Recording requested by and mail to:

City Clerk
City of Beaumont
550 E. Sixth Street
Beaumont, CA 92223

SPACE ABOVE THIS LINE FOR RECORDER'S USE
EXEMPT FROM RECORDER'S FEES PURSUANT TO GOVERNMENT CODE SECTION 6103 AND 27383

APN: 419150026 419150027

STORM WATER MANAGEMENT WQMP/BMP FACILITIES

COVENANT AND AGREEMENT NO. PW2021-0787

City of Beaumont, Riverside County, California

THIS COVENANT AND AGREEMENT is made and entered into this of 2019, by and between K Highland, LLC and M3K Highland, LLC, ("Owner"), and the City of Beaumont, California, ("City").

The Owner hereby certifies I am (we are) the sole owner of certain real property located at 675 and 695 Highland Springs Avenue (Site Address) in the City of Beaumont, County of Riverside, State of California, more specifically described in **Exhibit "A"** and depicted in **Exhibit "B"** ("Property").

The Owner covenants and agrees to comply with the Project Water Quality Management Plan ("WQMP"), attached hereto as **Exhibit "C"**, providing for storm water quality treatment within the confines of the Property.

The Owner covenants and agrees that the health, safety and welfare of the residents of the City of Beaumont, require that the Best Management Practice ("BMP") facilities, more specifically described in the WQMP (for example bio- swales, catch basins, roof drains and appurtenances) be constructed and maintained to minimize pollutants in urban runoff by the Owner.

The Owner further covenants and agrees as follows:

1. The on-site storm water management/BMP facilities mentioned above shall be constructed by the Owner at its sole cost and expense, in accordance with the plans and specifications identified in the WQMP approved by City.

2. The Owner shall adequately maintain the storm water management/BMP facilities in a manner assuring peak performance at all times, including source control BMPs at all times as its sole responsibility, at its sole cost

and expense. This includes all pipes and channels built to convey storm water on the Property, including catch basin inserts, underground detention ponds, swales and vegetation provided to control the quantity and quality of the storm water. Adequate maintenance is herein defined as good working condition so that these facilities are performing in accordance with their design functions continuously at all times.

3. The Owner shall annually inspect the storm water management/BMP facilities mentioned above and submit an inspection report annually to the Public Works Department by the anniversary of the date of this Agreement of each year. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the storm water management BMPs listed in the WQMP such as bioswales, catch basins and related filter units, etc. Deficiencies shall be noted in the inspection report and corrected by Owner promptly.

4. The Owner hereby grants permission to City, its authorized agents and employees, to enter upon the Property and to inspect the storm water management/BMP facilities, take samples and perform testing whenever the City deems necessary and as required by the City's most current National Pollutant Discharge Elimination System (NPDES) Permit. The purpose of the inspection, testing and sampling is to follow up on apparent and reported deficiencies and/or to respond to citizen complaints and meet the requirements of the City's NPDES Permit issued by the State Water Resources Control Board – Santa Ana River Region. The City shall provide the Owner with advanced notice of entering upon the Property, except in the event of an emergency, as determined by the City. The City shall provide the Owner copies of the inspection findings and a directive to commence with the repairs if necessary. Owner or Owner's successors or assigns shall pay City for all costs incurred by City in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of City invoice.

5. In the event the Owner fails to maintain the storm water management/BMP facilities in good working condition acceptable to the City, upon five (5) days advanced written notice, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in any inspection report and to charge the costs of such repairs to the Owner the cost of which shall constitute a lien against the Property. In the event of an emergency, as determined by City, advanced notice as aforesaid, shall not be required. Notwithstanding the forgoing, it is expressly understood and agreed that the City is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation to the City.

6. The Owner will perform the work necessary to keep these facilities in good working order as appropriate. The maintenance schedule for the storm water management BMP facilities (including sediment removal) is outlined in the approved WQMP and the schedule must be followed at all times. In the future, City of Beaumont may adopt an annual Stormwater Inspection Fee that would be assessed to the Owner.

7. In the event the City, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials and the like, the Owner, its successors and assigns shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder.
8. This Agreement imposes no liability of any kind whatsoever on the City. Owner agrees to indemnify, defend (with counsel reasonably approved by the City) and hold harmless the City and its authorized officers,

employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and for any costs or expenses incurred by the City on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the City's "active" as well as "passive" negligence but does not apply to the City's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the City under this Agreement.

9. This Agreement shall be recorded with the County Recorder for the County of Riverside and shall constitute a covenant running with the land, equitable servitude and lien against the Property, and shall be binding on the Owner, its successors, assigns, transferees, administrators, executors, heirs, encumbrancers and any other successors in interests, including any homeowner's association.

10. In addition to any remedy available to City under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the City if said cure reasonably requires more than the subject time, the City may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the City may recover any damages to which the City may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. Owner shall provide printed educational materials with any sale of the Property which provide information on what storm water management facilities are present, the types and locations of maintenance signs that are required and how the necessary maintenance can be maintained.

12. Owner shall provide actual notice of this Agreement and its terms to any respective buyers or successor(s) in interest.

13. In order to be valid, amendment or change to this Agreement including the WQMP and BMPs requires an amendment executed by the City and Owner which is recorded with the Riverside County Recorder.

WITNESS the following signatures:

OWNER: M3K Highland LLC

By: _____ By: _____

Name: Mary Kathawa Name: _____

Title: Managing Member Title: _____

CITY OF BEAUMONT
a Municipal Corporation

BY:

_____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
John Pinkney, City Attorney

APPROVED AS TO CONTENT:

_____
Jeff Hart, Dir. Of Eng./Public Works

All signatures on this Agreement on behalf of the Owner must be acknowledged before a Notary Public. In the event that the owner is a corporation, the President/Vice President and the corporate secretary of the corporation must sign.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of ~~Riverside~~ San Diego)

On Oct 25, 2022, ~~2019,~~ before me, S. A. KALANKE, notary public, personally appeared Mary Kathawa who proved to me on the basis of satisfactory evidence to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that ~~he~~/she/~~they~~ executed the same in ~~his~~/her/~~their~~ authorized capacity~~(ies)~~, and that by ~~his~~/her/~~their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: S.A Kalan (Seal)

S. A. KALANKE
Notary Public - California
San Diego County
Commission # 2369889
My Comm. Expires Aug 6, 2025

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature: _____ (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: _____ (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature: _____ (Seal)

EXHIBIT "A"
LEGAL DESCRIPTION
CERTIFICATE OF PARCEL MERGER 2021-M-001

PARCEL A

LOT 25 OF SCENIC VIEW SUBDIVISION UNIT NO. 1, IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 19, PAGE 41 OF MAPS, RECORDS OF THE RECORDER OF SAID COUNTY, LYING WITHIN SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SAN BERNARDINO BASE AND MERIDIAN;

TOGETHER WITH LOT 26 OF SAID MAP;

THE ABOVE DESCRIBED PARCEL CONTAINS 68,838 sq. ft. (1.580 ACRES), MORE OR LESS.

SUBJECT TO ALL COVENANTS, RIGHTS, RIGHTS-OF-WAY AND EASEMENT OF RECORD.

EXHIBIT "B" ATTACHED HERETO AND BY THIS REFERENCE MADE A PART HEREOF.

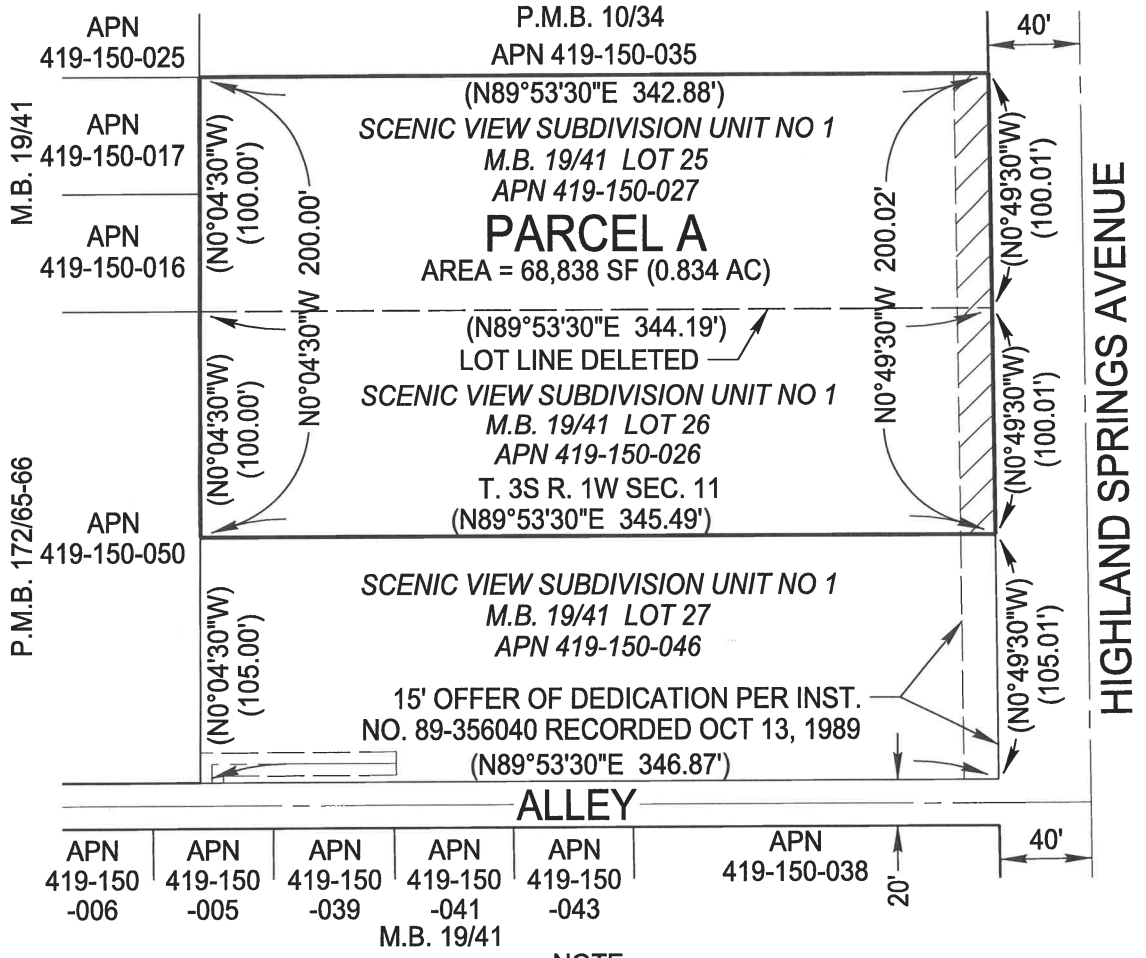
PREPARED BY OR UNDER THE DIRECTION OF:

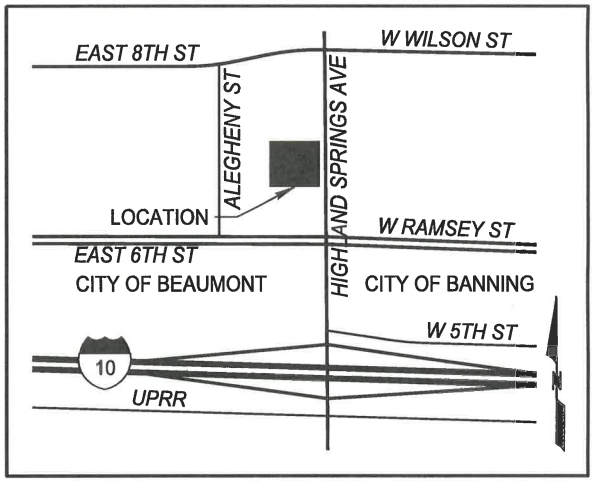
Allan R. Levin, RCE 27122
Expiration Date 3/31/2023

July 20, 2022
Date

EXHIBIT B
CERTIFICATE OF PARCEL MERGER NO. 2021-M-001

SHEET 1 OF 1





VICINITY MAP
NOT TO SCALE

INDICATES OFFER OF DEDICATION PER INST NO. _____ RECORDED _____

NOTE:
( ) INDICATES RECORD DATA PER SCENIC VIEW SUBDIVISION UNIT NO 1 PER M.B. 19/41.

REGISTERED PROFESSIONAL ENGINEER
ALLAN R. LEVIN
No. 27122
Exp. 3-31-23
CIVIL
STATE OF CALIFORNIA

SCALE: 1" = 80'

80 0 80 160

ALLAN LEVIN ASSOCIATES
Development & Construction Management
76-768 BISHOP PLACE
PALM DESERT, CA 92211
760.345.0058
alamagic@earthlink.net

Project Specific Water Quality Management Plan

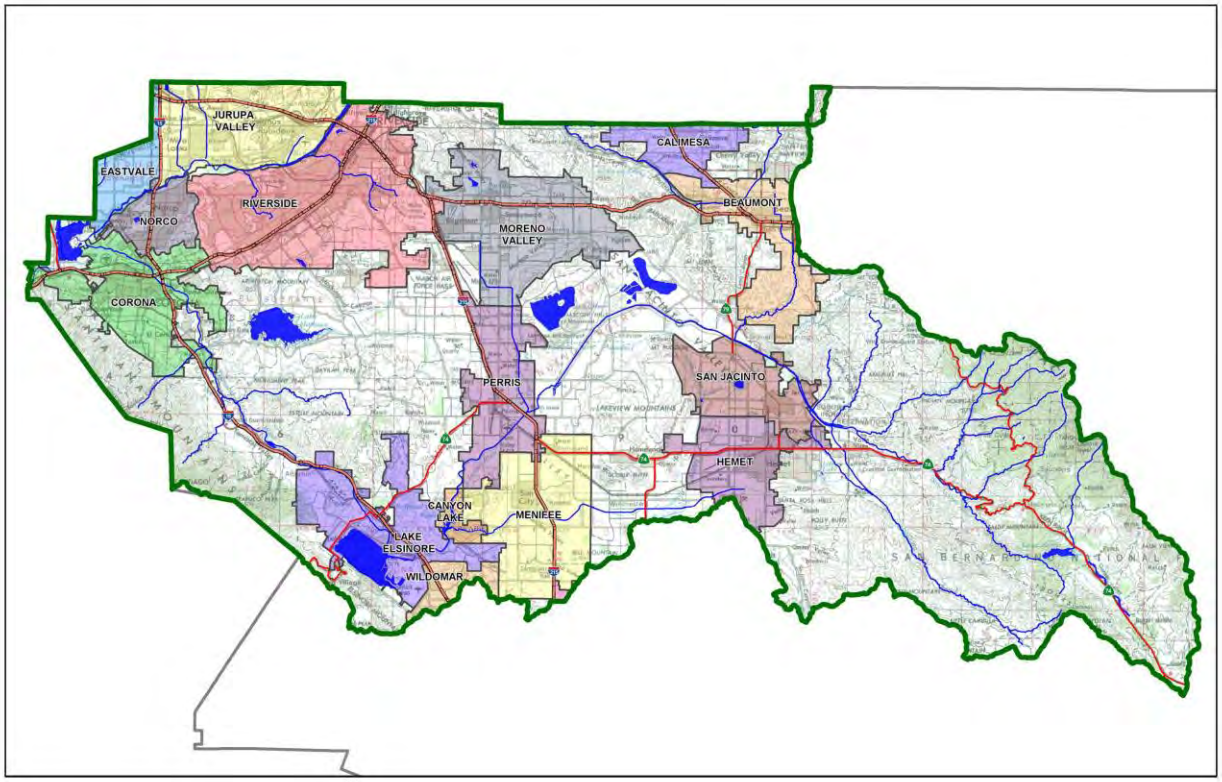
*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

No further comments
NV5
10/20/2022

Project Title: Highland Springs Remodel and Development

Development No: CUP2020-0049

Design Review/Case No: PW2021-0787



☐ **Preliminary**
☒ **Final**

Original Date Prepared: Sep 22, 2021

Revision Date(s): Mar 9, 2022, Jul 21, 2022, Aug 17, 2022, Sep 26, 2022

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

Contact Information:

Prepared for:
K Highland, LLC
360 South Spruce Street
Escondido, CA 92025

M3K Highland LLC
14170 Bryce Point
Poway, CA 92064

Mary Kathawa
(760) 801-7257
mary@plpent.com

Prepared by:
MTH2 Engineering, Inc
639 Lakewood Drive
Riverside, CA 92506
Marten Anderson
(951) 850-2190
marten@mth2engineering.com

OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for K Highland, LLC and M3K Highland, LLC by MTH2 Engineering, Inc. for the Highland Springs Remodel and Development project.

This WQMP is intended to comply with the requirements of the City of Beaumont for Riverside County's Water Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Ordinance No. 754 (Beaumont Municipal Code Section 13.24).

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

Mary Kathawa
Owner's Signature

9/26/22
Date

Mary Kathawa
Owner's Printed Name

managing member
Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature

September 26, 2022
Date

Marten L. Anderson
Preparer's Printed Name

President
Preparer's Title/Position

Preparer's Licensure:

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

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List of Tables

List of Appendices

Section A: Project and Site Information

PROJECT INFORMATION		
Type of Project:	Commercial	
Planning Area:	City of Beaumont	
Community Name:	City of Beaumont	
Development Name:	Highland Springs Remodel and Development	
PROJECT LOCATION		
Latitude & Longitude (DMS): 33°55'51.50" N 116°56'52.50" W		
Project Watershed and Sub-Watershed: Santa Ana Region		
Gross Acres: 65819.04 SF (1.511 Ac) APN(s): 419-150-026 and -027		
Map Book and Page No.: Scenic View Subdivision, MB 19/41		
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)	Commercial	
Proposed or Potential SIC Code(s)	5812	
Area of Project Footprint (SF)	65,819.04 SF	
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	54,497.59 SF	
Does the project consist of offsite road improvements?	☒ Y	☐ N
Does the project propose to construct unpaved roads?	☐ Y	☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y	☒ N
EXISTING SITE CHARACTERISTICS		
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0.00	
Is the project located within any MSHCP Criteria Cell?	☐ Y	☒ N
If so, identify the Cell number:	---	
Are there any natural hydrologic features on the project site?	☐ Y	☒ N
Is a Geotechnical Report attached?	☒ Y	☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	---	
What is the Water Quality Design Storm Depth for the project?	0.838"	

Project Description

The project is located on a vacant parcel along the westerly side of Highland Springs Avenue in the City of Beaumont. Existing drainage sheet flows easterly across the site to the offsite curb and gutter of Highland Springs Avenue, then southerly along Highland Springs Avenue.

The proposed site is comprised of a drive-thru restaurant building, an office building, and associated site improvements including a parking lot and discreet landscape areas. The site will be constructed in 2 phases, the first phase being entry lanes and parking spaces for the existing car wash facility southerly of the proposed project. The second phase includes the drive-thru restaurant and office buildings, and completion of the parking lot and other site improvements. The proposed drainage pattern mimics the existing drainage pattern.

The proposed project comprises 5 Drainage Management Areas (DMAs). The bio-retention facility to be constructed as a part of Phase 1 is sized for the Phase 1 and 2 parking lot improvements, and the Phase

2 restaurant improvements. In Phase 2, DMAs 2 and 3 will provide additional bio-retention facilities for the office building. The underground storage chamber system is not a water quality BMP and is sized to store the Phase 1 and Phase 2 incremental increase in runoff from the pre-to post-developed site only. The DMA bio-retention facilities exceed the required DCV volume.

Storm runoff from the Phase 1 and 2 parking lot improvements, and the Phase 2 restaurant, sheet flows within the parking lot areas to proposed concrete gutters which carry the runoff to the proposed bio-retention facility along Highland Springs Avenue. Forebays with slot weirs are located at the gutter outlet points to calm the flow and allow debris to settle before entering the landscape area around the bio-retention facility and then the bio-retention facility directly. The bio-retention facility incorporates an underdrain to carry runoff which has passed thru the engineered soil media to the chamber system. The bio-retention facility also has an overflow drain inlet to direct runoff to the chamber system once the bio-retention facility exceeds the 6" ponding depth. The chamber system is required to store the incremental increase of runoff of the pre- to post-developed site. The chamber system outlets via a sump and pump at the pre-developed, 2-year, 24-hour maximum flow rate to the curb and gutter in Highland Springs Avenue. For storms larger than the design storm, once the maximum storage capacity of the chamber system is reached, an overflow pipe carries runoff to the sump and pump structure and if the pump flow rate is exceeded, the runoff can bubble out the top of the sump and pump grate to the curb and gutter in Highland Springs Avenue via under-sidewalk drains.

The existing carwash and lube facility southerly of the project is not a part and does not run-on to the proposed project. Drainage within the existing carwash and lube facility drains southerly in a v-gutter between the 2 buildings, and the easterly in the existing parking lot southerly of the carwash to the curb and gutter of Highland Springs Avenue.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Timoteo Creek Reach 3 (Yucaipa Creek to Headwaters)	None	GWR, REC1, REC2, WARM, WILD, RARE	1.8 mi
Yucaipa Creek	None	RARE	
San Timoteo Wash	None	RARE	
Santa Ana River Reach 5	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD, RARE	
Santa Ana River Reach 4	Pathogens	GWR, REC1, REC2, WARM, WILD, RARE, SPWN	
Santa Ana River Reach 3	Copper, Lead, Pathogens	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☐ N
Other *(please list in the space below as required)* City of Beaumont Conditional Use Permit, various construction permits	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, the existing site generally drains from northwest to southeast to Highland Springs Avenue, which is mimicked by the proposed development.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing site was previously developed. Any existing vegetation will be removed and replaced per City of Beaumont development requirements.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The existing site was previously developed and existing infiltration rates are very low.

Did you identify and minimize impervious area? If so, how? If not, why?

Parking areas were designed to the City minimum dimensions.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, a parking area and the office building roof partially disperse runoff to landscape areas.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
1c	Landscape	1,696.67	A
2a	Concrete or Asphalt	815.36	D
2b	Roofs	3,214.33	D
2c	Landscape	1,039.10	D
3a	Concrete or Asphalt	806.28	D
3b	Roofs	3,214.17	D
3c	Landscape	1,225.82	D
4a	Concrete or Asphalt	42,040.11	D
4b	Roofs	2,970.73	D
4c	Landscape	6,187.45	D
5a	Concrete or Asphalt	1,581.96	C
5c	Landscape	1,027.06	B

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2]*If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
1C	1,696.67	Landscape	Drip

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table C.4 =	Required Retention Depth (inches)
		[A]	[B]		[C]	[D]
5c	Ornamental Landscape	1027.06	0.838	5A	1581.96	2.13

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
5a	1581.96	Concrete or Asphalt	1	1581.96	5c	1027.06	1.54<2

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
2a, 2b 2c	BR 2
3a, 3b, 3c	BR 3
4a, 4b, 4c	BR 4

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		√
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		√
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		√
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	√	
If Yes, list affected DMAs: 1, 2, 3, 4, 5		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		√
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		√
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 11,321.45 SF (0.260 Ac)

Type of Landscaping (Conservation Design or Active Turf): Conservative

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 54,497.59 SF (1.251 Ac)

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 2.06

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 112,003.44 SF (2.571 Ac)

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
112,003.44 SF (2.571 Ac)	11,321.45 SF (0.260 Ac)

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 100

Project Type: Commercial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 54,497.59 SF (1.251 Ac)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 174

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 217

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
217	100

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

Not applicable

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: 0 GPD

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 54,497.59 SF (1.251 Ac)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: 1,246

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: 1,559 GPD

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
1,559 GPD	0 GPD

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA 2	☐	☐	☒	☐	☐
DMA 3	☐	☐	☒	☐	☐
DMA 4	☐	☐	☒	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Not applicable.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***Enter BMP Name / Identifier Here*** ***BR2***		
	[A]		[B]	[C]	[A] x [C]			
D/2a	*815.36*	*Concrete or Asphalt*	*1.0*	*0.89*	*727.3*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D/2b	*3,214.33*	*Roofs*	*1.0*	*0.89*	*2,867.2*			
D/2c	*1,039.10*	*Landscape*	*0.1*	*0.11*	*114.8*			
	5,068.8				3,709.3	0.838	259	*301.6*

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***Enter BMP Name / Identifier Here*** ***BR3***		
	[A]		[B]	[C]	[A] x [C]			
D/3a	*806.28*	*Concrete or Asphalt*	*1.0*	*0.89*	*719.2*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D/3b	*3,214.17*	*Roofs*	*1.0*	*0.89*	*2,867.0*			
D/3c	*1,225.82*	*Landscape*	*0.1*	*0.11*	*135.4*			
	5,246.27				3,721.6	0.838	259.9	338.4

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *BR4*		
	[A]		[B]	[C]	[A] x [C]			
D/4a	*42,040.11*	*Concrete or Asphalt*	*1.0*	*0.89*	*37,499.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D/4b	*2,970.73*	*Roofs*	*1.0*	*0.89*	*2,649.9*			
D/4c	*6,187.45*	*Landscape*	*0.1*	*0.11*	*683.5*			
	51,198.29				40,833.2	0.838	2,8451.5	2,914.56

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☒	☒	☒	☒	☒	☒	☒

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
NA	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
NA		

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	---	---	---
Volume (Cubic Feet)	1,524.81 cf	11,625.13 cf	662.4%

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Per the Santa Ana WQMP Guidance Manual, Section 2.3.2 Hydromodification and item c. above:

In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow.

Since the project's excess volume cannot be infiltrated or captured and used, the proposed project's discharge flow rate must be limited to 110% of the pre-development 2-year, 24-hour peak flow rate of 0.058 CFS (26.0 GPM). The supporting pre-development Shortcut Unit Hydrograph Method is provided in Appendix 7.

Discharge from the proposed underground chamber system will be controlled via an orifice plate in the outlet manhole. The sump pump will be designed for a maximum flowrate of 0.064 CFS (28.7 GPM) and will outlet via a parkway drain to the Highland Springs Avenue curb and gutter.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Inlets marked with "Only Rain Down the Drain"	SC-44 Drainage System Maintenance
On-site storm drain inlet insert filters		SC-44 Drainage System Maintenance and insert filter manufacturer's service and maintenance guides

Landscape/Outdoor Pest Control	Pest-resistant plant species will be considered and selected based upon site soil type, slope, climate, ecological and plant interactions	Maintain landscaping using minimal pesticides. Integrated pest management information will be provided to owner and operator.
Refuse areas	Trash enclosures will be covered and signs posted “Do not dump hazardous materials here.”	SC-34 Waste Handling and Disposal
Fire sprinkler test water	Test water to be collected and drained to sewer.	SC-41 Building and Grounds Maintenance
Rooftop equipment, drainage sumps and roofing, gutters and trim.	Rooftop equipment with potential to produce pollutants shall be covered and/or have secondary containment. Drainage sumps shall have a sediment sum to reduce the quantity of sediment in pumped water.	
Plazas, sidewalks and parking lots		SC-43 Regular Sweeping Practices

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
BR 2	Bio-retention facility	Precise grading plan sheet 18 WQMP site plan	33°55'51.90" N 116°56'52.65" W
BR 3	Bio-retention facility	Precise grading plan sheet 17 WQMP site plan	33°55'50.21" N 116°56'52.90" W
BR 4	Bio-retention facility	Precise grading plan sheets 10 and 12 WQMP site plan	33°55'50.88" N 116°56'49.56" W

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Covenant and Agreement with City of Beaumont

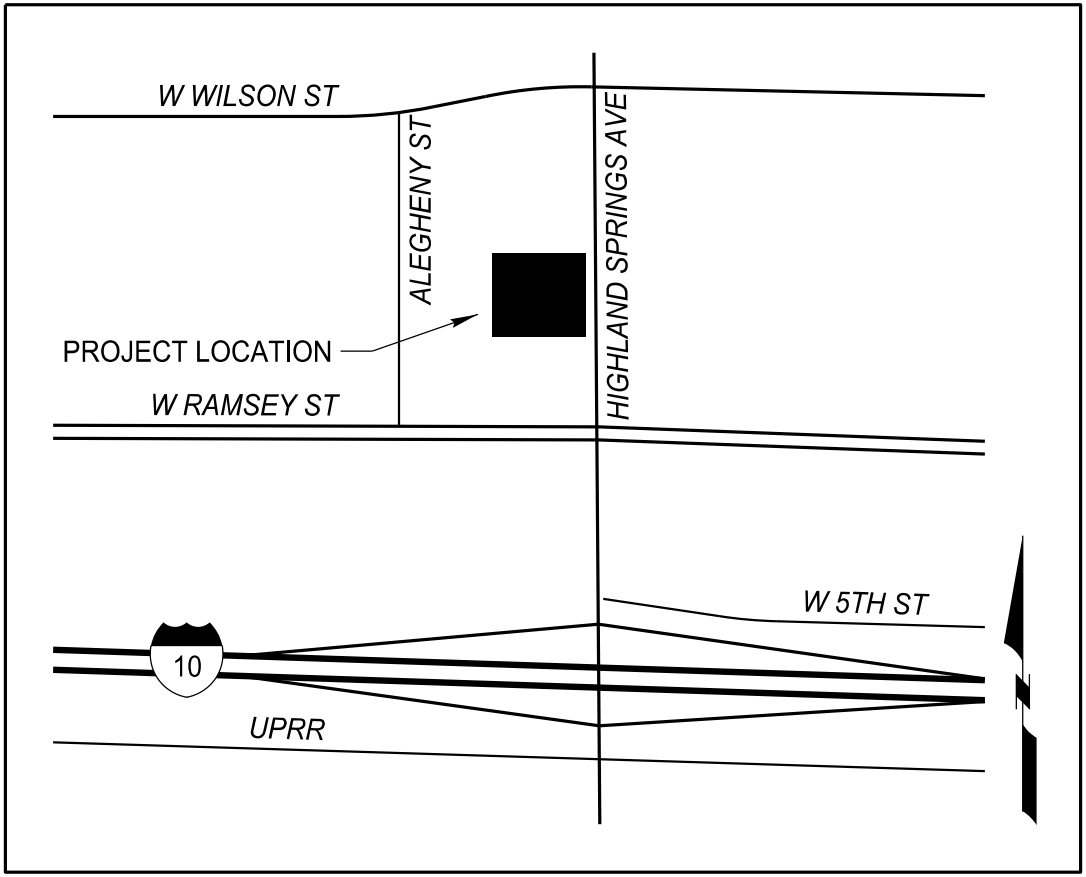
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

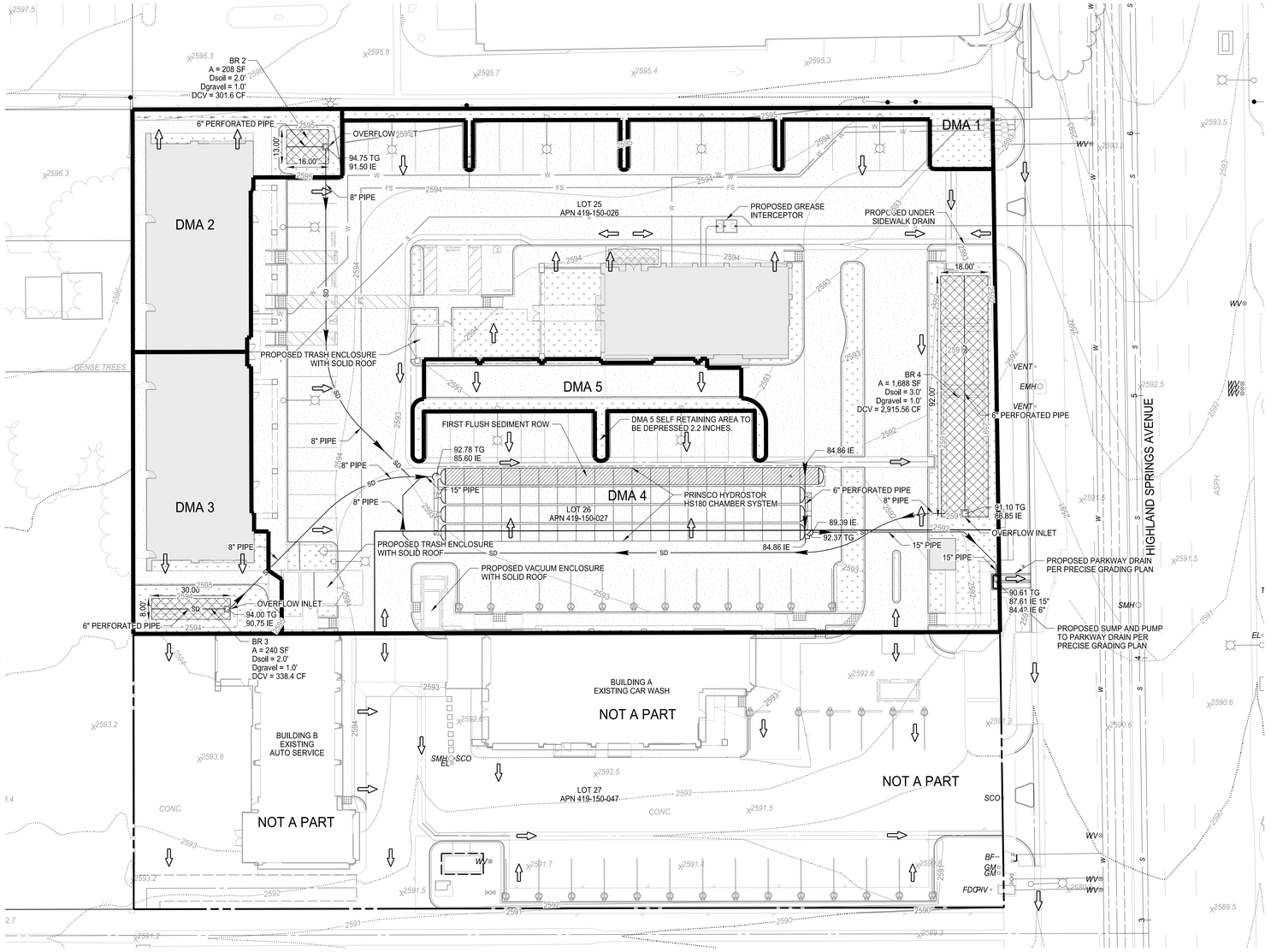


VICINITY MAP
NOT TO SCALE

IN THE CITY OF BEAUMONT, CALIFORNIA

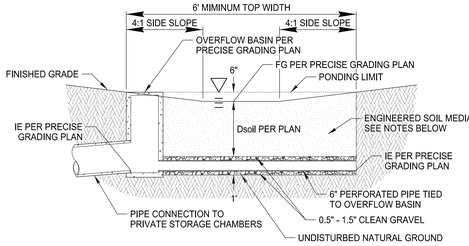
WQMP SITE PLAN

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
HIGH SAND, INC.



NOTES

1. LANDSCAPE AREAS TO BE DEPRESSED BELOW ADJACENT HARDSCAPE OR TOP OF CURB A MINIMUM OF 1" UNLESS OTHERWISE NOTED.
2. THE EXISTING DEVELOPED SITE WITHIN LOT 27 (APN 419-150-047) IS NOT A PART. THE REDEVELOPMENT PROPOSED WITHIN LOT 27 DOES NOT MEET THE MINIMUM THRESHOLDS LISTED PER TABLE 1-1 "PRIORITY DEVELOPMENT CATEGORIES" IN THE SANTA ANA REGION WATER QUALITY MANAGEMENT PLAN TECHNICAL GUIDANCE DOCUMENT, AND DOES NO RUN-ON TO THE PROPOSED PROJECT.



NOTES:

1. ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL AND 15% ORGANIC COMPONENTS BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.
2. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL MEETING THE RANGES BELOW:

70%-80%	SAND
15%-20%	SILT
5%-10%	CLAY

3. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT THE NITROGEN DOES NOT LEACH FROM THE MEDIA.

