total	TC	I (FIG B-6)	Fp (table C-3)	Al (Fig. C-4) (see below)	Ap	Fm	Fm (total)	Fm (Avg)	Q (cfs)	Nopp	Upper Elevation	Lower	H-DIFF	V	L	T		T-total	
P1	0.97	0.970	5.00	6.30	0.30	0.00	0.10	0.03	0.03	0.03	4.83	0.0061	80.02	78.03	3.99	2.79	491.49		5.0	5.0	Initial area
P2	0.48	1.350	5.00	6.30	0.30	0.00	0.10	0.03	0.04	0.03	7.89	0.0060	81.89	78.03	3.86		0	0.0	0.0	5.0	Bldg 2 east added
P3	0.47	2.820	5.75	6.00	0.30	0.00	0.10	0.03	0.11	0.03	19.84	0.0060	78.03	76.33	0.70	2.19	139.48	0.7	0.0	5.7	future bldg-3
P4	1.38	6.070	6.44	5.80	0.30	0.00	0.10	0.03	0.17	0.03	38.49	0.0060			0.00	3.84	188	0.7	0.0	6.4	future bldg-4
P5	0.53	6.600	6.44	5.80	0.30	0.00	0.10	0.03	0.19	0.03	39.51	0.0060			0.00	3.87	0	0.0	0.0	6.4	future park area

NOTE:
(ap indicates the ratio of pervious area to total area (in decimal) = 1-ai; ai number see figure C-4

HYDRAULIC STUDY

FILE: GG2-OFF.WSW

W S P G W - CIVILDESIGN Version 12.99
Program Package License Serial Number: 1230
WATER SURFACE PROFILE LISTING

Date:10-12-2022 Time:10: 8:18

TRACT MAP 17702 - LOT 1
BROOKHURST TRIANGLE PHASE II - BUILDING NO 2
OFFSITE STORM DRAIN

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1003.720	67.150	1.542	68.692	28.31	10.89	1.84	70.53	.00	1.83	1.68	2.000	.000	.00	1 .0
80.540	.0205					.0204	1.64	1.54	1.54	1.54	.014	.00	.00	PIPE
1084.260	68.805	1.550	70.355	28.31	10.83	1.82	72.18	.00	1.83	1.67	2.000	.000	.00	1 .0
68.620	.0205					.0193	1.32	1.55	1.53	1.54	.014	.00	.00	PIPE
1152.880	70.215	1.630	71.845	28.31	10.33	1.66	73.50	.00	1.83	1.55	2.000	.000	.00	1 .0
20.335	.0205					.0176	.36	1.63	1.37	1.54	.014	.00	.00	PIPE
1173.215	70.633	1.720	72.353	28.31	9.85	1.51	73.86	.00	1.83	1.39	2.000	.000	.00	1 .0
5.695	.0205					.0163	.09	1.72	1.21	1.54	.014	.00	.00	PIPE
1178.910	70.750	1.834	72.584	28.31	9.38	1.37	73.95	.00	1.83	1.10	2.000	.000	.00	1 .0

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

TRACT 17702 - LOT 1
BROOKHURST TRIANGLE PHASE II - BUILDING NO. 2
LINE A - CB TO ACO STORMBRIXX

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	71.000	1.351	72.351	28.31	12.54	2.44	74.79	.00	1.83	1.87	2.000	.000	.00	1 .0
3.410	.0117					.0291	.10	1.35	2.01	2.00	.014	.00	.00	PIPE
1003.410	71.040	1.332	72.372	28.31	12.74	2.52	74.89	.21	1.83	1.89	2.000	.000	.00	1 .0
7.719	.0125					.0310	.24	1.54	2.07	2.00	.014	.00	.00	PIPE
1011.129	71.136	1.291	72.427	28.31	13.20	2.71	75.13	.23	1.83	1.91	2.000	.000	.00	1 .0
9.951	.0125					.0344	.34	1.52	2.20	2.00	.014	.00	.00	PIPE
1021.080	71.260	1.239	72.499	28.31	13.84	2.98	75.48	.00	1.83	1.94	2.000	.000	.00	1 .0
.613	.0957					.0362	.02	1.24	2.38	.92	.014	.00	.00	PIPE
1021.693	71.319	1.247	72.566	28.31	13.74	2.93	75.50	.00	1.83	1.94	2.000	.000	.00	1 .0
3.469	.0957					.0338	.12	1.25	2.35	.92	.014	.00	.00	PIPE
1025.162	71.651	1.299	72.950	28.31	13.10	2.67	75.62	.00	1.83	1.91	2.000	.000	.00	1 .0
2.839	.0957					.0300	.09	1.30	2.17	.92	.014	.00	.00	PIPE
1028.001	71.922	1.355	73.277	28.31	12.49	2.42	75.70	.00	1.83	1.87	2.000	.000	.00	1 .0
2.326	.0957					.0267	.06	1.36	2.00	.92	.014	.00	.00	PIPE
1030.326	72.145	1.415	73.560	28.31	11.91	2.20	75.76	.00	1.83	1.82	2.000	.000	.00	1 .0
1.898	.0957					.0239	.05	1.42	1.84	.92	.014	.00	.00	PIPE
1032.225	72.326	1.479	73.806	28.31	11.36	2.00	75.81	.00	1.83	1.76	2.000	.000	.00	1 .0
1.496	.0957					.0214	.03	1.48	1.68	.92	.014	.00	.00	PIPE

TRACT 17702 - LOT 1
BROOKHURST TRIANGLE PHASE II - BUILDING NO. 2
LINE A - CB TO ACO STORMBRIXX

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1033.720	72.470	1.550	74.020	28.31	10.83	1.82	75.84	.00	1.83	1.67	2.000	.000	.00	1 .0
1.120	.0957					.0193	.02	1.55	1.53	.92	.014	.00	.00	PIPE
1034.840	72.577	1.630	74.207	28.31	10.33	1.66	75.86	.00	1.83	1.55	2.000	.000	.00	1 .0
.775	.0957					.0176	.01	1.63	1.37	.92	.014	.00	.00	PIPE
1035.615	72.651	1.720	74.371	28.31	9.85	1.51	75.88	.00	1.83	1.39	2.000	.000	.00	1 .0
.305	.0957					.0163	.00	1.72	1.21	.92	.014	.00	.00	PIPE
1035.920	72.680	1.834	74.514	28.31	9.38	1.37	75.88	.02	1.83	1.10	2.000	.000	.00	1 .0
4.548	.0033					.0164	.07	1.85	1.00	2.00	.014	.00	.00	PIPE
1040.468	72.695	2.000	74.695	28.31	9.01	1.26	75.96	2.00	1.83	.00	2.000	.000	.00	1 .0
130.792	.0033					.0176	2.30	2.00	.00	2.00	.014	.00	.00	PIPE
1171.260	73.120	4.198	77.318	28.31	9.01	1.26	78.58	.00	1.83	.00	2.000	.000	.00	1 .0
71.320	.0123					.0182	1.30	4.20	.00	2.00	.014	.00	.00	PIPE
1242.580	74.000	4.614	78.614	28.31	9.01	1.26	79.87	.00	1.83	.00	2.000	.000	.00	1 .0

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

TRACT MAP 17702 LOT 1
BROOKHURST TRIANGLE PHASE II - BUILDING NO 2
LINE B - ACO TO BUILDING 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	74.250	1.392	75.642	19.84	9.67	1.45	77.09	.00	1.59	1.41	1.750	.000	.00	1 .0
1.722	.0333					.0189	.03	1.39	1.41	1.12	.014	.00	.00	PIPE
1001.722	74.307	1.419	75.727	19.84	9.49	1.40	77.13	.00	1.59	1.37	1.750	.000	.00	1 .0
3.089	.0333					.0177	.05	1.42	1.35	1.12	.014	.00	.00	PIPE
1004.811	74.410	1.498	75.908	19.84	9.05	1.27	77.18	.00	1.59	1.23	1.750	.000	.00	1 .0
1.189	.0333					.0164	.02	1.50	1.19	1.12	.014	.00	.00	PIPE
1006.000	74.450	1.595	76.045	19.84	8.63	1.16	77.20	.06	1.59	1.00	1.750	.000	.00	1 .0
JUNCT STR	.0145					.0109	.66	1.65	1.00		.014	.00	.00	PIPE
1066.840	75.330	2.253	77.583	7.50	4.24	.28	77.86	.00	1.06	.00	1.500	.000	.00	1 .0
139.450	.0050					.0059	.82	2.25	.00	1.50	.014	.00	.00	PIPE
1206.290	76.030	2.378	78.408	7.50	4.24	.28	78.69	.00	1.06	.00	1.500	.000	.00	1 .0
JUNCT STR	.0000					.0062	.00	2.38	.00		.014	.00	.00	PIPE
1206.290	76.030	2.417	78.447	4.83	3.94	.24	78.69	.00	.89	.00	1.250	.000	.00	1 .0
276.740	.0050					.0065	1.79	2.42	.00	1.25	.014	.00	.00	PIPE
1483.030	77.420	2.821	80.241	4.83	3.94	.24	80.48	.00	.89	.00	1.250	.000	.00	1 .0