BIO-RETENTION FACILITY

DMA SURFACE TYPE AREA SUMMARY

DMA 1		
	Landscape (Self-treating)	1696.67 SF
		1696.67 SF Total
DMA 2		
	Concrete or Asphalt	815.36 SF
	Roofs	3214.33 SF
	Landscape	1039.10 SF
		5068.80 SF Total
DMA 3		
	Concrete or Asphalt	806.28 SF
	Roofs	3214.17 SF
	Landscape	1225.82 SF
		5246.26 SF Total
DMA 4		
	Concrete or Asphalt	42040.11 SF
	Roofs	2970.73 SF
	Landscape	6187.45 SF
		51198.29 SF Total
DMA 5		
	Concrete or Asphalt (Drains to self-retaining)	1581.96 SF
	Landscape (Self-retaining)	1027.06 SF
		2609.02 SF Total

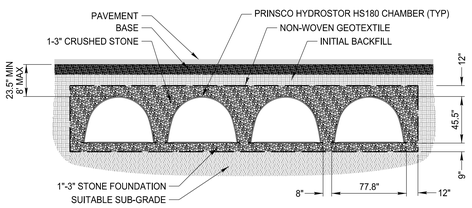
LEGEND

- INDICATES PC CONCRETE PAVEMENT
- INDICATES BUILDING ROOF
- INDICATES LANDSCAPE
- INDICATES BIO-RETENTION FACILITY
- INDICATES DMA BOUNDARY
- INDICATES STORM DRAIN PIPE
- INDICATES FLOW DIRECTION
- INDICATES OVERFLOW INLET

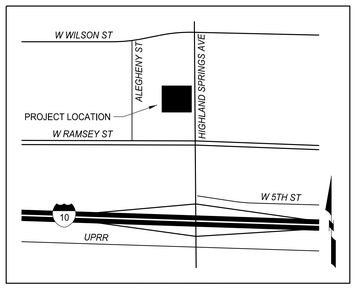
SCALE: 1" = 20'

20 0 20 40

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
www.mth2engineering.com
civil • water resources • storm water
urban design and planning



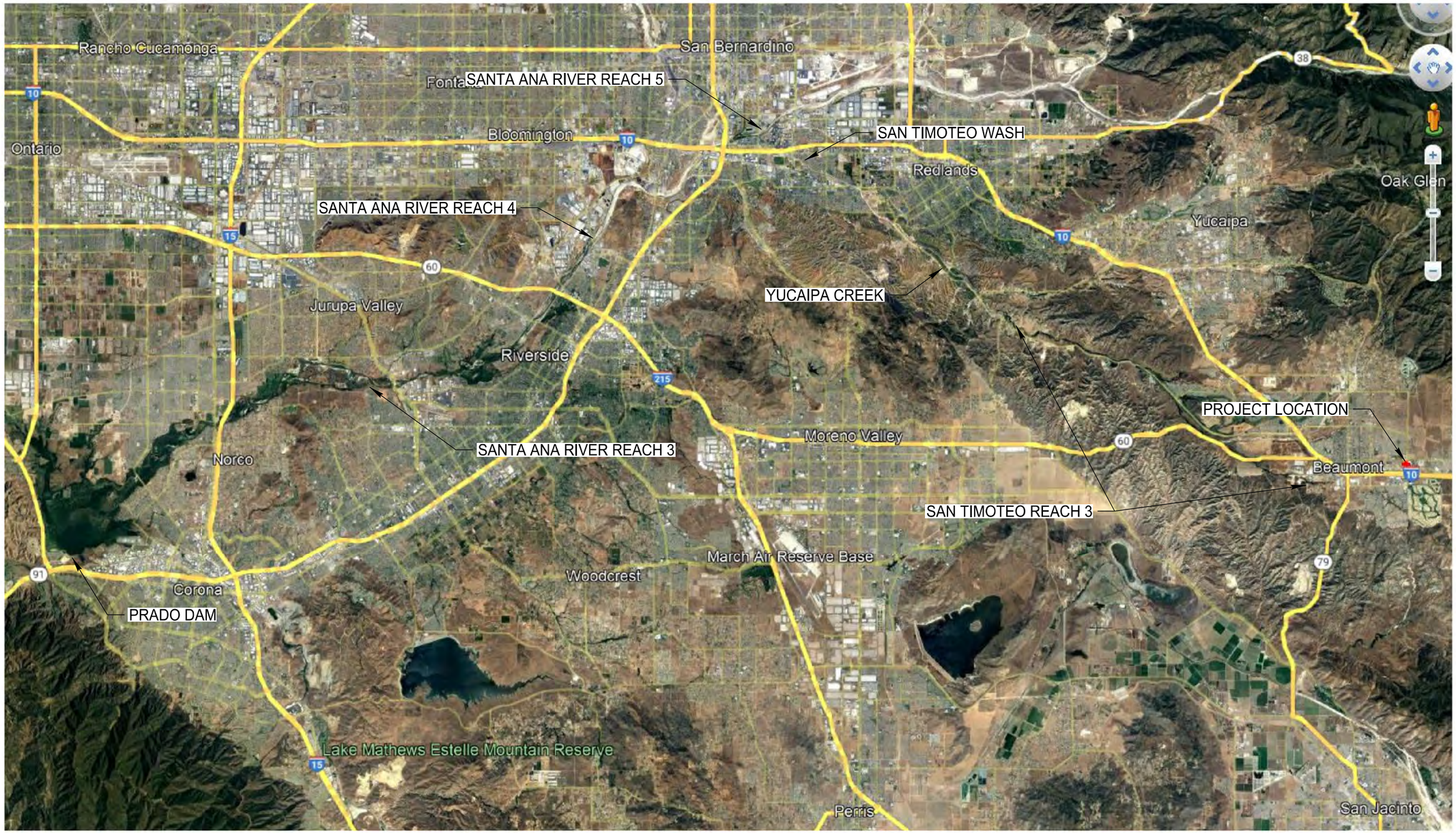
PRINSCO HYDROSTOR HS180 CHAMBER SYSTEM



VICINITY MAP
NOT TO SCALE

BMP GEO-LOCATIONS

DMA/ID	BMP DESCRIPTION	LATITUDE	LONGITUDE	DCV REQUIRED	DCV PROVIDED
DMA 1/LANDSCAPE	SELF-TREATING	33°55'52.05" N	116°56'51.65" W	---	---
DMA 2/BR-2	BIORETENTION FACILITY	33°55'52.05" N	116°56'52.65" W	259.0 CF	301.6 CF
DMA 3/BR-3	BIO-RETETNION FACILITY	33°55'50.25" N	116°56'53.10" W	259.9 CF	338.4 CF
DMA 4/BR-4	BIO-RETENTION FACILITY	33°55'51.05" N	116°56'50.00" W	2851.5 CF	2914.6 CF
DMA 5/LANDSCAPE	SELF-RETAINING	33°55'51.00" N	116°56'51.45" W	---	---



RECEIVING WATERS MAP

NTS

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
www.mth2engineering.com
civil • water resources • storm water
urban design and planning

Appendix 2: Construction Plans

Precise Grading and Drainage Plan

IN THE CITY OF BEAUMONT

PRECISE GRADING PLAN

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
HIGH SAND, INC.

GENERAL NOTES

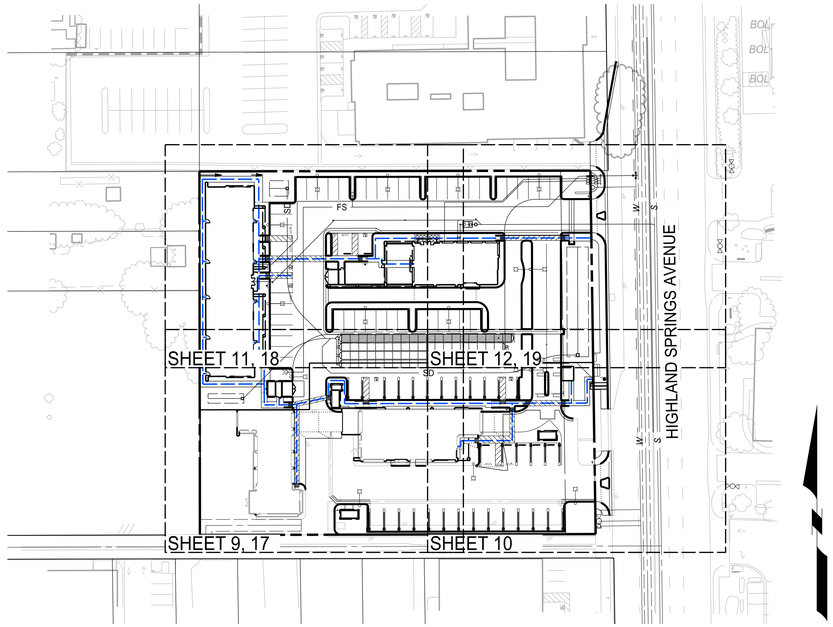
1. ALL GRADING SHALL CONFORM TO THE CITY OF BEAUMONT ORDINANCES, CURRENT ADOPTED CALIFORNIA BUILDING CODE, APPENDIX J, THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION "LATEST EDITION" AND RECOMMENDATIONS OF THE SOILS ENGINEER.
2. NO WORK SHALL COMMENCE UNTIL ALL PERMITS HAVE BEEN OBTAINED FROM THE CITY AND OTHER APPROPRIATE AGENCIES.
3. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION /GRADING.
4. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE AND EROSION CONTROL SHOULD BE PROVIDED TD PREVENT PONDING WATER, SEDIMENT TRANSPORTATION, AND DAMAGE TO ADJACENT PROPERTIES.
5. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
6. NO FILL SHALL BE PLACED ON EXITING GROUND THAT HAS NOT BEEN CLEARED OF WEEDS. DEBRIS, TOPSOIL AND OTHER DELETERIOUS MATERIAL.
7. MAXIMUM CUT AND FILL SLOPE = 2: 1 EXCEPT WHERE SPECIFICALLY APPROVED OTHERWISE.
8. STABILITY CALCULATIONS WITH A FACTOR OF SAFETY OF AT LEAST ONE AND FIVE TENTHS (1.5) SHALL BE SUBMITTED BY A SOILS ENGINEER TO THE PUBLIC WORKS DEPARTMENT.
9. PROVIDE A 5' WIDE BY 1' HIGH BERM OR EQUIVALENT ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
10. PROVIDE A BROW DITCH DESIGNED TO HANDLE 100 YR STORM FLOWS ALONG THE TOP OF CUT SLOPES.
11. MINIMUM BUILDING PAD AND DRAINAGE SWALE SLOPE SHALL BE 1% IF CUT OR FILL IS LESS THAN 10'. 2% IF CUT OR FILL IS GREATER THAN 10'. DRAINAGE SWALES SHALL BE A MINIMUM OF 0.2' DEEP AND BE CONSTRUCTED A MINIMUM OF 2' FROM THE TOE OF CUT OR FILL SLOPES.
12. NO OBSTRUCTION OF FLOODPLAIN OR NATURAL WATER COURSES SHALL BE PERMITTED.
13. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE SHALL CONTINUE TO FUNCTION, ESPECIALLY DURING STORM CONDITIONS, PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
14. FINISH GRADE SHALL BE SLOPED AWAY FROM ALL EXTERIOR WALLS AT NOT LESS THAN 5% FOR A MINIMUM OF 10'.
15. CUT AND FILL SLOPES EQUAL TO OR GREATER THAN 3' IN VERTICAL HEIGHT SHALL BE PLANTED WITH GRASS OR GROUND COVER TO PROTECT THE SLOPE FROM EROSION AND INSTABILITY IN ACCORDANCE WITH CITY OF BEAUMONT REQUIREMENTS PRIOR TO FINAL GRADING INSPECTION
16. ALL SLOPES REQUIRED TO BE PLANTED SHALL BE PLANTED WITH APPROVED GROUND COVER AT 12" ON CENTER. SLOPES EXCEEDING 15' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED TREES SPACED NOT TO EXCEED 20' ON CENTER OR SHRUBS NOT TO EXCEED 10' OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15' IN ADDITION TO A GRASS MIX GROUND COVER. SLOPES EQUAL TO OR GREATER THAN 4' IN VERTICAL HEIGHT SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM COMPLETE WITH AN APPROPRIATE BACKFLOW PREVENTION DEVICE PER CITY REQUIREMENTS.
17. IF STEEP SLOPING TERRAIN OCCURS UPON WHICH FILL IS TO BE PLACED, IT MUST BE CLEARED, KEYED, AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. PREPARATION SHALL BF APPROVED BY A SUITABLY QUALIFIED AND REGISTERED GEOTECHNICAL ENGINEER OR GEOLOGIST PRIOR TO PLACEMENT OF FILL MATERIAL.
18. ALL GRADING SHALL BE CONTINUOUSLY OBSERVED BY A COMPETENT SOILS ENGINEER WHO SHALL VERIFY THAT ALL FILL HAS BEEN PROPERLY PLACED AND WHO SHALL SUBMIT A FINAL COMPACTION REPORT FOR ALL FILLS OVER 1' DEEP.
19. A FINAL GEOTECHNICAL REPORT OF COMPLETION OF THE ROUGH GRADING, STATING SUBSTANTIAL CONFORMANCE WITH THE APPROVED GRADING PLAN, SHALL BE SUBMITTED TO THE BUILDING AND SAFETY DEPARTMENT AND THE PUBLIC WORKS DEPARTMENT PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF BUILDING PERMITS. CERTIFICATIONS SHALL INCLUDE LINE GRADES, ELEVATIONS, AND LOCATION OF CUT/FILL SLOPES.
20. A LAND SURVEYOR OR ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING SHALL SUBMIT A PAD CERTIFICATION FOR ALL PADS. THE ELEVATION WITH RESPECT TO MEAN SEA LEVEL SHALL BE GIVEN. IF AN ELEVATION WITH RESPECT TO ADJACENT GROUND SURFACE IS REQUIRED, THE ACTUAL DISTANCE ABOVE THE ADJACENT GROUND SHALL BE GIVEN.
21. A GEOTECHNICAL ENGINEER OR GEOLOGIST SHALL SUBMIT TO THE BUILDING AND SAFETY
22. DEPARTMENT AND THE PUBLIC WORKS DEPARTMENT A FINAL GEOTECHNICAL REPORT OF COMPLETION OF FINAL GRADING STATING SUBSTANTIAL CONFORMANCE WITH THE APPROVED PLANS FOR ALL GRADING DESIGNATED AS "ENGINEERED GRADING".
23. THE CONTRACTOR SHALL NOTIFY THE PUBLIC WORKS DEPARTMENT AT LEAST 24 HOURS IN ADVANCE REQUESTING FINISH LOT GRADE AND DRAINAGE INSPECTION. THIS INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION FOR EACH LOT.
24. ALL STORM DRAINS, CATCH BASINS, AND STORM WATER RUNOFF STRUCTURES WILL BE PROVIDED WITH ADEQUATE CAPABILITIES TO FILTER AND RETAIN SEDIMENT, GRIT, OIL, AND GREASE TD PREVENT POLLUTION IN STORM WATER RUNOFF IN COMPLIANCE WITH THE CITY OF BEAUMONT'S BEST MANAGEMENT PRACTICES AND BEAUMONT'S DRAINAGE MASTER PLAN FOR STORMWATER AS WELL AS BEST MANAGEMENT PRACTICES IDENTIFIED IN THE CURRENT REPORT OF WASTE DISCHARGE FOR RIVERSIDE COUNTY PERMITTEES.
25. CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT TWO DAYS BEFORE DIGGING AT 8-1-1 AND THE FOLLOWING UTILITY OR AGENCIES A MINIMUM OF TWO WORKING DAYS PRIOR TO COMMENCING ANY CONSTRUCTION OR GRADING:
    a. CITY OF BEAUMONT (951) 769-8520
    b. FRONTIER (877) 486-5667
    c. SOUTHERN CALIFORNIA GAS COMPANY (951) 423-1391
    d. BEAUMONT CHERRY VALLEY WATER DISTRICT (951) 845-9581
    e. SOUTHERN CALIFORNIA EDISON (800) 611-1911
26. TRENCHING FOR UTILITIES AND STRUCTURES IS NOT ALLOWED UNTIL A SOIL COMPACTION REPORT IS SUBMITTED TO AND APPROVED BY THE PUBLIC WORKS DEPARTMENT.
27. THE CONTRACTOR SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE CITY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF SEDIMENT, DEBRIS AND OTHER NUISANCES AT ALL TIMES. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY THE CONSTRUCTION.
28. ALL OPERATIONS CONDUCTED ON THE SITE OR ADJACENT THERETO SHALL ADHERE TO THE NOISE ORDINANCE SET FORTH BY THE CITY MUNICIPAL CODE. ALL OPERATIONS SHALL BE LIMITED BY THE NOISE ORDINANCE TO THE LIMIT OF DECIBELS SPECIFIED FOR THE AREA AND TIME PERIOD. CONSTRUCTION ACTIVITIES WILL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 6:00 P.M. MONDAY THROUGH FRIDAY.
29. ALL OFF-SITE HAUL ROUTES SHALL BE SUBMITTED BY THE CONTRACTOR TO THE CITY ENGINEER FOR APPROVAL TWO FULL WORKING DAYS PRIOR TO BEGINNING OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DEBRIS OR DAMAGE OCCURRING ALONG THE HAUL ROUTE OR ADJACENT STREETS AS A RESULT OF THE GRADING OPERATION.

ASSESSOR'S PARCEL NUMBERS

419-150-026, -027 AND -046

FEMA FLOODZONE

ZONE X PER FIRM MAP NO. 06065C0812G, EFFECTIVE DATE AUG 28, 2008



SCALE: 1" = 60'

60 0 60 120

PRIVATE ENGINEERS NOTICE TO CONTRACTOR(S)

1. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES
2. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE OWNER OF ALL UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.
3. QUANTITIES SHOWN HEREON ARE PROVIDED FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES PRIOR TO BIDDING FOR CONSTRUCTION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF BEAUMONT DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

FIRM: MTH2 ENGINEERING, INC.

ADDRESS: 639 LAKEWOOD DRIVE

CITY, ST: RIVERSIDE, CA

TELEPHONE: (951) 850-2190

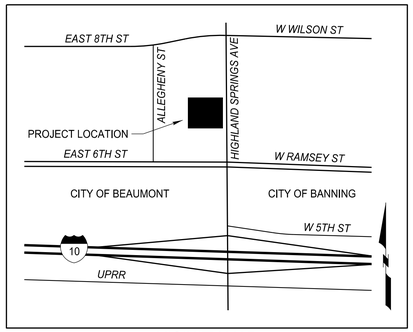
BY: _____ DATE: 17-OCT-2022

(MARTEN L. ANDERSON, RCE 51313)

STANDARD DRAWINGS NOTE

ALL STANDARD DRAWINGS ARE COUNTY OF RIVERSIDE ROAD IMPROVEMENT STANDARDS AND SPECIFICATIONS UNLESS NOTED OTHERWISE:

* RCFC&WCD STANDARD MANUAL
** EMWD SEWER STANDARD DRAWINGS
*** STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION



VICINITY MAP
NOT TO SCALE

GRADING TOLERANCE NOTE

GRADING SHALL BE DONE WITHIN A TOLERANCE OF 0.1' OF THE GRADES AND ELEVATIONS SHOWN ON THESE PLANS. ALL SLOPES SHALL BE CONSTRUCTED WITHIN O.5' OF THE LOCATION SHOWN ON THESE PLANS. IN NO WAY DO THE ABOVE TOLERANCES RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF PROVIDING A FINISHED SURFACE THAT WILL NOT POND.

ESTIMATED GRADING QUANTITIES

PHASE 1:
ESTIMATED EXCAVATION: 700 C.Y.
ESTIMATED EMBANKMENT: 250 C.Y.

PHASE 2:
ESTIMATED EXCAVATION: 1,200 C.Y.
ESTIMATED EMBANKMENT: 350 C.Y.

NOTE: THE GRADING QUANTITIES SHOWN HEREON ARE RAW QUANTITIES FOR PERMIT PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAY QUANTITIES.
THIS PROJECT IS DESIGNED TO BALANCE.

GEOTECHNICAL ENGINEER'S CERTIFICATE

THIS PLAN HAS BEEN REVIEWED BY THE UNDERSIGNED AND FOUND TO BE IN CONFORMANCE WITH THE RECOMMENDATIONS AS OUTLINED IN THE GEOTECHNICAL REPORT PREPARED BY SOIL EXPLORATION COMPANY, INC. PRELIMINARY SOIL INVESTIGATION AND INFILTRATION TESTS REPORT, ENTITLED "PROPOSED OFFICE COMPLEX, 675 AND 695 N. HIGHLAND SPRINGS AVE (APN 419-150-026 & -027) , CITY OF BEAUMONT, CALIFORNIA" DATED MAR 16,2020.

NAME DATE

SHEET INDEX

WORK TO BE DONE

THESE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THIS PLAN, THE CURRENT CITY OF BEAUMONT STANDARDS AND SPECIFICATIONS, AND THE 2021 EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION ("GREENBOOK").

ENGINEER'S NOTES TO CONTRACTOR

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD IMMEDIATELY OF ANY OMISSIONS OR DISCREPANCIES BETWEEN THIS ENGINEERING PLAN, OTHER CONSULTING PROFESSIONAL'S PLANS, SPECIFICATIONS, OR EXISTING CONDITIONS. SHOULD THERE BE AN OMISSION OR DISCREPANCY BETWEEN SAID PLANS AND SPECIFICATIONS, IT SHALL BE BROUGHT TO THE ENGINEER OF RECORD'S ATTENTION IN WRITING FOR CLARIFICATION PRIOR TO INSTALLATION OF SAID WORK.
2. ALL CONTRACTORS AND SUB-CONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THIS PLAN SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED.
3. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH REGULATIONS OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS CONSTRUCTION SAFETY ORDERS. THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR'S AND SUB-CONTRACTOR'S COMPLIANCE WITH SAID REGULATIONS AND ORDERS.
4. CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND CIVIL ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTION FOR LIABILITY RISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
5. THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THIS PLAN ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CIVIL ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HERE ON, AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES.
6. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND APPROVALS FOR ALL WORK.
7. ALL SYMBOLS AND ABBREVIATIONS SHOWN ON THIS PLAN ARE CONSIDERED TO BE CONSTRUCTION STANDARDS. QUESTIONS REGARDING THE SAME, OR THEIR EXACT MEANING, SHALL BE DIRECTED TO THE ENGINEER OF RECORD.
8. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALE. DO NOT SCALE PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURATE PLACEMENT AND CONFIGURATION OF THE IMPROVEMENTS ON THE SITE.

OWNER/APPLICANT/DEVELOPER

HIGH SAND, INC.
655 HIGHLAND SPRINGS AVENUE
BEAUMONT, CA 92223
CONTACT: ALI HARB
(951) 214-3333

ENGINEER/CONTACT PERSON

MTH2 ENGINEERING, INC.
639 LAKEWOOD DRIVE
RIVERSIDE, CA 92506
CONTACT: MARTEN L. ANDERSON
(951) 850-2190

LEGAL DESCRIPTION

LOTS 25 THRU 27 INCLUSIVE OF SCENIC VIEW SUBDIVISION, UNIT NO. 1, IN THE CITY OF BEAUMONT, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 19, PAGE 41 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

BASIS OF BEARINGS

THE BASIS OF BEARINGS IS THE CENTERLINE OF GLEN EYRIE AVENUE (HIGHLAND SPRINGS AVE) SHOWN AS N0°49'30"W PER MAP OF SCENIC VIEW SUBDIVISION UNIT NO. 1, FILED IN BOOK 19, PAGE 41 OF MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, STATE OF CALIFORNIA.

BENCHMARK

NGS BENCHMARK DESIGNATION 400 PID DX5401
IN BANNING, AT THE NORTHWEST BRIDGE ABUTMENT FOR SOUTHERN PACIFIC RAILROAD OVER HIGHLAND SPRINGS AVE., 60 FEET (18.3 M) WEST OF THE CENTERLINE OF HIGHLAND SPRINGS AVE., 20 FEET (6.1 M) NORTH OF THE NORTH RAIL OF RAILROAD, FOUND 3 1/4 INCH MWD STANDARD ALUMINUM DISK SET FLUSH IN CONCRETE BRIDGE ABUTMENT.

ELEVATION = 2573.37 FEET NAVD 88 DATUM
JANUARY 1993 ADJUSTMENT

CAUTION:

EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD PRIOR TO START OF CONSTRUCTION.

WDID NO. 8 33C398692

811 Know what's below. Call before you dig. Call at least 2 working days prior to excavating.

BENCHMARK:

SEE SHEET ABOVE RIGHT

BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS	CITY	

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
www.mth2engineering.com
civil • water resources • storm water
urban design and planning

17-OCT-2022
ENGINEER OF WORK DATE
R.C.E. 51313

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

DESIGN BY: MTH2
DRAWN BY: MTH2
CHECKED BY: MTH2
SCALE: 1" = 60'
DATE: SEP, 2021
JOB NUMBER: 2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Date: _____
Staff Engineer

Recommended for Approval By: _____ Date: _____
Administrative Engineer

Approved By: _____ Date: _____
City Engineer/Director of Public Works

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
TITLE SHEET

SHEET 1 OF 20 SHEETS
FILE NO: PW2021-0785

D:\MTH2\Engineering\2019_23 Beaumont\Civil\2019_23pgp01.dgn

JOB 2019_23 PLOTTED: 17-OCT-2022

LEGEND

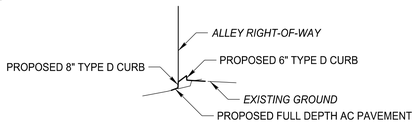
EXISTING BOUNDARY
EXISTING CENTERLINE
EXISTING EASEMENT LINE
EXISTING PROPERTY LINE
EXISTING RIGHT-OF-WAY LINE
EXISTING BUILDING
EXISTING CONTOUR MAJOR — 100
EXISTING CONTOUR MINOR — 99
EXISTING CURB
EXISTING EDGE OF AC PAVING
EXISTING EDGE OF CONCRETE
EXISTING EDGE OF UNIMPROVED ROAD
EXISTING FLOWLINE
EXISTING FENCE - CHAINLINK
EXISTING WALL - CONCRETE OR MASONRY
EXISTING SPOT ELEVATION — 24.50
EXISTING BACKFLOW — BF
EXISTING BOLLARD — BOL
EXISTING ELECTRIC MANHOLE — EMH
EXISTING ELECTRIC BOX — EL
EXISTING ELECTRIC VAULT VENT — VENT
EXISTING FIRE DEPARTMENT CONNECTION — FDC
EXISTING FIRE HYDRANT
EXISTING POST INDICATOR VALVE — PIV
EXISTING POWER POLE
EXISTING SEWER CLEANOUT — SCO
EXISTING SEWER MANHOLE — SMH
EXISTING SIGN
EXISTING STORM DRAIN MANHOLE — SDMH
EXISTING STREET LIGHT
EXISTING WATER VALVE — WV
EXISTING WATER METER — WM
EXISTING TREE
EXISTING SEWER — S
EXISTING STORM DRAIN — SD
EXISTING WATER — W
PROPOSED PROPERTY LINE
PROPOSED RIGHT-OF-WAY LINE
PROPOSED ADA PATH OF TRAVEL
PROPOSED BUILDING
PROPOSED CONTOUR MAJOR — 100
PROPOSED CONTOUR MINOR — 99
PROPOSED CUT/FILL LINE
PROPOSED DAYLIGHT LINE
PROPOSED CURB
PROPOSED EDGE OF AC PAVING
PROPOSED EDGE OF PCC PAVING
PROPOSED FLOWLINE
PROPOSED GRADEBREAK LINE
PROPOSED SAWCUT LINE
PROPOSED GRADED SWALE
PROPOSED WALL - RETAINING
PROPOSED ELEVATION — 24.50
PROPOSED BOLLARD
PROPOSED FIRE HYDRANT
PROPOSED STREET LIGHT
PROPOSED SIGN
PROPOSED VACUUM CANOPY ARM AND FOUNDATION
PROPOSED FIRE SERVICE — FS
PROPOSED IRRIGATION — IRR
PROPOSED SEWER — S
PROPOSED STORM DRAIN (12" OR SMALLER) — SD
PROPOSED STORM DRAIN (LARGER THAN 12")
PROPOSED WATER — W
PROPOSED BMP FACILITY AREA
PROPOSED DEMOLITION LIMITS
PROPOSED AC PAVEMENT
PROPOSED PCC PAVEMENT
PROPOSED LANDSCAPE AREA
PROPOSED CHAMBER SEDIMENT ROW

ABBREVIATIONS

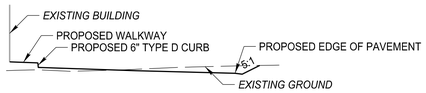
AC	ASPHALT CONCRETE
ADA	AMERICANS WITH DISABILITIES ACT
BC	BEGIN CURVE
BMP	BEST MANAGEMENT PRACTICE
CBC	CALIFORNIA BUILDING CODE
CF	CURB FACE
CFS	CUBIC FEET PER SECOND
CL	CENTERLINE
CONC	CONCRETE
DWG	DRAWING
EC	END CURVE
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE
FL	FLOWLINE
FS	FINISHED SURFACE
GB	GRADE BREAK
GPM	GALLONS PER MINUTE
HDPE	HIGH DENSITY POLYETHYLENE
HP	HIGH POINT
IE	INVERT ELEVATION
LP	LOW POINT
MAX	MAXIMUM
MIN	MINIMUM
NO	NUMBER
PCC	PORTLAND CEMENT CONCRETE
PE	PAD ELEVATION
PL	PROPERTY LINE
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT-OF-WAY
SF	SQUARE FEET
STD	STANDARD
SPPWC	STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
SSPWC	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
TC	TOP OF CURB
TG	TOP OF GRADE
TYP	TYPICAL
WQMP	WATER QUALITY MANAGEMENT PLAN

CONSTRUCTION NOTES AND QUANTITY ESTIMATE

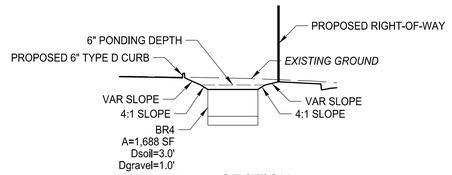
		PHASE 1	PHASE 2
1	PROTECT IN PLACE AS NOTED	1 LS	1 LS
2	SAWCUT AS NOTED	562 LF	0 LF
3	REMOVE AS NOTED	1 LS	1 LS
4	CONSTRUCT COMBINATION FREESTANDING-RETAINING WALL PER STRUCTURAL PLAN	292 LF	0 LF
5	CONSTRUCT PRINSCO HYDROSTOR HS180 STORMWATER CHAMBER SYSTEM PER GENERIC DETAIL 1 ON SHEET NO. 3 AND MANUFACTURER'S INSTALLATION DRAWINGS UNDER SEPARATE COVER	1 EA	0 EA
6	CONSTRUCT BIO-RETENTION FACILITY PER DETAIL 2 ON SHEET NO. 3	1,656 SF	448 SF
7	INSTALL JENSEN PRECAST 18"X18" DROP INLET WITH PEDESTRIAN FRAME AND GRATE OR APPROVED EQUAL, WITH FLOGARD CATCH BASIN INSERT FILTER FGP-18F, OR APPROVED EQUAL	0 EA	2 EA
8	INSTALL JENSEN PRECAST 24"X24" DROP INLET WITH PEDESTRIAN FRAME AND GRATE OR APPROVED EQUAL, WITH FLOGARD CATCH BASIN INSERT FILTER FGP-24F, OR APPROVED EQUAL	1 EA	0 EA
9	CONSTRUCT SUMP AND PUMP PER DETAIL 3 ON SHEET NO. 3	1 EA	0 EA
10	INSTALL 6" ADS N-12 OR PVC PERFORATED PIPE	120 LF	42 LF
11	INSTALL 6" ADS N-12 OR PVC PIPE	86 LF	0 LF
12	INSTALL 8" ADS N-12 OR PVC PIPE	358 LF	110 LF
13	INSTALL 15" ADS N-12 OR PVC PIPE	9 LF	0 LF
14	INSTALL 6" ADS N-12 OR PVC 90° BEND	1 EA	0 EA
15	INSTALL 8" ADS N-12 OR PVC 45° BEND	3 EA	0 EA
16	INSTALL 15" ADS N-12 OR PVC 45° BEND	2 EA	0 EA
17	INSTALL 8" ADS N-12 OR PVC CAP	2 EA	0 EA
18	INSTALL 15" ADS N-12 OR PVC WYE	2 EA	0 EA
19	INSTALL 15X8" ADS N-12 OR PVC ECCENTRIC REDUCER	2 EA	0 EA
20	CONSTRUCT FOREBAY AT RIBBON GUTTER PER DETAIL 4 ON SHEET NO. 3	1 EA	0 EA
21	CONSTRUCT FOREBAY AT UNDERSIDEWALK DRAIN PER DETAIL 5 ON SHEET NO. 3	1 EA	0 EA
22	CONSTRUCT UNDERSIDEWALK DRAIN PER DETAIL 6 ON SHEET NO. 3	1 EA	0 EA
23	CONSTRUCT 3' RIBBON GUTTER, MATCH EXISTING	42 LF	0 LF
24	CONSTRUCT 4' RIBBON GUTTER PER DETAIL 7 ON SHEET NO. 3	123 LF	229 LF
25	CONSTRUCT TYPE A-6 CURB PER COUNTY OF RIVERSIDE STD NO. 200	44 LF	150 LF
26	CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204	1,123 LF	1,095 LF
27	CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204 WITH CURB OPENINGS PER DETAIL 8 ON SHEET NO. 4	0 LF	121 LF
28	CONSTRUCT 8" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204	218 LF	0 LF
29	PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%	20,083 SF	18,757 SF
30	PLACE FULL DEPTH AC PAVEMENT OVER COMPACTED NATIVE	451 SF	0 SF
31	PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC	2,208 SF	4,708 SF
32	INSTALL DETECTABLE WARNINGS PER CBC 11B-705	133 SF	69 SF
33	APPLY ACCESSIBLE PARKING STRIPING PER DETAIL 9 ON SHEET NO. 4	3 EA	3 EA
34	APPLY CLEAN AIR/VANPOOL/EV PARKING STRIPING PER DETAIL 10 ON SHEET NO. 4	2 EA	4 EA
35	INSTALL ACCESSIBLE PARKING SIGNAGE PER DETAIL 11 ON SHEET NO. 4	1 EA	1 EA
36	INSTALL VAN ACCESSIBLE PARKING SIGNAGE PER DETAIL 12 ON SHEET NO. 4	1 EA	2 EA
37	INSTALL PARKING LOT ENTRY SIGNAGE PER DETAIL 13 ON SHEET NO. 4	3 EA	0 EA
38	APPLY 4" WIDE WHITE STRIPE	1,508 LF	722 LF
39	APPLY 4" WIDE BLUE STRIPE	749 LF	106 LF
40	INSTALL JENSEN PRECAST 6' STANDARD PARKING CURB PER MANUFACTURER'S INSTRUCTIONS	5 EA	2 EA



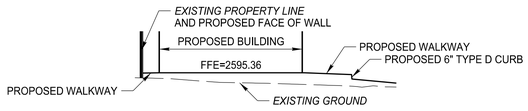
A/2 SECTION
1" = 20' HORIZ
1" = 5' VERT



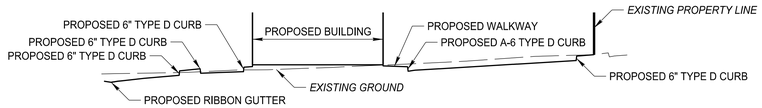
B/2 SECTION
1" = 20' HORIZ
1" = 5' VERT



C/2 SECTION
1" = 20' HORIZ
1" = 5' VERT



D/2 SECTION
1" = 20' HORIZ
1" = 5' VERT



E/2 SECTION
1" = 20' HORIZ
1" = 5' VERT

CAUTION:

EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD PRIOR TO START OF CONSTRUCTION.

WDID NO. 8 33C398692

811 Know what's below. Call before you dig.
Call at least 2 working days prior to excavating.

BENCHMARK:

BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS		CITY

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
www.mth2engineering.com
civil • water resources • storm water
urban design and planning

ENGINEER OF WORK
R.C.E. 51313
17-OCT-2022
DATE

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	AS NOTED
DATE:	SEP. 2021
JOB NUMBER:	2019_23

Reviewed By: _____ Staff Engineer Date: _____

Recommended for Approval By: _____ Administrative Engineer Date: _____

Approved By: _____ City Engineer/Director of Public Works Date: _____

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ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
NOTES AND SECTIONS SHEET

SHEET 2 OF 20 SHEETS
FILE NO: PW2021-0785

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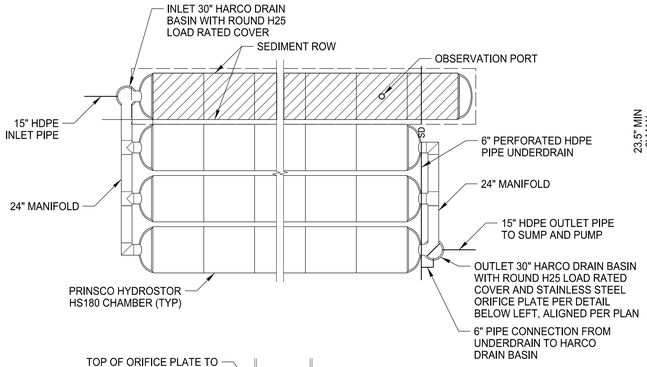
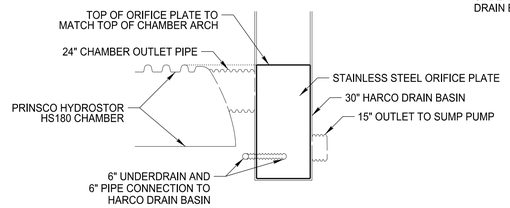
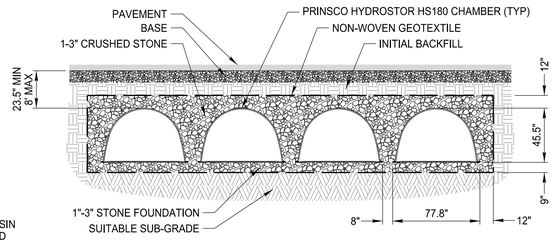
JOB 2019_23 PLOTTED: 17-OCT-2022





ORIFICE PLATE DETAIL

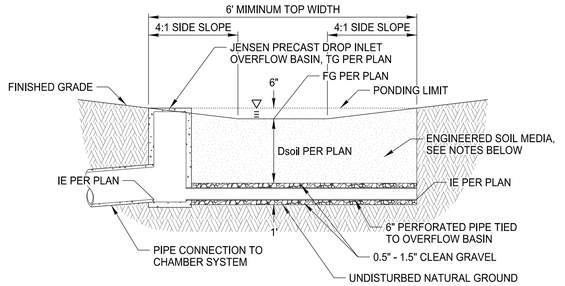


NOTES:

1. DETAILS AND DIMENSIONS HEREON ARE GENERAL IN NATURE AND FOR GENERAL REFERENCE ONLY.
2. REFER TO MANUFACTURER'S DRAWINGS UNDER SEPARATE COVER FOR ADDITIONAL INFORMATION AND INSTALLATION DETAILS.

1/3 PRINSCO HYDROSTOR HS180 CHAMBER SYSTEM DETAIL

NOT TO SCALE



NOTES:

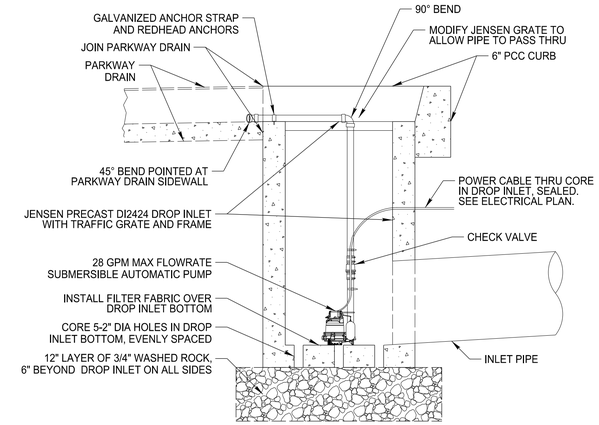
1. ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL AND 15% ORGANIC COMPONENTS BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.
2. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL MEETING THE RANGES BELOW:

70%-80%	SAND
15%-20%	SILT
5%-10%	CLAY

3. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT THE NITROGEN DOES NOT LEACH FROM THE MEDIA.

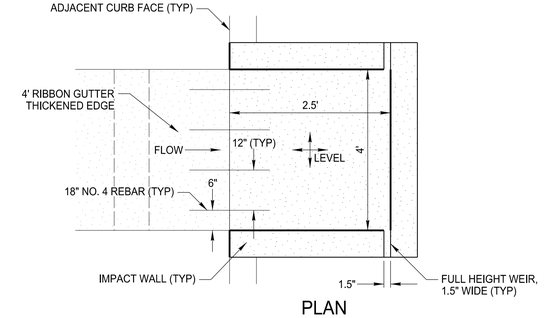
2/3 BIO-RETENTION FACILITY DETAIL

NOT TO SCALE

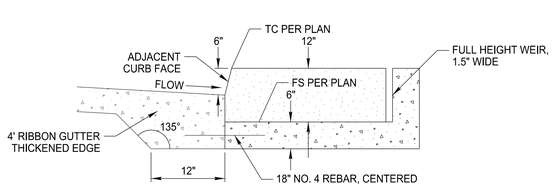


3/3 SUMP AND PUMP DETAIL

NOT TO SCALE



PLAN



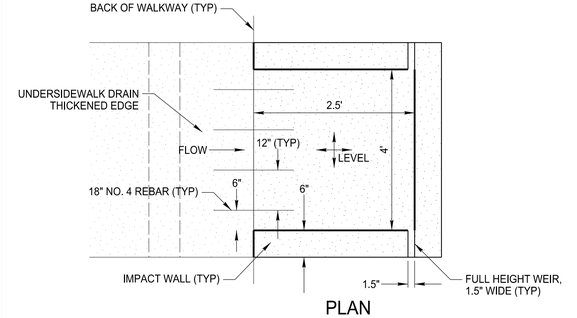
SECTION

NOTES:

1. CLASS 520-C-2500 CONCRETE.
2. ALL EXPOSED CORNERS ON PCC WALL SHALL BE ROUNDED WITH A 1/2" RADIUS.
3. CONSTRUCT PER SSPWC 303-5.

4/3 FOREBAY AT RIBBON GUTTER DETAIL

NOT TO SCALE



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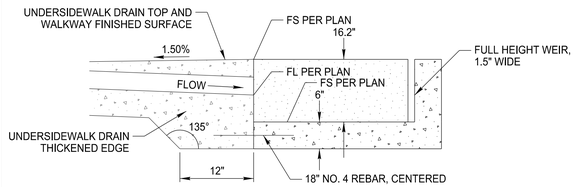


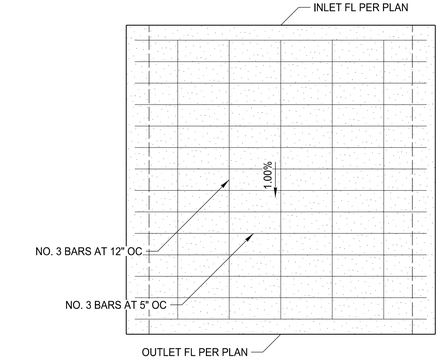
SECTION

NOTES:

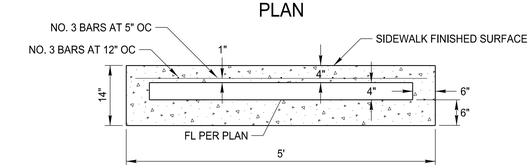
1. CLASS 520-C-2500 CONCRETE.
2. ALL EXPOSED CORNERS ON PCC WALL SHALL BE ROUNDED WITH A 1/2" RADIUS.
3. CONSTRUCT PER SSPWC 303-5.

5/3 FOREBAY AT UNDERSIDEWALK DRAIN DETAIL

NOT TO SCALE



PLAN



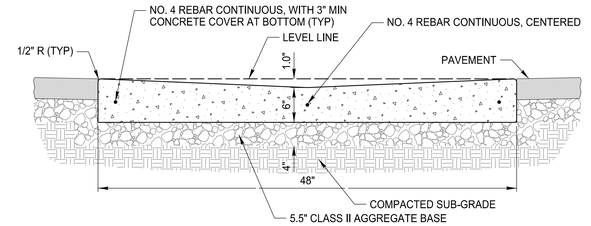
SECTION

NOTES:

1. UNDERSIDEWALK DRAIN SHALL BE 520-C-2500 CONCRETE.
2. ALL EXPOSED CORNERS ON UNDERSIDEWALK DRAIN SHALL BE ROUNDED WITH A 1/2" RADIUS.
3. SEE DETAIL 5 FOR THICKENED EDGE REQUIREMENTS AT FOREBAY.

6/3 UNDERSIDEWALK DRAIN DETAIL

NOT TO SCALE



NOTES:

1. 520-C-2500 CONCRETE.
2. ALL EXPOSED CORNERS ON PCC CURB SHALL BE ROUNDED WITH A 1/2" RADIUS.
3. SEE DETAIL 4 FOR THICKENED EDGE REQUIREMENTS AT FOREBAY.

7/3 4' RIBBON GUTTER DETAIL

NOT TO SCALE

WDID NO. 8 33C398692

Know what's below. Call before you dig. Call at least 2 working days prior to excavating.

BENCHMARK:

SEE SHEET NO. 1

BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS	CITY	

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
www.mth2engineering.com
civil • water resources • storm water
urban design and planning

ENGINEER OF WORK R.C.E. 51313 — 17-OCT-2022 DATE

REGISTERED PROFESSIONAL ENGINEER — MARTEN L. ANDERSON — No. 51313 — Exp. 6-30-24 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	AS NOTED
DATE:	SEP, 2021
JOB NUMBER:	2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Staff Engineer — Date: _____

Recommended for Approval By: _____ Administrative Engineer — Date: _____

Approved By: _____ City Engineer/Director of Public Works — Date: _____

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT DETAIL SHEET

SHEET 3 OF 20 SHEETS
FILE NO: PW2021-0785

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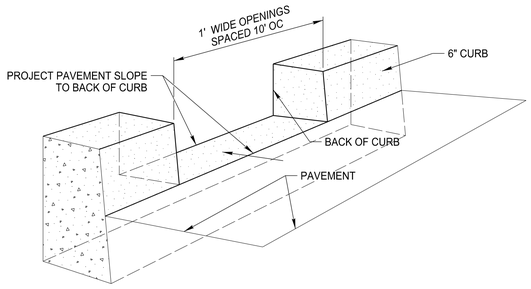
JOB 2019_23 PLOTTED:17-OCT-2022

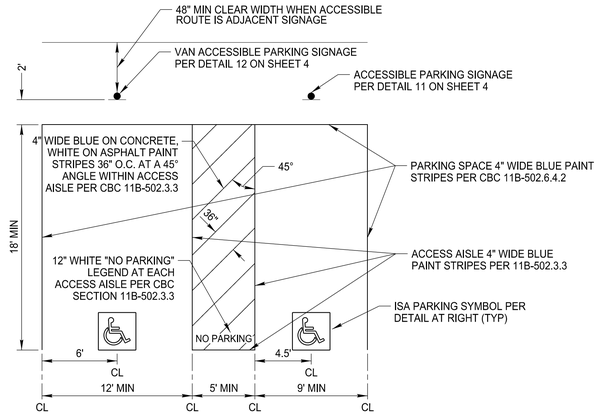


NOTES:

1. CURB SHALL BE 520-C-2500 CONCRETE.
2. ALL EXPOSED CORNERS ON PCC CURB SHALL BE ROUNDED WITH A 1/2" RADIUS.

8/4 CURB OPENING DETAIL

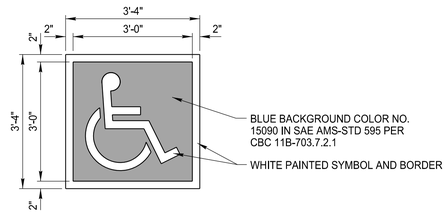
NOT TO SCALE



NOTES:
1. PARKING SPACES SHALL CONFORM TO CBC 11B-502.
2. FLOOR OR GROUND SURFACES SHALL CONFORM TO CBC 11B-302.

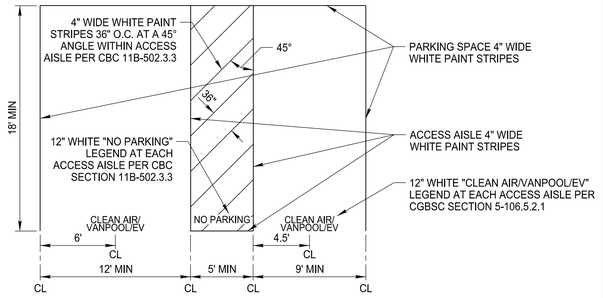
9/4 ACCESSIBLE PARKING STRIPING DETAIL

NOT TO SCALE



INTERNATIONAL SYMBOL OF ACCESSIBILITY PER CBC 11B-703.7.2.1

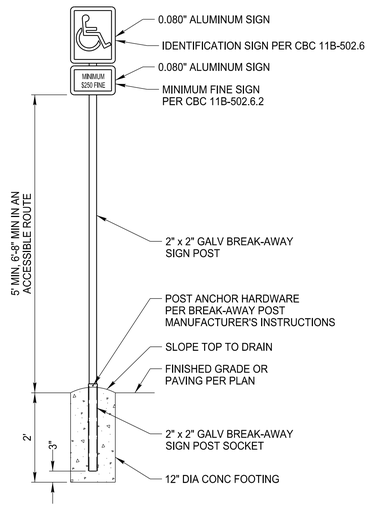
ISA PARKING SYMBOL DETAIL



NOTES:
1. PARKING SPACES SHALL CONFORM TO CGBSC 5.106.5.2.
2. FOR ADA COMPLIANT CLEAN AIR/VANPOOL/EV PARKING SPACES:
   A. FLOOR OR GROUND SURFACES SHALL CONFORM TO CBC 11B-302.
   B. APPLY ACCESS AISLE STRIPING.

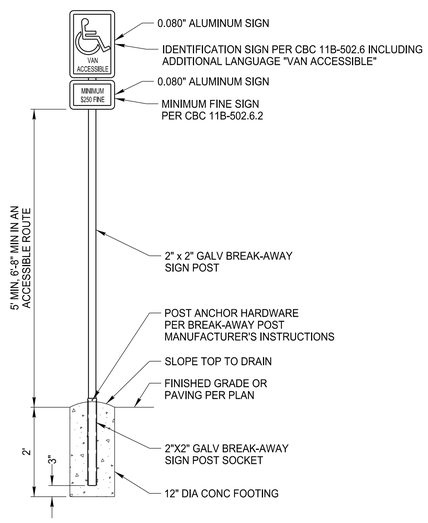
10/4 CLEAN AIR/VANPOOL/EV PARKING STRIPING DETAIL

NOT TO SCALE



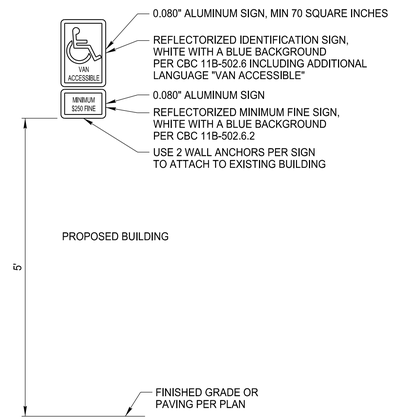
11/4 ACCESSIBLE PARKING SIGNAGE DETAIL

NOT TO SCALE

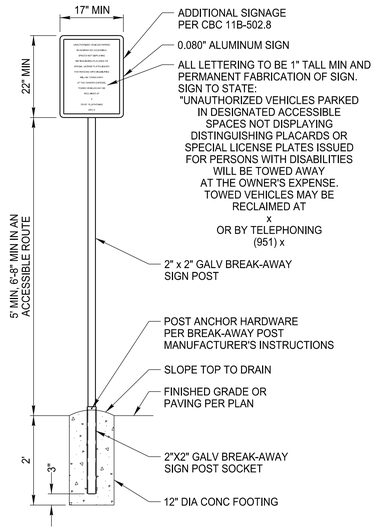


12/4 VAN ACCESSIBLE PARKING SIGNAGE DETAIL

NOT TO SCALE



WALL MOUNTED



13/4 PARKING LOT ENTRY SIGNAGE DETAIL

NOT TO SCALE

WDID NO. 8 33C398692

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BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS		CITY

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urban design and planning

ENGINEER OF WORK
R.C.E. 51313
17-OCT-2022
DATE

REGISTERED PROFESSIONAL ENGINEER — MARTEN L. ANDERSEN — No. 51313 — Exp. 6-30-24 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	AS NOTED
DATE:	SEP, 2021
JOB NUMBER:	2019_23

BEAUMONT — CALIFORNIA

Reviewed By: _____ Staff Engineer Date: _____

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ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
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CITY OF BEAUMONT, CALIFORNIA

PRECISE GRADING PLANS FOR:

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT DETAIL SHEET

SHEET 4 OF 20 SHEETS

FILE NO: PW2021-0785

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JOB 2019_23 PLOTTED: 17-OCT-2022

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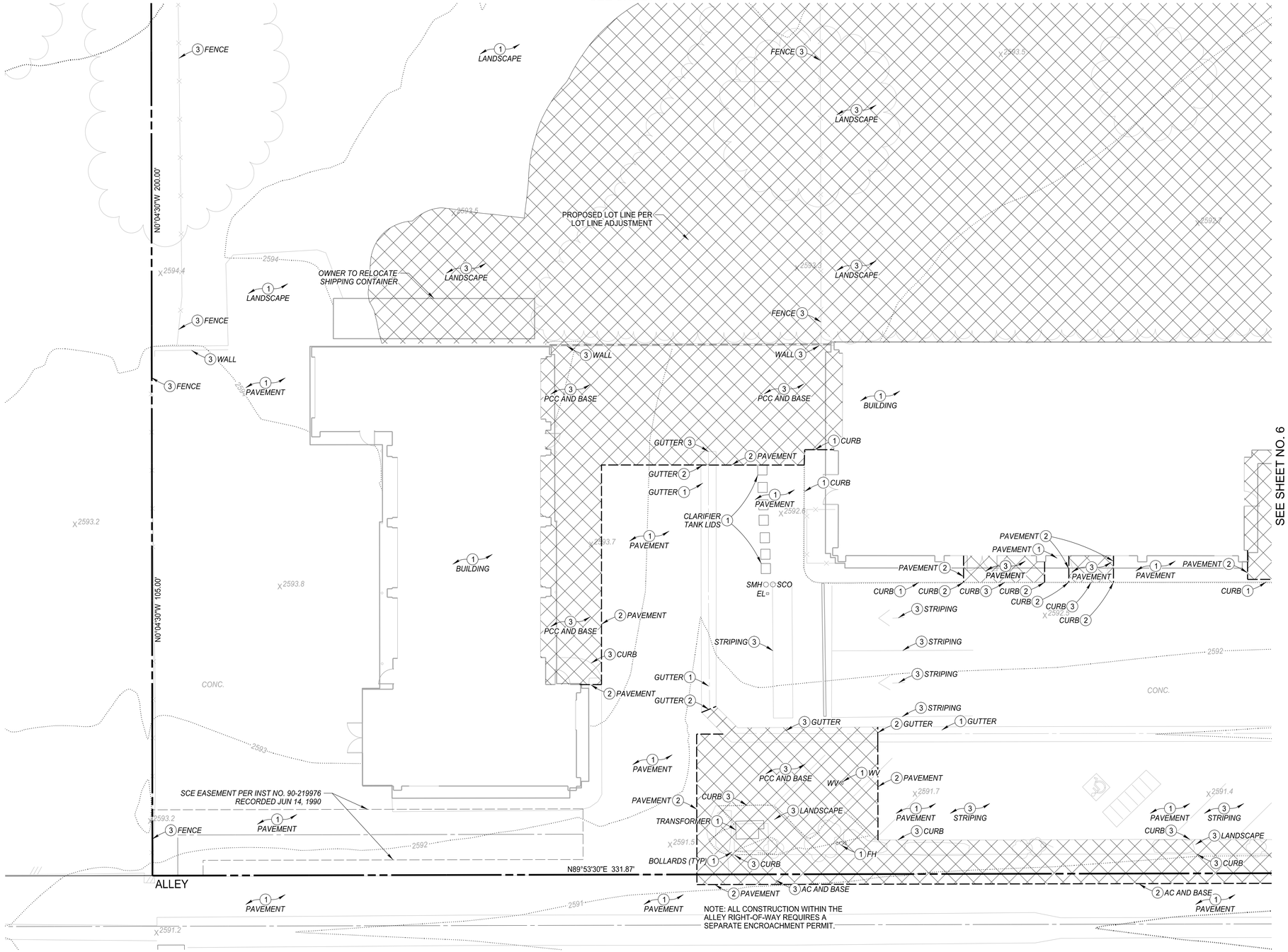

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WDID NO. 8 33C398692

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
DEMOLITION SHEET
PHASE 1

SHEET 5 OF 20 SHEETS
FILE NO: PW2021-0785

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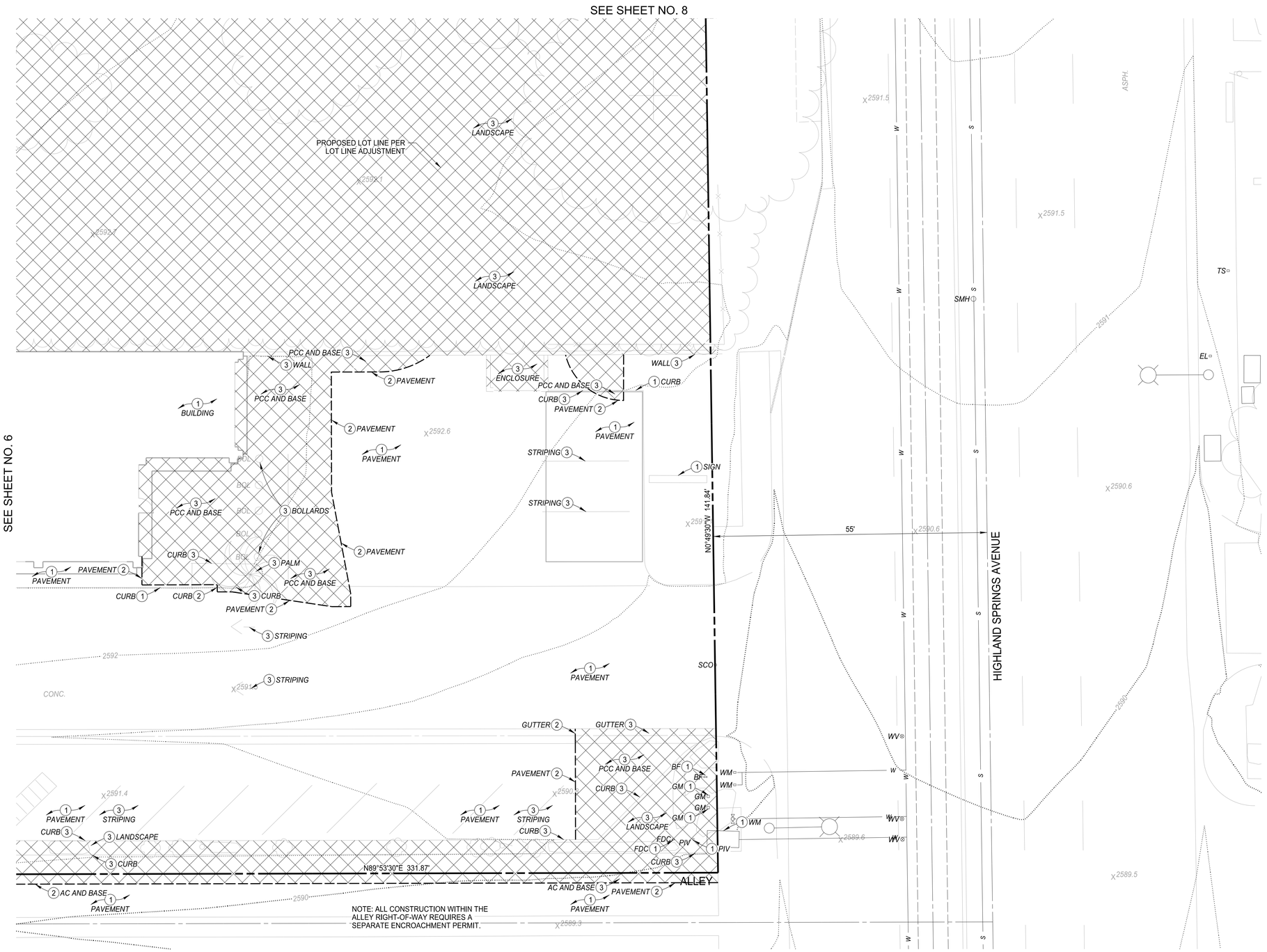

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BEAUMONT CALIFORNIA

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City Engineer/Director of Public Works

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT DEMOLITION SHEET PHASE 1

SHEET 6 OF 20 SHEETS
FILE NO: PW2021-0785

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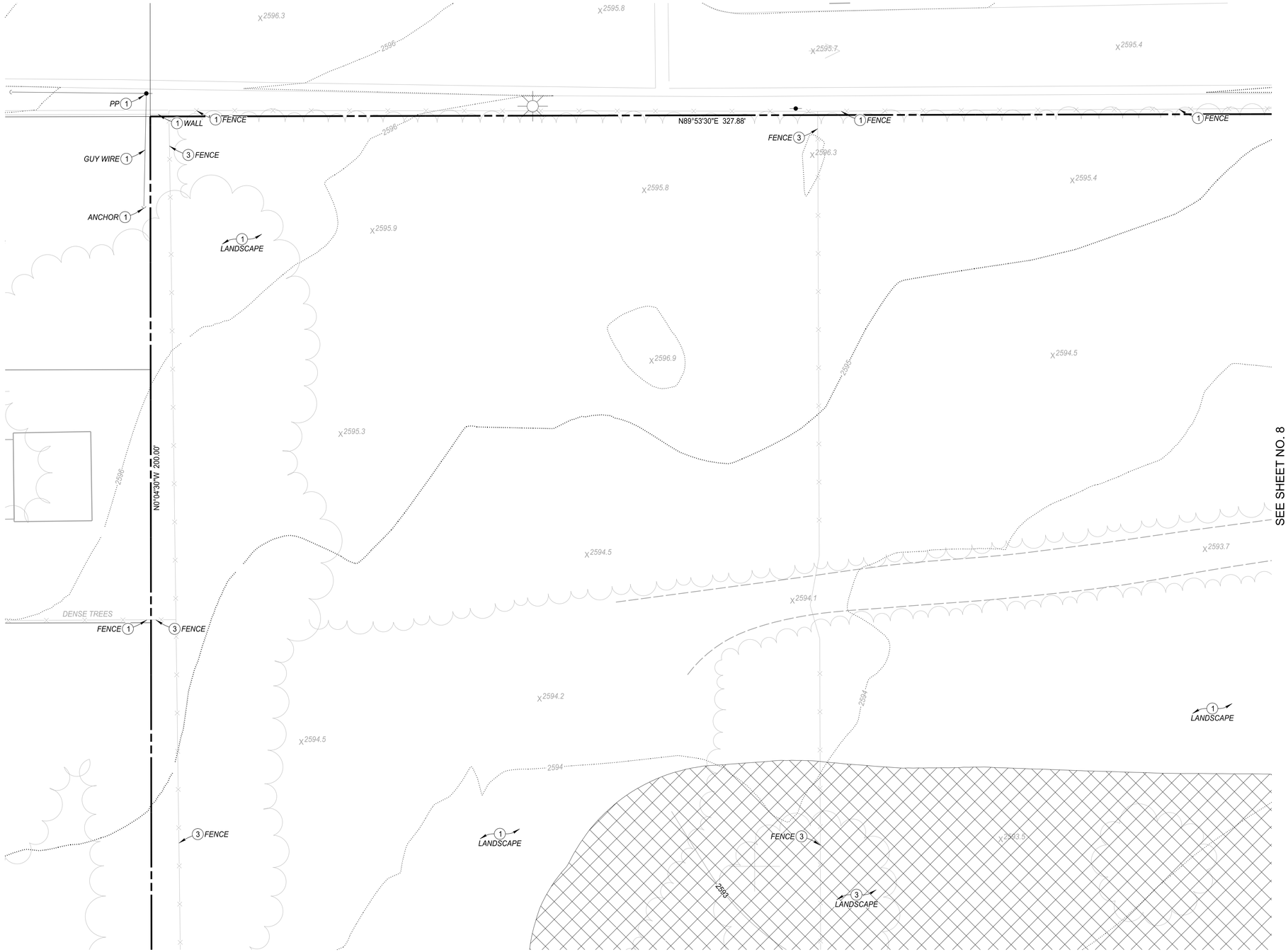
JOB 2019_23 PLOTTED:17-OCT-2022



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SHEET 7 OF 20 SHEETS
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MARTEN L. ANDERSEN
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Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	1" = 10'
DATE:	SEP, 2021
JOB NUMBER:	2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Date: _____
Staff Engineer

Recommended for Approval By: _____ Date: _____
Administrative Engineer

Approved By: _____ Date: _____
City Engineer/Director of Public Works

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
DEMOLITION SHEET
PHASE 1

SHEET 8 OF 20 SHEETS
FILE NO: PW2021-0785

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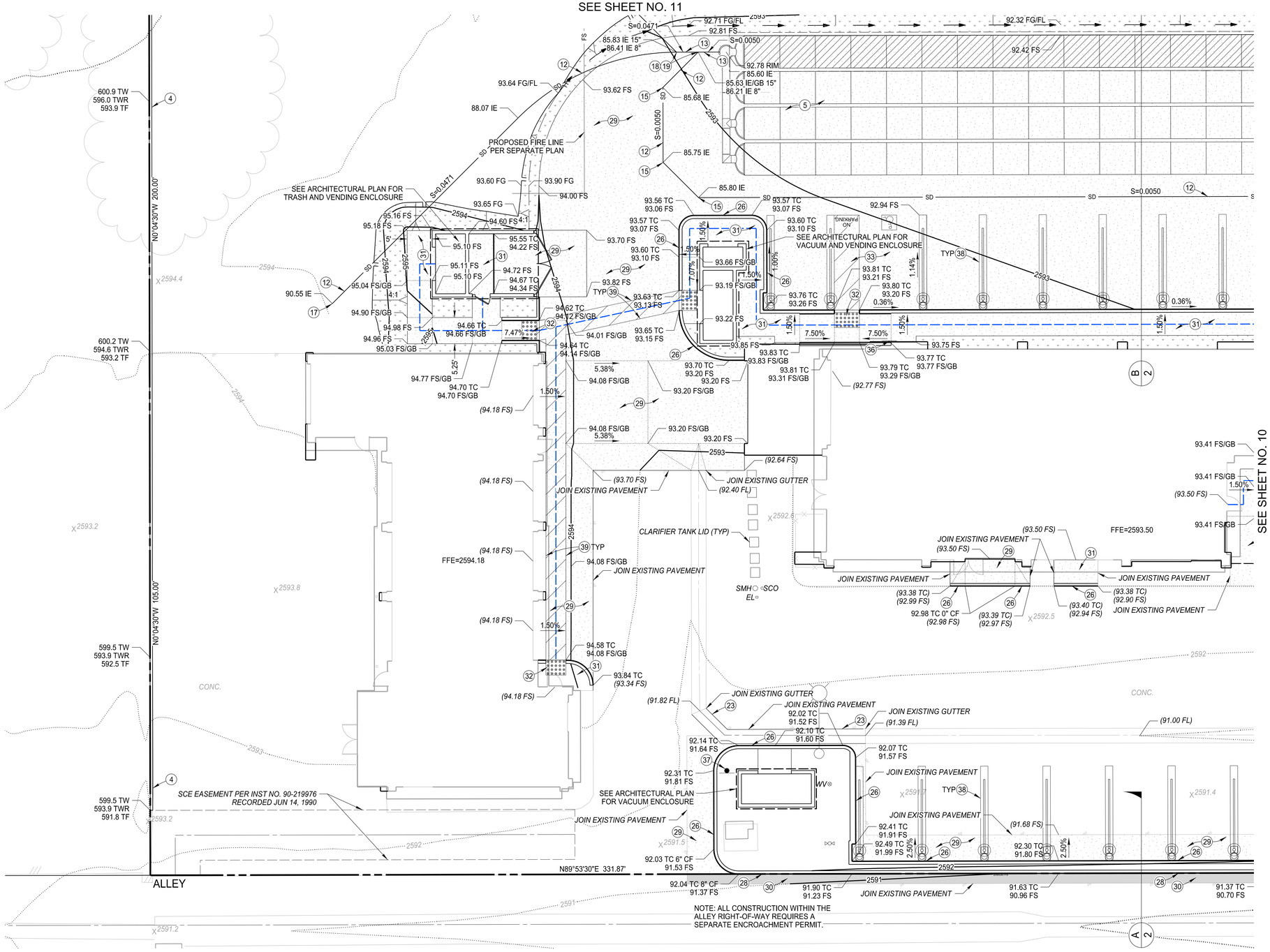
JOB 2019_23 PLOTTED: 17-OCT-2022



CONSTRUCTION NOTES

4. CONSTRUCT COMBINATION FREESTANDING-RETAINING WALL PER STRUCTURAL PLAN
5. CONSTRUCT PRINSCO HYDROSTOR HS180 STORMWATER CHAMBER SYSTEM PER GENERIC DETAIL 1 ON SHEET NO. 3 AND MANUFACTURER'S INSTALLATION DRAWINGS UNDER SEPARATE COVER
12. INSTALL 8" ADS N-12 OR PVC PIPE
13. INSTALL 15" ADS N-12 OR PVC PIPE
15. INSTALL 8" ADS N-12 OR PVC 45° BEND
16. INSTALL 15" ADS N-12 OR PVC 45° BEND
17. INSTALL 8" ADS N-12 OR PVC CAP
18. INSTALL 15" ADS N-12 OR PVC WYE
19. INSTALL 15X8" ADS N-12 OR PVC ECCENTRIC REDUCER
23. CONSTRUCT 3' RIBBON GUTTER, MATCH EXISTING
26. CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204
28. CONSTRUCT 8" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204
29. PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%
30. PLACE FULL DEPTH AC PAVEMENT OVER COMPACTED NATIVE
31. PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC
32. INSTALL DETECTABLE WARNINGS PER CBC 11B-705
33. APPLY ACCESSIBLE PARKING STRIPING PER DETAIL 9 ON SHEET NO. 4
35. INSTALL ACCESSIBLE PARKING SIGNAGE PER DETAIL 10 ON SHEET NO. 4
36. INSTALL VAN ACCESSIBLE PARKING SIGNAGE PER DETAIL 11 ON SHEET NO. 4
37. INSTALL PARKING LOT ENTRY SIGNAGE PER DETAIL 12 ON SHEET NO. 4
38. APPLY 4" WIDE WHITE STRIPE
39. APPLY 4" WIDE BLUE STRIPE

CAUTION:

EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD PRIOR TO START OF CONSTRUCTION.

SCALE: 1" = 10'

10 0 10 20

WDID NO. 8 33C398692

811 Know what's below. Call before you dig. Call at least 2 working days prior to excavating.

BENCHMARK:

SEE SHEET NO. 1

BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS	CITY	

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
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civil • water resources • storm water
urban design and planning

17-OCT-2022
ENGINEER OF WORK DATE
R.C.E. 51313

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRUCTION SHEET PHASE 1

SHEET 9 OF 20 SHEETS
FILE NO: PW2021-0785

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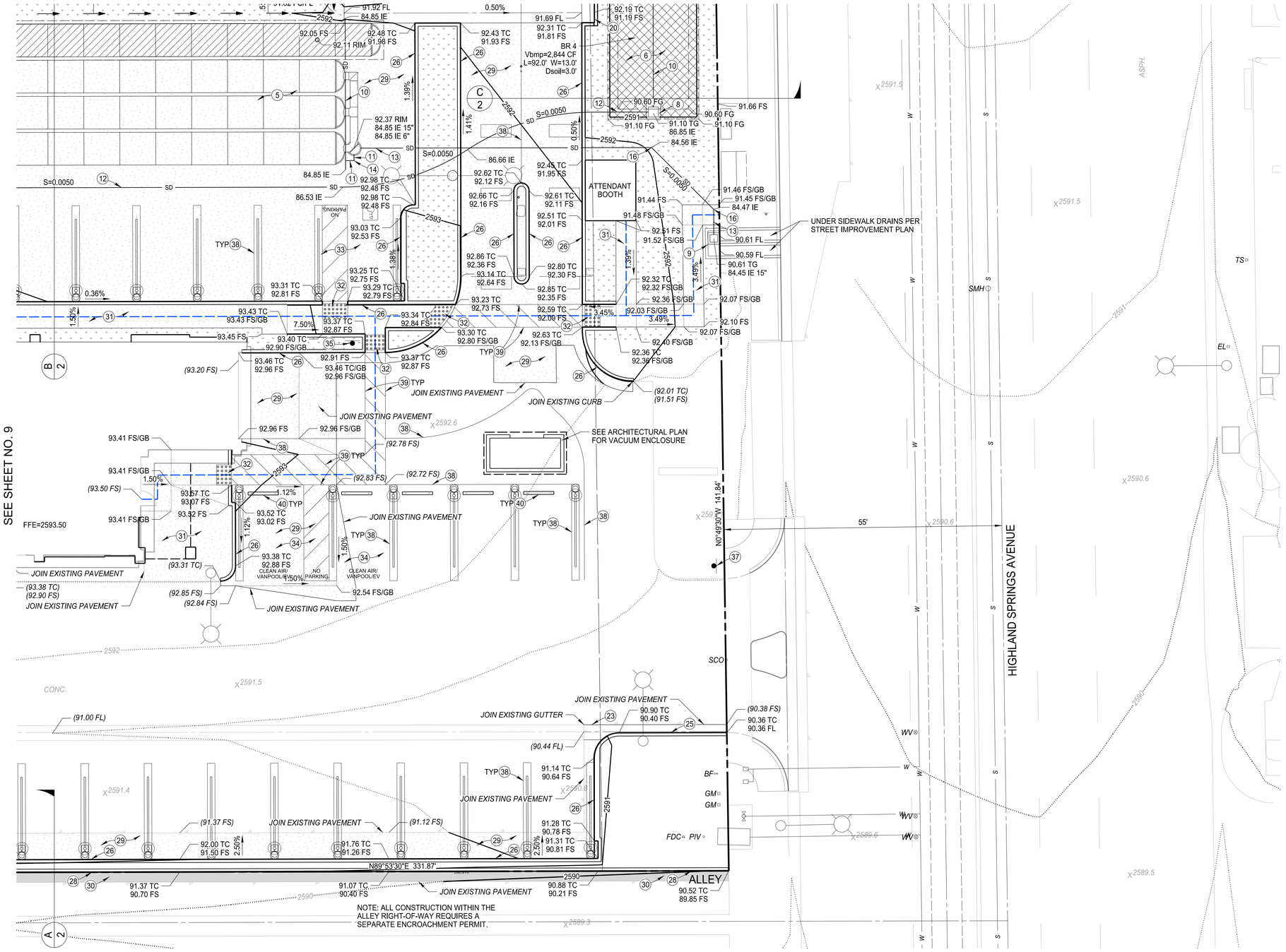
JOB 2019_23 PLOTTED: 17-OCT-2022



CONSTRUCTION NOTES

(5) CONSTRUCT PRINSCO HYDROSTOR HS180 STORMWATER CHAMBER SYSTEM PER GENERIC DETAIL 1 ON SHEET NO. 3 AND MANUFACTURER'S INSTALLATION DRAWINGS UNDER SEPARATE COVER

(6) CONSTRUCT BIO-RETENTION FACILITY PER DETAIL 2 ON SHEET NO. 3

(8) INSTALL JENSEN PRECAST 24"X24" DROP INLET WITH PEDESTRIAN FRAME AND GRATE OR APPROVED EQUAL, WITH FLOGARD CATCH BASIN INSERT FILTER FGP-24F, OR APPROVED EQUAL

(9) CONSTRUCT SUMP AND PUMP PER DETAIL 3 ON SHEET NO. 3

(10) INSTALL 6" ADS N-12 OR PVC PERFORATED PIPE

(11) INSTALL 6" ADS N-12 OR PVC PIPE

(12) INSTALL 8" ADS N-12 OR PVC PIPE

(13) INSTALL 15" ADS N-12 OR PVC PIPE

(14) INSTALL 6" ADS N-12 OR PVC 90° BEND

(16) INSTALL 15" ADS N-12 OR PVC 45° BEND

(25) CONSTRUCT TYPE A-6 CURB PER COUNTY OF RIVERSIDE STD NO. 200

(26) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204

(28) CONSTRUCT 8" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204

(29) PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%

(30) PLACE FULL DEPTH AC PAVEMENT OVER COMPACTED NATIVE

(31) PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC

(32) INSTALL DETECTABLE WARNINGS PER CBC 11B-705

(33) APPLY ACCESSIBLE PARKING STRIPING PER DETAIL 9 ON SHEET NO. 4

(34) APPLY CLEAN AIR/VANPOOL/EV PARKING STRIPING PER DETAIL 10 ON SHEET NO. 4

(35) INSTALL ACCESSIBLE PARKING SIGNAGE PER DETAIL 10 ON SHEET NO. 4

(36) INSTALL VAN ACCESSIBLE PARKING SIGNAGE PER DETAIL 11 ON SHEET NO. 4

(37) INSTALL PARKING LOT ENTRY SIGNAGE PER DETAIL 12 ON SHEET NO. 4

(38) APPLY 4" WIDE WHITE STRIPE

(39) APPLY 4" WIDE BLUE STRIPE

(40) INSTALL JENSEN PRECAST 6' STANDARD PARKING CURB PER MANUFACTURER'S INSTRUCTIONS

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

WDID NO. 8 33C398692

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ENGINEER OF WORK 17-OCT-2022
R.C.E. 51313 DATE

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSEN
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

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DATE:	SEP, 2021
JOB NUMBER:	2019_23

BEAUMONT CALIFORNIA

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRUCTION SHEET PHASE 1

SHEET 10 OF 20 SHEETS
FILE NO: PW2021-0785

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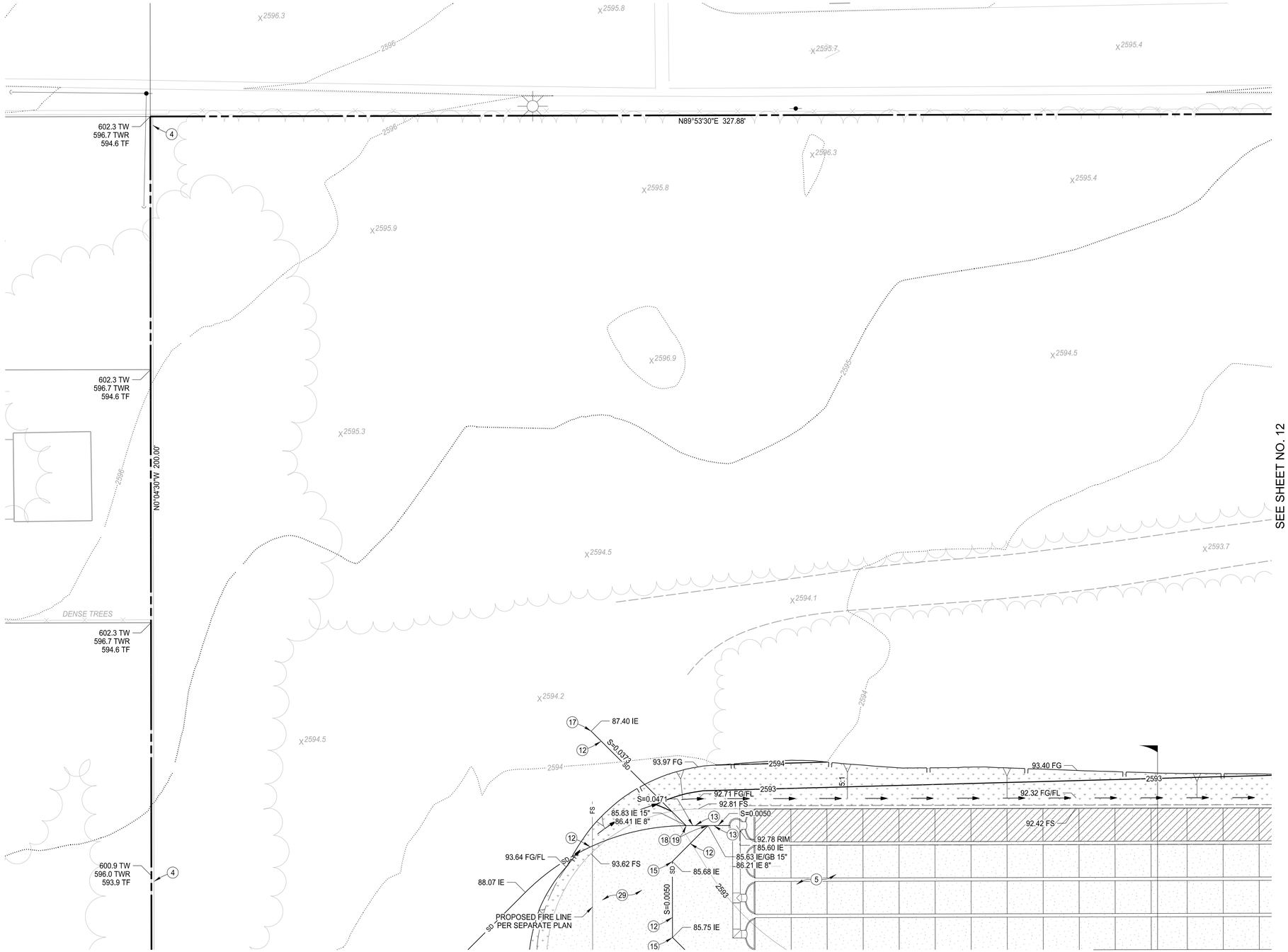
JOB 2019_23 PLOTTED:17-OCT-2022