N O T E S
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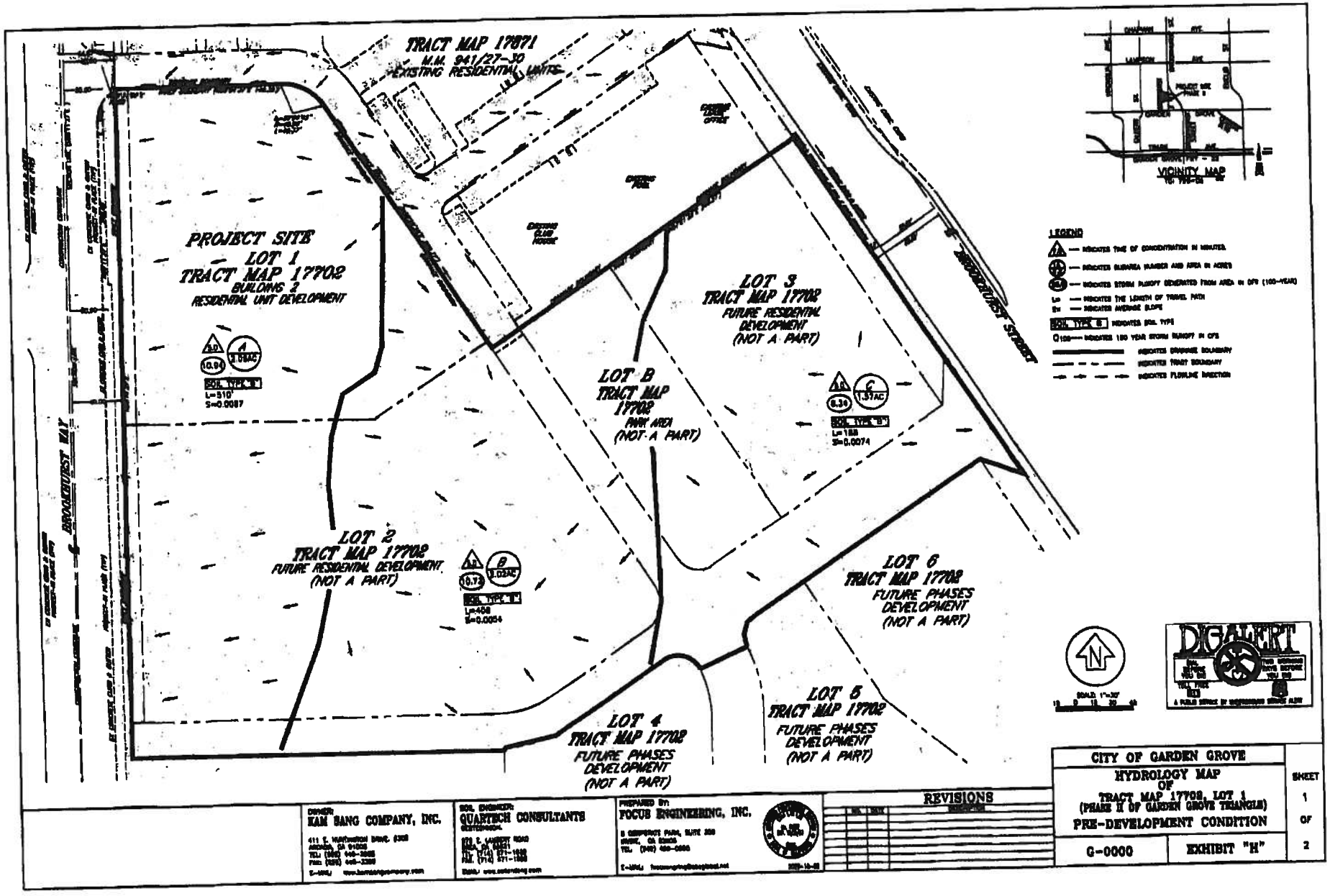
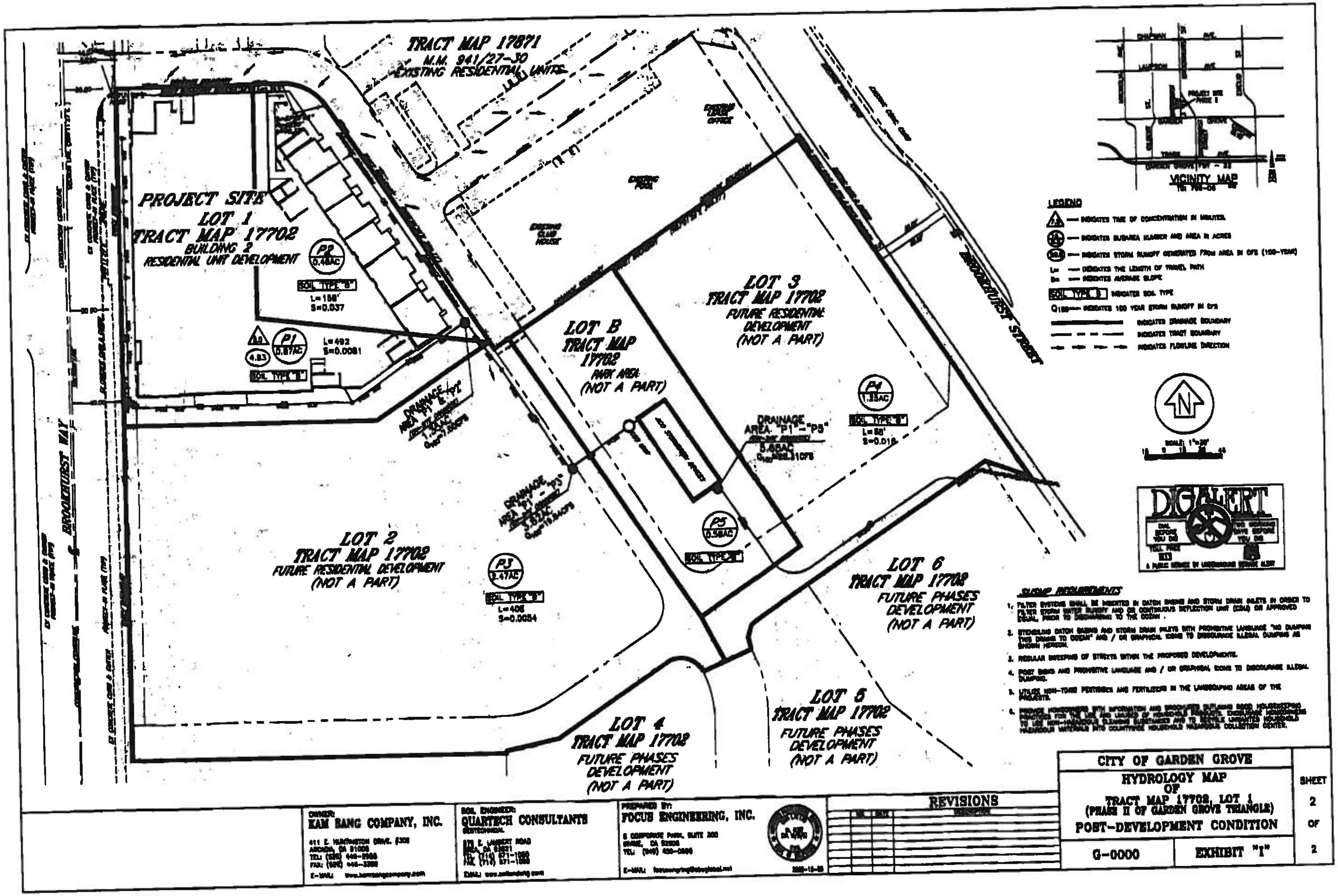
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

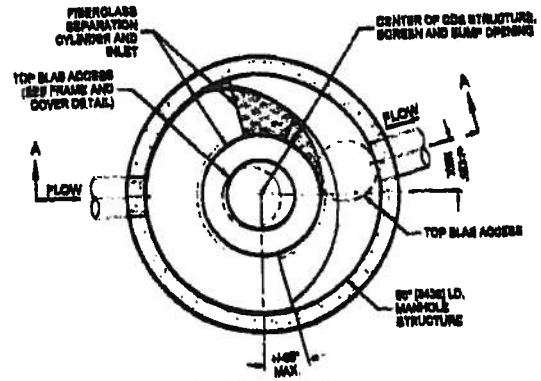
HYDROLOGY MAPS



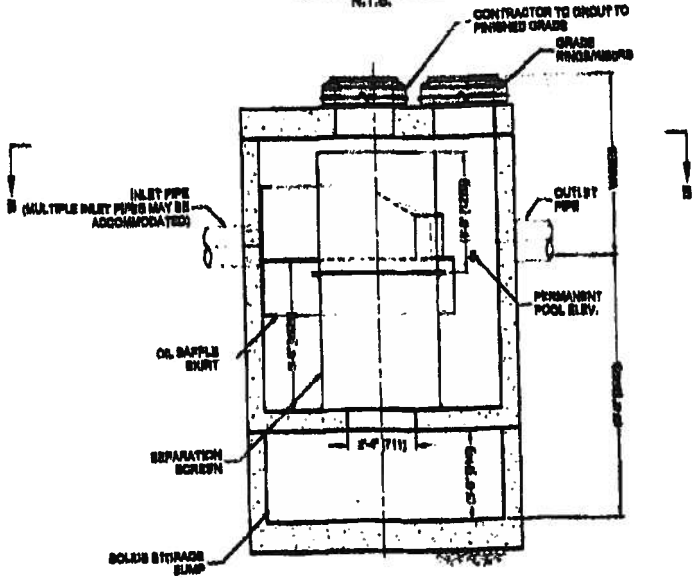
OWNER: KAM SANG COMPANY, INC.	SOIL ENGINEER: QUARTECH CONSULTANTS	PREPARED BY: FOCUS ENGINEERING, INC.	REVISIONS	CITY OF GARDEN GROVE
				HYDROLOGY MAP OF TRACT MAP 17702, LOT 1 (PHASE II OF GARDEN GROVE TRIANGLE) PRE-DEVELOPMENT CONDITION
				G-0000 / EXHIBIT "H"

SHEET 1 OF 2


TRACT MAP 17871
M.M. 941/27-30
EXISTING RESIDENTIAL UNITS
PROJECT SITE
LOT 1
TRACT MAP 17702
BUILDING 2
RESIDENTIAL UNIT DEVELOPMENT
P2
0.46AC
SOIL TYPE "B"
L=158'
S=0.037
P1
0.87AC
4.83
L=492
S=0.0081
LOT 2
TRACT MAP 17702
FUTURE RESIDENTIAL DEVELOPMENT
(NOT A PART)
P3
2.47AC
L=408
S=0.0054
LOT B
TRACT MAP 17702
PARK AREA
(NOT A PART)
LOT 3
TRACT MAP 17702
FUTURE RESIDENTIAL DEVELOPMENT
(NOT A PART)
P4
1.35AC
L=82'
S=0.018
DRAINAGE AREA "P1"-"P5"
5.65AC
P5
0.58AC
LOT 4
TRACT MAP 17702
FUTURE PHASES DEVELOPMENT
(NOT A PART)
LOT 5
TRACT MAP 17702
FUTURE PHASES DEVELOPMENT
(NOT A PART)
LOT 6
TRACT MAP 17702
FUTURE PHASES DEVELOPMENT
(NOT A PART)
BROOKHURST WAY
BROOKHURST STREET
VICINITY MAP
LEGEND
SUSMP REQUIREMENTS
CITY OF GARDEN GROVE
HYDROLOGY MAP OF
TRACT MAP 17702, LOT 1
(PHASE II OF GARDEN GROVE TRIANGLE)
POST-DEVELOPMENT CONDITION
G-0000
EXHIBIT "I"
SHEET 2 OF 2
REVISIONS
OWNER:
KAM SANG COMPANY, INC.
SOIL ENGINEER:
QUARTECH CONSULTANTS
PREPARED BY:
FOCUS ENGINEERING, INC.



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.

CDS4045-8-C DESIGN NOTES
THE STANDARD CDS4045-8-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.
CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE SHIELD INLET PIPE REQUIRED FOR THIS CONFIGURATION
PERMANENT WORK FOR NUSEP / NJDEP CONFORMING UNITS

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)	*		
PEAK FLOW RATE (CFS OR L/s)	*		
RETURN PERIOD OF PEAK FLOW (YRS)	*		
SCREEN APERTURE (4700 OR 6720)			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST	WIDTH	*	
	HEIGHT	*	
NOTE/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