CONSTRUCTION NOTES

(4) CONSTRUCT COMBINATION FREESTANDING-RETAINING WALL PER STRUCTURAL PLAN
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10 0 10 20

WDID NO. 8 33C398692

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ENGINEER OF WORK
R.C.E. 51313
17-OCT-2022
DATE

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
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BEAUMONT
CALIFORNIA

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Administrative Engineer

Approved By: _____ Date: _____
City Engineer/Director of Public Works

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRUCTION SHEET PHASE 1

SHEET 11 OF 20 SHEETS
FILE NO: PW2021-0785

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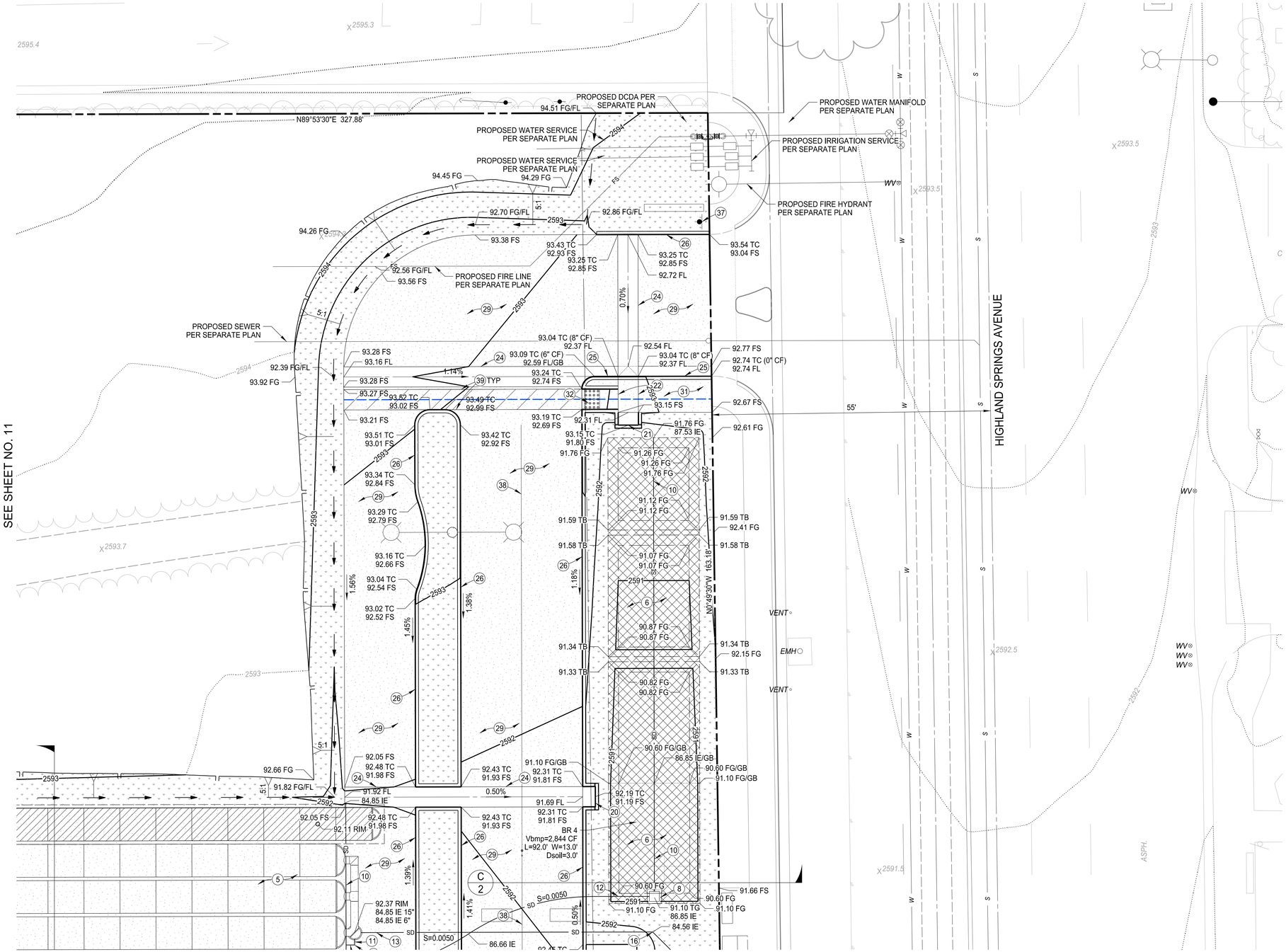
JOB 2019_23 PLOTTED:17-OCT-2022



CONSTRUCTION NOTES

- (5) CONSTRUCT PRINSCO HYDROSTOR HS180 STORMWATER CHAMBER SYSTEM PER GENERIC DETAIL 1 ON SHEET NO. 3 AND MANUFACTURER'S INSTALLATION DRAWINGS UNDER SEPARATE COVER
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- (14) INSTALL 6" ADS N-12 OR PVC 90° BEND
- (16) INSTALL 15" ADS N-12 OR PVC 45° BEND
- (20) CONSTRUCT FOREBAY AT RIBBON GUTTER PER DETAIL 4 ON SHEET NO. 3
- (21) CONSTRUCT FOREBAY AT UNDERSIDEWALK DRAIN PER DETAIL 5 ON SHEET NO. 3
- (22) CONSTRUCT UNDERSIDEWALK DRAIN PER DETAIL 5 ON SHEET NO. 3
- (24) CONSTRUCT 4' RIBBON GUTTER PER DETAIL 6 ON SHEET NO. 3
- (25) CONSTRUCT TYPE A-6 CURB PER COUNTY OF RIVERSIDE STD NO. 200
- (26) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204
- (29) PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%
- (31) PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC
- (32) INSTALL DETECTABLE WARNINGS PER CBC 11B-705
- (37) INSTALL PARKING LOT ENTRY SIGNAGE PER DETAIL 11 ON SHEET NO. 4
- (38) APPLY 4" WIDE WHITE STRIPE
- (39) APPLY 4" WIDE BLUE STRIPE

CAUTION:

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10 0 10 20

WDID NO. 8 33C398692

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17-OCT-2022
ENGINEER OF WORK DATE
R.C.E. 51313

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CITY OF BEAUMONT, CALIFORNIA

PRECISE GRADING PLANS FOR:

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRUCTION SHEET PHASE 1

SHEET 12 OF 20 SHEETS

FILE NO: PW2021-0785

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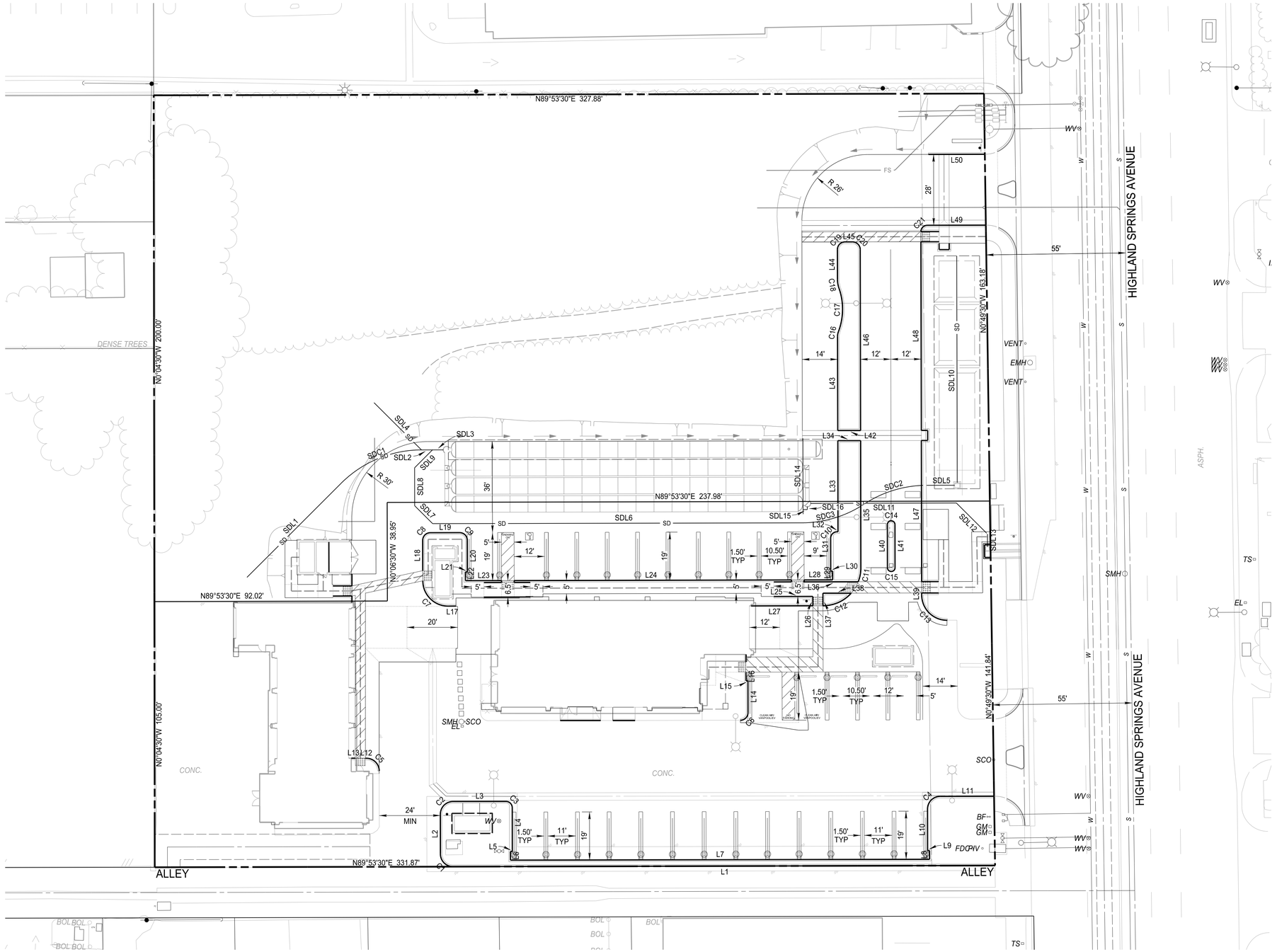
JOB 2019_23 PLOTTED: 17-OCT-2022



Line Table

Name	Length	Direction
L1	214.00'	N89°52'45"E
L2	15.72'	N0°07'25"W
L3	20.86'	N89°52'35"E
L4	17.26'	N0°07'25"W
L5	0.75'	N89°52'35"E
L6	3.47'	N0°07'25"W
L7	165.50'	N89°52'45"E
L8	3.47'	N0°07'25"W
L9	0.75'	N89°52'35"E
L10	16.39'	N0°07'25"W
L11	21.30'	N89°52'45"E
L12	0.48'	N89°35'55"W
L13	1.58'	N89°35'55"W
L14	12.55'	N0°07'25"W
L15	0.75'	N89°52'35"E
L16	3.47'	N0°07'25"W
L17	3.06'	N89°52'26"E
L18	12.02'	N0°07'25"W
L19	11.58'	N89°52'35"E
L20	12.53'	N0°07'25"W
L21	0.75'	N89°52'35"E
L22	3.47'	N0°07'25"W
L23	14.25'	N89°52'35"E
L24	109.50'	N89°52'35"E
L25	15.33'	N89°52'35"E
L26	3.70'	N0°07'25"W
L27	24.37'	N89°52'26"E
L28	11.25'	N89°52'35"E
L29	3.47'	N0°07'25"W
L30	0.75'	N89°52'35"E
L31	13.03'	N0°07'25"W
L32	0.42'	N89°52'35"E
L33	36.00'	N0°07'25"W
L34	9.00'	N89°52'35"E
L35	50.20'	N0°07'25"W
L36	21.35'	N89°52'35"E
L37	4.95'	N0°07'25"W
L38	11.13'	N89°52'35"E
L39	0.79'	N0°07'25"W
L40	17.00'	N0°07'25"W
L41	17.00'	N0°07'25"W
L42	9.00'	N89°52'35"E
L43	37.23'	N0°07'25"W
L44	11.84'	N0°07'25"W
L45	3.00'	N89°52'35"E
L46	71.50'	N0°07'25"W
L47	55.75'	N0°07'25"W
L48	74.50'	N0°07'25"W
L49	23.13'	N89°52'35"E
L50	22.29'	N89°52'35"E

Curve Table

Name	Delta	Radius	Arc Length	Tangent Length
C1	89°59'50"	5.00'	7.85'	5.00'
C2	90°00'00"	5.00'	7.85'	5.00'
C3	90°55'15"	2.50'	3.97'	2.54'
C4	90°00'10"	5.00'	7.85'	5.00'
C5	89°26'16"	5.00'	7.80'	4.95'
C6	89°43'13"	3.00'	4.70'	2.99'
C7	90°00'09"	10.00'	15.71'	10.00'
C8	90°00'00"	3.00'	4.71'	3.00'
C9	90°00'00"	3.00'	4.71'	3.00'
C10	90°00'00"	2.50'	3.93'	2.50'
C11	21°42'58"	15.00'	5.69'	2.88'
C12	47°55'47"	15.00'	12.55'	6.67'
C13	90°30'09"	10.00'	15.80'	10.09'
C14	180°00'00"	1.50'	4.71'	---
C15	180°00'00"	1.50'	4.71'	---
C16	21°02'22"	5.00'	1.84'	0.93'
C17	40°30'09"	25.00'	17.67'	9.22'
C18	19°27'47"	10.00'	3.40'	1.71'
C19	90°00'00"	3.00'	4.71'	3.00'
C20	90°00'00"	3.00'	4.71'	3.00'
C21	90°00'00"	2.50'	3.93'	2.50'

Storm Drain Line Table

Name	Length	Direction
SDL1	52.58'	N45°00'00"E
SDL2	4.34'	N89°52'35"E
SDL3	4.34'	N89°52'35"E
SDL4	26.44'	N45°07'25"W
SDL5	11.09'	N89°52'35"E
SDL6	145.78'	N89°52'35"E
SDL7	10.00'	N45°07'25"W
SDL8	15.00'	N0°07'25"W
SDL9	10.00'	N44°52'35"E
SDL10	90.08'	N0°07'25"W
SDL11	57.62'	N89°52'35"E
SDL12	17.34'	N45°07'25"W
SDL13	5.00'	N0°07'25"W
SDL14	29.93'	N0°07'25"W
SDL15	1.68'	N89°52'35"E
SDL16	1.25'	N0°07'25"W

Storm Drain Curve Table

Name	Delta	Radius	Arc Length	Tangent Length
SDC1	44°52'35"	45.00'	35.25'	18.58'
SDC2	33°14'15"	45.00'	26.10'	13.43'
SDC3	33°14'14"	45.00'	26.10'	13.43'

CAUTION:

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SCALE: 1" = 20'

20 0 20 40

WDID NO. 8 33C398692

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PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
HORIZONTAL CONTROL SHEET
PHASE 1

SHEET 13 OF 20 SHEETS

FILE NO: PW2021-0785

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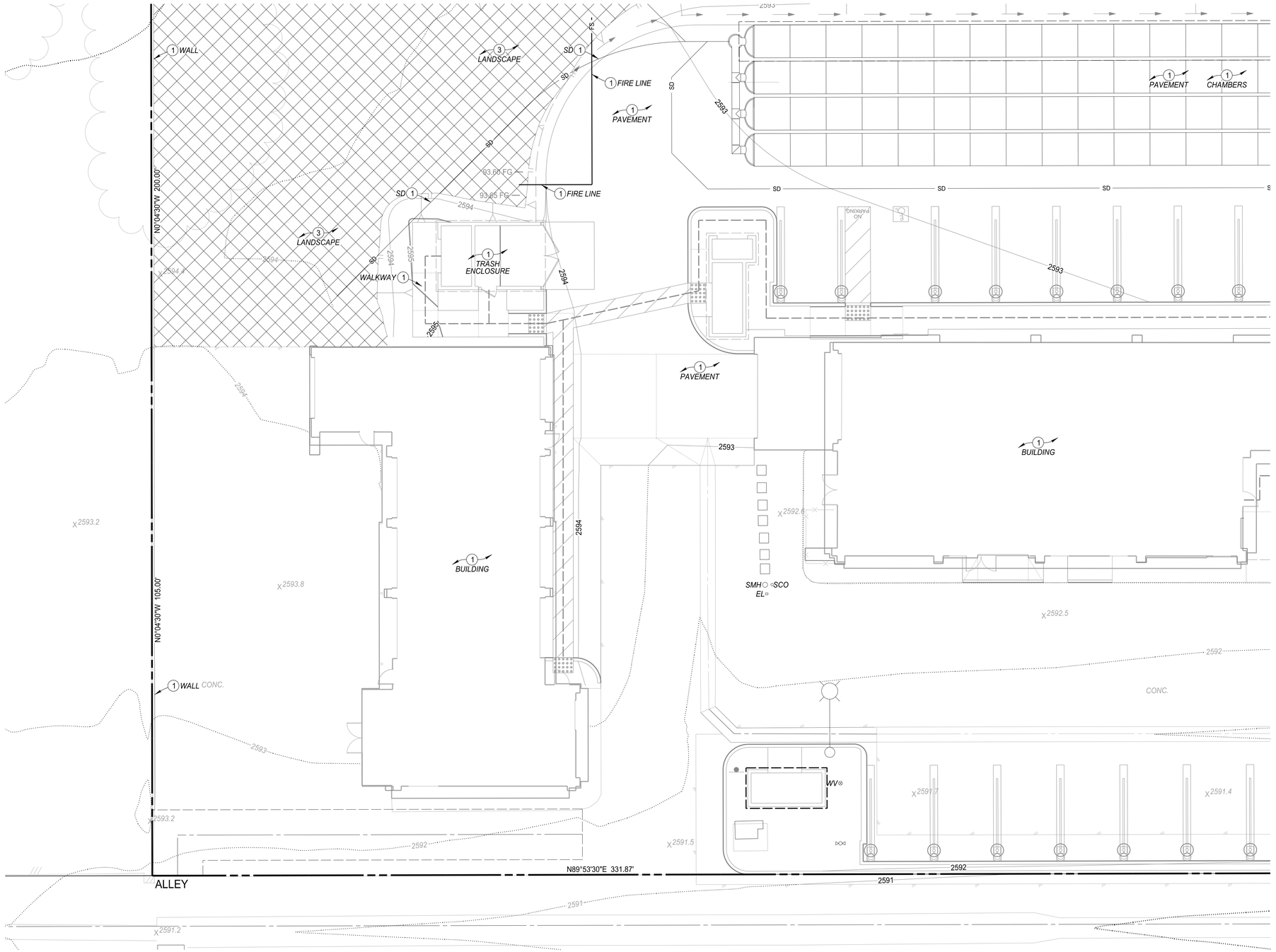
JOB 2019_23 PLOTTED: 17-OCT-2022



CONSTRUCTION NOTES

(1) PROTECT IN PLACE AS NOTED

(3) REMOVE AS NOTED

DEMOLITION NOTES

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2. CONTRACTOR TO REMOVE DEBRIS AND RESIDUE.
3. DISPOSE OF DEBRIS AND TRASH CREATED DURING THE DEMOLITION PROCESS BY TRANSPORTING TO AN APPROVED LANDFILL.
4. BURYING, COVERING, OR OTHERWISE DISCARDING OF DEBRIS ON THE DEMOLITION SITE IS NOT PERMITTED.
5. ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEET FLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES OR WIND.
6. STOCKPILES OF EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER.
7. FUELS, OILS, SOLVENTS AND OTHER TOXIC MATERIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MUST BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.
8. NON-STORM WATER RUNOFF FROM EQUIPMENT AND VEHICLE WASHING AND ANY OTHER ACTIVITY SHALL BE CONTAINED AT THE PROJECT SITE.
9. TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND.
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SCALE: 1" = 10'

10 0 10 20

WDID NO. 8 33C398692

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BENCHMARK:

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ENGINEER		REVISIONS	CITY	

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urban design and planning

ENGINEER OF WORK 17-OCT-2022
R.C.E. 51313 DATE

REGISTERED PROFESSIONAL ENGINEER — MARTEN L. ANDERSON — No. 51313 — Exp. 6-30-24 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	1" = 10'
DATE:	SEP, 2021
JOB NUMBER:	2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Date: _____
Staff Engineer

Recommended for Approval By: _____ Date: _____
Administrative Engineer

Approved By: _____ Date: _____
City Engineer/Director of Public Works

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
DEMOLITION SHEET
PHASE 2

SHEET 14 OF 20 SHEETS
FILE NO: PW2021-0785

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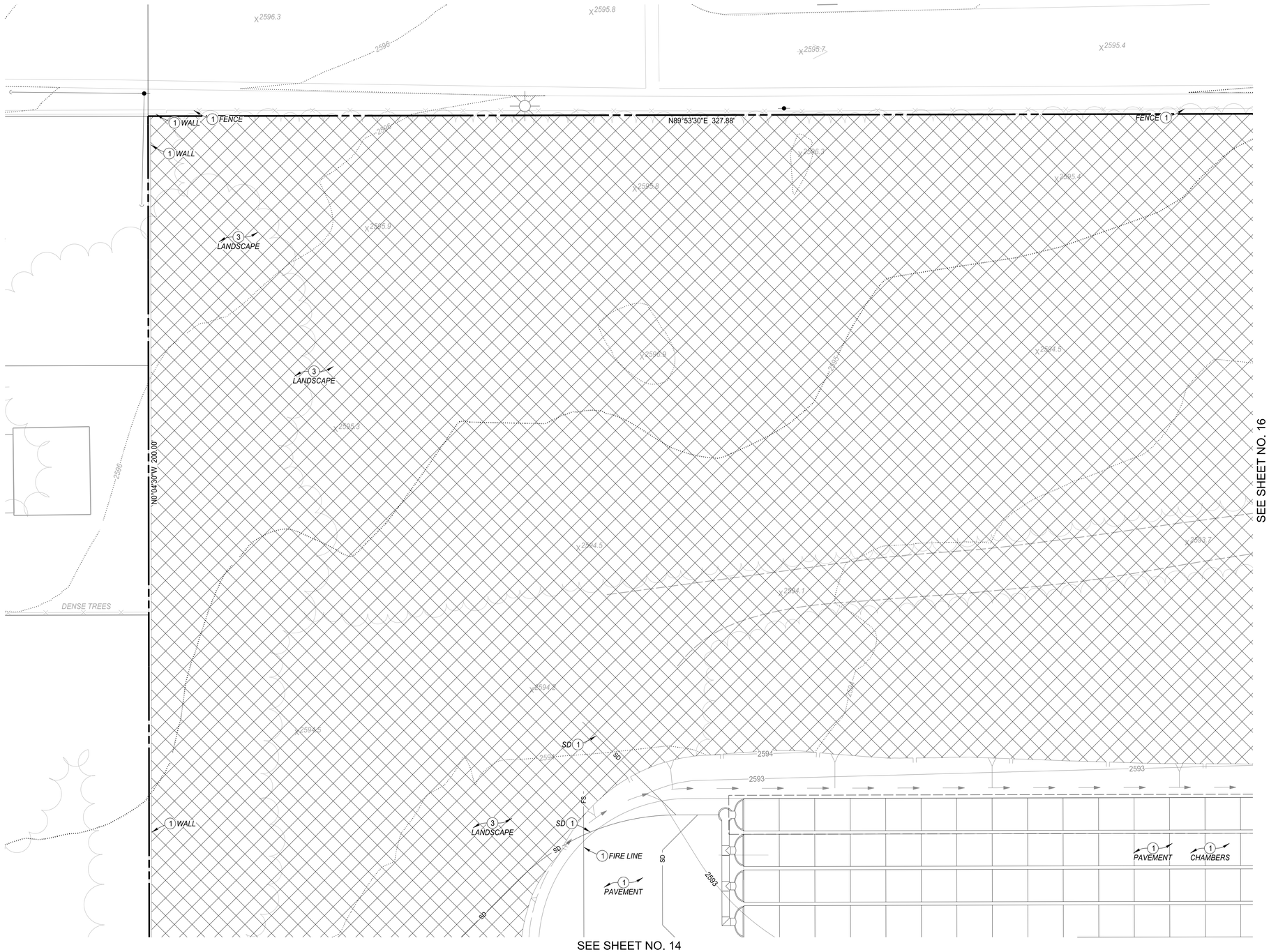
JOB 2019_23 PLOTTED:17-OCT-2022



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ENGINEER OF WORK DATE
R.C.E. 51313

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

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BEAUMONT CALIFORNIA

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Staff Engineer

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Administrative Engineer

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City Engineer/Director of Public Works

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
DEMOLITION SHEET
PHASE 2

SHEET 15 OF 20 SHEETS
FILE NO: PW2021-0785

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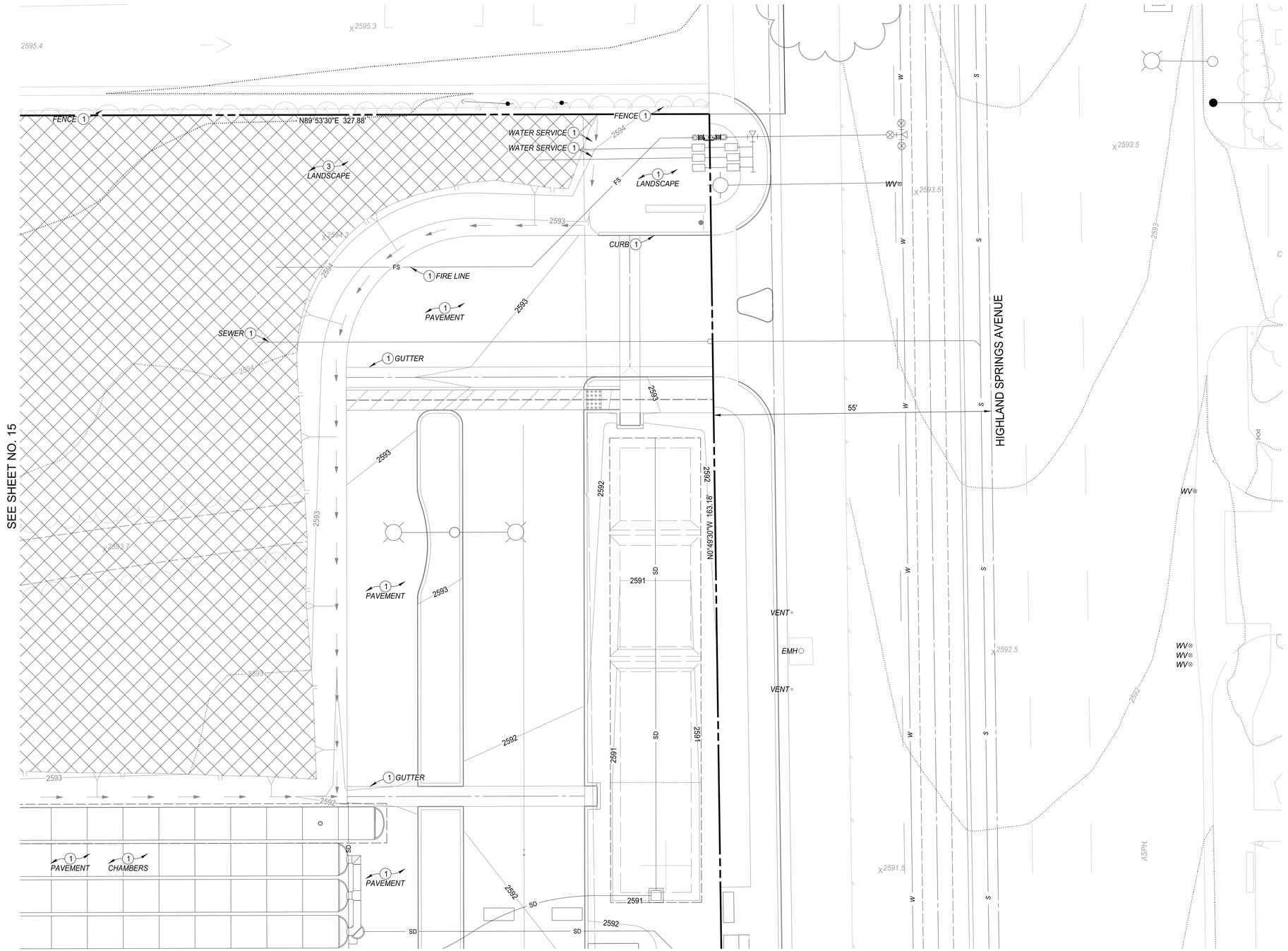
JOB 2019_23 PLOTTED: 17-OCT-2022



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BEAUMONT CALIFORNIA

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CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT DEMOLITION SHEET PHASE 2

SHEET 16 OF 20 SHEETS
FILE NO: PW2021-0785

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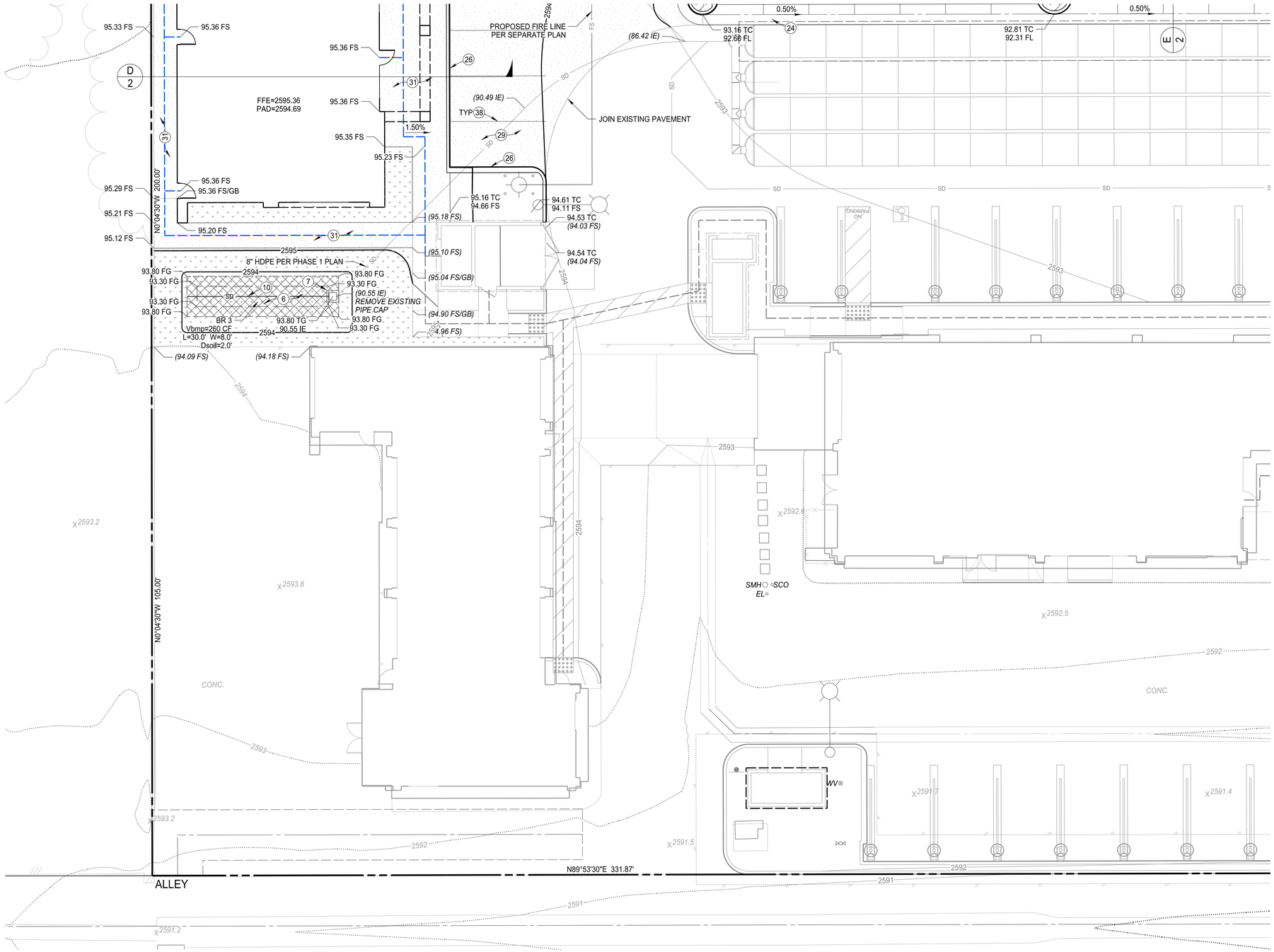
JOB 2019_23 PLOTTED: 17-OCT-2022



CONSTRUCTION NOTES

(6) CONSTRUCT BIO-RETENTION FACILITY PER DETAIL 2 ON SHEET NO. 3

(7) INSTALL JENSEN PRECAST 18"X18" DROP INLET WITH PEDESTRIAN FRAME AND GRATE OR APPROVED EQUAL, WITH FLOGARD CATCH BASIN INSERT FILTER FGP-18F, OR APPROVED EQUAL

(10) INSTALL 6" ADS N-12 OR PVC PERFORATED PIPE

(24) CONSTRUCT 4' RIBBON GUTTER PER DETAIL 7 ON SHEET NO. 3

(26) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204

(29) PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%

(31) PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC

(38) APPLY 4" WIDE WHITE STRIPE

CAUTION:

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10 0 10 20

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PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRUCTION SHEET PHASE 2

SHEET 17 OF 20 SHEETS
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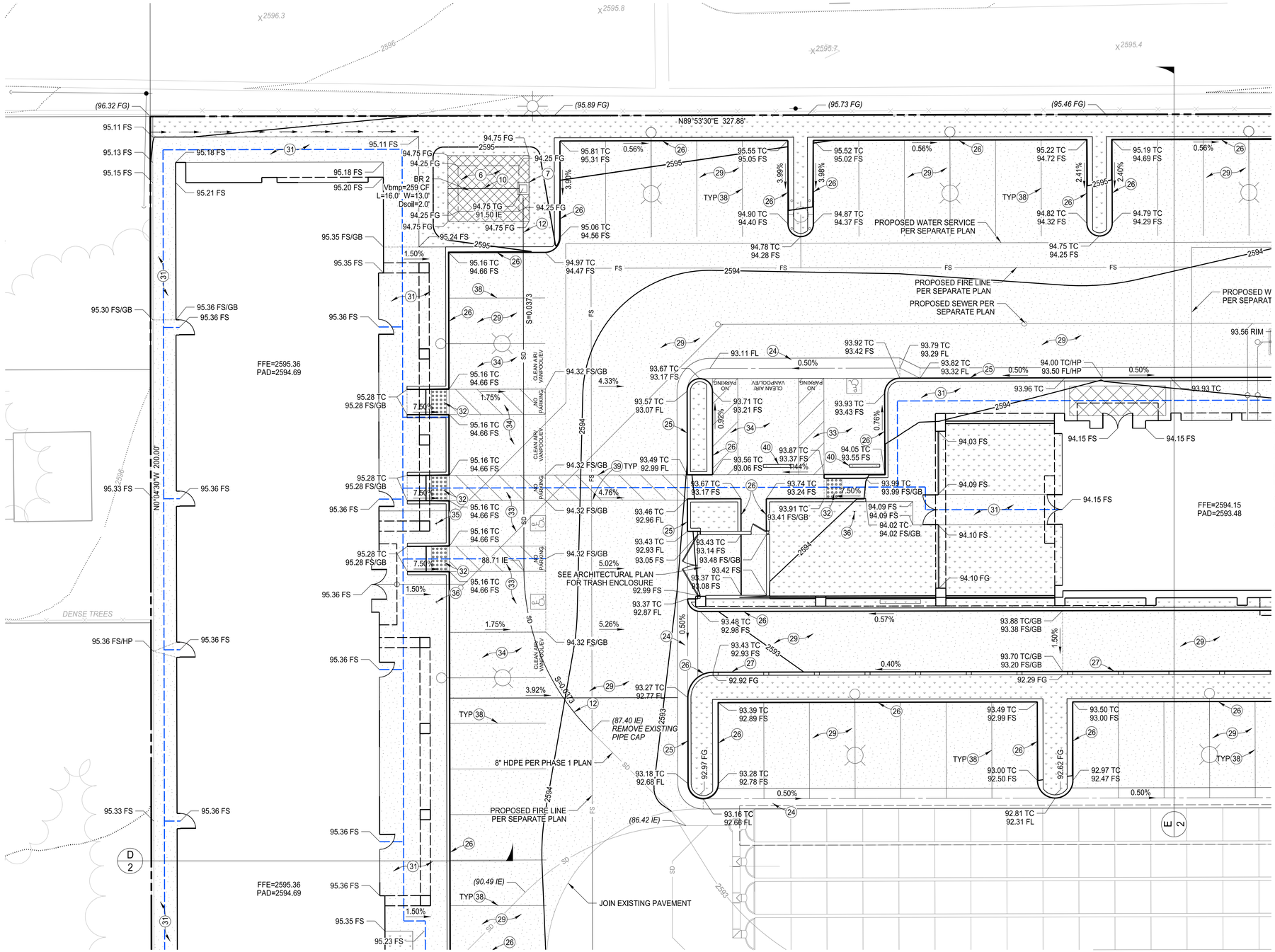

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(24) CONSTRUCT 4' RIBBON GUTTER PER DETAIL 7 ON SHEET NO. 3
(25) CONSTRUCT TYPE A-6 CURB PER COUNTY OF RIVERSIDE STD NO. 200
(26) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204
(27) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204 WITH CURB OPENINGS PER DETAIL 8 ON SHEET NO. 4
(29) PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%
(31) PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC
(32) INSTALL DETECTABLE WARNINGS PER CBC 11B-705
(33) APPLY ACCESSIBLE PARKING STRIPING PER DETAIL 9 ON SHEET NO. 4
(34) APPLY CLEAN AIR/VANPOOL/EV PARKING STRIPING PER DETAIL 10 ON SHEET NO. 4
(35) INSTALL ACCESSIBLE PARKING SIGNAGE PER DETAIL 10 ON SHEET NO. 4
(36) INSTALL VAN ACCESSIBLE PARKING SIGNAGE PER DETAIL 11 ON SHEET NO. 4
(37) INSTALL PARKING LOT ENTRY SIGNAGE PER DETAIL 12 ON SHEET NO. 4
(38) APPLY 4" WIDE WHITE STRIPE
(39) APPLY 4" WIDE BLUE STRIPE
(40) INSTALL JENSEN PRECAST 6' STANDARD PARKING CURB PER MANUFACTURER'S INSTRUCTIONS

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SHEET 18 OF 20 SHEETS
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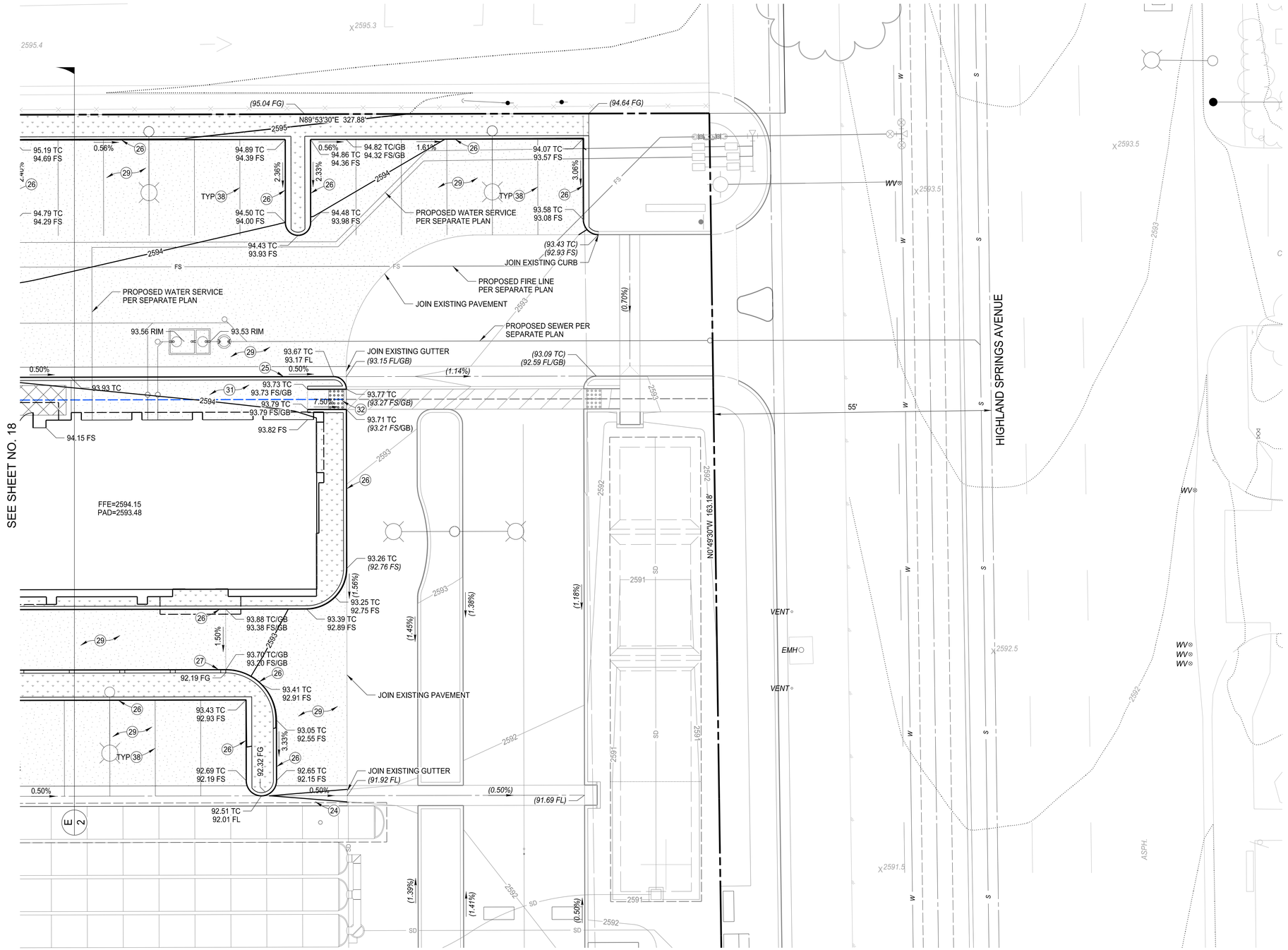

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(26) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204
(27) CONSTRUCT 6" TYPE "D" CURB PER COUNTY OF RIVERSIDE STD NO. 204 WITH CURB OPENINGS PER DETAIL 8 ON SHEET NO. 4
(29) PLACE 6" CLASS 560-C-3250 PCC PAVEMENT PER SSPWC OVER 12" NATIVE SUB-GRADE COMPACTED TO 95%
(31) PLACE 4" CLASS 520-A-2500 PCC PAVEMENT PER SSPWC
(32) INSTALL DETECTABLE WARNINGS PER CBC 11B-705
(38) APPLY 4" WIDE WHITE STRIPE

CAUTION:
EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD PRIOR TO START OF CONSTRUCTION.

SCALE: 1" = 10'
10 0 10 20

WDID NO. 8 33C398692

811 Know what's below. Call before you dig.
Call at least 2 working days prior to excavating.

BENCHMARK:
SEE SHEET NO. 1

BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS		CITY

MTH2 engineering inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-21990
www.mth2engineering.com
civil • water resources • storm water
urban design and planning

17-OCT-2022
ENGINEER OF WORK DATE
R.C.E. 51313

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

DESIGN BY: MTH2
DRAWN BY: MTH2
CHECKED BY: MTH2
SCALE: 1" = 10'
DATE: SEP, 2021
JOB NUMBER: 2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Date: _____
Staff Engineer
Recommended for Approval By: _____ Date: _____
Administrative Engineer
Approved By: _____ Date: _____
City Engineer/Director of Public Works

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St.
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
PRECISE GRADING PLANS FOR:
HIGHLAND SPRINGS REMODEL AND DEVELOPMENT CONSTRCUTION SHEET PHASE 2

SHEET 19 OF 20 SHEETS
FILE NO: PW2021-0785

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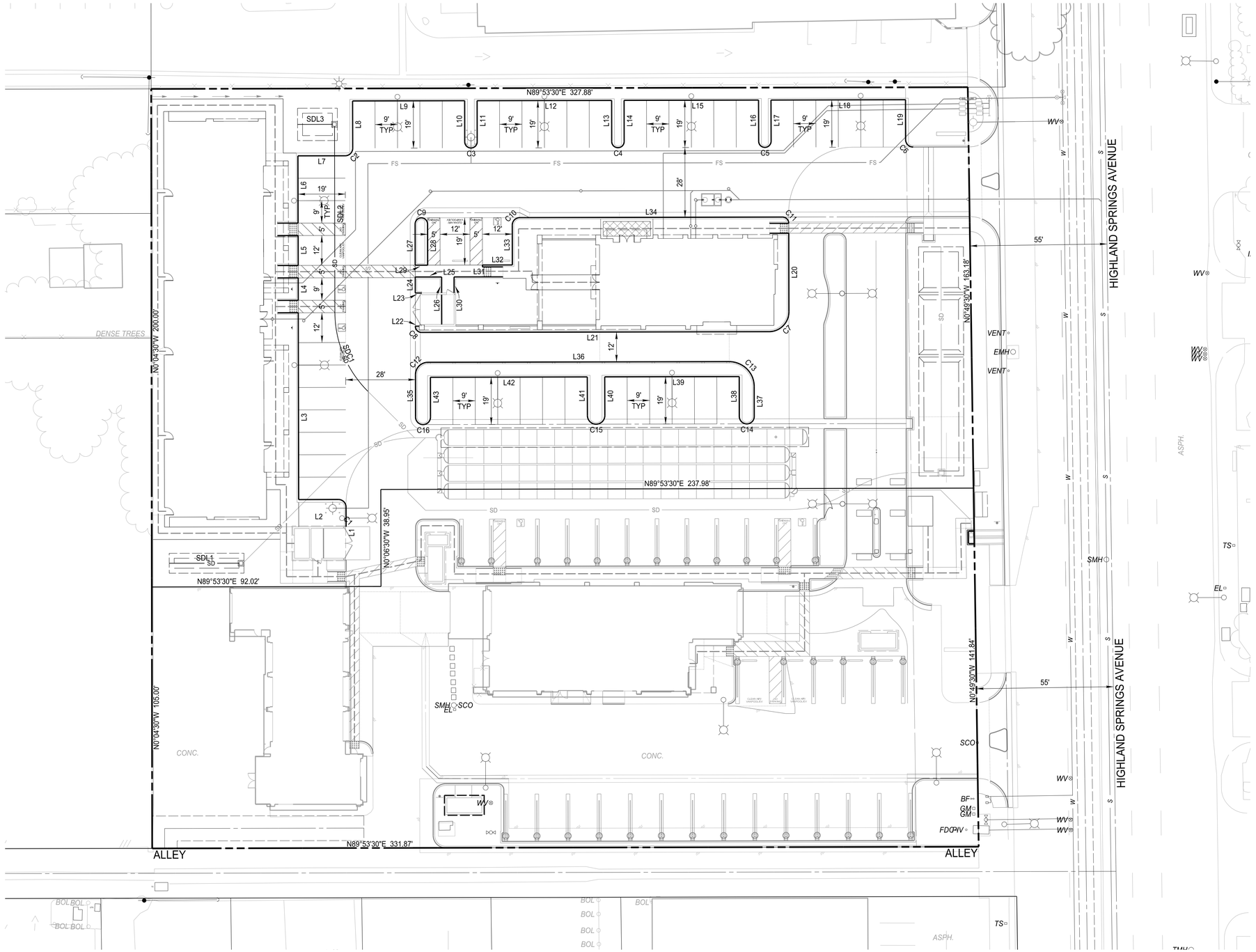
JOB 2019_23 PLOTTED: 17-OCT-2022



Line Table

Name	Length	Direction
L1	3.00'	N0°07'25"W
L2	16.00'	N89°52'35"E
L3	84.00'	N0°07'25"W
L4	9.00'	N0°07'25"W
L5	12.00'	N0°07'25"W
L6	27.00'	N0°07'25"W
L7	19.00'	N89°52'35"E
L8	19.00'	N0°07'25"W
L9	45.00'	N89°52'35"E
L10	16.50'	N0°07'25"W
L11	16.50'	N0°07'25"W
L12	54.00'	N89°52'35"E
L13	16.50'	N0°07'25"W
L14	16.50'	N0°07'25"W
L15	54.00'	N89°52'35"E
L16	16.50'	N0°07'25"W
L17	16.50'	N0°07'25"W
L18	54.00'	N89°52'35"E
L19	16.00'	N0°07'25"W
L20	31.50'	N0°07'25"W
L21	139.50'	N89°52'35"E
L22	1.58'	N89°52'35"E
L23	2.58'	N89°52'35"E
L24	6.42'	N0°07'25"W
L25	10.58'	N89°52'35"E
L26	6.42'	N0°07'25"W
L27	16.50'	N0°07'25"W
L28	16.50'	N0°07'25"W
L29	5.00'	N89°52'35"E
L30	6.33'	N0°07'25"W
L31	19.63'	N89°52'35"E
L32	12.00'	N89°52'35"E
L33	16.00'	N0°07'25"W
L34	105.50'	N89°52'35"E
L35	17.00'	N0°07'25"W
L36	121.00'	N89°52'35"E
L37	12.00'	N0°07'25"W
L38	16.00'	N0°07'25"W
L39	54.00'	N89°52'35"E
L40	15.50'	N0°07'25"W
L41	15.50'	N0°07'25"W
L42	63.00'	N89°52'35"E
L43	16.00'	N0°07'25"W

Curve Table

Name	Delta	Radius	Arc Length	Tangent Length
C1	90°00'00"	3.00'	4.71'	3.00'
C2	90°00'00"	3.00'	4.71'	3.00'
C3	180°00'00"	2.50'	7.85'	---
C4	180°00'00"	2.50'	7.85'	---
C5	180°00'00"	2.50'	7.85'	---
C6	90°00'00"	3.00'	4.71'	3.00'
C7	90°00'00"	8.00'	12.57'	8.00'
C8	90°00'00"	2.50'	3.93'	2.50'
C9	180°00'00"	2.50'	7.85'	---
C10	90°00'00"	3.00'	4.71'	3.00'
C11	90°00'00"	2.50'	3.93'	2.50'
C12	90°00'00"	5.00'	7.85'	5.00'
C13	90°00'00"	10.00'	15.71'	10.00'
C14	180°00'00"	3.00'	9.42'	---
C15	180°00'00"	3.50'	11.00'	---
C16	180°00'00"	3.00'	9.42'	---

Storm Drain Line Table

Name	Length	Direction
SDL1	28.08'	N89°56'20"E
SDL2	74.65'	N0°07'25"W
SDL3	14.08'	N89°52'35"E

Storm Drain Curve Table

Name	Delta	Radius	Arc Length	Tangent Length
SDC1	45°00'00"	45.00'	35.34'	18.64'

CAUTION:

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SCALE: 1" = 20'

20 0 20 40

WDID NO. 8 33C398692

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BENCHMARK:

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BY	MARK	DESCRIPTION	APPR.	DATE
ENGINEER		REVISIONS		CITY

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506
(951) 850-2190
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civil • water resources • storm water
urban design and planning

17-OCT-2022
ENGINEER OF WORK DATE
R.C.E. 51313

REGISTERED PROFESSIONAL ENGINEER
MARTEN L. ANDERSON
No. 51313
Exp. 6-30-24
CIVIL
STATE OF CALIFORNIA

DESIGN BY:	MTH2
DRAWN BY:	MTH2
CHECKED BY:	MTH2
SCALE:	1" = 20'
DATE:	SEP. 2021
JOB NUMBER:	2019_23

BEAUMONT CALIFORNIA

Reviewed By: _____ Staff Engineer Date: _____

Recommended for Approval By: _____ Administrative Engineer Date: _____

Approved By: _____ City Engineer/Director of Public Works Date: _____

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St.
Beaumont, CA. 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA

PRECISE GRADING PLANS FOR:

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT

HORIZONTAL CONTROL SHEET PHASE 2

SHEET 20 OF 20 SHEETS

FILE NO: PW2021-0785

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JOB 2019_23 PLOTTED: 17-OCT-2022

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

SOIL
EXPLORATION
COMPANY, INC.

Soil Engineering, Environmental Engineering, Materials Testing, Geology

March 16, 2020

Project No. 19137-01

TO: Ali Harb
Harkon, Inc.
18651 Van Buren Blvd.
Riverside, CA 92508

SUBJECT: Preliminary Soil Investigation and Infiltration Tests Report, Proposed Office Complex, 675 and 695 N. Highland Springs Ave (APN 419-150-026, & -027), City of Beaumont, California

Introduction

In accordance with your authorization, Soil Exploration Co., Inc. has performed a preliminary soil investigation and infiltration tests for the subject site (see Figure 1, Site Location Map). The accompanying report presents a summary of our findings, conclusions, recommendations and limitations of our work for construction of the proposed office complex and associated parking and driveway(s).

Scope of Work

- Review soils, geologic, seismic, groundwater data and maps in our files.
- Perform exploration of the site by means of four 8" diameter borings, 16.5 to 25 feet deep, at readily accessible locations.
- Field Engineer (California Registered RCE) for logging, sampling of select soils, observation of excavation resistance, record SPT blow counts and water seepage (if any).
- Perform basic laboratory testing on select soil samples, expected to include moisture, density, sand equivalent, expansion index and water soluble sulfates.
- Perform digitized search of known faults within a 50-mile radius of the site.
- Determine California Building Code (CBC) 2019 seismic parameters for the site.
- Consult with project architect/civil design engineer.
- Perform four shallow infiltration tests at locations suggested by you.
- Prepare a report of our findings, conclusions and recommendations for site preparation, including overexcavation/removal depth, allowable bearing value, foundation/slab-on-grade depth/thickness recommendations, excavation characteristics, lateral static/seismic earth pressures for retaining walls design, general grading and grading specifications, California Building Code (2019) seismic design coefficient, Cal/OSHA soil classification and infiltration rate in inches/hour.

Existing Site Condition

The rectangular shaped, relatively flat, vacant site is located on the east side of N. Highland Spring Ave. and north of E. 6th St. in the City of Beaumont, Riverside County, California. N. Highland Spring Ave. is a paved road with curbs and gutters. A chain link fence borders the site on the north and west side. A medical and dental building is located on adjacent property to the north, a car wash to the south and an existing house to the west. Vegetation consists of dense weeds, scattered trees and debris.

The approximate locations of the above and other features are shown on Exploratory Boring and Infiltration Tests Location Map (Plate 1).

Proposed Development

We understand a proposed 1-story office building, drive-thru restaurant building, an extension of the existing car wash building, facade enhancements to the existing vehicle service building, and associated site improvements are proposed at the site. Construction of the proposed site will be phased. We understand the proposed structures will be wood framed construction with concrete slabs supported on prepared subgrade. Based on the relatively flat topography of the site, modest cut or fill grading and no permanent significant cut or fill slopes are proposed. A minor temporary cut slope will be created as a part of the first construction phase.

Field Work

Four exploratory borings were drilled on February 14, 2020, to a maximum depth of 20 feet below existing ground surface, utilizing a B-53 mobile drill rig equipped with 8-inch diameter hollow stem auger. Refer to Plate 1 for boring locations. Standard Penetration Tests (SPT) blow counts were recorded for the earth materials. Relatively undisturbed samples of the soils were also obtained by utilizing California Ring Sampler.

In general these borings revealed that the site area is underlain by alluvial soils consisting of silty sand (USCS "SM"}. The earth materials are loose to very dense. Geologic Map of the Beaumont Quadrangle shows the site area is underlain with alluvial-fan deposits (see Figure 2). Detailed descriptions of the earth materials encountered are presented in the form of Geotechnical Boring Logs in Appendix B.

Laboratorv Testing

Laboratory tests were performed for select soils samples. The tests consisted primarily of natural moisture contents, dry density and water soluble sulfates. Laboratory test results are presented in Appendix C and with Geotechnical Boring Logs in Appendix B.

Groundwater/Liquefaction

Groundwater, seepage or wet soils were not encountered in our exploratory borings, drilled to a maximum depth of 20 feet, at the time this work was performed. Groundwater study is not within the scope of this work. However groundwater data from State well in the vicinity of the site is tabulated below (see Figure 1, Site Location Map, for location of well):

State Well No.	WSE* (ft)	Date Measured	Distance/Location Relative to Site	Estimated Depth of Water Below Site (ft)
03S01W01NOOS	2300.09	12/3/1930	N/0.33 miles	308.3
	2240.89	10/26/1999		367.5
03S01W12E001S	2191.4	11/17/2000	SEJ0.13 miles	401
	2189.27	11/06/2017		390.73

• WSE = Water Surface Elevation

Liquefaction occurs when loose, fine grained (poorly graded), saturated cohesionless soils are subject to ground shaking during an earthquake of large magnitude. Liquefaction potential in general is relatively high when the ground water table is less than thirty feet below ground surface. Based on the Riverside County GIS map, the site is located in a zone of low liquefaction potential (see Figure 3). Considering depth to groundwater (over 300 feet below ground surface), the potential for liquefaction at the site is very low.

Seismicity/Faulting

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone or County of Riverside fault zone.

A computer search of known Quaternary major faults within 50 miles of the site from USGS National Seismic Hazard Maps is presented in Appendix D. Please note that it is probable that not all-active or potentially active faults in the region have been identified. Furthermore, seismic potential of the smaller and less notable faults is not sufficiently developed for assignment of maximum magnitudes and associated levels of ground shaking that might occur at the site due to these faults.

Conclusions

- Any vegetable matter, existing structures, old foundations, seepage pits, leach lines, septic tanks, old fills, buried utilities/irrigation lines, etc. and deleterious materials associated with previous use of the site would require removal from the proposed building/grading areas.

- Overexcavation and recompaction of loose/porous surficial soils should be anticipated to provide adequate and uniform support for the proposed building(s), pavement and settlement sensitive improvements. All earth materials encountered during our exploration can be excavated with normal grading equipment in good working condition.

- Based on observations and soil classification, the expansion potential of the sandy foundation soils at the site is expected to be very low (EI<20).

- Subsequent to site preparation the use of shallow spread footings appears feasible for the proposed construction.

- Site is located approximately 6.70 miles from the San Jacinto fault. The site is located in a region of generally high seismicity, as is all of Southern California. During its design life, the site is expected to experience moderate to strong ground motions from earthquakes on regional and/or nearby causative faults.

- There is a 2 percent probability in 50 years (2475 year return period) that site modified peak ground acceleration (PGAm) at the site will be 0.917g (see Appendix D).

- Based on Riverside County GIS map, the site is in an area of low liquefaction potential (see Figure 3).

- Flooding potential of the site should be determined by the design civil engineer and considered in planning and construction.

- The potential for seismically induced dynamic settlement of the onsite sandy soils during a strong earthquake is low, however cannot be precluded. This would be partially mitigated by overexcavation and recompaction of the upper foundations soils.

- Groundwater and/or seepage were not encountered during our subsurface investigation. Our experience indicates that surface or near-surface groundwater conditions can develop in areas where groundwater conditions did not exist prior to site development, especially in areas where a substantial increase in surface water infiltration results from landscape irrigation. We have no way of predicting depth to the groundwater which may fluctuate with seasonal changes and from one year to the next due to precipitation, irrigation, land use, climatic conditions as well as other factors. Subdrains, horizontal drains or other devices may be recommended in future for graded areas that exhibit nuisance seepage conditions.

Recommendations

Site Preparation/Overexcavation

All grading and backfills should be performed in accordance with City of Beaumont Grading Ordinance and the attached General Earthwork and Grading Specifications (Appendix E), except as modified in the text of this report. The proposed grading area should be cleared of existing structures, vegetation and deleterious material which should be hauled off site.

New buildings/structures should be provided with a compacted fill mat that extends to at least 5 feet beyond the structure lines in plan (where practical) and to a depth of at least 3 feet below existing ground or proposed grade, whichever is deeper. The excavated bottoms should be cleaned of roots, soft spots, deleterious materials, old fills, etc. As a result, deeper excavations should not be precluded. After cleaning of the excavated bottom, the exposed surfaces should be further scarified to a depth of at least 6 inches, thoroughly watered and recompacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557-12 Test Method, prior to placement of fill. All fills should be compacted to at least 90 percent of the maximum dry density.

Compacted Fills/Imported Soils

Any soil to be placed as fill, whether presently onsite or import, should be approved by the soil engineer or his representative prior to its placement. All onsite soils to be used as fill should be cleansed of any roots or other deleterious materials. Cobbles larger than 3 inches in diameter should not be placed in the vicinity of foundations and for utility line backfills. All fills should be placed in 6 to 8 inch loose lifts, thoroughly watered, mixed and compacted to at least 90 percent relative compaction. This is relative to the maximum dry density determined by ASTM 1557-12 Test Method.

Any imported soils should be sandy (preferably (USCS "SM" or "SW" and very low in expansion potential, EI<20) and approved by the soil engineer. The soil engineer or his representative should observe the placement of fill and take sufficient tests to verify the moisture content and the uniformity and degree of compaction obtained.

Foundation Design/Footings

Following site preparation, the use of shallow spread footings is feasible. A maximum allowable bearing value of 2000 psf is recommended. This bearing pressure has been established based on the assumption that the footings will be embedded at least 18 inches below lowest adjacent firm grade and into the onsite compacted soil mat, and measure at least 15 inches in width. Isolated column footings should be embedded at least 24 inches below lowest adjacent firm grade. This bearing value may be increased by one third for temporary (wind or seismic) loads. Reinforcement of the footings should be determined by qualified structural engineer, however minimum reinforcement of two No. 5 bars at top and two at bottom of continuous footings is recommended.

Concrete Slabs-On-Grade

Floor slabs-on-grade should be at least 4 inches thick and should be reinforced with at least No. 3 bars at 18-inches on-center both ways, properly centered in mid-thickness of slabs (structural recommendations govern). Thicker slabs (at least 8 inches thick and supported on 4-inch thick aggregate base) should be considered for canopy area and driveways by structural design engineer based on the use of facilities.

A moisture barrier comprised of 10-mil Visqueen underlain with 2-inches of sand below the Visqueen should be provided for office areas and where moisture intrusion from slabs-on-grade is objectionable. The Visqueen member should be lapped and sealed around all utility conduits. We recommend that a slipsheet (or equivalent) be utilized if grouted tiles or other crack sensitive flooring (such as marble tiles) is planned directly on concrete slabs.

Concrete Joints

The joints spacing for concrete slabs should be determined by the project architect. Joints should be laid out to form approximately square panels (equal transverse and longitudinal joint spacing). Rectangular panels, with the long dimension no more than one-and-one-half times the short, may be used when square panels are not feasible. The depth of longitudinal and transverse joints should be one-fourth the depth of the slab thickness.

Joint layout should be adjusted so that the joints will line up with the corners of structures, small foundations and other built-in structures. Acute angles or small pieces of slab curves as a result of joints layout should not be permitted.

Concrete Slump/Curing

The use of mechanically compacted/dense concrete with slump not exceeding 4 inches is recommended. Fresh concrete should be cured by protecting it against loss of moisture, rapid temperature change, and mechanical injury for at least 3 days after placement. Moist curing, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used. After finishing operations have been completed, the entire surface of the newly placed concrete should be covered by whatever curing medium is applicable to local conditions and approved by the engineer. The edges of concrete slabs exposed by the removal of forms should be protected immediately to provide these surfaces with continuous curing treatment equal to the method selected for curing the slab surfaces. The contractor should have at hand and ready to install before actual placement begins the equipment needed for adequate curing of the concrete.

Special Considerations/Excess Soils From Foundation Excavations

Excess soils generated from foundation excavations should not be placed on slabs and driveways without proper moisture and compaction. Slab subgrade should be verified to contain 1.2 times the soil optimum moisture content to a depth of 6 inches prior to placement of slab building materials. Moisture content must be tested in the field by the soil engineer. The addition of fiber mesh in the concrete and careful control of water/cement ratios may lessen the potential for slab cracking.

In hot or windy weather (80°F or 12 mph), the contractor must take appropriate curing precautions after the placement of concrete. The use of mechanically compacted low slump concrete (not exceeding 4 inches at the time of placement) is recommended.

Lateral Earth Pressures

The following lateral earth pressures and soil parameters in conjunction with the above recommended bearing value (2000 psf), may be used for design of canopy caissons and retaining walls with free draining compacted backfills. If passive earth pressure and friction are combined to provide required resistance to lateral forces, the value of the passive pressure should be reduced to two-thirds the following recommendations:

Active Earth Pressure with level backfill (P_a)	35 pcf (EFP), drained, yielding
At Rest Pressure (P_o)	55 pcf (EFP), drained, non-yielding (part of building wall)
Passive Earth Pressure (P_p)	250 pcf (EFP), drained, maximum of 2500 psf
Horizontal Coefficient of Friction (μ)	0.30
Unit Soil Weight (γ_t)	120 pcf
Skin Friction Value (caissons)	300 psf/foot of bounding area of caisson

We recommend drainage for retaining walls to be provided in accordance with Plate 2 of this report. Maximum precautions should be taken when placing drainage materials and during backfilling. Retaining walls should be waterproofed in accordance with project architect recommendations. All wall backfills should be properly compacted to at least 90 percent relative compaction.

Seismic Considerations

The site is located approximately 6.70 miles from the San Jacinto fault. The site soils class is D. Moderate to strong ground shaking can be expected at the site and there is a 2 percent probability in 50 years (2475 year return period) that site modified peak ground acceleration (PGAm) will be 0.917g. The site soil profile is Class D (stiff soils). The structural engineer should consider City/County local codes, California Building Code (CBC) 2019 seismic data presented in this report (Appendix D), the latest requirements of the Structural Engineers Association of Southern California and any other pertinent data in selecting design parameters.

Expansion Index and Soluble Sulfates

Based on observation and soil classification, the expansion potential of the onsite soils is anticipated to be very low (EI<20).

Results of tests also performed by Cal Land Engineering, Inc. of Brea, California on a select soil sample indicate moderate soluble sulfate exposure (0.18 percent water soluble sulfates by weight) (see Appendix C). Concrete, mix, placement and curing for concrete should comply with ACI guidelines. Based on sulfate test results, cement type II maximum water cement ration of 0.50 and minimum 4000psf compression strength should be used. Ferrous metal pipes should be protected in accordance with recommendations of your structural or corrosion engineer.

Surface Drainage/Groundwater

The surface of the site should be graded to provide positive drainage away from structures and foundations. Drainage should be directed to established swales and then to appropriate drainage structures to minimize the possibility of serious erosion. Surface drainage must be directed and maintained away from the foundations. Water, either natural or by irrigation, should not be permitted to pond or saturate the surface soils.

Pavement Design/Subgrade-Base Compaction

On the basis of laboratory classification, we are of the opinion that the tentative new pavement design may be based on an R-value on the order of 30 (or better) corresponding to near surface soils. Considering this and based on typical traffic indices, the recommended pavement sections are outlined as follows:

Location	TI	Recommended Tentative Pavement Thickness
Heavy Truck/Traffic	6.5	4" asphalt concrete over 8" Class II aggregate base
Concrete Pad Areas	---	8" PCC over 4" Class II aggregate base
Vehicle Drive Area	5.5	3" AC over 7" aggregate base
Parking Area	4.5	3" AC over 4" aggregate base

The upper at least 12 inches of pavement subgrade soils should be recompacted to at least 95 percent relative compaction per maximum dry density determined by ASTM D1557-12. The aggregate base should also be compacted to at least 95 percent relative compaction. All subgrade and base must be firm and unyielding without pumping condition prior to placement of asphalt concrete or PCC pavement. Reinforcement of the concrete pavement (with at least No. 3 bars at 18-inches on-center) and use of 4000 psi concrete should also be a consideration.

Cal/OSHA Classification/Trench Excavations/Backfills

In general Cal/OSHA classification of onsite soils appears to be Type B.

Temporary trench excavations deeper than 5 feet should be shored or sloped at 1:1 or flatter in compliance with Cal/OSHA requirements:

a.) The shoring should be designed by a qualified engineer experienced in the shoring design.

b.) The tops of any temporary unshored excavations should be barricaded to prevent vehicle and storage loads within a 1:1 line projected upward from the bottom of the excavation or a minimum of 5 feet, whichever is greater. If the temporary construction embankments, including shored excavations, are to be maintained during the rainy season, berms are suggested along the tops of the excavations where necessary to prevent runoff from entering the excavation and eroding the slope faces.

c.) The soils exposed in the excavations should be inspected during excavation by the soils engineer so that modifications can be made if variations in the soil conditions occur.

d.) All unshored excavations should be stabilized within 30 days of initial excavation.

Backfills in the utility trenches should be compacted to at least 90 percent relative compaction. Onsite earth materials will be suitable for backfills. Clean sandy materials with sand equivalent value of at least 30 must be utilized for the pipe bedding and shading zone. Placement of the trench backfill in lifts and compaction by mechanical effort should be anticipated.

Foundation Plan Review/Observations and Testing

The recommendations provided in this report are based on preliminary design information and subsurface conditions as interpreted from limited exploratory work. Soil Exploration Co., Inc. should review the foundation plans prior to construction. Our conclusions and recommendations should also be reviewed, verified during grading/construction and revised as necessary.

Soil Exploration Co., Inc. should observe and/or test at the following stages of construction:

- During all overexcavations and grading.
- Following footing excavation and prior to placement of footing materials.
- During wetting of slab subgrade and prior to placement of slab materials.
- During all trench and wall backfills.
- During subgrade and base compaction prior to paving.
- When any unusual conditions are encountered.

Final Compaction Report

A final report of compaction control should be prepared subsequent to the completion of grading. The report should include a summary of work performed, laboratory test results, and the results, locations and elevations of field density tests performed during grading.

Limitation of Investigation

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers practicing in this or similar locations. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The field and laboratory test data are believed representative of the project site; however, soil conditions can vary significantly. As in most projects, conditions revealed during grading may be at variance with preliminary findings. If this condition occurs, the possible variations must be evaluated by the Project Geotechnical Engineer and adjusted as required or alternate design recommended.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractor carry out such recommendations in the field.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In additions, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge.

This report was prepared for the client based on client's needs, directions and requirements at the time. This report is not authorized for use by and is not to be relied upon by any party except the client with whom Soil Exploration Co., Inc. contracted for the work. Use of, or reliance on, this report by any other party is at that party's risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Soil Exploration Co., Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Soil Exploration Co., Inc.

Closure

If you should have any questions or concerns regarding this report, please do not hesitate to call our office. We appreciate this opportunity to be of service.

Very truly yours,
Soil Exploration Co., Inc.

Gene K. Luu, PE 53417
Project Engineer

Distribution: [1] Addressee

Attachments:

Figure 1	Site Location Map
Figure 2	Geologic Map
Figure 3	Riverside County GIS Map
Figure 4	U.S. Geological Survey Faults Map
Plate 1	Exploratory Boring and Infiltration Test Location Map
Plate 2	Retaining Wall Backfill and Subdrain Detail
Appendix A	References
Appendix B	Geotechnical Boring Logs
Appendix C	Laboratory Test Results
Appendix D	National Seismic Hazard Maps-Source Parameters and CBC (2019) Seismic Parameters
Appendix E	General Earthwork and Grading Specifications
Appendix F	Infiltration Test Procedure and Test Results

Site Location Map

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1:36,112

0 0.25 0.5 1 mi

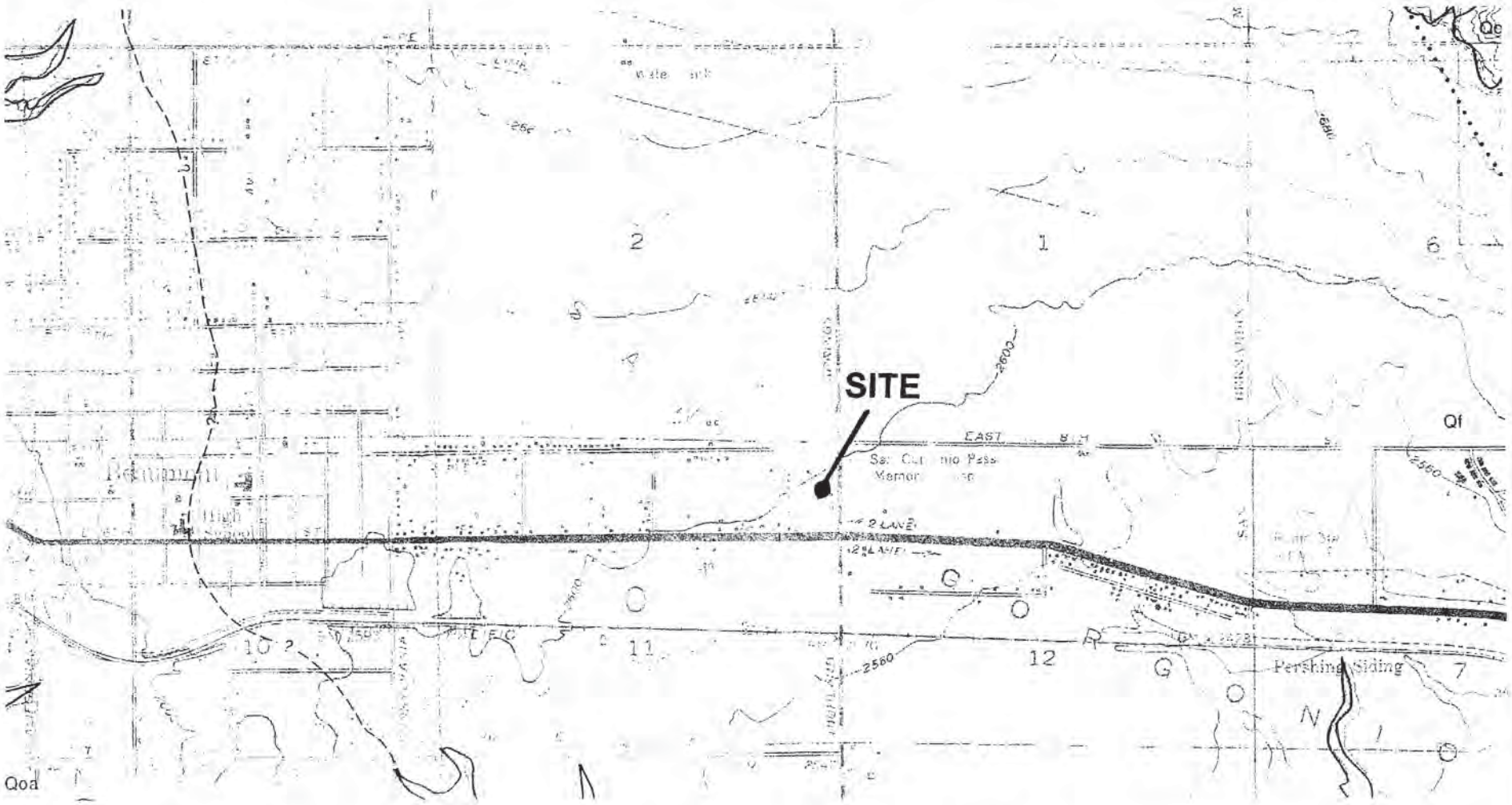
0 0.4 0.8 1.6 km

Map data © OpenStreetMap contributors, Map layer by Esri

N

Figure 1

Map data © OpenStreetMap contributors, Map layer by Esri |



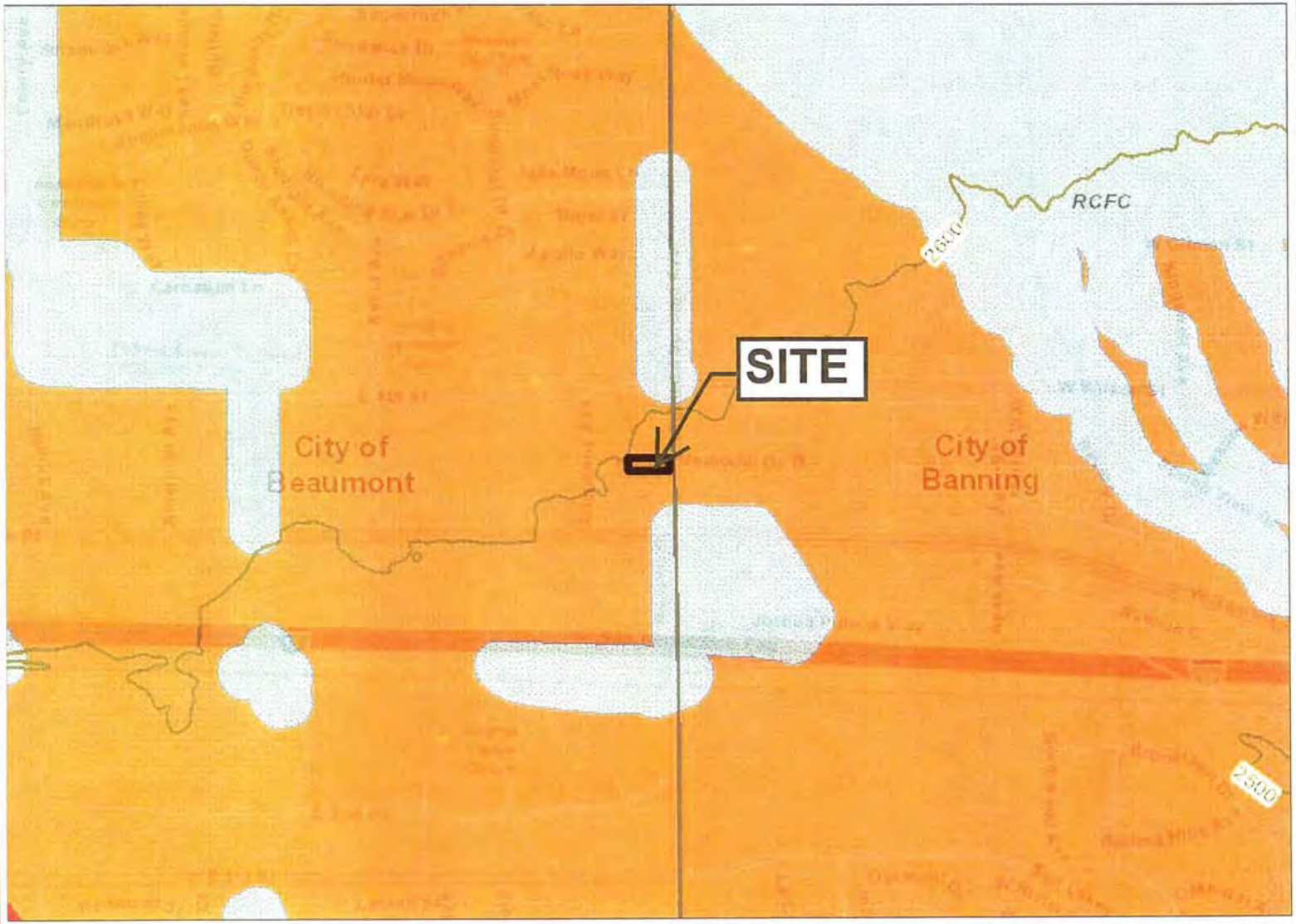
Base Map: USGS Geologic Map of the Beaumont Quadrangle, Riverside County, California.