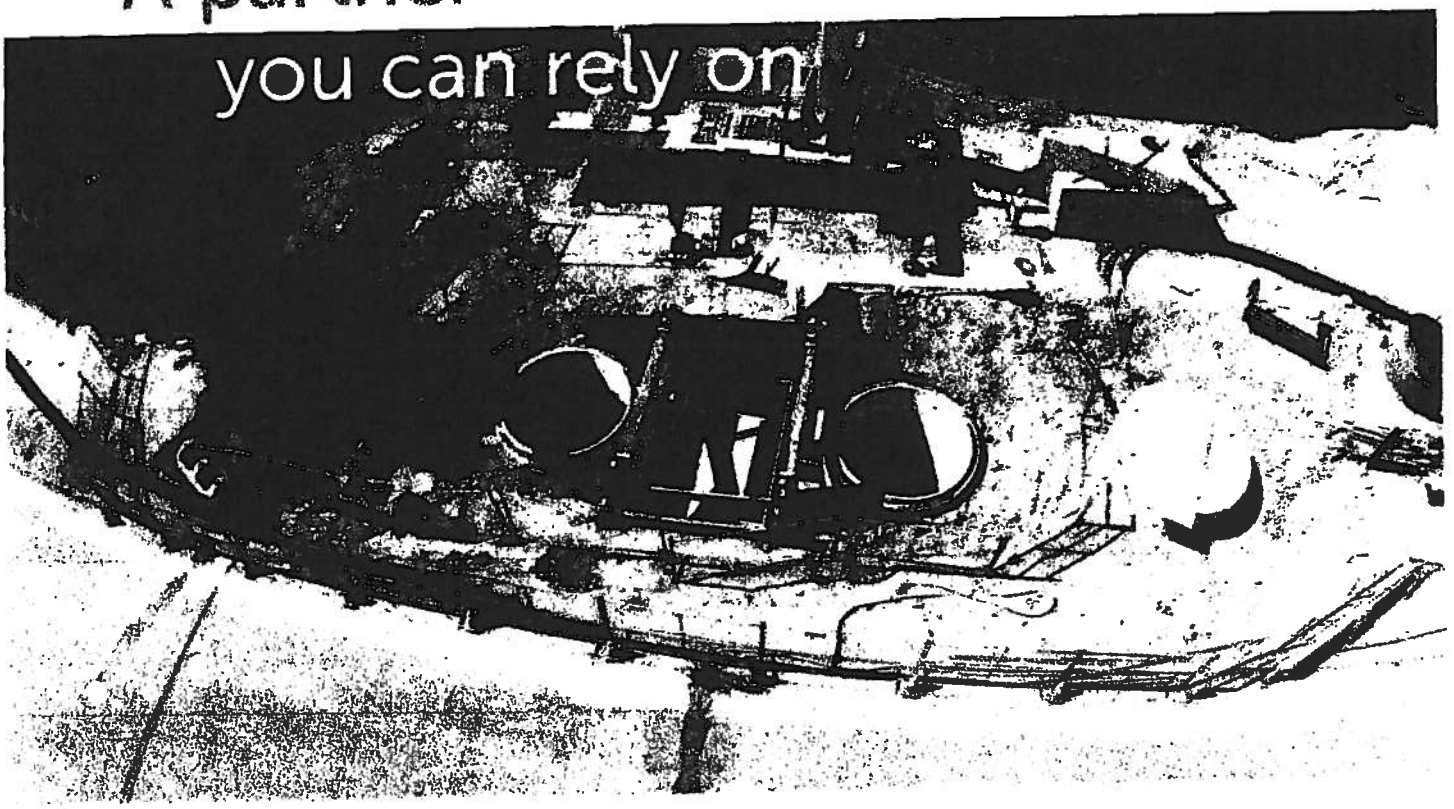
GENERAL NOTES
1. CONTRACT TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contech-cpi.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO H20 AND CASTINGS SHALL MEET H20 (AASHTO M 306) LOAD RATING. ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC B-BAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY BACKFILL, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
(800) 338-1122 (513) 645-7000 (513) 645-7993 FAX

CDS4045-8-C
INLINE CDS
STANDARD DETAIL

A partner you can rely on



THE CONTECH WAY

Contech Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information:

CONTECH
ENGINEERED SOLUTIONS

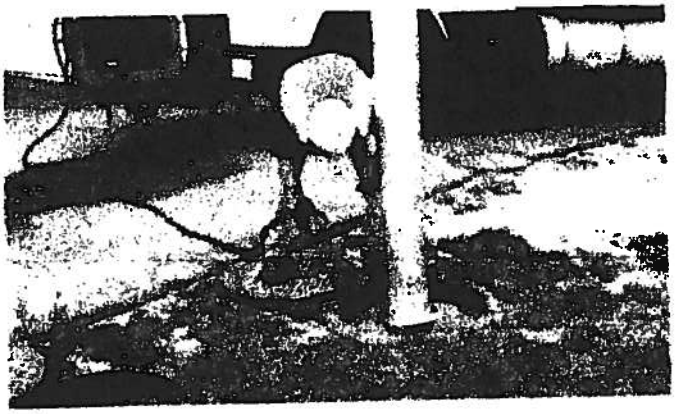
Get social with us:

800-338-1122 | www.ContechES.com

CDS® Maintenance

Systems vary in their maintenance needs, and the selection of a cost-effective and easy-to-access treatment system can mean a huge difference in maintenance expenses for years to come.

A CDS unit is designed to minimize maintenance and make it as easy and inexpensive as possible to keep our systems working properly.



Most CDS® units can easily be cleaned within thirty minutes.

INSPECTION

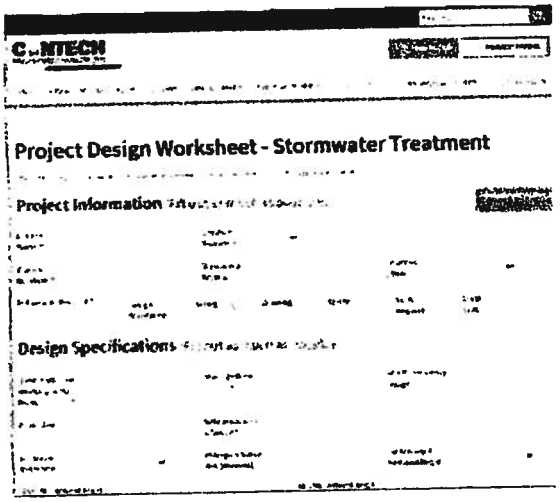
Inspection is the key to effective maintenance. Pollutant deposition and transport may vary from year to year and site to site. Semi-annual inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed more frequently where site conditions may cause rapid accumulation of pollutants.

RECOMMENDATIONS FOR CDS MAINTENANCE

The recommended cleanout of solids within the CDS unit's sump should occur at 75% of the sump capacity. Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber and sump, and another allows inspection and cleanout of sediment captured and retained behind the screen. A vacuum truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30 minutes for most installations.

HDS Product Design Worksheets

Our in-house team of engineers can support you through the entire permitting process - and the first step is sending us your project information by filling out one of the Project Design Worksheets. We will forward your information to an in-house engineer who will contact you with specific recommendations for your project.


C.NTECH

Project Design Worksheet - Stormwater Treatment

Project Information

Design Specifications

Learn More:

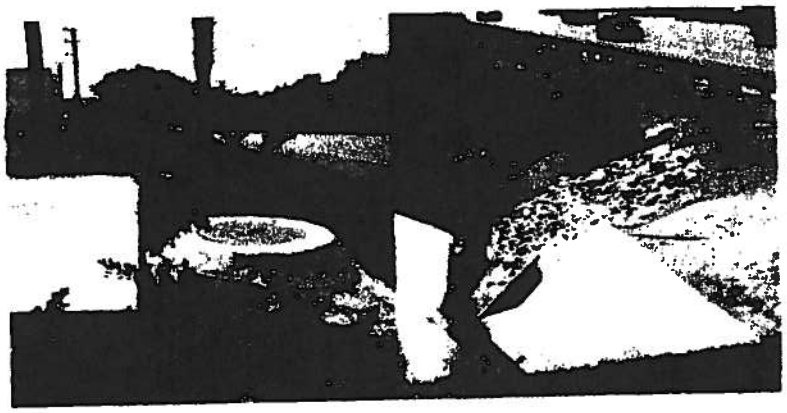
C.NTECH
ENGINEERED SOLUTIONS

CDS® Applications

CDS is commonly used in the following stormwater applications:

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal
- Urban retrofit and redevelopment
- Inlet and outlet protection
- Pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and Low Impact Development designs

CDS® provides trash control



CDS® pretreats a bioswale

Select CDS® Certifications and Verifications

CDS has been verified by some of the most stringent stormwater technology evaluation organizations in North America, including:

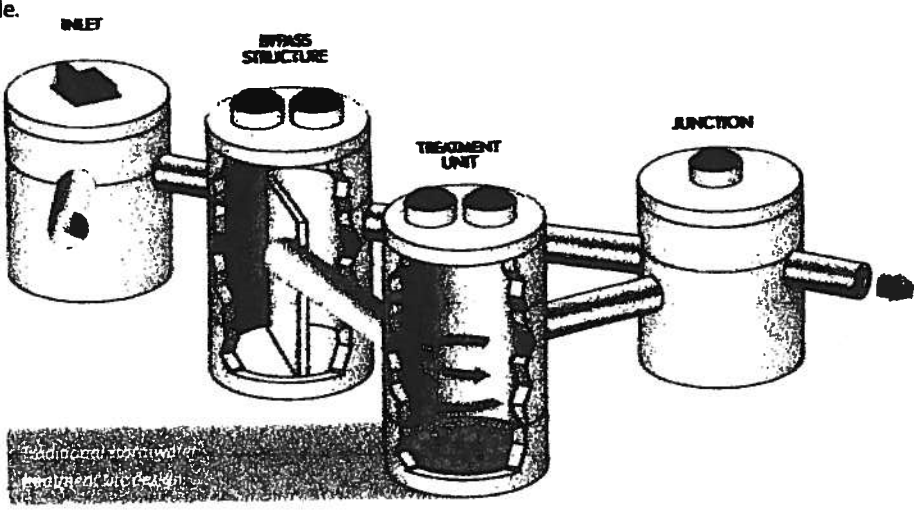
- Washington State Department of Ecology (GULD) - Pretreatment
- New Jersey Department of Environmental Protection (NJ DEP)
- Canadian Environmental Technology Verification (ETV)
- California Statewide Trash Amendments Full Capture System Certified*

**The CDS System has been certified by the California State Water Resources Control Board as a Full Capture System provided that it is sized to treat the peak flow rate from the region specific 1-year, 1-hour design storm, or the peak flow capacity of the corresponding storm drain, whichever is less.*

Save time, space and money with CDS

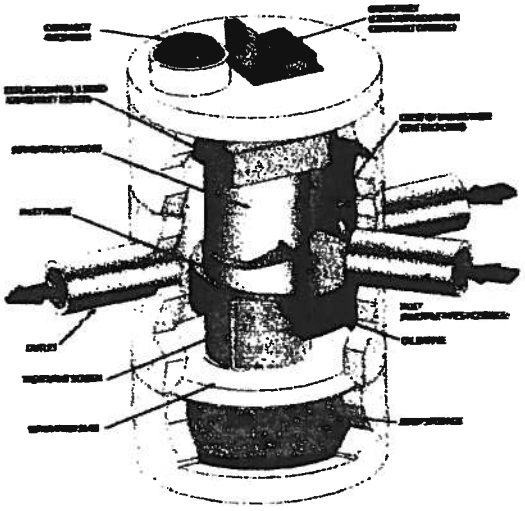
CDS® Design Configuration

The CDS effectively treats stormwater runoff while reducing the number of structures on your site. Inline, offline, grate inlet, and drop inlet configurations available. Internal and external peak bypass options also available.