LEGEND:

Qf: Alluvial fan of San Gorgonio Pass, sand and gravel of plutonic and gneissic detritus derived from rising San Bernardino mountains to the north.

N. Highland Springs Ave. **City of Beaumont, California** **92223**	**Soil Exploration Co., Inc.** **Project No.: 19137-01** **Date: March 16, 2020** **Figure: 2**

Map My County Map



Legend

- Contours100 ft interval (with 1(
- Faults
  - OTHER AUTHORITY
  - ALQUIST-PRIOLO
  - RIVERSIDE COUNTY
- Fault Zones
  - OTHER FAULT ZONE
  - COUNTY FAULT ZONE
  - ELSINORE FAULT ZONE
  - SAN ANDREAS FAULT ZONE
  - SAN JACINTO FAULT ZONE
- Flood
- Liquefaction
  - Other Susceptibility
  - High
  - Low
  - Moderate
  - Very High
  - Very low
- Blueline Streams
- City Areas
- World Street Map

RCIT

0 1,505 3,009 Feet

IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

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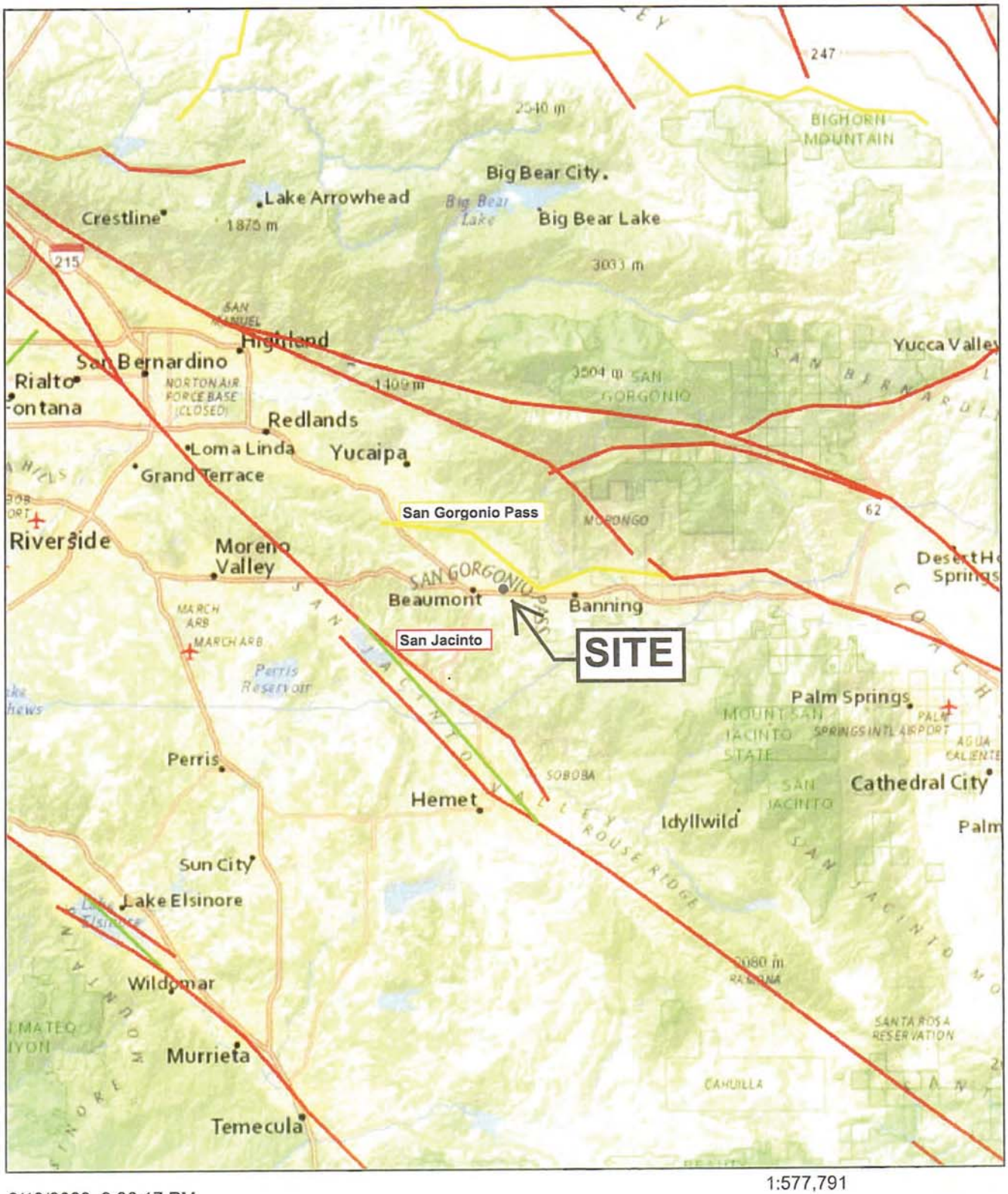
Notes

APN 419-150-026, 027

Figure 3

U.S. Geological Survey 2014 Faults



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1:577,791

0 4 8 16 mi

0 5 10 20 km

NSHM 2014 Fault Sources

Thrust

Normal

Unassigned

Strike Slip

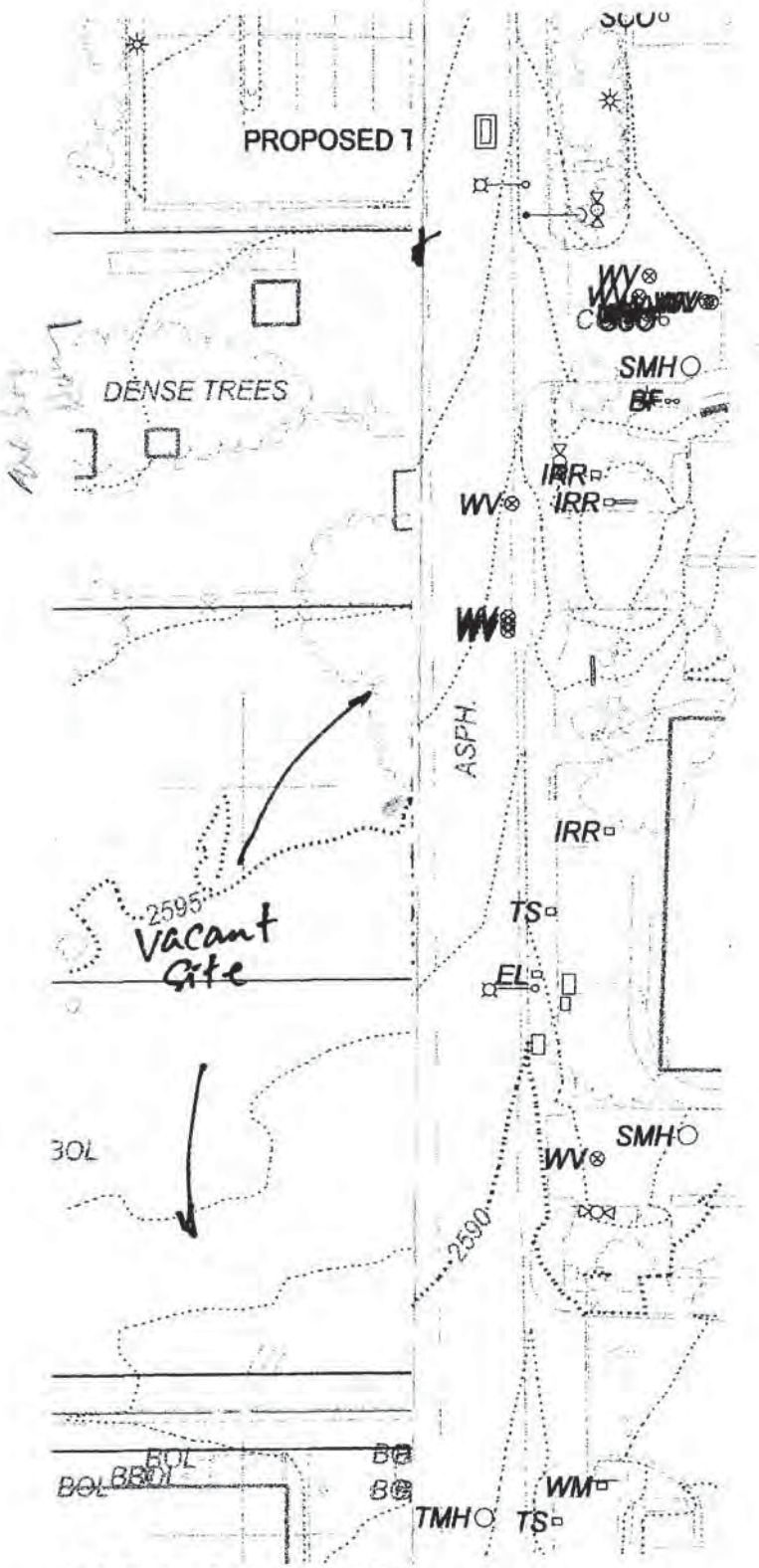
N

USGS, National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Figure 4

USGS

National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. | USGS |



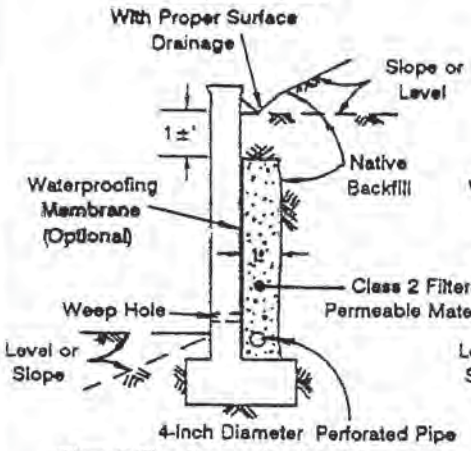
MTH2 engineering inc.
639 Lakewood
Riverside, CA 92
(951) 850-2190
www.mth2engineering.com
civil • water resources • sto
urban design and planning

SCALE: 1" = 50'

50 0 50 100

SUBDRAIN OPTIONS FOR NATIVE MATERIAL BACKFILL

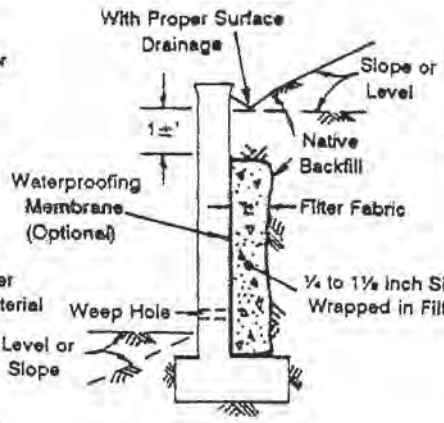
OPTION N2: Pipe Surrounded with Class 2 Material



Class 2 Filter Permeable Material Grading
Per Caltrans Specifications

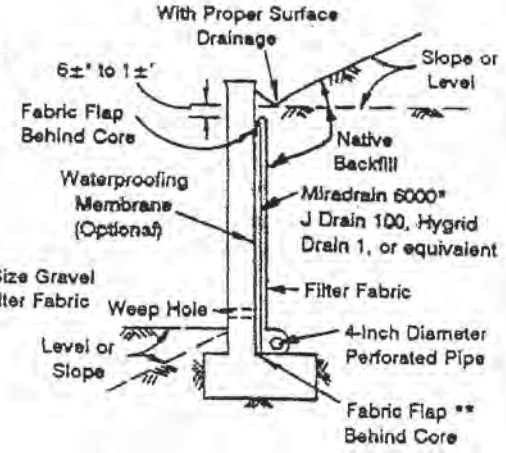
Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

OPTION N1: Gravel Wrapped in Filter Fabric



Proper Outlet Should be Provided for Gravel Subdrain (See Notes)

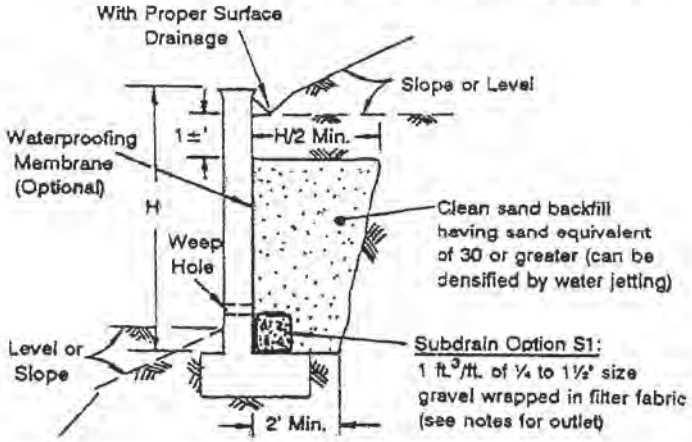
OPTION N3: Geotextile Drain

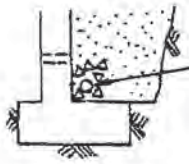


*Miradrain 6000 or J Drain 100 for non-waterproofed walls; Miradrain 6200 or J Drain 200 for completed waterproofed walls

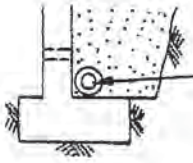
**Peel back the bottom fabric flap, place pipe next to core, wrap fabric around pipe and tuck behind core.

SUBDRAIN OPTIONS FOR CLEAN SAND BACKFILL





Subdrain Option S2:
4" diameter perforated pipe surrounded with 1 ft³/ft. of Class 2 filter material per Caltrans specifications as above



Subdrain Option S3:
4" diameter perforated pipe wrapped in filter fabric

Notes:

- Pipe type should be ASTM D1527 Acrylonitrile Butediene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down.
- Filter fabric should be Mirafi 140N, 140NS, Supac 4NP, Amoco 4545, Trevira 1114, or approved equivalent.
- All drains should have a gradient of 1 percent minimum.
- Outlet portion for gravel subdrain should have a 4"-diameter pipe with the perforated portion inserted into the gravel approximately 2' minimum and the nonperforated portion extending approximately 1' outside the gravel. Proper sealing should be provided at the pipe insertion enabling water to run from the gravel portion into rather than outside the pipe.
- Waterproofing membrane may be required for a specific retaining wall such as a stucco or basement wall.
- Weephole should be 2" minimum diameter and provided at 25' minimum in length of wall. If exposure is permitted, weephole should be located at 3±" above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to discharge through the curb face or equivalent should be provided, or for a basement-type wall, a proper subdrain outlet system should be provided. Open vertical masonry joints (i.e., omit mortar from joints of first course above finished grade) at 32" maximum intervals may be substituted for weepholes. Screening such as with a filter fabric should be provided for weepholes/open joints to prevent earth materials from entering the holes/joints.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL

Soil Exploration Co. Inc.

Plate: 2

APPENDIX A

REFERENCES

- CDMG, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, Dated February 1998.
- Riverside County GIS Map
- Geologic Map of the Beaumont Quadrangle, Riverside County, California, by Thomas W. Dibblee, Jr., 2003.
- U.S. Geological Survey Faults, 2014.
- Riverside County Stormwater Quality Best Management Practice, Design Handbook for Low Impact Development, Riverside County, June 2014.

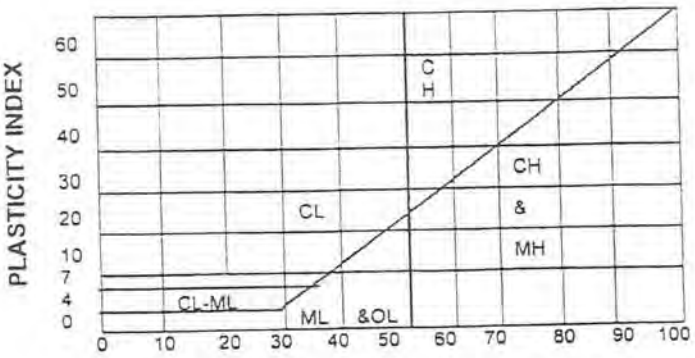
APPENDIX B

MAJOR DIVISIONS		SYMBOLS		TYPICAL NAMES
COARSE-GRAINED SOILS (More than ½ of soil < No. 200 sieve)	GRAVELS (More than ½ of coarse fraction > No. 4 sieve size)	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than ½ of coarse fraction < No. 4 sieve size)	SW		Well-graded sands or gravely sands, little or no fines
		SP		Poorly graded sands or gravelly sands, little or no fines
		SM		Silty sands, sand-salt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (More than ½ of soil < No. 200 sieve)	SILTS & CLAYS LL < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL		Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS LL > 50	MH		Inorganic silts, caceous or diatonaceous fine sandy or silty soils, elastic silts
		CH		Inorganic clays of medium to high plasticity, organic silty clays, organic silts
		OH		Organic clays of medium to high plasticity, organic silty clays, organic silts
	HIGHLY ORGANIC SOILS	Pt		Peat and other highly organic soils

CLASSIFICATION CHART
(UNIFIED SOIL CLASSIFICATION SYSTEM)

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDER	ABOVE 12"	ABOVE 305
COBBLES	3" to 12"	305 to 76.2
GRAVEL	3" to No. 4	762 to 4.76
COARSE	3" TO ¾"	76.2 to 19.1
FINE	¾"to No. 4	19.1 to 4.76
SAND	No. 4 to 200	4.76 to 0.074
COARSE	No. 4 to 10	4.76 to 2.00
MEDIUM	No. 10 to 40	2.00 to 0.420
FINE	No. 40 to 200	0.420 to 0.074
SILT & CLAY	BELOW No. 200	BELOW 0.074

GRAIN SIZE CHART



PLASTICITY CHART

Ring Sample	Bag Sample	NR No Recovery
SPT Sample	Seepage	

Classification in accordance with ASTM D2487
Description and visual observation in accordance with ASTM D2488
All Sieve Sizes shown are US Standard
SPT Refusal is defined as one of the following:
10 blows for no apparent displacement
50 blows for less than 6 inches advancement
100 blows for 6 to 18 inches advancement

GEOTECHNICAL BORING LOGS

Drill Hole No. B-1

Date: 2/14/20 **Project No.** 19137-01

Drilling Company: Larry Harklerode **Type of Rig:** B-53

Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30" **Elevation:** Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	**SILTY SAND:** Brown, fine to medium silty sand, slightly moist, loose
2							
3		X		4/5/5	11.6		Slightly moist, loose
4							
5							
6		X		7/8/9	7.8		Light brown, fine to medium, slightly moist, medium dense, porous
7							
8							
9							
10							
11		X		10/13/15			Slightly moist, medium dense
12							
13							
14							
15							
16		X		12/16/22			Yellowish light brown, slightly moist, dense
17							
18							
19		X		22/26/36			Slightly moist, very dense
20							Boring end at 20', no groundwater, no caving
21							
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-2

Date: 2/14/20 **Project No.** 19137-01

Drilling Company: Larry Harklerode **Type of Rig:** B-53

Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30" **Elevation:** Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	**SILTY SAND:** Light brown, fine to medium silty sand, slightly moist, medium dense
2							
3		■	7/15/27	119.2	10.4		Slightly moist, medium dense
4							
5							
6		■	12/27/27	110.0	8.3		Slightly moist, dense
7							
8							
9							
10							
11		☒	8/14/17				Slightly moist, dense
12							
13							
14							
15							
16		☒	12/15/22				Slightly moist, dense
17							
18							
19		☒	31/33				Yellowish light brown, fine to coarse grained, slightly moist, very dense
20							Boring end at 20', no groundwater, no caving
21							
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-3

Date: 2/14/20 **Project No.** 19137-01

Drilling Company: Larry Harklerode **Type of Rig:** B-53

Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30" **Elevation:** Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	**SILTY SAND:** Light brown, fine to medium silty sand, slightly moist, loose
2							
3		X	5/5/10		8.9		Slightly moist, medium dense
4							
5							
6		X	12/15/15		9.2		Slightly moist, medium dense
7							
8							
9							
10							
11		X	17/21/22				Slightly moist, dense
12							
13							
14		X	30/50/3"				Slightly moist, dense
15							Boring end at 15', no groundwater, no caving
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-4

Date: 2/14/20 **Project No.** 19137-01

Drilling Company: Larry Harklerode **Type of Rig:** B-53

Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30" **Elevation:** Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	**SILTY SAND:** Light brown, fine to medium silty sand, slightly moist, medium dense
2							
3		■	10/14/31	109.2	6.6		Slightly moist, dense
4							
5							
6		■	21/23/40	102.2	6.9		Slightly moist, dense
7							
8							
9							
10							
11		☒	21/28/30				Very dense
12							
13							
14		☒	40/50/5"				Yellowish light brown, dry, very dense
15							Boring end at 15', no groundwater, no caving
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

APPENDIX C

Cal Land Engineering, Inc.
dba Quartech Consultants
Geotechnical, Environmental & Civil Engineering

February 19, 2020

Soil Exploration Company Inc.
7535 Jurupa Avenue, Unit C
Riverside, California 92504

Attn: Mr. Gene Luu

RE: LABORATORY TEST RESULTS/REPORT
Client: MTH2 Engineering
Project No.: 19137-01
QCI Job No.: 20-183-002i

Gentlemen:

We have completed the testing program conducted on sample for above project. The tests were performed in accordance with testing procedures as follows:

Sample ID	Sample Depth (ft)	Sulfate CT-417 % By Weight
B-1	0-5'	0.180

We appreciate the opportunity to provide testing services to Soil Exploration Company Inc. Should you have any questions, please call the undersigned.

Sincerely yours,

Cal Land Engineering, Inc. (CLE)
dba Quartech Consultants (QCI)

Jack C. Lee, GE 2153
Principle Engineer

REGISTERED PROFESSIONAL ENGINEER
JACK C. S. LEE
2153
Exp. 3-31-21
GEOTECHNICAL
STATE OF CALIFORNIA

Matthew Au
Project Engineer

Enclosure

APPENDIX D

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

New Search

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)
6.70	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16
6.70	San Jacinto;SJV	CA	18	90	V	strike slip	0	16
6.82	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13
6.82	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14
6.82	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13
6.82	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12
6.82	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13
6.82	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13
6.82	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13
6.82	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13
6.82	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13
6.82	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13
6.82	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13
6.82	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14
6.82	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13
6.82	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13
6.82	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14

6.82	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13
6.82	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14
6.82	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14
6.82	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13
6.82	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14
6.82	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14
6.82	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13
6.82	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12
6.82	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14
7.37	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16
7.37	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16
7.37	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15
7.37	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15
7.37	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16
7.37	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15
7.37	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17
7.37	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17
7.37	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17
7.37	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15
8.50	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12
8.50	S. San Andreas;BG	CA	n/a	58		strike slip	0	13

8.61	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17
8.61	San Jacinto;A	CA	9	90	V	strike slip	0	17
8.61	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16
8.61	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15
8.61	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15
15.56	Pinto Mtn	CA	2.5	90	V	strike slip	0	16
17.70	San Jacinto;SBV	CA	6	90	V	strike slip	0	16
21.87	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13
21.87	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13
21.87	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14
21.87	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13
21.87	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13
21.87	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14
21.87	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14
28.19	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14
28.19	Elsinore;GI	CA	5	90	V	strike slip	0	13
28.21	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13
28.42	Cleghorn	CA	3	90	V	strike slip	0	16
29.18	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16
29.18	Elsinore;GI+T	CA	5	90	V	strike slip	0	14
29.18	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17

29.18	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16
29.18	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16
29.18	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14
29.20	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17
29.20	Elsinore;T	CA	5	90	V	strike slip	0	14
29.20	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16
29.24	North Frontal (East)	CA	0.5	41	S	thrust	0	16
29.95	North Frontal (West)	CA	1	49	S	reverse	0	16
31.88	Burnt Mtn	CA	0.6	67	W	strike slip	0	16
33.20	Cucamonga	CA	5	45	N	thrust	0	8
33.74	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13
34.32	Landers	CA	0.6	90	V	strike slip	0	15
34.34	Eureka Peak	CA	0.6	90	V	strike slip	0	15
36.33	Chino, alt 2	CA	1	65	SW	strike slip	0	14
37.64	Elsinore;W	CA	2.5	75	NE	strike slip	0	14
37.77	Chino, alt 1	CA	1	50	SW	strike slip	0	9
38.47	Johnson Valley (No)	CA	0.6	90	V	strike slip	0	16
39.33	San Jacinto;C	CA	14	90	V	strike slip	0	17
39.41	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14
39.41	San Jacinto;CC	CA	4	90	V	strike slip	0	16
39.41	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14
40.80	Elsinore;J	CA	3	84	NE	strike slip	0	19

40.80	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17
41.45	S. San Andreas;CO	CA	20	90	V	strike slip	0.6	11
43.57	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14
43.57	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14
43.57	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13
43.57	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14
43.57	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14
43.57	S. San Andreas;SM	CA	29	90	V	strike slip	0	13
44.04	So Emerson-Copper Mtn	CA	0.6	90	V	strike slip	0	14
44.49	San Jose	CA	0.5	74	NW	strike slip	0	15
47.42	Sierra Madre	CA	2	53	N	reverse	0	14
47.42	Sierra Madre Connected	CA	2	51		reverse	0	14
47.76	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13
48.17	Calico-Hidalgo	CA	1.8	90	V	strike slip	0	14

2019 CBC – SEISMIC PARAMETERS		
Site Coordinates	**Latitude**	**Longitude**
	33.9306	**-116.9476**
Mapped Spectral Response Acceleration	**S_S = 2.044**	**S_1 = 0.701**
Site Coefficients (Class "D")	**F_a = 1.00**	**F_v = 1.70**
Maximum Considered Earthquake (MCE) Spectral Response Acceleration	**S_{MS} = 2.044**	**S_{M1} = 1.192**
Design Spectral Response Acceleration Parameters	**S_{DS} = 1.363**	**S_{D1} = 0.795**
Seismic Design Category	**D**	
Peak Ground Acceleration (PGA)	**0.834g**	
Site Amplification factor at PGA (F_{PGA})	**1.1**	
Site Modified Peak Ground Acceleration (PGA_m)	**0.917**	

References:

- Earthquake.usgs.gov/research/hazmaps/design
- 2019 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Section 1613, Earthquake Loads

APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 GENERAL INTENT

These specifications present general procedures and requirements for grading and earthwork as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installations of subdrains, and excavations. The recommendations contained in the geotechnical report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new recommendations which could supersede these specifications or the recommendations of the geotechnical report.

2.0 EARTHWORK OBSERVATIONS AND TESTING

Prior to the commencement of grading, a qualified geotechnical consultant (soils engineer and engineering geologist, and their representatives) shall be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the consultant provide adequate testing and observations so that he may determine that the work was accomplished as specified. It shall be the responsibility of the contractor to assist the consultant and keep him apprised of work schedules and changes so that he may schedule his personnel accordingly.

It shall be the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and approved grading plans. If, in the opinion of the consultant, unsatisfactory conditions, such as questionable soil, poor moisture conditions, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the consultant will be empowered to reject the work and recommend that construction be stopped until the unsatisfactory conditions are rectified.

Maximum dry density tests used to determine the degree of compaction will be performed in accordance with the American Society of Testing and Materials, test method ASTM D1557-12.

3.0 PREPARATION OF AREAS TO BE FILLED

3.1 Clearing and Grubbing

All brush, vegetation, and debris shall be removed or piled and otherwise disposed of.

3.2 Processing

The existing ground which is determined to be satisfactory for support of fill shall be scarified to a minimum depth of 6 inches. Existing ground which is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until the soils are broken down and free of large clay lumps or clods and until the working surface is reasonably uniform and free of uneven features which would inhibit uniform compaction.

3.3 Overexcavation

Soft, dry, spongy, highly fractured or otherwise unsuitable ground, extending to such depth that surface processing cannot adequately improve the condition, shall be overexcavated down to firm ground, approved by the consultant.

3.4 Moisture Conditioning

Overexcavated and processed soils shall be watered, dried-back, blended, and/or mixed, as required to attain a uniform moisture content near optimum.

3.5 Recompaction

Overexcavation and processed soils which have been properly mixed and moisture-conditioned shall be recompacted to a minimum relative compaction of 90 percent.

3.6 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal : vertical), the ground shall be stepped or benched. The lowest bench shall be a minimum of 15 feet wide, shall be at least 2 feet deep, shall expose firm materials, and shall be approved by the consultant. Other benches shall be excavated in firm materials for a minimum width of 4 feet. Ground sloping flatter than 5:1 (horizontal : vertical) shall be benched or otherwise overexcavated when considered necessary by the consultant.

3.7 Approval

All areas to receive fill, including processed areas, removal areas and toe-of-fill benches shall be approved by the consultant prior to fill placement.

4.0 FILL MATERIAL

4.1 General

Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the consultant. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by consultant or shall be mixed with other soils to serve as satisfactory fill material.

4.2 Oversize

Oversize materials defined as rock, or other irreducible material with maximum dimension greater than 12 inches, shall not be buried or placed in fills, unless the location, materials, and disposal methods are specifically approved by the consultant. Oversize disposal operations shall be such that nesting of oversize material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet vertically of finish grade or within the range of future utilities or underground construction, unless specifically approved by the consultant.

4.3 Import

If importing of fill material is required for grading, the import material shall meet the requirements of Section 4.1.

5.0 FILL PLACEMENT and COMPACTION

5.1 Fill Lifts

Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 6 inches in compacted thickness. The consultant may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

5.2 Fill Moisture

Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or shall be blended with drier material. Moisture conditioning and mixing of fill layers shall continue until the fill material is at a uniform moisture content at or near optimum.

5.3 Compaction of Fill

After each layer has been evenly spread, moisture-conditioned, and mixed, it shall be uniformly compacted to not less than 90 percent of maximum dry density. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

5.4 *Fill Slopes*

Compacting of slopes shall be accomplished, in addition to normal compacting procedures, by backrolling of slopes with sheepsfoot rollers at frequent increments of 2 to 3 feet in fill elevation gain, or by other methods producing satisfactory results. At the completion of grading, the relative compaction of the slope out to the slope face shall be at least 90 percent.

5.5 *Compaction Testing*

Field-tests to check the fill moisture and degree of compaction will be performed by the consultant. The location and frequency of tests shall be at the consultant's discretion. In general, the tests will be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of embankment.

6.0 SUBDRAIN INSTALLATION

Subdrain systems, if required, shall be installed in approved ground to conform to the approximate alignment and details shown on the plans or herein. The subdrain location or materials shall not be changed or modified without the approval of the consultant. The consultant, however, may recommend and upon approval, direct changes in subdrain line, grade or material. All subdrains should be surveyed for line and grade after installation and sufficient time shall be allowed for the surveys, prior to commencement of filling over the subdrain.

7.0 EXCAVATION

Excavations and cut slopes will be examined during grading. If directed by the consultant, further excavation or overexcavation and refilling of cut areas shall be performed, and/or remedial grading of cut slopes shall be performed. Where fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope shall be made and approved by the consultant prior to placement of materials for construction of the fill portion of the slope.

8.0 TRENCH BACKFILLS

Trench excavations for utility pipes shall be backfilled under engineering supervision.

After the utility pipe has been laid, the space under and around the pipe shall be backfilled with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill shall be uniformly jetted into place before the controlled backfill is placed over the sand.

The onsite materials, or other soils approved by the soil engineer, shall be watered and mixed as necessary prior to placement in lifts over the sand backfill.

The controlled backfill shall be compacted to at least 90 percent of the maximum dry density as determined by the ASTM D1557-12 test method.

Field density tests and inspection of the backfill procedures shall be made by the soil engineer during backfilling to see that proper moisture content and uniform compaction is being maintained. The contractor shall provide test holes and exploratory pits as required by the soil engineer to enable sampling and testing.

APPENDIX F

Infiltration Test (Percolation Test Procedure)

The tests were performed in accordance with Riverside County Stormwater Quality Best Management Practice Design Handbook for Low Impact Development, dated June 2014.

Four 8-inch diameter test holes (I-1, I-2, I-3 and I-4) were drilled at the suggested locations. The soil at the test locations was visually classified as silty sand. To mitigate any possible caving or sloughing of the test holes, a 6-inch diameter perforated pipe was placed in the hole. The bottom of the hole was covered with 2 inches of gravel.

The testing was conducted after presoaking. Two consecutive measurements showed that 6 inches of water seeped away in more than 25 minutes for I-1, I-2, I-3 and I-4. The tests for an additional six hours with measurements taken at 30 minute intervals. Water level was adjusted to 20 inches above the bottom of the test hole after each measurement. The drop that occurred during the final reading was used for design rate purposes.

Infiltration Test/Tabulated Test Results

Test No.	Depth of Test (feet)	Earth Material	Infiltration Rate (in/hr)
I-1	4	Silty Sand (SM)	0.05
I-2	4	Silty Sand (SM)	0.88
I-3	4	Silty Sand (SM)	0.67
I-4	4	Silty Sand (SM)	0.69

We recommend that a suitable factor of safety should be applied to the rate in design of the system.