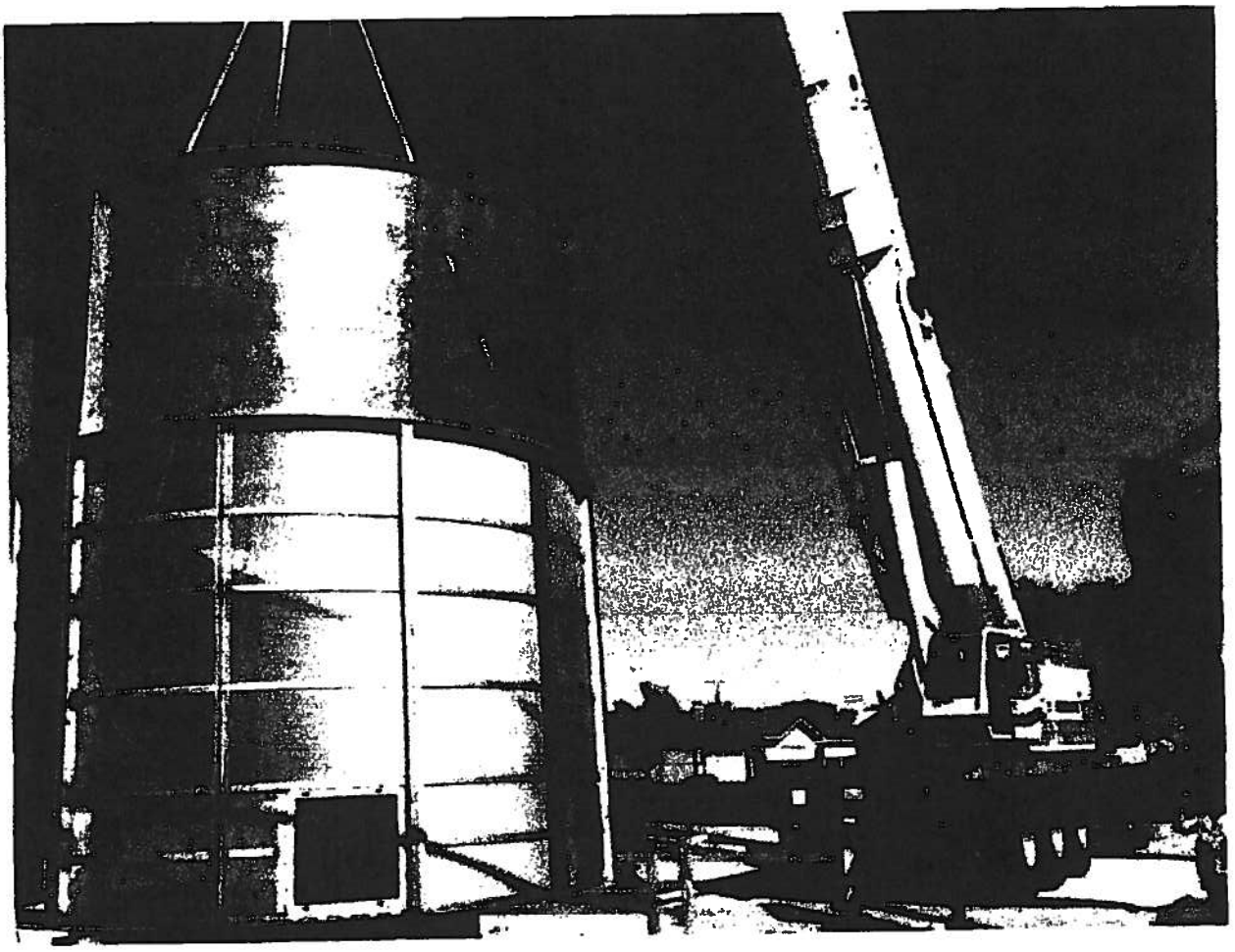


CDS® Advantages

- Grate inlet option available
- Internal bypass weir
- Accepts multiple inlets at a variety of angles
- Advanced hydrodynamic separator
- Captures and retains 100% of floatables and neutrally buoyant debris 4.7 mm or larger
- Indirect screening capability keeps screen from clogging
- Retention of all captured pollutants, even at high flows
- Performance verified by NJCAT, WA Ecology, and ETV Canada

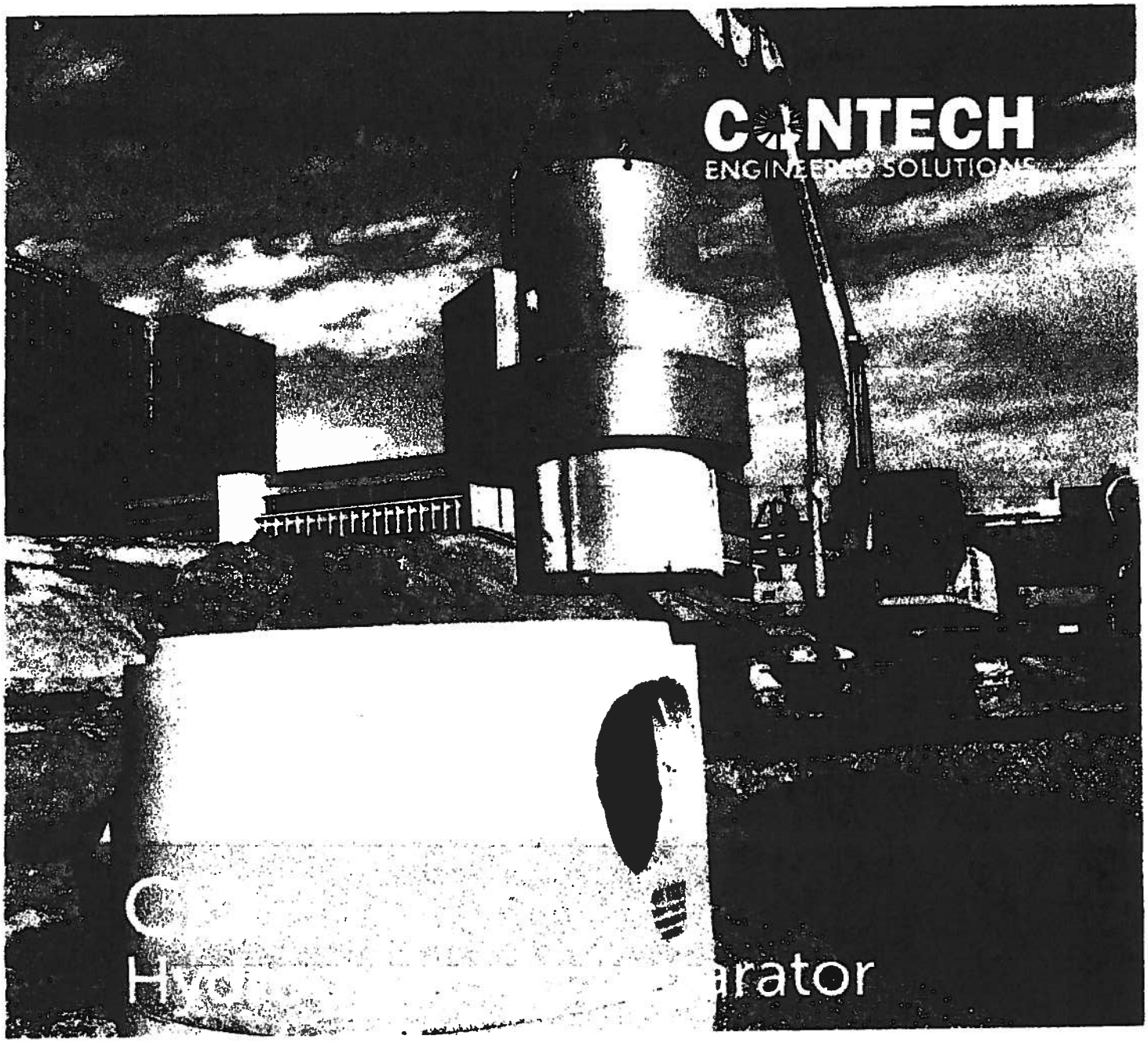


Learn More:



Unique screening technology for stormwater runoff – CDS®

CONTECH


C NTECH
ENGINEERED SOLUTIONS
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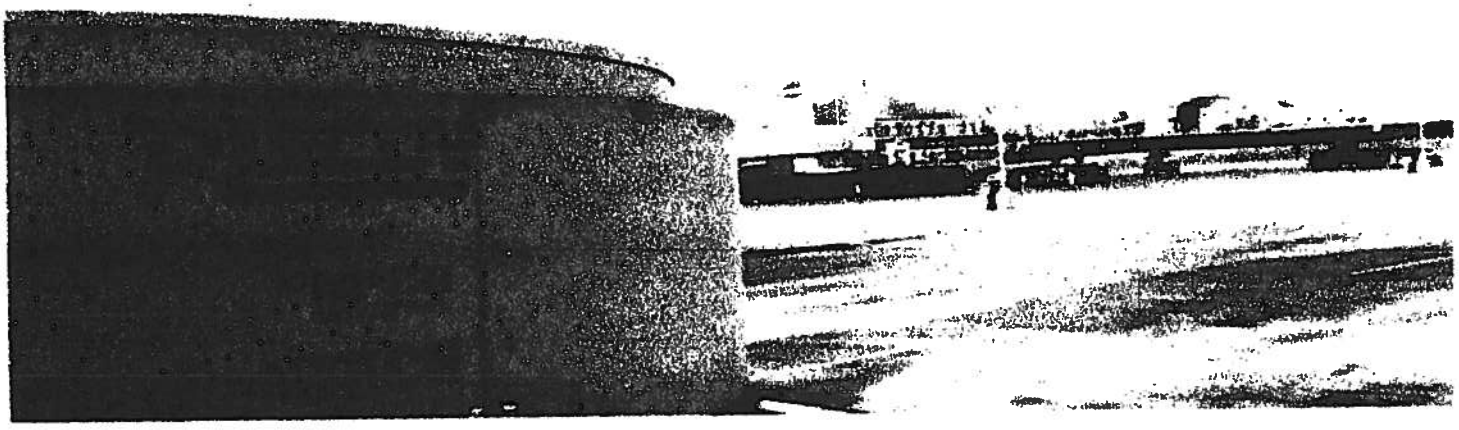

Inspections:

Follow all local, state, and federal regulations regarding stormwater BMP inspection requirements.

ACO INC. makes the following recommendations:

1. During the first service year a visual inspection should be completed during and after each major rainfall event, in addition to every 6 month period, to monitor and establish what sediment and debris buildup occurs.

Each ACO StormBrixx system is unique to the application and multiple criteria can affect maintenance frequency such as:

a) System Design: pre-treatment/no-pretreatment, inlet protection, stand-alone device.

b) Surface Area collecting from: hardscape, gravel, soil or any other surface.

c) Adjacent Area: soil runoff, gravel, trash.

2. Second year; establish an annual inspection frequency based on the information collected during the first year. At a minimum an inspection should be performed at 6 month intervals.

3. Inspect:

a. ACO StormBrixx access chambers & inspection ports.

b. Inflow and outflow points.

c. Discharge area.

4. Identify and Report maintenance required:

a. Sediment and debris accumulation.

b. System backing up.

ACO, Inc.

Electronic Contact
www.acousa.com
info@acousa.com

West Sales Office
825 W. Beechcraft Street
Casa Grande, AZ 85122
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(888) 490-9552
Fax: (520) 421-9899

Northeast Sales Office
9470 Pinecone Dr.
Mentor, OH 44060
Tel: (440) 639-7230
(800) 543-4764
Fax: (440) 639-7235

Southeast Sales Office
4211 Pleasant Road
Fort Mill, SC 29708
Tel: (800) 543-4764
Fax: (803) 802-1063

General:

ACO StormBrixx is a unique and patented geocellular stormwater management system for detention and infiltration usage.

Its versatile design allows the system to be used in configurations and applications across all construction environments as a standalone solution or as part of an integrated LID (Low Impact Development) or BMP (Best Management Practices). Systems may or may not include pre-treatment to remove sediment and/or contaminants prior to entering the storage area. Those without pre-treatment require greater attention to system functionality and may require additional maintenance.

In order to sustain proper system functionality, ACO offers the following general maintenance guidelines for the StormBrixx product.

Prevention Measures:

1. Prior to & During Construction - Siltation prevention of the stormwater system.

a. Conform to all local, state and federal regulations for sediment and erosion control during construction.

b. Install site erosion and sediment BMP's (Best Management Practices) required to prevent siltation of the stormwater system.

c. Inspect and maintain erosion and sediment BMP's during construction.

2. Post Construction - Prior to commissioning the ACO StormBrixx system.

a. Remove and properly dispose of construction erosion and sediment BMP's per all local, state and federal regulations. Care should be taken during removal of the BMP's as not to allow collected sediment or debris into the stormwater system.

b. Flush the ACO StormBrixx system to remove any sediment or construction debris immediately after the BMP's removal. Follow the maintenance procedure outlined.

ACO, Inc.

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Fort Mill, SC 29708
Tel: (803) 543-4764
Fax: (803) 802-1063

APPENDIX C- AMENDMENT 1

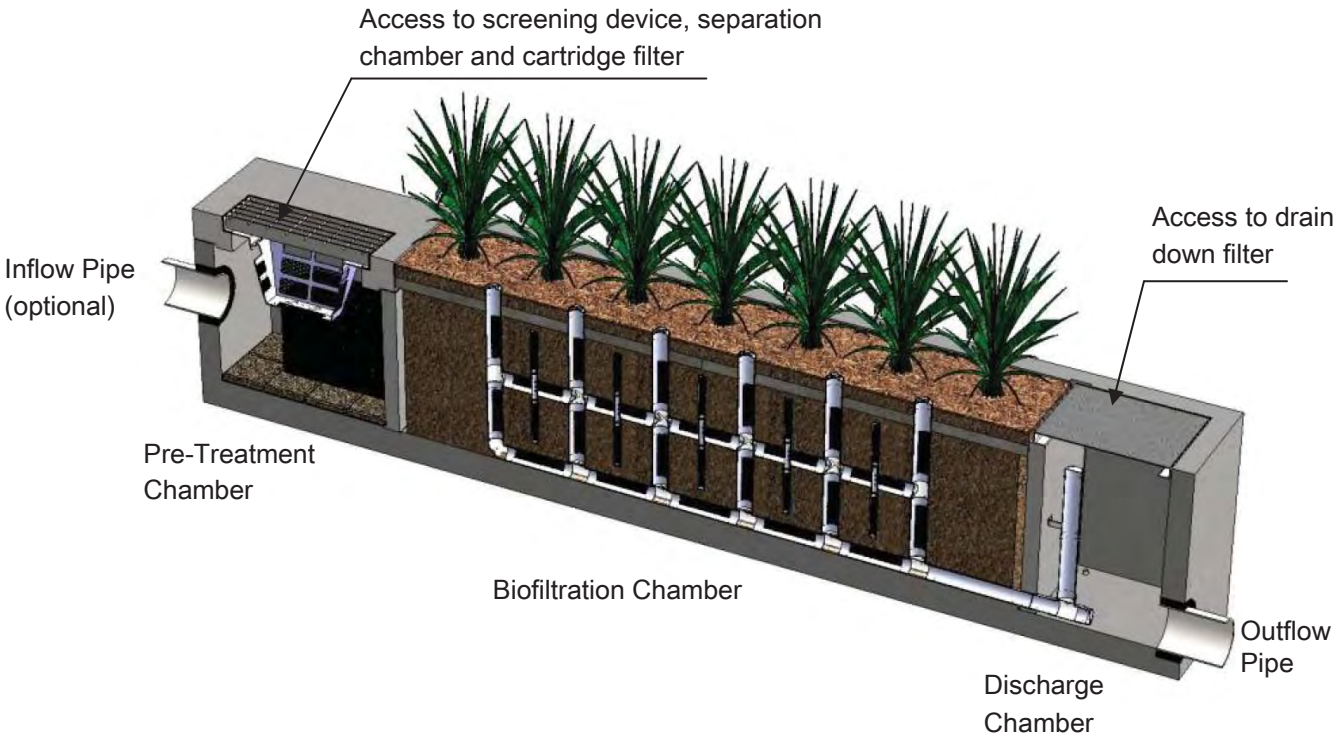
BMP MAINTENANCE SUPPLEMENT / O&M PLAN

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

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

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

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

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

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

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

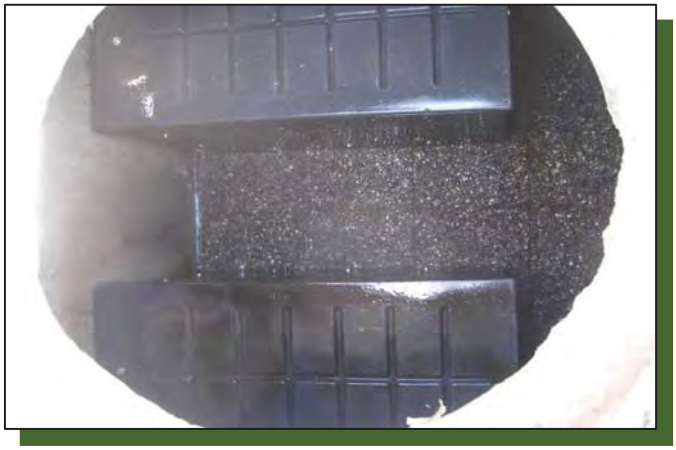
The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

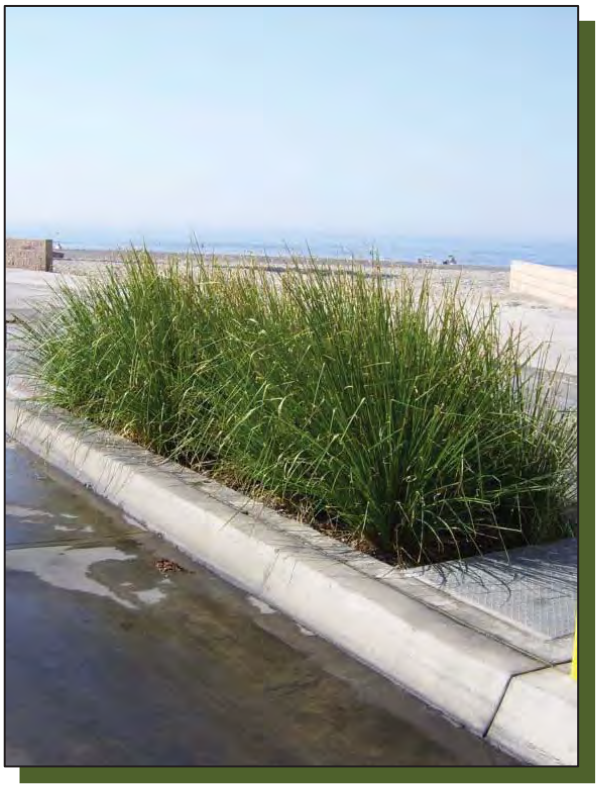


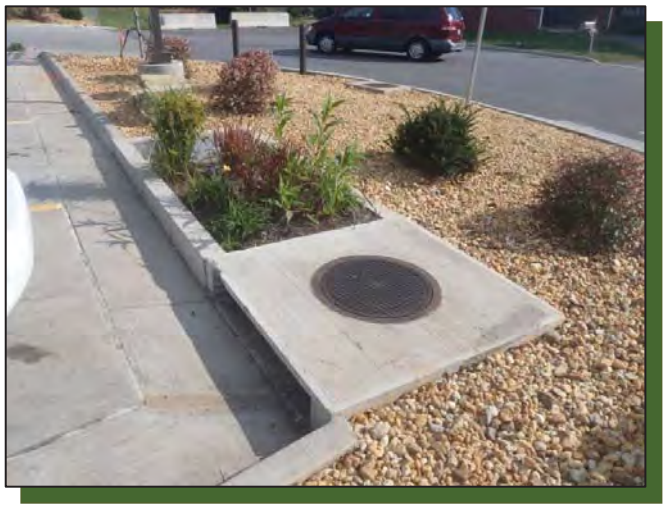
Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.





Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

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

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes:

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

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

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Maintenance Procedure

The following procedures are for the maintenance of StormTrap as suggested by StormTrap, LLC. All regulations set by governing bodies retain precedence over the subsequent instructions.

1. Do not enter the StormTrap system unless properly trained, equipped, and qualified to enter a confined space as identified by local occupational safety and health regulations.

2. StormTrap recommends an annual inspection. Frequency of cleaning will vary due to site conditions and storage capacity. StormTrap recommends maintenance when the sediment occupies more than one-tenth of the system's volume. Also refer to local municipality regulations for their maintenance requirements and schedules. Inspections should be a part of your standard operating procedure.

3. Maintenance is typically preformed using a vacuum truck. Remove manhole cover at grade and lower vac hose into StormTrap system (or sump pit within system if applicable). Sediment should be flushed towards vac hose to provide for thorough removal. When finished, replace all covers that were removed.

Bio Clean

A Forterra Company

UrbanPond™

A Stormwater Storage Solution

INSPECTION & MAINTENANCE MANUAL

5796 Armada Drive Suite 250 | Carlsbad, CA 92008 | 855.566.3938

stormwater@forterrabp.com | biocleanenvironmental.com

URBAN POND INSPECTION & MAINTENANCE

Inspection and maintenance of the Urban Pond underground detention, retention, or infiltration system is vital for the performance and life cycle of the stormwater management system. All local, state, and federal permits and regulations must be followed for system compliance. Manway access locations are provided on each system for ease of ingress and egress for routine inspection and maintenance activities. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed and providing protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific conditions. Inspection after the first significant rainfall event and at quarterly intervals is typical. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance a BMP can exceed its storage capacity, become blocked, or damaged, which can negatively affect its continued performance.

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the underground detention, retention, or infiltration system:

- Bio Clean Environmental Inspection and Maintenance Report Form
- Flashlight
- Manhole hook or appropriate tools to access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- Note: Entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system.

Inspection Steps

The key to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Urban Pond underground detention, retention, or infiltration system are quick and easy. As mentioned above, the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order

to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long term inspection and maintenance interval requirements.

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

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
- Observe the upstream drainage area and look for sources of pollution, sediment, trash and debris.
- Observe the inside of the system through the access manholes. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its modules.
- Look for any out of the ordinary obstructions in the inflow and outflow pipes. Check pipes for movement or leakage. Write down any observations on the inspection form.
- Observe any movement of modules.
- Observe concrete for cracks and signs of deterioration.
- In detention and retention systems inspect for any signs of leakage.
- In infiltration systems inspect for any signs of blockage or reasons that the soils are not infiltrating.
- Through observation and/or digital photographs, estimate the amount of floatable debris accumulated in the system. Record this information on the inspection form. Next, utilizing a tape measure or measuring stick, estimate the amount of sediment accumulated in the system. Sediment depth may vary throughout the system, depending on the flow path. Record this depth on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

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

- Damaged inlet and outlet pipes.
- Obstructions in the system or its inlet or outlet.
- Excessive accumulation of floatables.
- Excessive accumulation of sediment of more than 6” in depth.
- Damaged joint sealant.

Maintenance Equipment

While maintenance can be done fully by hand it is recommended that a vacuum truck be utilized to minimize time requirements required to maintain the Urban Pond underground detention, retention, or infiltration system:

- Bio Clean Environmental Inspection and Maintenance Report Form
- Flashlight
- Manhole hook or appropriate tools to access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- Vacuum truck
- Trash can
- Pressure washer
- Note: Entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system. Entry into the system will be required if maintenance is required.

Maintenance Procedures

It is recommended that maintenance occurs at least three days after the most recent rain event to allow for drain down of the system and any upstream detention systems designed to drain down over an extended period of time. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Once all safety measures have been set up cleaning of the system can proceed as follows:

- Using an extension on a boom on the vacuum truck, position the hose over the opened manway and lower into the system. Remove all floating debris, standing water (as needed) and sediment from the system. A power washer can be used to assist if sediments have become hardened and stuck to the walls and columns. Repeat the same procedure at each manway until the system has been fully maintained. Be sure not to pressure wash the infiltration area as it may scour.

If maintenance requires entry into the vault:

- Following rules for confined space entry use a gas meter to detect the presence of any hazardous gases. If hazardous gases are present do not enter the vault. Follow appropriate confined space procedures, such as utilizing venting system, to address the hazard. Once it is determined to be safe, enter utilizing appropriate entry equipment such as a ladder and tripod with harness.