INFILTRATION TEST DATA
(Boring Percolation Test Procedure)

Project: MTB2 Infrastructure, INC. Project No.: 19137-01
Test Hole No.: 1 Date Excavated: 2/14/20
Depth of Test Hole: 4' Soil Classification: SM
Diameter: 8" Presoak: 24 hrs
Tested By: ER Date: 12/25/20

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Greater Than or Equal to 6" (Y/N)
1	8:35:09 9:00:09	25	28	28.75	0.75	N
2	9:03:20 9:28:20	25	11	28.5	0.5	N

Use Normal Sandy (Circle One) Soil Criteria

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	Do Initial Depth to Water(in.)	Df Final Depth to Water(in.)	ΔD Change in Water Level (in.)	Infiltration Rate (in./hr.)
1	9:33:19	10:03:19	30	28	28.375	0.375	
2	10:09:33	10:39:33	30	11	28.25	0.25	
3	10:43:05	11:13:05	30	11	11	11	
4	11:17:16	11:47:16	11	11	11	11	
5	11:50:27	12:20:27	11	11	11	11	
6	12:24:38	12:54:38	11	11	11	11	
7	12:57:49	1:27:49	11	11	11	11	
8	1:31:02	2:01:02	11	11	11	11	
9	2:05:13	2:35:13	11	11	11	11	
10	9:39:25	3:09:25	11	11	11	11	
11	3:12:37	3:42:37	11	11	11	11	
12	3:45:49	4:15:49	11	11	11	11	0.05

COMMENTS:

Infiltration Rate = $\frac{4 \times 60 \times 0.25}{30[4+(20+(20-0.25))}$ = 0.05 in/hr

INFILTRATION TEST DATA
(Boring Percolation Test Procedure)

Project: MTH2 Tryneery, INC — Project No.: 19137-01
Test Hole No.: T2 — Date Excavated: 9/14/20
Depth of Test Hole: 4' — Soil Classification: SM
Diameter: 8" — Presoak: 24 hr
Tested By: TAR — Date: 12/23/20

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Greater Than or Equal to 6" (Y/N)
1	8:36:38 9:01:38	25	28	32	4.0	N
2	9:05:49 9:30:49	25	11	31.5	3.5	N

Use Normal Sandy (Circle One) Soil Criteria

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	Do Initial Depth to Water(in.)	Df Final Depth to Water(in.)	ΔD Change in Water Level (in.)	Infiltration Rate (in./hr.)
1	9:34:37	10:04:37	30	28	32.375	4.375	
2	10:10:40	10:40:40	30	〃	〃	〃	
3	10:44:30	11:14:30	30	〃	〃	〃	
4	11:18:41	11:48:41	〃	〃	〃	〃	
5	11:52:52	12:22:52	〃	〃	〃	〃	
6	12:26:04	12:56:04	〃	〃	〃	〃	
7	1:00:16	1:30:16	〃	〃	〃	〃	
8	1:34:28	2:04:28	〃	〃	〃	〃	
9	2:08:40	2:38:40	〃	〃	〃	〃	
10	2:42:52	3:12:52	〃	〃	〃	〃	
11	3:16:05	3:46:05	〃	〃	〃	〃	
12	3:50:18	4:20:18	〃	〃	〃	4.375	0.88

COMMENTS:

Infiltration Rate = $\frac{4 \times 60 \times 4.375}{30(4+(20+(20-4.375)))} = 0.88$ in/hr

INFILTRATION TEST DATA
(Boring Percolation Test Procedure)

Project: MTH2 Engineering, INC. Project No.: 19137-01
Test Hole No.: I-4 Date Excavated: 9/14/20
Depth of Test Hole: 4' Soil Classification: SM
Diameter: 8in Presoak: 24 hrs
Tested By: MR Date: 12/25/20

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Greater Than or Equal to 6 (Y/N)
1		25	28	32	4.0	N
2	9:10 01 9:35 01	25	11	31.75	3.75	11

Use Normal Sandy (Circle One) Soil Criteria

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	Do Initial Depth to Water(in.)	Df Final Depth to Water(in.)	ΔD Change in Water Level (in.)	Infiltration Rate (in./hr.)
1	9:39:10	10:09:10	30	28	31.5	3.5	
2	10:14:29	10:44:29	30	11	11	11	
3	10:48:01	11:18:01	30	11	11	11	
4	11:25:12	11:55:12	11	11	11	11	
5	11:59:23	12:29:23	11	11	11	11	
6	12:33:34	1:03:34	11	11	11	11	
7	1:07:45	1:37:45	11	11	11	11	
8	1:41:56	2:11:56	11	11	11	11	
9	2:16:08	2:46:08	11	11	11	11	
10	3:00:20	3:30:20	11	11	11	11	
11	3:35:32	4:05:32	11	11	11	11	
12	4:09:43	4:39:43	11	11	11	11	0.69

COMMENTS:

Infiltration Rate = $\frac{4 \times 60 \times 3.5}{30(4+(20+(20-3.5)))} = 0.69$ in/hr

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Not applicable

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Not applicable

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Wednesday, May 13, 2020

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicantï¿½s Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	419150046, 419150027, 419150026, 419150035, 419150017, RW, 419150016, 419150025, 419150050
Latitude/Longitude:	33.9307, -116.9476
Thomas Brothers Page:	
Project Site Acreage:	2.36
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	**HUC Name** - HUC Number **Potrero Creek** - 180702020201
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	**WBID Name** - WBID Number **Canyon Lake (Railroad Canyon Reservoir)** - CAL8021100019990208151525 **Elsinore, Lake** - CAL8023100019990208151100
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Bacterial Indicators** - Pathogens **Nutrients** - Nutrients, Organic Enrichment/Low Dissolved Oxygen **Other Organics** - PCBs (Polychlorinated biphenyls) **Toxicity** - Sediment Toxicity, Unknown Toxicity
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - C **Known Groundwater Contamination Plumes within 1000'** - No **Adjacent Water Supply Wells(s)** - No information available please contact your local water agency for more information. Your local contact agency is BEAUMONT-CHERRY VALLEY W.D.. Your local wholesaler contact agency is SAN GORGONIO PASS WATER AGENCY.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None

Environmentally Sensitive Areas within 200'(CVMSHCP):	None
Environmentally Sensitive Areas within 200'(WRMSHCP):	None
Groundwater elevation from Mean Sea Level:	2160
85th Percentile Design Storm Depth (in):	0.838
Groundwater Basin:	Beaumont
MSHCP/CVMSHCP Criteria Cell (s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	Comprehensive Nutrient Reduction Plan IBI Scores - Southern Cal bulletin118_4-sc water_fact_3_7.11 8039-SAR-Hydromodification BCVWD Urban Management Plan 2006-Report-on-Water-Supply-Issues-LAFCO 2010 Urban Water Management Plan SGPWA-B-W ByerlyReport2005Dec5 RiversideCountyOrdinance859.2 sir_2006-5026 v2-ReportOnWaterConditions-2010-200dpi Beaumont MDP

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	MTH2 Engineering, Inc.	Date	9/12/2021
Designed by	MTH2 Engineering, Inc.	Case No	
Company Project Number/Name	Beaumont		

BMP Identification

BMP NAME / ID: DMA 2/BR 2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85} = 0.84 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
2a	*815.36*	*Concrete or Asphalt*	*1*	*0.89*	*727.3*			
2b	*3214.33*	*Roofs*	*1*	*0.89*	*2867.2*			
2c	*1039.1*	*Ornamental Landscaping*	*0.1*	*0.11*	*114.8*			
	5068.79	**Total**			**3709.3**	**0.84**	***259***	***301.6***

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries	
	DMA2 BR 2		Calculated Cells	

Company Name:	MTH2 Engineering, Inc.	Date:	12-Sep-21
Designed by:	MTH2 Engineering, Inc.	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.1163636	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	259	ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	2.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	13.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.45	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	180	ft^2
Proposed Surface Area	A=	208	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
6" Check Dam Spacing		0	feet
Describe Vegetation:		Natural Grasses	

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: MTH2 Engineering, Inc. — Date: 9/12/2021

Designed by: MTH2 Engineering, Inc. — Case No:

Company Project Number/Name: Beaumont

BMP Identification

BMP NAME / ID: DMA 3/BR 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.84 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
3a	*806.28*	*Concrete or Asphalt*	*1*	*0.89*	*719.2*			
3b	*3214.17*	*Roofs*	*1*	*0.89*	*2867*			
3c	*1225.82*	*Ornamental Landscaping*	*0.1*	*0.11*	*135.4*			
	5246.27	***Total***			**3721.6**	**0.84**	***259.9***	***338.4***

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries	
	DMA 3 BR 3		Calculated Cells	

Company Name:	MTH2 Engineering, Inc.	Date:	12-Sep-21
Designed by:	MTH2 Engineering, Inc.	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.1204378 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	260 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	2.0 ft
Top Width of Bioretention Facility, excluding curb	w_T =	8.0 ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.41 ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	184 ft^2
Proposed Surface Area	A=	240 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0 %
6" Check Dam Spacing		0 feet
Describe Vegetation:	Natural Grasses	

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name MTH2 Engineering, Inc. Date 9/12/2021

Designed by MTH2 Engineering, Inc. Case No

Company Project Number/Name Beaumont

BMP Identification

BMP NAME / ID DMA 4/BR 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.84 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
4a	*42040.11*	*Concrete or Asphalt*	*1*	*0.89*	*37499.8*			
4b	*2970.73*	*Roofs*	*1*	*0.89*	*2649.9*			
4c	*6187.45*	*Ornamental Landscaping*	*0.1*	*0.11*	*683.5*			
	51198.29	***Total***			**40833.2**	**0.84**	**2851.5**	**2914.56**

Notes:

Bioretention Facility - Design Procedure	BMP ID: DMA 4 BR 4	Legend:	Required Entries / Calculated Cells

Company Name:	MTH2 Engineering, Inc.	Date:	12-Sep-21
Designed by:	MTH2 Engineering, Inc.	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	1.175351	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	2,852	ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	18.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.76	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	1,620	ft^2
Proposed Surface Area	A=	1,656	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:		Natural Grasses	

Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Hydrology Study

for

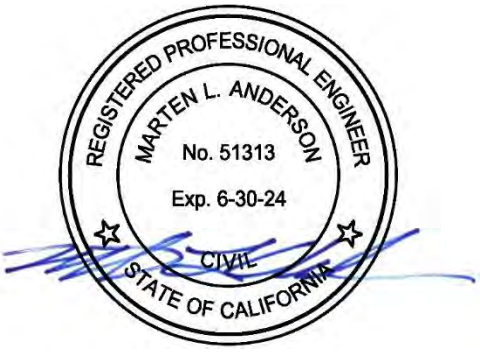
Highland Springs Remodel and Development
PW2021-0786

Prepared for:

High Sand, Inc.
655 Highland Springs Avenue
Beaumont, CA 92223

Prepared by:

MTH2 engineering, inc
639 Lakewood Drive
Riverside, CA 92506



September 22, 2021
Revised: March 10, 2022

Table of Contents

1.0 Introduction

1.1 Project Description

The project is proposed on 2 vacant parcels westerly side of Highland Springs Avenue, between East 6th Street to the south and East 8th Street to the north. See the location map in Appendix A.

The proposed project is an office building and drive-thru restaurant, entry lanes and canopy-covered vacuum parking for the existing car wash on the parcel to the south, trash enclosures and associated parking and site improvements. Highland Springs Avenue will be widened along the project frontage to ultimate width per the Beaumont General Plan Circulation Element.

1.2 Purpose of The Study

The purpose of this study is to develop a hydrologic analysis of the existing and proposed conditions of the project site, and to design facilities and methods for flood protection for the proposed project site and existing downstream facilities.

1.3 Hydrology Study Methodology

The Shortcut Unit Hydrograph methodology per the Riverside County Flood Control and Water Conservation District Hydrology Manual is used to determine the runoff volumes and peak flow rates for the 2, 5, 10 and 100-year, 1, 3, 6 and 24-hour duration storm events.

2.0 Pre-Development Condition Hydrology

2.1 Pre-Development Conditions

The pre-developed site is an undeveloped area. The project totals 1.511 acres. The site generally drains towards the east, and then south within the existing curb and gutter of Highland Springs Avenue.

The existing site has an impervious coverage of 0.0%.

2.2 Pre-Development Hydrology Calculations

See the pre-developed hydrology map in Appendix D. For pre-development hydrology calculations, see Appendix E.

3.0 Post-Development Condition Hydrology

3.1 Post-Development Conditions

The post-developed site contains one office and one drive-thru restaurant building, self-serve vacuum parking spaces with canopy shades above, two trash enclosures, a vacuum enclosure, paved entry and exit lanes, and various landscape areas.

The project applicant proposes bio-retention with underdrain facilities for Water Quality Management Plan (WQMP) purposes. An underground detention chamber system is proposed to detain the incremental increase in storm runoff. Runoff from the development will be directed to the bio-retention with underdrain facilities, and low flow and overflow will be directed to the underground detention chamber system. The detention chamber system will have a orifice/weir plate within the outlet basin to allow storm events larger than the critical storm to pass thru the system, and an orifice to release the stored volume at a maximum rate of 110% of the 2-year, 24-hour pre-development rate via a pipe and sump pump to under sidewalk drains to Highland Springs Avenue.

The proposed site has an impervious coverage of approximately 82.8%.

3.2 Post-Development Hydrology Calculations

See the post-developed hydrology map in Appendix D. For post-development hydrology calculations, see Appendix F.

4.0 Comparison of Post-Development and Pre-Development Hydrologic Conditions

4.1 Hydrologic Conditions of Concern (HCOC)

Per the Santa Ana WQMP Guidance Manual, Section 2.3.2 Hydromodification:

In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow.

Since the project's excess volume cannot be infiltrated or captured and used, the proposed project's discharge flow rate must be limited to 110% of the pre-development 2-year, 24-hour peak flow rate of 0.058 CFS (26.0 GPM).

Calculations for sizing of the orifice plate within the underground detention chamber system outlet basin are provided in Appendix G.

5.0 Hydraulic Calculations

5.1 Hydraulic Calculations Methodology

Pipe flow calculations were performed using the Hazen-Williams formula to determine the full flow capacity of various pipe diameters at a 0.5% slope.

The peak site flowrate was proportioned for each Drainage Management Area (DMA) based on the percent area to determine the peak flowrate for each DMA overflow inlet. The pipe network sizing is designed from each DMA overflow drain inlet to meet or exceed the pipe size capacity for each branch. Where 2 DMA branches join, the appropriate pipe size is selected to meet or exceed the cumulative flowrate of the joining DMA branches.

See Appendix G for calculations.

6.0 Conclusions

Peak flows from the Shortcut Unit Hydrograph methodology per the Riverside County Flood Control and Water Conservation District Hydrology Manual were determined to be the following:

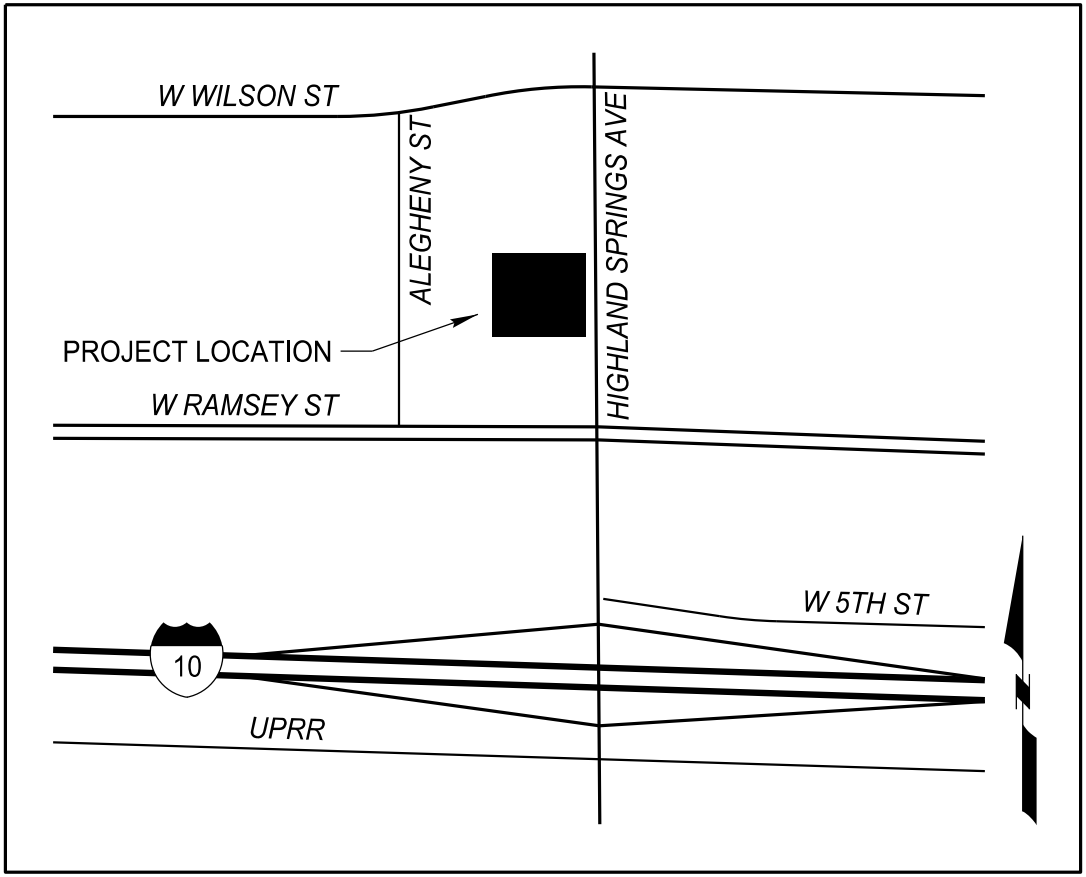
Development Phase	Peak Flow
Pre-developed	5.538 cfs (100-Year, 1-hr event)
Post-developed	5.980 cfs (100-Year, 1-hr event)

Bio-retention with underdrain facilities will be constructed to satisfy NPDES requirements and are designed to capture and treat the 85th-percentile storm event.

The bio-retention with underdrain facilities will increase the time of concentration of the developed project, reduce pollutant generation thru filtration and absorption, and reduce runoff volume thru minor infiltration, absorption and evapotransporation.

The Shortcut Unit Hydrograph Method resulted in a pre- to post-development runoff volume increase of 19,009 CF for the 100-year, 24-hour event. The total volume for the bio-retention with underdrain facilities equates to 3,736 CF. The minimum underground chamber detention volume required is 15,272 CF, with the proposed detention chamber system providing 15,451 CF of storage. The total storage volume proposed is 19,187 CF, which exceeds the pre- to post- increase in volume of 19,099 CF.

Appendix A - Location Map



VICINITY MAP
NOT TO SCALE

Appendix B – Hydrology Manual Plates

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
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 should 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 horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

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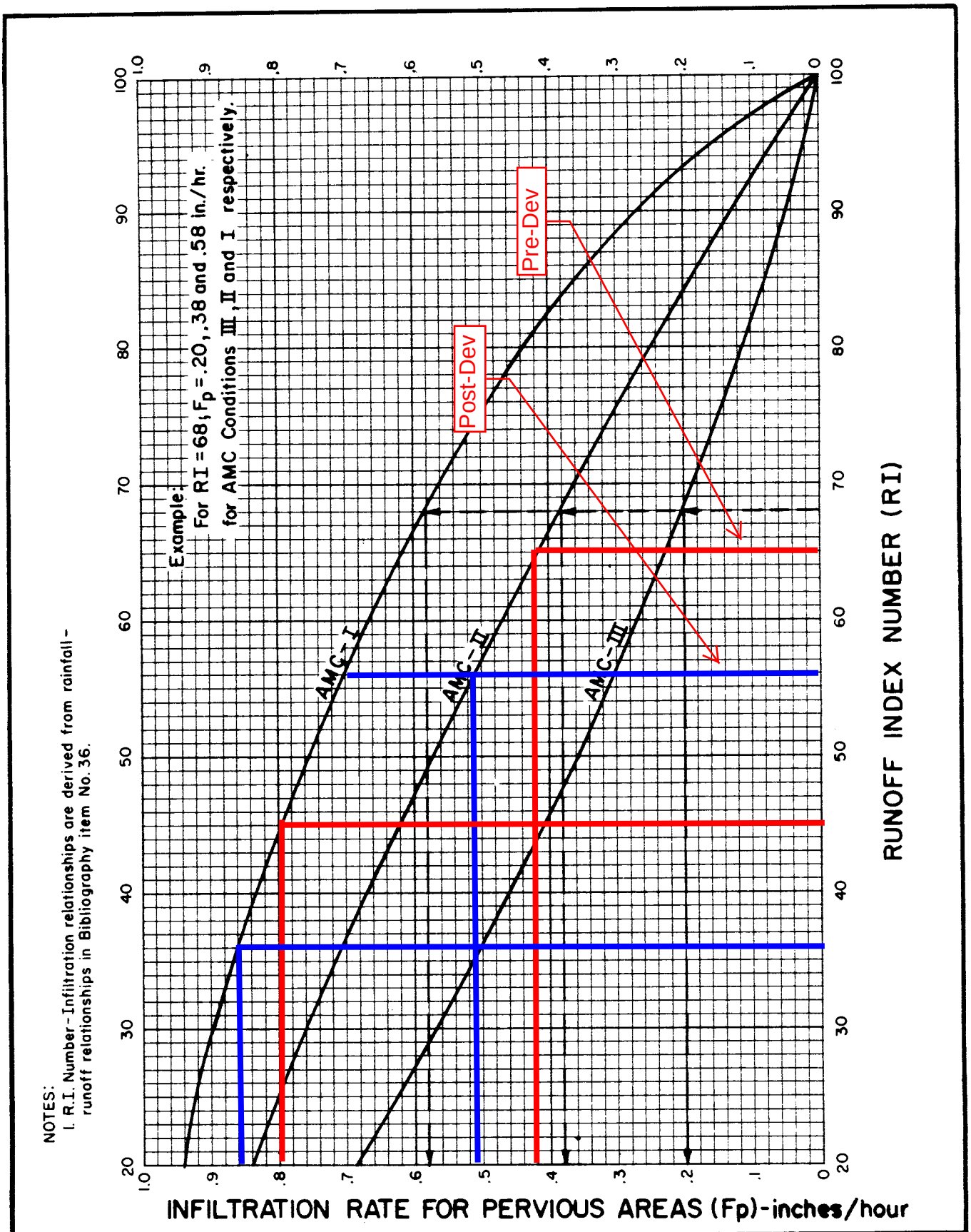
IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE E-6.3



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INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

PLATE E-6.2

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

PLATE E-6.1 (1 of 2)

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

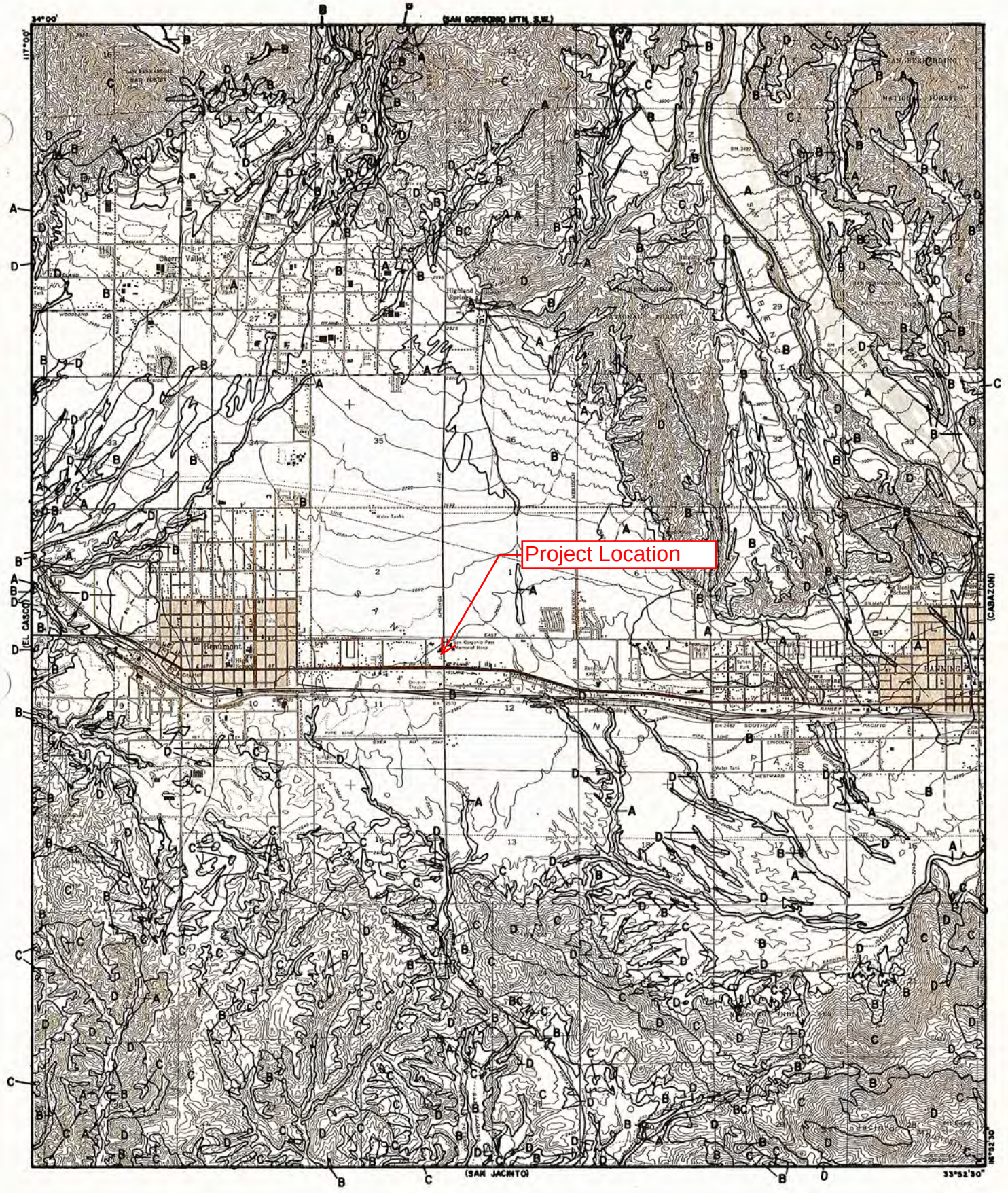
RUNOFF COEFFICIENT CURVE DATA

The data in the following tables may be used to develop runoff coefficient (C) curves for any combination of runoff index (RI) number and antecedent mositure condition (AMC). For an RI number with an AMC of II (from Plate D-5.5) enter the tables on the following pages and plot the "C" curve data directly on Plate D-5.8. "C" curve data is given for even RI numbers only, but values may easily be interpolated for odd RI numbers.

For an AMC of I or III enter the tabulation on this page with the RI for AMC II, and read the appropriate RI for AMC I or III. Use this revised RI to enter the tables on the following pages to determine "C". For example if RI = 40 for AMC II, then RI = 22 for AMC I and RI = 60 for AMC III.

AMC ADJUSTMENT RELATIONSHIPS

RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	AMC III	RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	AMC III
10	--	22	55	35	74
11	--	24	56	36	75
12	--	25	57	37	75
13	--	27	58	38	76
14	--	28	59	39	77
15	--	30	60	40	78
16	--	31	61	41	78
17	--	33	62	42	79
18	--	34	63	43	80
19	--	36	64	44	81
20	--	37	65	45	82
21	10	38	66	46	82
22	10	39	67	47	83
23	11	41	68	48	84
24	11	42	69	50	84
25	12	43	70	51	85
26	12	44	71	52	86
27	13	46	72	53	86
28	14	47	73	54	87
29	14	49	74	55	88
30	15	50	75	57	88
31	16	51	76	58	89
32	16	52	77	59	89
33	17	53	78	60	90
34	18	54	79	62	91
35	18	55	80	63	91
36	19	56	81	64	92
37	20	57	82	66	92
38	21	58	83	67	93
39	21	59	84	68	93
40	22	60	85	70	94
41	23	61	86	72	94
42	24	62	87	73	95
43	25	63	88	75	95
44	25	64	89	76	96
45	26	65	90	78	96
46	27	66	91	80	97
47	28	67	92	81	97
48	29	68	93	83	98
49	30	69	94	85	98
50	31	70	95	87	98
51	31	70	96	89	99
52	32	71	97	91	99
53	33	72	98	94	99
54	34	73	99	97	--



LEGEND

SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR BEAUMONT

PLATE C-1.19

Appendix C - NOAA Atlas 14 Point Precipitation Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Beaumont, California, USA*
Latitude: 33.9309°, Longitude: -116.9475°
Elevation: 2597.87 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.124** (0.103-0.150)	**0.161** (0.134-0.196)	**0.218** (0.181-0.265)	**0.271** (0.223-0.333)	**0.355** (0.282-0.451)	**0.429** (0.334-0.557)	**0.516** (0.391-0.686)	**0.617** (0.455-0.845)	**0.776** (0.549-1.11)	**0.921** (0.628-1.36)
10-min	**0.177** (0.148-0.215)	**0.231** (0.192-0.281)	**0.313** (0.259-0.380)	**0.389** (0.320-0.477)	**0.508** (0.404-0.646)	**0.615** (0.479-0.799)	**0.739** (0.561-0.984)	**0.884** (0.652-1.21)	**1.11** (0.786-1.59)	**1.32** (0.900-1.95)
15-min	**0.215** (0.179-0.260)	**0.279** (0.233-0.339)	**0.378** (0.314-0.460)	**0.470** (0.387-0.577)	**0.615** (0.489-0.781)	**0.744** (0.579-0.966)	**0.894** (0.678-1.19)	**1.07** (0.788-1.46)	**1.35** (0.951-1.92)	**1.60** (1.09-2.36)
30-min	**0.313** (0.261-0.379)	**0.407** (0.339-0.494)	**0.551** (0.457-0.670)	**0.685** (0.563-0.840)	**0.896** (0.712-1.14)	**1.08** (0.844-1.41)	**1.30** (0.988-1.73)	**1.56** (1.15-2.13)	**1.96** (1.39-2.80)	**2.33** (1.59-3.44)
60-min	**0.461** (0.384-0.558)	**0.600** (0.499-0.728)	**0.811** (0.673-0.988)	**1.01** (0.830-1.24)	**1.32** (1.05-1.68)	**1.60** (1.24-2.07)	**1.92** (1.46-2.55)	**2.30** (1.69-3.14)	**2.89** (2.04-4.13)	**3.43** (2.34-5.07)
2-hr	**0.660** (0.550-0.800)	**0.822** (0.684-0.998)	**1.06** (0.883-1.30)	**1.29** (1.06-1.58)	**1.63** (1.29-2.07)	**1.93** (1.50-2.50)	**2.27** (1.72-3.02)	**2.66** (1.96-3.64)	**3.26** (2.31-4.66)	**3.80** (2.59-5.62)
3-hr	**0.809** (0.674-0.980)	**0.995** (0.828-1.21)	**1.27** (1.05-1.54)	**1.52** (1.25-1.86)	**1.89** (1.50-2.40)	**2.21** (1.72-2.87)	**2.57** (1.95-3.42)	**2.98** (2.20-4.09)	**3.61** (2.55-5.15)	**4.15** (2.83-6.14)
6-hr	**1.18** (0.980-1.43)	**1.44** (1.20-1.74)	**1.81** (1.50-2.20)	**2.13** (1.76-2.62)	**2.62** (2.08-3.32)	**3.02** (2.35-3.92)	**3.46** (2.62-4.60)	**3.94** (2.91-5.40)	**4.65** (3.29-6.65)	**5.26** (3.59-7.79)
12-hr	**1.61** (1.34-1.95)	**2.01** (1.68-2.44)	**2.56** (2.13-3.12)	**3.02** (2.49-3.71)	**3.67** (2.92-4.67)	**4.19** (3.26-5.44)	**4.74** (3.59-6.30)	**5.31** (3.92-7.28)	**6.13** (4.33-8.76)	**6.78** (4.63-10.0)
24-hr	**2.15** (1.90-2.47)	**2.78** (2.46-3.21)	**3.62** (3.19-4.19)	**4.31** (3.77-5.03)	**5.25** (4.45-6.33)	**5.98** (4.96-7.35)	**6.73** (5.45-8.47)	**7.50** (5.91-9.70)	**8.55** (6.48-11.5)	**9.37** (6.86-13.1)
2-day	**2.60** (2.30-3.00)	**3.46** (3.06-3.99)	**4.63** (4.08-5.36)	**5.61** (4.91-6.55)	**7.01** (5.93-8.44)	**8.12** (6.74-9.98)	**9.28** (7.52-11.7)	**10.5** (8.30-13.6)	**12.3** (9.30-16.5)	**13.7** (10.0-19.1)
3-day	**2.82** (2.50-3.25)	**3.79** (3.35-4.38)	**5.15** (4.54-5.96)	**6.33** (5.54-7.38)	**8.05** (6.82-9.69)	**9.46** (7.85-11.6)	**11.0** (8.90-13.8)	**12.6** (9.97-16.4)	**15.0** (11.4-20.3)	**17.0** (12.5-23.7)
4-day	**3.06** (2.71-3.53)	**4.14** (3.66-4.77)	**5.65** (4.99-6.54)	**6.98** (6.11-8.14)	**8.92** (7.56-10.7)	**10.5** (8.74-13.0)	**12.3** (9.95-15.5)	**14.2** (11.2-18.4)	**17.0** (12.9-22.9)	**19.3** (14.2-26.9)
7-day	**3.56** (3.15-4.10)	**4.79** (4.24-5.53)	**6.53** (5.75-7.55)	**8.03** (7.02-9.37)	**10.2** (8.65-12.3)	**12.0** (9.97-14.8)	**13.9** (11.3-17.6)	**16.1** (12.7-20.8)	**19.1** (14.5-25.8)	**21.7** (15.9-30.2)
10-day	**3.91** (3.46-4.51)	**5.26** (4.65-6.08)	**7.15** (6.30-8.27)	**8.77** (7.67-10.2)	**11.1** (9.40-13.4)	**13.0** (10.8-16.0)	**15.1** (12.2-19.0)	**17.3** (13.6-22.3)	**20.4** (15.5-27.5)	**23.1** (16.9-32.1)
20-day	**4.89** (4.33-5.64)	**6.65** (5.88-7.68)	**9.04** (7.98-10.5)	**11.1** (9.68-12.9)	**13.9** (11.8-16.8)	**16.2** (13.5-19.9)	**18.6** (15.1-23.4)	**21.2** (16.7-27.4)	**24.8** (18.8-33.4)	**27.7** (20.3-38.6)
30-day	**5.77** (5.11-6.65)	**7.89** (6.98-9.11)	**10.7** (9.47-12.4)	**13.1** (11.5-15.3)	**16.4** (13.9-19.8)	**19.0** (15.8-23.4)	**21.7** (17.6-27.3)	**24.6** (19.4-31.8)	**28.5** (21.6-38.4)	**31.7** (23.2-44.2)
45-day	**6.96** (6.16-8.02)	**9.55** (8.44-11.0)	**13.0** (11.4-15.0)	**15.8** (13.8-18.4)	**19.6** (16.6-23.6)	**22.6** (18.7-27.8)	**25.6** (20.8-32.3)	**28.8** (22.7-37.3)	**33.2** (25.1-44.7)	**36.6** (26.8-51.0)
60-day	**8.14** (7.20-9.38)	**11.2** (9.86-12.9)	**15.1** (13.3-17.4)	**18.3** (16.0-21.3)	**22.6** (19.1-27.2)	**25.9** (21.5-31.8)	**29.2** (23.7-36.8)	**32.7** (25.8-42.3)	**37.4** (28.3-50.4)	**41.1** (30.1-57.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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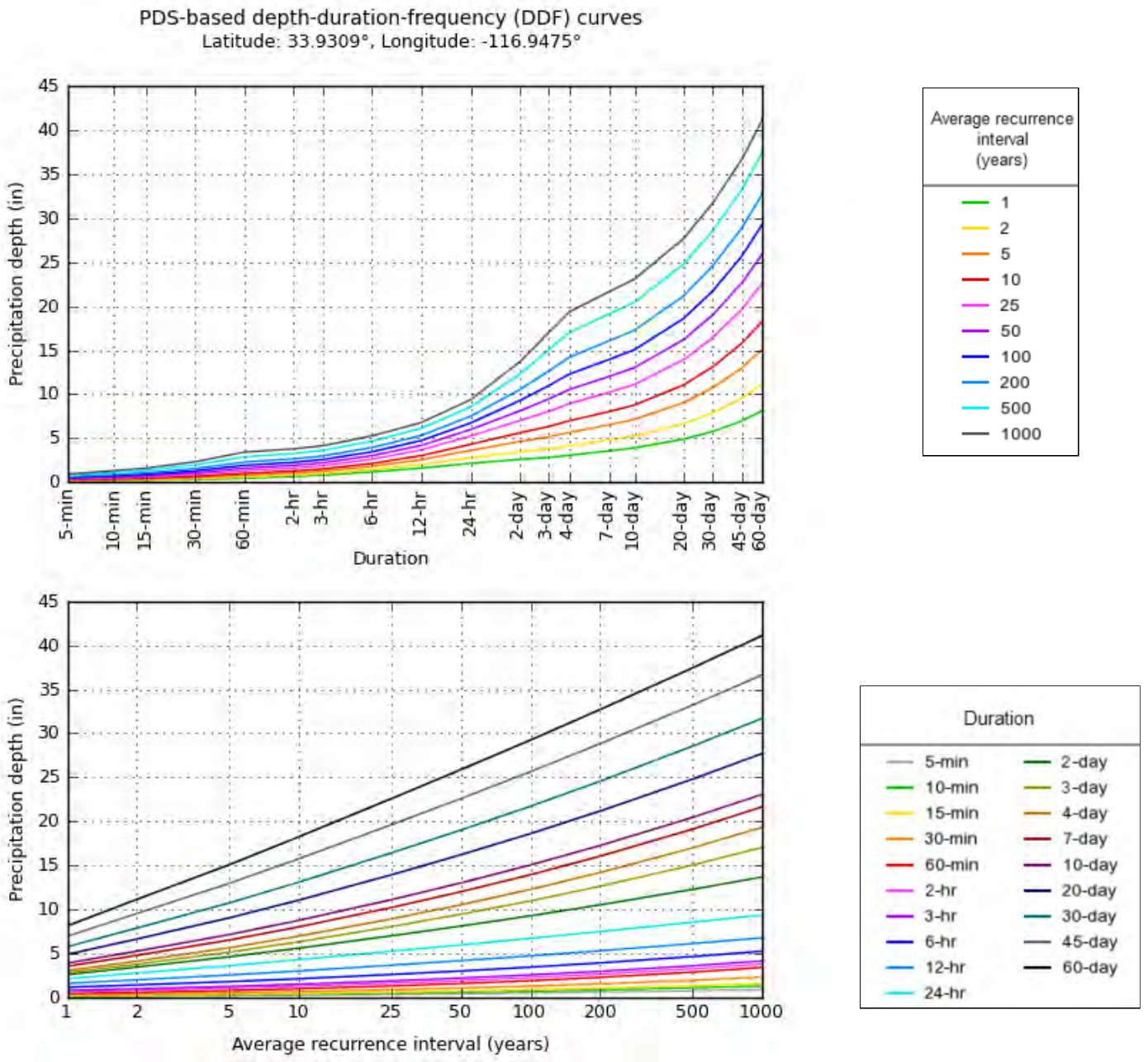
PF graphical



NOAA Atlas 14, Volume 6, Version 2

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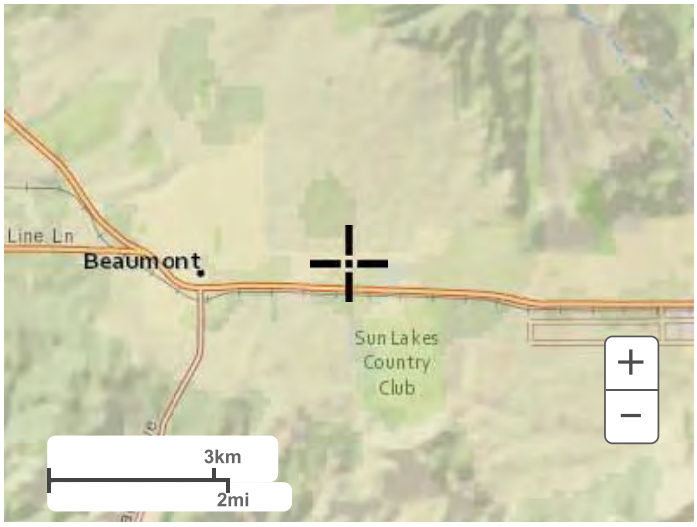
Maps & aerials

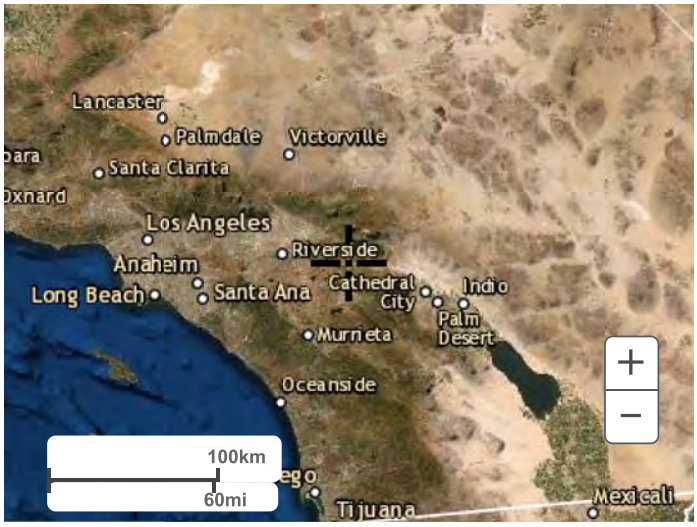
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
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National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Appendix D - Hydrology Maps