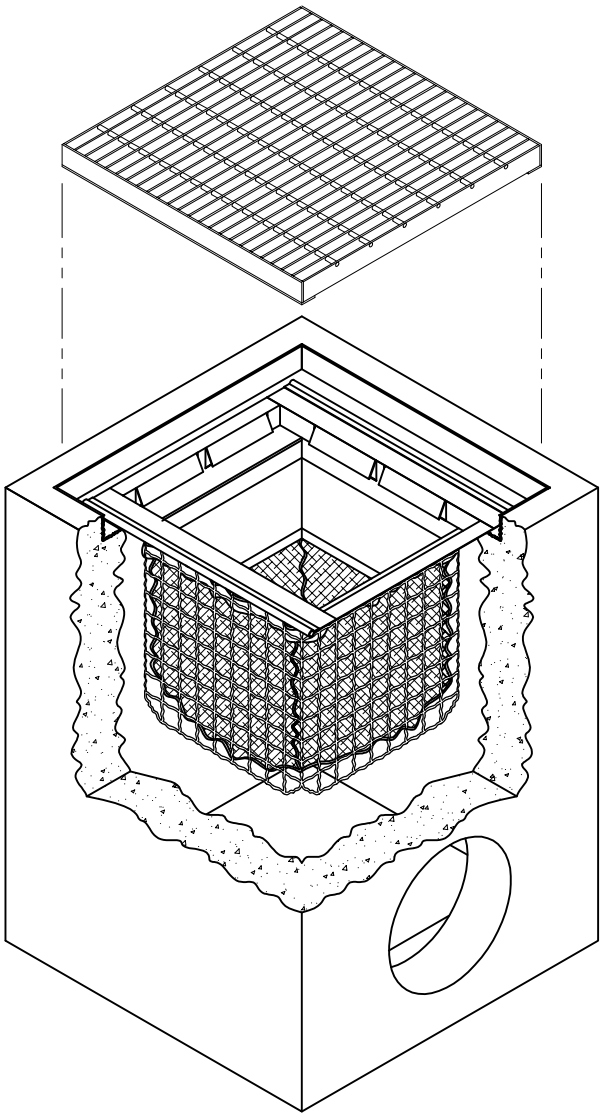
- The last step is to close up and replace all manhole covers and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.

For Maintenance Services please contact Bio Clean at 760-433-7640, or email info@biocleanenvironmental.com.

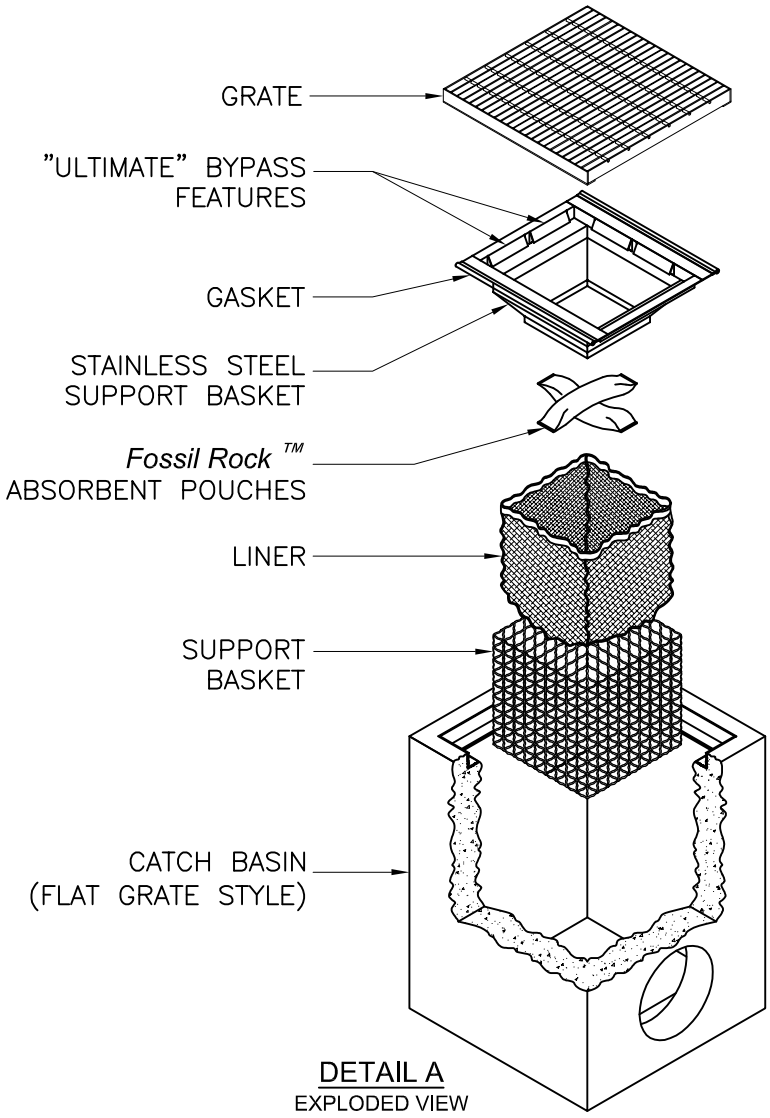
APPENDIX E -AMENDMENT 1

BMPs Devices Details

FGP-0001



FloGard® FILTER
-INSTALLED INTO CATCH BASIN-



DETAIL A
EXPLODED VIEW

NOTES:

1. Filter insert shall have a high flow bypass feature.
2. Filter support frame shall be constructed from stainless steel Type 304.
3. Filter medium shall be *Fossil Rock* ™, installed and maintained in accordance with manufacturer specifications.
4. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.

U.S. PATENT # 6,00,023 & 6,877,029

Inlet Filtration

FloGard®

Catch Basin Insert Filter

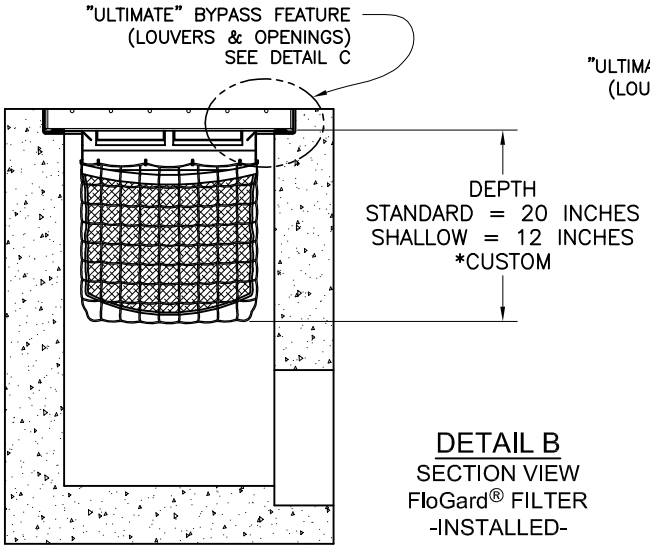
Grated Inlet Style

Oldcastle® Stormwater Solutions

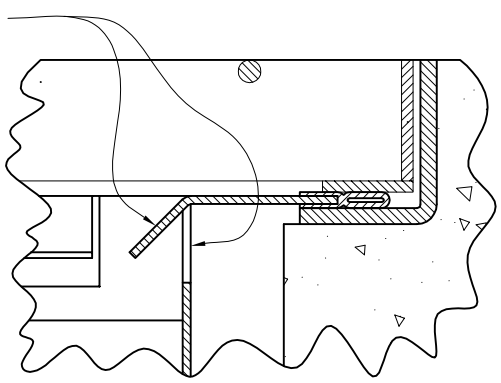
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0001	G	ECO-0142 JPR 7/13/16	JPR 11/3/06	SHEET 1 OF 2

U.S. PATENT # 6,00,023 & 6,877,029



DETAIL B
SECTION VIEW
FloGard® FILTER
-INSTALLED-



DETAIL C
"ULTIMATE"
BYPASS FEATURES

* MANY OTHER STANDARD & CUSTOM SIZES & DEPTHS AVAILABLE UPON REQUEST.

SPECIFIER CHART

MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data In these columes Is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-	
	INLET ID Inside Dimension (inch x inch)	GRATE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	.4
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18F8	.45	.4
FGP-1824F	16 X 22	18 X 24	5.0	1.5	1.2	FGP-1824F8	.85	.7
FGP-1836F	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836F8	1.3	.9
FGP-2024F	18 X 22	20 X 24	5.9	1.2	1.0	FGP-2024F8	.7	.55
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85
FGP-2430F	24 X 30	26 X 30	7.0	2.8	1.8	FGP-2430F8	1.6	1.05
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15
FGP-2448F	24 X 48	26 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35
FGP-28F	28 X 28	32 X 32	6.3	2.2	1.5	FGP-28F8	1.25	.85
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30F8	2.05	1.15
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36F8	2.65	1.35
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25
FGP-SD24F	24 X 24	28 X 28	6.1	2.2	1.5	FGP-SD24F8	1.25	.85

Inlet Filtration

FloGard®

Catch Basin Insert Filter

Grated Inlet Style

Oldcastle® Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0001	G	ECO-0142 JPR 7/13/16	JPR 11/3/06	SHEET 2 OF 2

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

OVERVIEW

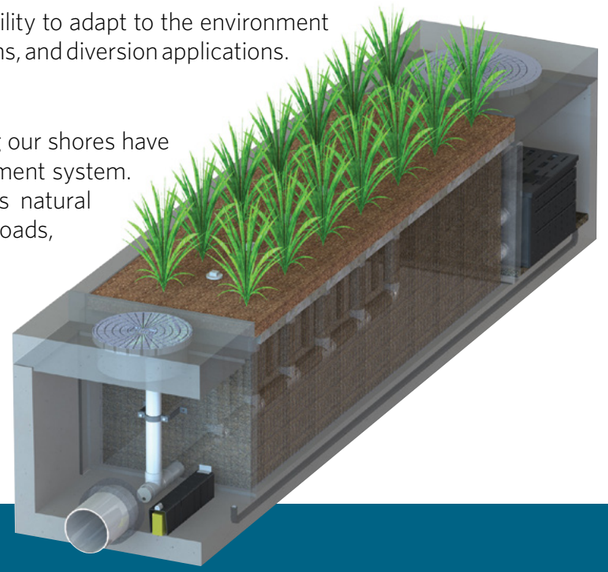
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

Texas Commission on Environmental Quality

Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

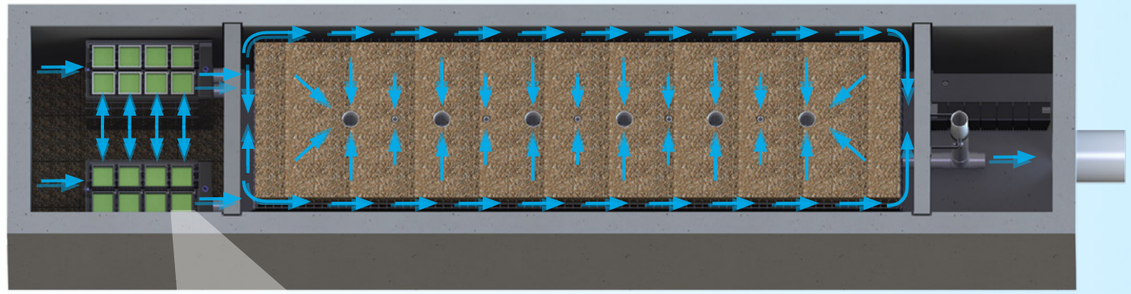


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

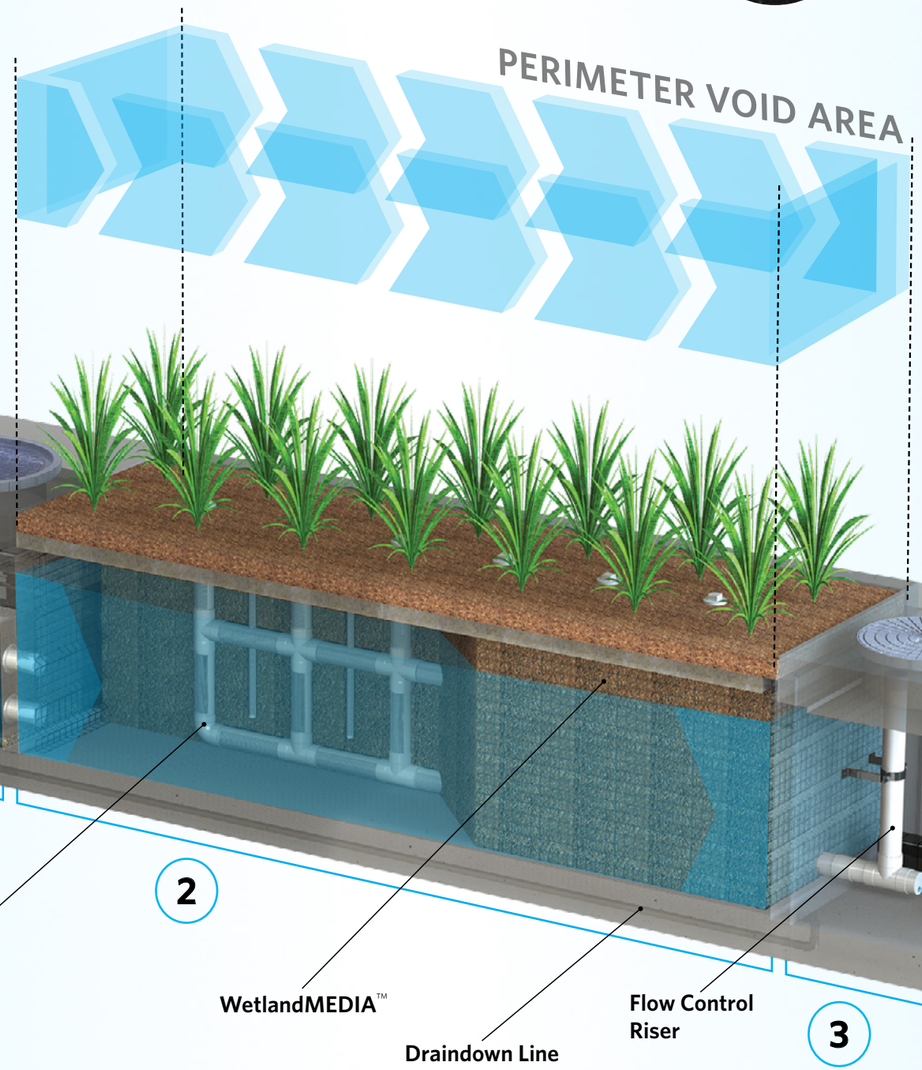


Figure 1

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

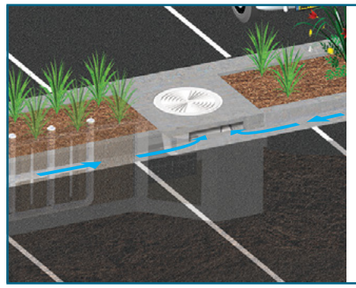
- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

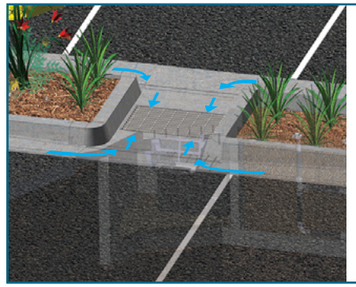
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



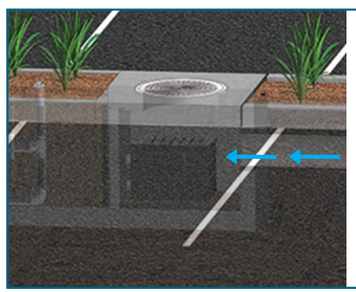
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

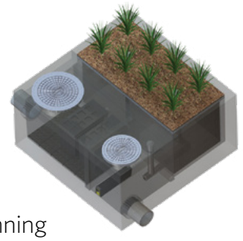
The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/ bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

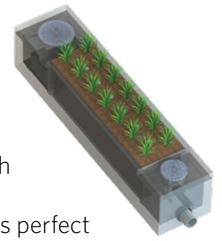
ORIENTATIONS

SIDE-BY-SIDE



The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

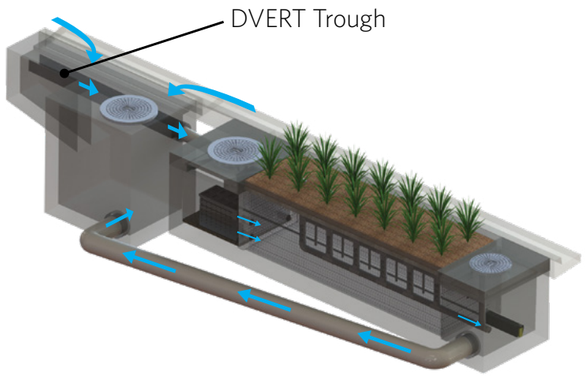
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

BMPs for DMA A1

BMPs for DMA A2

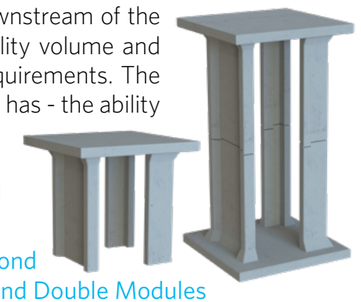
MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE

MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.



UrbanPond
Single and Double Modules

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

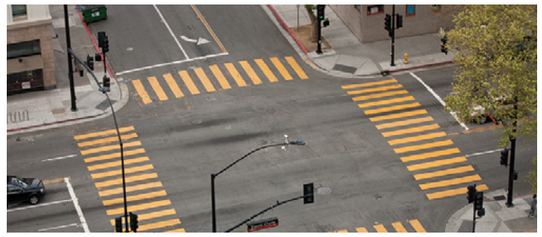
The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.

RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

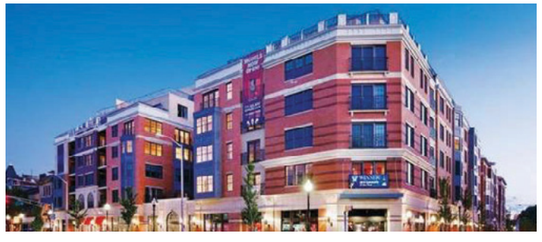
Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE

Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.

Bio Clean
A Forterra Company

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Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

01172020

APPENDIX F -AMENDMENT 1

GEOTECHNICAL STUDY

Project No. W1771-88-01
May 10, 2023

VIA EMAIL

Mr. John Hicks
Kam Sang Company
411 E Huntington Dr, #305
Arcadia, CA 91006

Subject: GEOTECHNICAL FEASIBILITY EVALUATION
BUILDING 2 – BROOKHURST TRIANGLE
BROOKHURST STREET AND GARDEN GROVE BOULEVARD
GARDEN GROVE, CALIFORNIA

Dear Mr. Hicks:

This letter presents the result of our geotechnical feasibility evaluation of the project Building 2 project site located within the Brookhurst Triangle. The overall site is located at the intersection of Brookhurst Street and Garden Grove Boulevard in Garden Grove, California. This geotechnical feasibility evaluation report summarizes the anticipated geologic hazards as well as the subsurface data collected from nearby and adjacent sites and provides general geotechnical recommendations regarding development of the site.

The scope our evaluation included review and evaluation of pertinent geologic and seismologic information pertaining to the site including published geologic maps, geologic and seismic hazard maps published by California Geological Survey (CGS), and other in-house reports and geologic maps pertaining to the site. These documents include but are not limited to the State of California official Alquist-Priolo Earthquake Fault Zone maps and Seismic Hazard Zone maps published by the CGS.

Our scope of services also included a review of geotechnical investigation reports for the subject properties and adjacent properties from our in-house repository. A full list of references reviewed to prepare this report are provided in the *List of References* section.

This scope of work did not include site-specific borings. The purpose of this report is to demonstrate project feasibility; it is not intended for submittal to the building official. Site-specific exploration will be required, and the actual subsurface geologic conditions may vary from those described herein.

1. SITE AND PROJECT DESCRIPTION

The site is an approximately 56,000 square-foot lot identified as Lot 1 of Tract 17702, APN: 089-661-10, and is currently vacant land. Based on a review of historic aerials, the site was previously used as a construction laydown yard and an unpaved parking lot. Historic aerials from 1987 show that the site was once developed with structures and paved surface parking.

The existing conditions are depicted on Figure 1 below.

Figure 1: Existing Conditions

The topography at the site appears is relatively level with surface drainage flowing along existing contours to city streets.

That subject project consists of the construction of Building 2 within the overall Brookhurst Triangle development. Building 2 is anticipated to consist of a 5-story structure to be constructed at or near present grade, or over one level of subterranean parking.

2. PRIOR SITE EXPLORATION

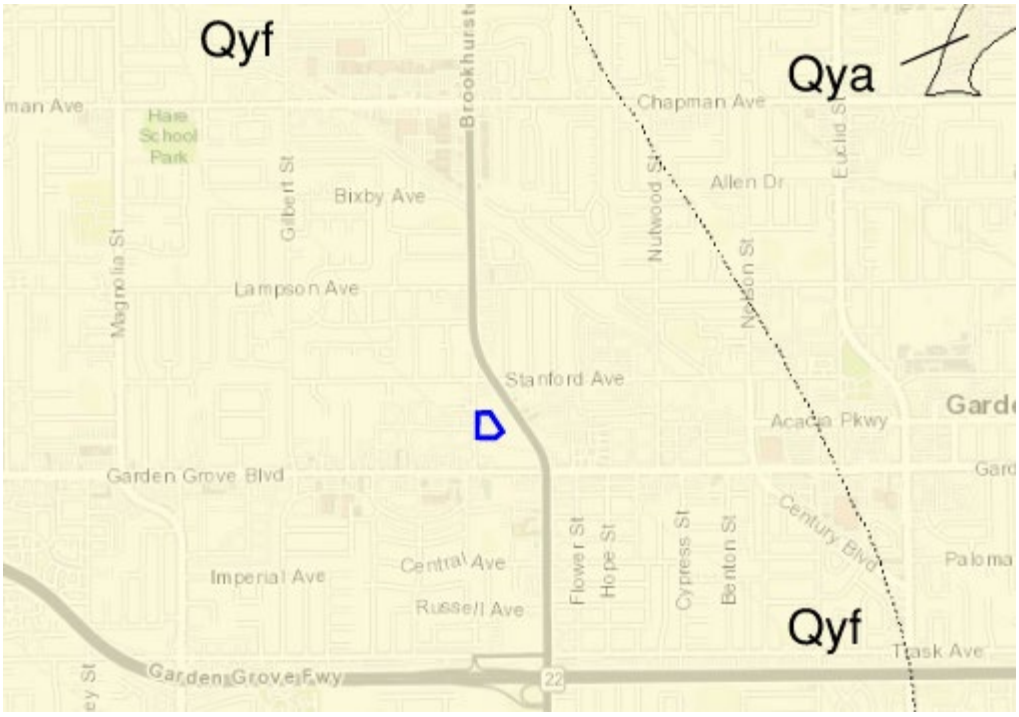
A geotechnical investigation for the adjacent Building 1 project was performed in 2013 by Cal Land Engineering, Inc. (Cal Land). The prior subsurface exploration included the excavation and logging of 5 borings to a maximum depth of 51½ feet below the existing ground surface. Groundwater was encountered at a depth of 15 feet below the ground surface. Recommendations to support Building 1 on a reinforced concrete mat foundation were provided.

Additional site exploration was performed in 2013 by Geotechnical Solutions, Inc. (GSI) and consisted of the excavation of 6 borings using a hollow stem auger drilling machine to depths of up to 5 feet below the ground surface. The additional site exploration was performed for the purpose of studying onsite infiltration characteristics. The report by GSI found shallow onsite infiltration to be feasible.

3. GEOLOGIC CONDITIONS

The subject site is located on the south-central portion of the Orange County Coastal Plain, a relatively flat-lying to very gently sloping alluviated surface with an average slope of less than 20 feet per mile. The lowland surface is bounded by hills and mountains on the north and east, and by the Pacific Ocean to the south and southwest and the Los Angeles Coastal Plain to the west. Prominent structural features within the Orange County Coastal Plain include the central lowland plain, the northwest trending line of low hills and mesas underlain by the Newport-Inglewood Fault Zone along the coastline (Newport Mesa, Huntington Beach Mesa, Bolsa Chica Mesa, and Landing Hill), and the San Joaquin Hills to the southeast.

Figure 2: Local Geologic Map



4. GEOLOGIC MATERIALS

Based on the prior site exploration performed for the adjacent Building 1 site, it is anticipated that the site is underlain by a relatively thin veneer of artificial fill underlain by Holocene age alluvial fan deposits consisting of unconsolidated to poorly consolidated sand, silt, and clay (CGS, 2012). The alluvium is anticipated to consist of poorly graded sand, silty sand, and sandy clay. Some layers of clayey silt and silty clay were reported by Cal Land.

5. GROUNDWATER

Review of the Seismic Hazard Zone Report for the Anaheim Quadrangle (California Division of Mines and Geology [CDMG], 1997, revised 2001) indicates the historically highest groundwater level in the area is approximately 15 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was encountered in the borings performed in 2013 by Cal Land at a depth of approximately 15 feet below the ground surface.

Considering the reported historic high groundwater level in the area, the depth to groundwater encountered in the prior borings, and the depth of the proposed construction, static groundwater will likely not be encountered during construction. If deep excavations are necessary for shoring piles or elevator pistons, groundwater may be encountered. However, it is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project.

6. GEOLOGIC-SEISMIC HAZARDS

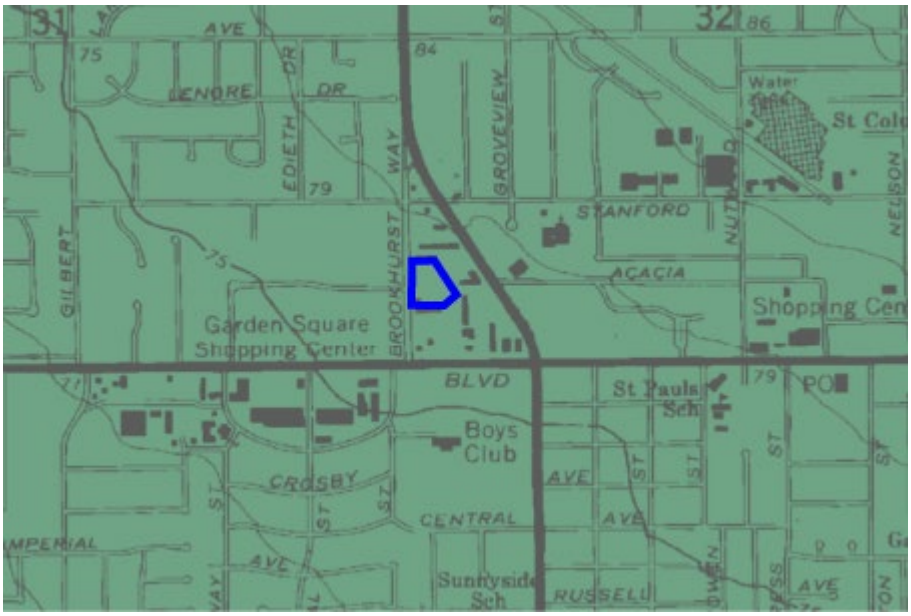
We have found the following based on our review of published maps, technical reports, available prior geotechnical investigation reports and available city, county and state documents:

1. The closest Holocene-active fault with the potential for surface fault rupture is the Newport-Inglewood Fault Zone located approximately 1.9 miles southwest of the site. The site is not within a state-designated Alquist-Priolo Earthquake Fault Zone (CGS, 2022a; 2022b) as having a potential for surface fault rupture. No Holocene-active or pre-Holocene faults with the potential for surface fault rupture are known to pass directly beneath the site or project toward the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low.

2. The site has not experienced significant ground failure as a result of any of the major historic recorded earthquakes; however, the site could be subjected to strong ground shaking in the event of an earthquake. This hazard is common throughout California and the effects of ground shaking can be addressed if the proposed structures are designed and constructed in conformance with current building codes and engineering practices.

3. Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Review of the State of California Seismic Hazard Zone Map for the Anaheim 7.5 Minute Quadrangle Map (CDMG, 1998b) indicates that the site is located within an area designated as having a potential for liquefaction (area shaded green on Figure 3). Based on the report by Cal Land for the adjacent Building 1 site, seismically-induced settlement of up to 0.75 inches was predicted. An updated site-specific evaluation of the potential for liquefaction will be required prior to site development.

Figure 3: Seismic Hazard Zone Map



4. The topography at the site and in the general site vicinity is essentially flat-lying. Based on a review of the City of Garden Grove Safety Element (2008) and the Orange County Safety Element (2004), the site is not located within an area identified as having a potential for slope stability hazards. Also, the site is not within an area identified as having a potential for seismic slope instability (CDMG, 1998). There are no mapped landslides near the site, nor is the site in the path of any known or potential landslides. Therefore, the potential for slope stability hazards to adversely affect the proposed development is considered low.

5. Based on a review of the County of Orange Safety Element (2004), the site is not located downslope of any large bodies of water that could adversely affect the site in the event of earthquake-induced dam failure or seiche (wave oscillations in an enclosed or semi-enclosed body of water. Therefore, probability of earthquake-induced flooding is considered very low.

6. The site is located within a Flood Zone X (0.2%) as designated by FEMA (2023). Zone X (0.2%) is defined as an area of 0.2% annual flood chance or an area of 1% annual chance of flooding with average flood depths of less than 1 foot (FEMA, 2023). Therefore, the site is considered to have a moderate flood potential.

7. The site is not located within an area of known subsidence associated with fluid withdrawal (groundwater or petroleum), or peat oxidation. Therefore, the potential for subsidence to impact the site is considered low.

8. The site is not located within a coastal area. Therefore, tsunamis are not considered a significant hazard at the site.

9. Based on a review of the California Geologic Energy Management Division (CalGEM) Well Finder Website, the site is not located within an oil field and active oil or gas wells are not documented in the immediate site vicinity (CalGEM, 2022). However, due to the voluntary nature of record reporting by the oil well drilling companies, wells may be improperly located or not shown on the location map and undocumented wells could be encountered during construction. Any wells encountered during construction will need to be properly abandoned in accordance with the current requirements of the CalGEM.

10. Since the site is not located within the boundaries of an oil field, the potential for methane or other volatile gases to occur at the site is considered low. However, should it be determined that a methane study is required for the proposed development it is recommended that a qualified methane consultant be retained to perform the study and provide mitigation measures as necessary.

7. CONCLUSIONS

It is our opinion that no geologic conditions are known to exist at the site that would preclude the construction of the proposed development. A comprehensive geotechnical investigation with site-specific explorations will be required to provide conclusions and recommendations for the design and construction of the site. This report is intended to provide an overview of anticipated geologic-seismic hazard and soils information in order to demonstrate feasibility of the site development.

1. There are no known active faults that cross the site. The site seismicity is typical for this area of Garden Grove and Southern California. Structure design should consider the requirements of the California Building Code.

2. The potential for other geologic hazards, such as slope instability, seiches, flooding, inundation, tsunamis, methane/other volatile gases, and subsidence affecting the site is also considered low.

3. The site is located within an area identified as having a potential for liquefaction and, based on our review of prior geotechnical reports, seismically induced settlements could be on the order of 1 inch or greater. These magnitudes of seismically induced settlements are considered moderate; the potential for liquefaction will likely impact the foundation design.

4. Based on the consideration that the site was previously developed, it is anticipated that a thin veneer of artificial fill is present at the site. Any existing fill is not considered suitable for direct support of proposed foundations or slabs. The existing fill must be excavated and replaced as compacted fill or penetrated through by foundation excavations. The existing fill and site soils will likely be suitable for re-use onsite as engineered fill for geotechnical purposes.

5. Groundwater has been encountered at depths of 15 feet below the ground surface. Based on the anticipated depth of construction, static groundwater is not anticipated to be encountered during construction. However, if deeper excavations are necessary for shoring piles or elevator pistons, groundwater may be encountered.

6. If the project includes 2 level of subterranean construction, there is a potential for high-moisture content soils to be encountered at the excavation bottom. If this condition exists, stabilization measures will likely be necessary to prevent excessive disturbance to the excavation bottom and to create a firm surface upon which engineered fill can be placed. Stabilization typically consists of the placement of a thin lift of 3- to 6-inch angular rock or the placement of a geogrid and 12-inches of base material.

7. Due to the potential for liquefaction, the grading and foundation design will need to address the potential for static and seismically induced settlements to impact proposed development of the site.

8. For a proposed 5-story residential structure, it is anticipated that a reinforced concrete mat foundation system or ground improvement consisting of stone columns will be necessary. The depth of ground improvement will depend on the liquefaction evaluation; for preliminary planning purposes a depth of ground improvement of 20 feet below the foundation system may be considered.

9. For on-grade construction with ground improvement, it is likely the proposed structure can be supported on conventional foundations. For subterranean construction with ground improvement, a mat foundation system is more compatible with subgrade stabilization and waterproofing, if necessary.

10. For on-grade construction, grading to remove and replace the existing artificial fill should be anticipated. The depth of existing artificial fill should be determined with site-specific borings. Excavations on the order of 5 to 6 feet in depth are common.

11. If subterranean construction is planned, considerations for design and construction must include temporary shoring.

12. Based on the potential for seismic and/or static settlements, consideration should be given to the flexibility of the utilities, and pavements installed in order to mitigate the damage caused by potential soil movements. Pressured utilities should be provided with earthquake shut off valves at their entrance to the site.

13. The soils encountered during the prior geotechnical investigation for Building 1 are considered to have a “very low” expansive potential. It is anticipated that similar conditions existing at the Building 2 site.

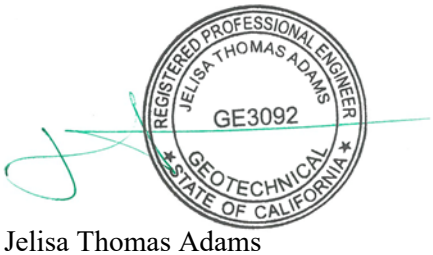
14. The soils encountered during the prior geotechnical investigation for Building 1 are considered "corrosive" with respect to corrosion of buried ferrous metals on site. Due to the corrosive potential of the soils, it is recommended that PVC, ABS or other approved plastic piping be utilized in lieu of cast-iron when in direct contact with the site soils.

15. The soils encountered during the prior explorations possess a sulfate exposure class of "S0" to concrete structures as defined by ACI 318. Special requirements for concrete mix design for soil corrosivity are not anticipated.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON WEST, INC.



Jelisa Thomas Adams
GE 3092

LIST OF REFERENCES

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Geotechnical Solutions, Inc., 2013, *Geotechnical Engineering Percolation Test Report, Brookhurst Triangle, Garden Grove,* dated November 12, 2013, project No. G4338-01.

Orange County General Plan, 2004, *Safety Element,* Advance Planning Program, Environmental Management Agency.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The information presented in this report pertains only to the site evaluated and is based upon published maps and reports. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. The findings of this report are valid as of the date of this report. However, changes in the published maps and reports can occur with the passage of time. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of two years.