Pre-Development Hydrology Map

Post-Development Hydrology Map

IN THE CITY OF BEAUMONT

PRE-DEVELOPMENT HYDROLOGY MAP

HIGH SAND, INC

LEGEND

INDICATES DRAINAGE BOUNDARY

INDICATES FLOW DIRECTION

SITE DATA

AREA: 65,819 SF (1.511 AC)

FLOW SUMMARY:

2-YEAR, 1-HOUR - 0.712 CFS
5-YEAR, 1-HOUR - 1.391 CFS
10-YEAR, 1-HOUR - 2.610 CFS
100-YEAR, 1-HOUR - 5.538 CFS

SCALE: 1" = 20'

20 0 20 40

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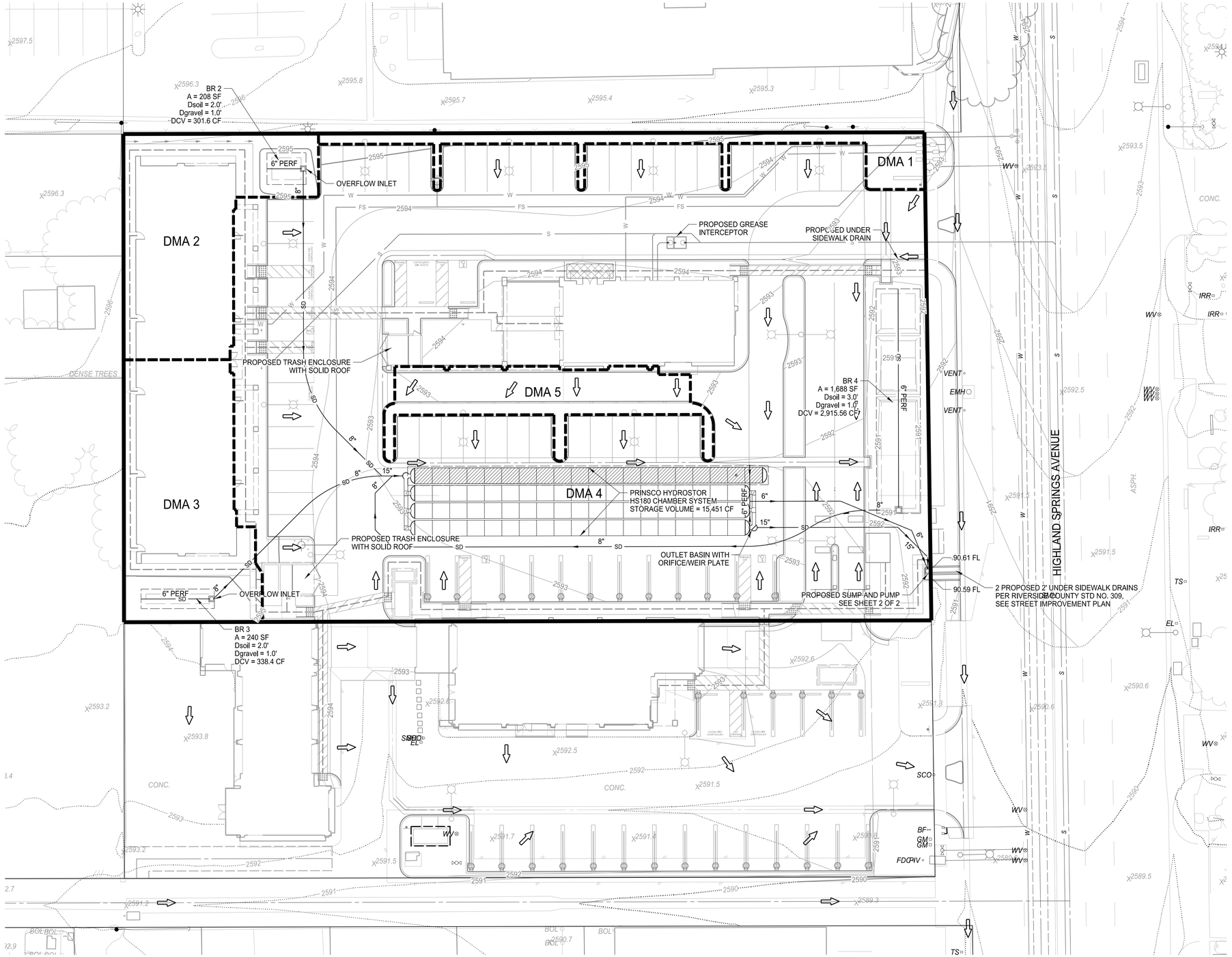
IN THE CITY OF BEAUMONT

POST-DEVELOPMENT HYDROLOGY MAP

HIGH SAND, INC



LEGEND

- INDICATES DRAINAGE BOUNDARY
- INDICATES DRAINAGE MANAGEMENT AREA BOUNDARY
- INDICATES PC CONCRETE PAVEMENT
- INDICATES LANDSCAPE
- INDICATES BIO-RETENTION FACILITY
- INDICATES FLOW DIRECTION
- INDICATES DRAIN INLET
- INDICATES DRAIN INLET

SITE DATA

AREA: 65,819 SF (1.511 AC)

FLOW SUMMARY:

2-YEAR, 1-HOUR -	1.597 CFS
5-YEAR, 1-HOUR -	2.276 CFS
10-YEAR, 1-HOUR -	3.052 CFS
100-YEAR, 1-HOUR -	5.980 CFS

NOTE:

1. SEE SHEET 2 OF 2 FOR DETAILS AND SECTIONS.

SCALE: 1" = 20'

20 0 20 40

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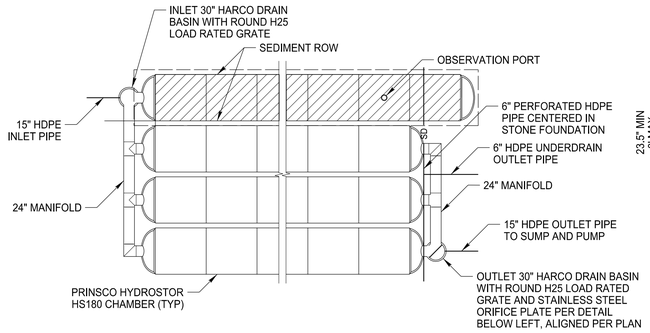
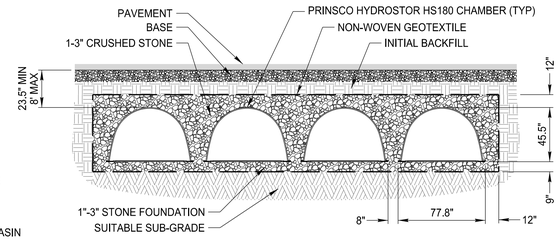
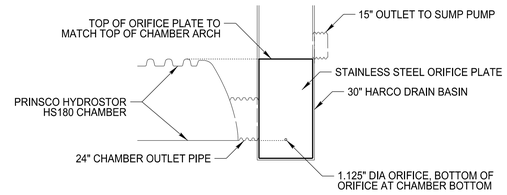
IN THE CITY OF BEAUMONT

POST-DEVELOPMENT HYDROLOGY MAP

HIGH SAND, INC







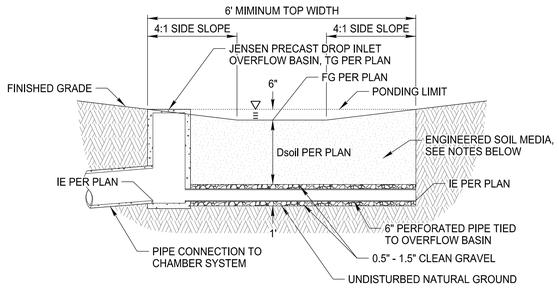
ORIFICE PLATE DETAIL

NOTES:

1. DETAILS AND DIMENSIONS HEREON ARE GENERAL IN NATURE AND FOR GENERAL REFERENCE ONLY.
2. REFER TO MANUFACTURER'S DRAWINGS UNDER SEPARATE COVER FOR ADDITIONAL INFORMATION AND INSTALLATION DETAILS.

PRINSCO HYDROSTOR HS180 CHAMBER SYSTEM DETAIL

NOT TO SCALE



NOTES:

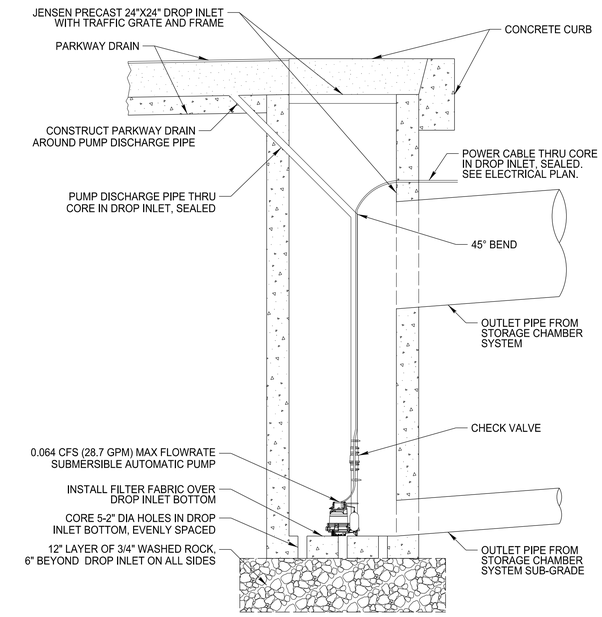
1. ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL AND 15% ORGANIC COMPONENTS BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.
2. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL MEETING THE RANGES BELOW:

70%-80%	SAND
15%-20%	SILT
5%-10%	CLAY

3. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT THE NITROGEN DOES NOT LEACH FROM THE MEDIA.

BIO-RETENTION FACILITY DETAIL

NOT TO SCALE



SUMP AND PUMP DETAIL

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Appendix E - Pre-Development Hydrology Calculations

2-Year Frequency Storm Hydrology
5-year Frequency Strom Hydrology
10-Year Frequency Storm Hydrology
100-Year Frequency Storm Hydrology

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Pre-Development

Recurrence Interval	2	year			
Storm Duration (hrs)	1	3	6	24	
2-year NOAA Atlas 14 Point Precipitation (in)	0.600	0.995	1.440	2.780	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Woodland, Grass; fair		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.80	AMC I			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	0				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.80*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*90*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

2 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.27	0.80	0.24		0.027	0.041	12.18	0.00	0.00	0.00	0.00	0.00	12.18	0.00	0.00	0.00	0.00	12.18	0.04
0:10	4.8	0.35	0.80	0.31		0.035	0.053	15.80	0.00	0.00	0.00	0.00	0.00	15.80	0.00	0.00	0.00	0.00	15.80	0.05
0:15	5.1	0.37	0.80	0.33		0.037	0.056	16.78	0.00	0.00	0.00	0.00	0.00	16.78	0.00	0.00	0.00	0.00	16.78	0.06
0:20	4.9	0.35	0.80	0.32		0.035	0.054	16.13	0.00	0.00	0.00	0.00	0.00	16.13	0.00	0.00	0.00	0.00	16.13	0.05
0:25	6.6	0.48	0.80	0.43		0.048	0.072	21.72	0.00	0.00	0.00	0.00	0.00	21.72	0.00	0.00	0.00	0.00	21.72	0.07
0:30	7.3	0.53	0.80	0.47		0.053	0.080	24.02	0.00	0.00	0.00	0.00	0.00	24.02	0.00	0.00	0.00	0.00	24.02	0.08
0:35	8.4	0.60	0.80	0.54		0.060	0.092	27.64	0.00	0.00	0.00	0.00	0.00	27.64	0.00	0.00	0.00	0.00	27.64	0.09
0:40	9.0	0.65	0.80	0.58		0.065	0.099	29.62	0.00	0.00	0.00	0.00	0.00	29.62	0.00	0.00	0.00	0.00	29.62	0.10
0:45	12.3	0.89	0.80	0.80		0.089	0.135	40.48	0.00	0.00	0.00	0.00	0.00	40.48	0.00	0.00	0.00	0.00	40.48	0.13
0:50	17.6	1.27	0.80	N/A		0.467	**0.712**	213.55	0.00	0.00	0.00	0.00	0.00	213.55	0.00	0.00	0.00	0.00	213.55	0.71
0:55	16.1	1.16	0.80	N/A		0.359	0.547	164.18	0.00	0.00	0.00	0.00	0.00	164.18	0.00	0.00	0.00	0.00	164.18	0.55
1:00	4.2	0.30	0.80	0.27		0.030	0.046	13.82	0.00	0.00	0.00	0.00	0.00	13.82	0.00	0.00	0.00	0.00	13.82	0.05
					Total volume (CF)			**595.92**								**Total Overflow (CF)**			**595.92**	

2 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.16	0.80	0.14	0.016	0.024	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.02
0:10	1.3	0.16	0.80	0.14	0.016	0.024	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.02
0:15	1.1	0.13	0.80	0.12	0.013	0.020	6.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	6.00	0.02
0:20	1.5	0.18	0.80	0.16	0.018	0.027	8.19	0.00	0.00	0.00	0.00	0.00	8.19	0.00	0.00	0.00	0.00	8.19	0.03
0:25	1.5	0.18	0.80	0.16	0.018	0.027	8.19	0.00	0.00	0.00	0.00	0.00	8.19	0.00	0.00	0.00	0.00	8.19	0.03
0:30	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
0:35	1.5	0.18	0.80	0.16	0.018	0.027	8.19	0.00	0.00	0.00	0.00	0.00	8.19	0.00	0.00	0.00	0.00	8.19	0.03
0:40	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
0:45	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
0:50	1.5	0.18	0.80	0.16	0.018	0.027	8.19	0.00	0.00	0.00	0.00	0.00	8.19	0.00	0.00	0.00	0.00	8.19	0.03
0:55	1.6	0.19	0.80	0.17	0.019	0.029	8.73	0.00	0.00	0.00	0.00	0.00	8.73	0.00	0.00	0.00	0.00	8.73	0.03
1:00	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
1:05	2.2	0.26	0.80	0.24	0.026	0.040	12.01	0.00	0.00	0.00	0.00	0.00	12.01	0.00	0.00	0.00	0.00	12.01	0.04
1:10	2.2	0.26	0.80	0.24	0.026	0.040	12.01	0.00	0.00	0.00	0.00	0.00	12.01	0.00	0.00	0.00	0.00	12.01	0.04
1:15	2.2	0.26	0.80	0.24	0.026	0.040	12.01	0.00	0.00	0.00	0.00	0.00	12.01	0.00	0.00	0.00	0.00	12.01	0.04
1:20	2.0	0.24	0.80	0.21	0.024	0.036	10.91	0.00	0.00	0.00	0.00	0.00	10.91	0.00	0.00	0.00	0.00	10.91	0.04
1:25	2.6	0.31	0.80	0.28	0.031	0.047	14.19	0.00	0.00	0.00	0.00	0.00	14.19	0.00	0.00	0.00	0.00	14.19	0.05
1:30	2.7	0.32	0.80	0.29	0.032	0.049	14.74	0.00	0.00	0.00	0.00	0.00	14.74	0.00	0.00	0.00	0.00	14.74	0.05
1:35	2.4	0.29	0.80	0.26	0.029	0.044	13.10	0.00	0.00	0.00	0.00	0.00	13.10	0.00	0.00	0.00	0.00	13.10	0.04
1:40	2.7	0.32	0.80	0.29	0.032	0.049	14.74	0.00	0.00	0.00	0.00	0.00	14.74	0.00	0.00	0.00	0.00	14.74	0.05
1:45	3.3	0.39	0.80	0.35	0.039	0.060	18.01	0.00	0.00	0.00	0.00	0.00	18.01	0.00	0.00	0.00	0.00	18.01	0.06
1:50	3.1	0.37	0.80	0.33	0.037	0.056	16.92	0.00	0.00	0.00	0.00	0.00	16.92	0.00	0.00	0.00	0.00	16.92	0.06
1:55	2.9	0.35	0.80	0.31	0.035	0.053	15.83	0.00	0.00	0.00	0.00	0.00	15.83	0.00	0.00	0.00	0.00	15.83	0.05
2:00	3.0	0.36	0.80	0.32	0.036	0.055	16.37	0.00	0.00	0.00	0.00	0.00	16.37	0.00	0.00	0.00	0.00	16.37	0.05
2:05	3.1	0.37	0.80	0.33	0.037	0.056	16.92	0.00	0.00	0.00	0.00	0.00	16.92	0.00	0.00	0.00	0.00	16.92	0.06
2:10	4.2	0.50	0.80	0.45	0.050	0.076	22.92	0.00	0.00	0.00	0.00	0.00	22.92	0.00	0.00	0.00	0.00	22.92	0.08
2:15	5.0	0.60	0.80	0.54	0.060	0.091	27.29	0.00	0.00	0.00	0.00	0.00	27.29	0.00	0.00	0.00	0.00	27.29	0.09
2:20	3.5	0.42	0.80	0.38	0.042	0.064	19.10	0.00	0.00	0.00	0.00	0.00	19.10	0.00	0.00	0.00	0.00	19.10	0.06
2:25	6.8	0.81	0.80	0.73	0.081	0.124	37.11	0.00	0.00	0.00	0.00	0.00	37.11	0.00	0.00	0.00	0.00	37.11	0.12
2:30	7.3	0.87	0.80	0.78	0.087	0.133	39.84	0.00	0.00	0.00	0.00	0.00	39.84	0.00	0.00	0.00	0.00	39.84	0.13
2:35	8.2	0.98	0.80	N/A	0.179	**0.273**	81.85	0.00	0.00	0.00	0.00	0.00	81.85	0.00	0.00	0.00	0.00	81.85	0.27
2:40	5.9	0.70	0.80	0.63	0.070	0.107	32.20	0.00	0.00	0.00	0.00	0.00	32.20	0.00	0.00	0.00	0.00	32.20	0.11
2:45	2.0	0.24	0.80	0.21	0.024	0.036	10.91	0.00	0.00	0.00	0.00	0.00	10.91	0.00	0.00	0.00	0.00	10.91	0.04
2:50	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
2:55	1.8	0.21	0.80	0.19	0.021	0.033	9.82	0.00	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	0.00	9.82	0.03
3:00	0.6	0.07	0.80	0.06	0.007	0.011	3.27	0.00	0.00	0.00	0.00	0.00	3.27	0.00	0.00	0.00	0.00	3.27	0.01
					Total volume (CF)		**582.85**											**Total Overflow (CF)**	**582.85**

2 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.09	0.80	0.08	0.009	0.013	3.95	0.00	0.00	0.00	0.00	0.00	3.95	0.00	0.00	0.00	0.00	3.95	0.01
0:10	0.6	0.10	0.80	0.09	0.010	0.016	4.74	0.00	0.00	0.00	0.00	0.00	4.74	0.00	0.00	0.00	0.00	4.74	0.02
0:15	0.6	0.10	0.80	0.09	0.010	0.016	4.74	0.00	0.00	0.00	0.00	0.00	4.74	0.00	0.00	0.00	0.00	4.74	0.02
0:20	0.6	0.10	0.80	0.09	0.010	0.016	4.74	0.00	0.00	0.00	0.00	0.00	4.74	0.00	0.00	0.00	0.00	4.74	0.02
0:25	0.6	0.10	0.80	0.09	0.010	0.016	4.74	0.00	0.00	0.00	0.00	0.00	4.74	0.00	0.00	0.00	0.00	4.74	0.02
0:30	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
0:35	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
0:40	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
0:45	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
0:50	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
0:55	0.7	0.12	0.80	0.11	0.012	0.018	5.53	0.00	0.00	0.00	0.00	0.00	5.53	0.00	0.00	0.00	0.00	5.53	0.02
1:00	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:05	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:10	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:15	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:20	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:25	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:30	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:35	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:40	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:45	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:50	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
1:55	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
2:00	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:05	0.8	0.14	0.80	0.12	0.014	0.021	6.32	0.00	0.00	0.00	0.00	0.00	6.32	0.00	0.00	0.00	0.00	6.32	0.02
2:10	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:15	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:20	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:25	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:30	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:35	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:40	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
2:45	1.0	0.17	0.80	0.16	0.017	0.026	7.90	0.00	0.00	0.00	0.00	0.00	7.90	0.00	0.00	0.00	0.00	7.90	0.03
2:50	1.0	0.17	0.80	0.16	0.017	0.026	7.90	0.00	0.00	0.00	0.00	0.00	7.90	0.00	0.00	0.00	0.00	7.90	0.03
2:55	1.0	0.17	0.80	0.16	0.017	0.026	7.90	0.00	0.00	0.00	0.00	0.00	7.90	0.00	0.00	0.00	0.00	7.90	0.03
3:00	1.0	0.17	0.80	0.16	0.017	0.026	7.90	0.00	0.00	0.00	0.00	0.00	7.90	0.00	0.00	0.00	0.00	7.90	0.03
3:05	1.0	0.17	0.80	0.16	0.017	0.026	7.90	0.00	0.00	0.00	0.00	0.00	7.90	0.00	0.00	0.00	0.00	7.90	0.03
3:10	1.1	0.19	0.80	0.17	0.019	0.029	8.69	0.00	0.00	0.00	0.00	0.00	8.69	0.00	0.00	0.00	0.00	8.69	0.03
3:15	1.1	0.19	0.80	0.17	0.019	0.029	8.69	0.00	0.00	0.00	0.00	0.00	8.69	0.00	0.00	0.00	0.00	8.69	0.03
3:20	1.1	0.19	0.80	0.17	0.019	0.029	8.69	0.00	0.00	0.00	0.00	0.00	8.69	0.00	0.00	0.00	0.00	8.69	0.03
3:25	1.2	0.21	0.80	0.19	0.021	0.032	9.48	0.00	0.00	0.00	0.00	0.00	9.48	0.00	0.00	0.00	0.00	9.48	0.03
3:30	1.3	0.22	0.80	0.20	0.022	0.034	10.27	0.00	0.00	0.00	0.00	0.00	10.27	0.00	0.00	0.00	0.00	10.27	0.03
3:35	1.4	0.24	0.80	0.22	0.024	0.037	11.06	0.00	0.00	0.00	0.00	0.00	11.06	0.00	0.00	0.00	0.00	11.06	0.04
3:40	1.4	0.24	0.80	0.22	0.024	0.037	11.06	0.00	0.00	0.00	0.00	0.00	11.06	0.00	0.00	0.00	0.00	11.06	0.04
3:45	1.5	0.26	0.80	0.23	0.026	0.039	11.85	0.00	0.00	0.00	0.00	0.00	11.85	0.00	0.00	0.00	0.00	11.85	0.04
3:50	1.5	0.26	0.80	0.23	0.026	0.039	11.85	0.00	0.00	0.00	0.00	0.00	11.85	0.00	0.00	0.00	0.00	11.85	0.04
3:55	1.6	0.28	0.80	0.25	0.028	0.042	12.64	0.00	0.00	0.00	0.00	0.00	12.64	0.00	0.00	0.00	0.00	12.64	0.04
4:00	1.6	0.28	0.80	0.25	0.028	0.042	12.64	0.00	0.00	0.00	0.00	0.00	12.64	0.00	0.00	0.00	0.00	12.64	0.04
4:05	1.7	0.29	0.80	0.26	0.029	0.045	13.43	0.00	0.00	0.00	0.00	0.00	13.43	0.00	0.00	0.00	0.00	13.43	0.04

4:10	1.8	0.31	0.80	0.28	0.031	0.047	14.22	0.00	0.00	0.00	0.00	0.00	14.22	0.00	0.00	0.00	0.00	14.22	0.05
4:15	1.9	0.33	0.80	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
4:20	2.0	0.35	0.80	0.31	0.035	0.053	15.80	0.00	0.00	0.00	0.00	0.00	15.80	0.00	0.00	0.00	0.00	15.80	0.05
4:25	2.1	0.36	0.80	0.33	0.036	0.055	16.59	0.00	0.00	0.00	0.00	0.00	16.59	0.00	0.00	0.00	0.00	16.59	0.06
4:30	2.1	0.36	0.80	0.33	0.036	0.055	16.59	0.00	0.00	0.00	0.00	0.00	16.59	0.00	0.00	0.00	0.00	16.59	0.06
4:35	2.2	0.38	0.80	0.34	0.038	0.058	17.38	0.00	0.00	0.00	0.00	0.00	17.38	0.00	0.00	0.00	0.00	17.38	0.06
4:40	2.3	0.40	0.80	0.36	0.040	0.061	18.17	0.00	0.00	0.00	0.00	0.00	18.17	0.00	0.00	0.00	0.00	18.17	0.06
4:45	2.4	0.41	0.80	0.37	0.041	0.063	18.96	0.00	0.00	0.00	0.00	0.00	18.96	0.00	0.00	0.00	0.00	18.96	0.06
4:50	2.4	0.41	0.80	0.37	0.041	0.063	18.96	0.00	0.00	0.00	0.00	0.00	18.96	0.00	0.00	0.00	0.00	18.96	0.06
4:55	2.5	0.43	0.80	0.39	0.043	0.066	19.75	0.00	0.00	0.00	0.00	0.00	19.75	0.00	0.00	0.00	0.00	19.75	0.07
5:00	2.6	0.45	0.80	0.40	0.045	0.068	20.54	0.00	0.00	0.00	0.00	0.00	20.54	0.00	0.00	0.00	0.00	20.54	0.07
5:05	3.1	0.54	0.80	0.48	0.054	0.082	24.48	0.00	0.00	0.00	0.00	0.00	24.48	0.00	0.00	0.00	0.00	24.48	0.08
5:10	3.6	0.62	0.80	0.56	0.062	0.095	28.43	0.00	0.00	0.00	0.00	0.00	28.43	0.00	0.00	0.00	0.00	28.43	0.09
5:15	3.9	0.67	0.80	0.61	0.067	0.103	30.80	0.00	0.00	0.00	0.00	0.00	30.80	0.00	0.00	0.00	0.00	30.80	0.10
5:20	4.2	0.73	0.80	0.65	0.073	0.111	33.17	0.00	0.00	0.00	0.00	0.00	33.17	0.00	0.00	0.00	0.00	33.17	0.11
5:25	4.7	0.81	0.80	0.73	0.081	0.124	37.12	0.00	0.00	0.00	0.00	0.00	37.12	0.00	0.00	0.00	0.00	37.12	0.12
5:30	5.6	0.97	0.80	N/A		0.168	**0.255**	76.64	0.00	0.00	0.00	0.00	0.00	76.64	0.00	0.00	0.00	0.00	76.64	0.26
5:35	1.9	0.33	0.80	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
5:40	0.9	0.16	0.80	0.14	0.016	0.024	7.11	0.00	0.00	0.00	0.00	0.00	7.11	0.00	0.00	0.00	0.00	7.11	0.02
5:45	0.6	0.10	0.80	0.09	0.010	0.016	4.74	0.00	0.00	0.00	0.00	0.00	4.74	0.00	0.00	0.00	0.00	4.74	0.02
5:50	0.5	0.09	0.80	0.08	0.009	0.013	3.95	0.00	0.00	0.00	0.00	0.00	3.95	0.00	0.00	0.00	0.00	3.95	0.01
5:55	0.3	0.05	0.80	0.05	0.005	0.008	2.37	0.00	0.00	0.00	0.00	0.00	2.37	0.00	0.00	0.00	0.00	2.37	0.01
6:00	0.2	0.03	0.80	0.03	0.003	0.005	1.58	0.00	0.00	0.00	0.00	0.00	1.58	0.00	0.00	0.00	0.00	1.58	0.01
					Total volume (CF)		**822.24**								**Total Overflow (CF)**			**822.24**	

2 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.02	1.40	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
0:30	0.3	0.03	1.39	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
0:45	0.3	0.03	1.37	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
1:00	0.4	0.04	1.36	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
1:15	0.3	0.03	1.34	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
1:30	0.3	0.03	1.32	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
1:45	0.3	0.03	1.31	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
2:00	0.4	0.04	1.29	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
2:15	0.4	0.04	1.28	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
2:30	0.4	0.04	1.26	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
2:45	0.5	0.06	1.25	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
3:00	0.5	0.06	1.23	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
3:15	0.5	0.06	1.21	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
3:30	0.5	0.06	1.20	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
3:45	0.5	0.06	1.18	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
4:00	0.6	0.07	1.17	0.06	0.007	0.010	9.15	0.00	0.00	0.00	0.00	0.00	9.15	0.00	0.00	0.00	0.00	9.15	0.01
4:15	0.6	0.07	1.15	0.06	0.007	0.010	9.15	0.00	0.00	0.00	0.00	0.00	9.15	0.00	0.00	0.00	0.00	9.15	0.01
4:30	0.7	0.08	1.14	0.07	0.008	0.012	10.67	0.00	0.00	0.00	0.00	0.00	10.67	0.00	0.00	0.00	0.00	10.67	0.01
4:45	0.7	0.08	1.13	0.07	0.008	0.012	10.67	0.00	0.00	0.00	0.00	0.00	10.67	0.00	0.00	0.00	0.00	10.67	0.01
5:00	0.8	0.09	1.11	0.08	0.009	0.014	12.20	0.00	0.00	0.00	0.00	0.00	12.20	0.00	0.00	0.00	0.00	12.20	0.01
5:15	0.6	0.07	1.10	0.06	0.007	0.010	9.15	0.00	0.00	0.00	0.00	0.00	9.15	0.00	0.00	0.00	0.00	9.15	0.01
5:30	0.7	0.08	1.08	0.07	0.008	0.012	10.67	0.00	0.00	0.00	0.00	0.00	10.67	0.00	0.00	0.00	0.00	10.67	0.01
5:45	0.8	0.09	1.07	0.08	0.009	0.014	12.20	0.00	0.00	0.00	0.00	0.00	12.20	0.00	0.00	0.00	0.00	12.20	0.01
6:00	0.8	0.09	1.05	0.08	0.009	0.014	12.20	0.00	0.00	0.00	0.00	0.00	12.20	0.00	0.00	0.00	0.00	12.20	0.01
6:15	0.9	0.10	1.04	0.09	0.010	0.015	13.72	0.00	0.00	0.00	0.00	0.00	13.72	0.00	0.00	0.00	0.00	13.72	0.02
6:30	0.9	0.10	1.03	0.09	0.010	0.015	13.72	0.00	0.00	0.00	0.00	0.00	13.72	0.00	0.00	0.00	0.00	13.72	0.02
6:45	1.0	0.11	1.01	0.10	0.011	0.017	15.25	0.00	0.00	0.00	0.00	0.00	15.25	0.00	0.00	0.00	0.00	15.25	0.02
7:00	1.0	0.11	1.00	0.10	0.011	0.017	15.25	0.00	0.00	0.00	0.00	0.00	15.25	0.00	0.00	0.00	0.00	15.25	0.02
7:15	1.0	0.11	0.98	0.10	0.011	0.017	15.25	0.00	0.00	0.00	0.00	0.00	15.25	0.00	0.00	0.00	0.00	15.25	0.02
7:30	1.1	0.12	0.97	0.11	0.012	0.019	16.77	0.00	0.00	0.00	0.00	0.00	16.77	0.00	0.00	0.00	0.00	16.77	0.02
7:45	1.2	0.13	0.96	0.12	0.013	0.020	18.30	0.00	0.00	0.00	0.00	0.00	18.30	0.00	0.00	0.00	0.00	18.30	0.02
8:00	1.3	0.14	0.94	0.13	0.014	0.022	19.82	0.00	0.00	0.00	0.00	0.00	19.82	0.00	0.00	0.00	0.00	19.82	0.02
8:15	1.5	0.17	0.93	0.15	0.017	0.025	22.87	0.00	0.00	0.00	0.00	0.00	22.87	0.00	0.00	0.00	0.00	22.87	0.03
8:30	1.5	0.17	0.92	0.15	0.017	0.025	22.87	0.00	0.00	0.00	0.00	0.00	22.87	0.00	0.00	0.00	0.00	22.87	0.03
8:45	1.6	0.18	0.91	0.16	0.018	0.027	24.40	0.00	0.00	0.00	0.00	0.00	24.40	0.00	0.00	0.00	0.00	24.40	0.03
9:00	1.7	0.19	0.89	0.17	0.019	0.029	25.92	0.00	0.00	0.00	0.00	0.00	25.92	0.00	0.00	0.00	0.00	25.92	0.03
9:15	1.9	0.21	0.88	0.19	0.021	0.032	28.97	0.00	0.00	0.00	0.00	0.00	28.97	0.00	0.00	0.00	0.00	28.97	0.03
9:30	2.0	0.22	0.87	0.20	0.022	0.034	30.50	0.00	0.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00	0.00	30.50	0.03
9:45	2.1	0.23	0.86	0.21	0.023	0.036	32.02	0.00	0.00	0.00	0.00	0.00	32.02	0.00	0.00	0.00	0.00	32.02	0.04
10:00	2.2	0.24	0.84	0.22	0.024	0.037	33.55	0.00	0.00	0.00	0.00	0.00	33.55	0.00	0.00	0.00	0.00	33.55	0.04
10:15	1.5	0.17	0.83	0.15	0.017	0.025	22.87	0.00	0.00	0.00	0.00	0.00	22.87	0.00	0.00	0.00	0.00	22.87	0.03
10:30	1.5	0.17	0.82	0.15	0.017	0.025	22.87	0.00	0.00	0.00	0.00	0.00	22.87	0.00	0.00	0.00	0.00	22.87	0.03
10:45	2.0	0.22	0.81	0.20	0.022	0.034	30.50	0.00	0.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00	0.00	30.50	0.03
11:00	2.0	0.22	0.79	0.20	0.022	0.034	30.50	0.00	0.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00	0.00	30.50	0.03
11:15	1.9	0.21	0.78	0.19	0.021	0.032	28.97	0.00	0.00	0.00	0.00	0.00	28.97	0.00	0.00	0.00	0.00	28.97	0.03
11:30	1.9	0.21	0.77	0.19	0.021	0.032	28.97	0.00	0.00	0.00	0.00	0.00	28.97	0.00	0.00	0.00	0.00	28.97	0.03
11:45	1.7	0.19	0.76	0.17	0.019	0.029	25.92	0.00	0.00	0.00	0.00	0.00	25.92	0.00	0.00	0.00	0.00	25.92	0.03
12:00	1.8	0.20	0.75	0.18	0.020	0.030	27.45	0.00	0.00	0.00	0.00	0.00	27.45	0.00	0.00	0.00	0.00	27.45	0.03
12:15	2.5	0.28	0.74	0.25	0.028	0.042	38.12	0.00	0.00	0.00	0.00	0.00	38.12	0.00	0.00	0.00	0.00	38.12	0.04

12:30	2.6	0.29	0.73	0.26	0.029	0.044	39.65	0.00	0.00	0.00	0.00	0.00	39.65	0.00	0.00	0.00	0.00	39.64	0.04
12:45	2.8	0.31	0.72	0.28	0.031	0.047	42.69	0.00	0.00	0.00	0.00	0.00	42.69	0.00	0.00	0.00	0.00	42.69	0.05
13:00	2.9	0.32	0.70	0.29	0.032	0.049	44.22	0.00	0.00	0.00	0.00	0.00	44.22	0.00	0.00	0.00	0.00	44.22	0.05
13:15	3.4	0.38	0.69	0.34	0.038	**0.058**	51.84	0.00	0.00	0.00	0.00	0.00	51.84	0.00	0.00	0.00	0.00	51.84	0.06
13:30	3.4	0.38	0.68	0.34	0.038	**0.058**	51.84	0.00	0.00	0.00	0.00	0.00	51.84	0.00	0.00	0.00	0.00	51.84	0.06
13:45	2.3	0.26	0.67	0.23	0.026	0.039	35.07	0.00	0.00	0.00	0.00	0.00	35.07	0.00	0.00	0.00	0.00	35.07	0.04
14:00	2.3	0.26	0.66	0.23	0.026	0.039	35.07	0.00	0.00	0.00	0.00	0.00	35.07	0.00	0.00	0.00	0.00	35.07	0.04
14:15	2.7	0.30	0.65	0.27	0.030	0.046	41.17	0.00	0.00	0.00	0.00	0.00	41.17	0.00	0.00	0.00	0.00	41.17	0.05
14:30	2.6	0.29	0.64	0.26	0.029	0.044	39.65	0.00	0.00	0.00	0.00	0.00	39.65	0.00	0.00	0.00	0.00	39.64	0.04
14:45	2.6	0.29	0.63	0.26	0.029	0.044	39.65	0.00	0.00	0.00	0.00	0.00	39.65	0.00	0.00	0.00	0.00	39.64	0.04
15:00	2.5	0.28	0.62	0.25	0.028	0.042	38.12	0.00	0.00	0.00	0.00	0.00	38.12	0.00	0.00	0.00	0.00	38.12	0.04
15:15	2.4	0.27	0.61	0.24	0.027	0.041	36.60	0.00	0.00	0.00	0.00	0.00	36.60	0.00	0.00	0.00	0.00	36.60	0.04
15:30	2.3	0.26	0.60	0.23	0.026	0.039	35.07	0.00	0.00	0.00	0.00	0.00	35.07	0.00	0.00	0.00	0.00	35.07	0.04
15:45	1.9	0.21	0.60	0.19	0.021	0.032	28.97	0.00	0.00	0.00	0.00	0.00	28.97	0.00	0.00	0.00	0.00	28.97	0.03
16:00	1.9	0.21	0.59	0.19	0.021	0.032	28.97	0.00	0.00	0.00	0.00	0.00	28.97	0.00	0.00	0.00	0.00	28.97	0.03
16:15	0.4	0.04	0.58	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
16:30	0.4	0.04	0.57	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
16:45	0.3	0.03	0.56	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
17:00	0.3	0.03	0.55	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
17:15	0.5	0.06	0.54	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
17:30	0.5	0.06	0.53	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
17:45	0.5	0.06	0.53	0.05	0.006	0.008	7.62	0.00	0.00	0.00	0.00	0.00	7.62	0.00	0.00	0.00	0.00	7.62	0.01
18:00	0.4	0.04	0.52	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
18:15	0.4	0.04	0.51	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
18:30	0.4	0.04	0.50	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
18:45	0.3	0.03	0.50	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
19:00	0.2	0.02	0.49	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
19:15	0.3	0.03	0.48	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
19:30	0.4	0.04	0.48	0.04	0.004	0.007	6.10	0.00	0.00	0.00	0.00	0.00	6.10	0.00	0.00	0.00	0.00	6.10	0.01
19:45	0.3	0.03	0.47	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
20:00	0.2	0.02	0.46	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
20:15	0.3	0.03	0.46	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
20:30	0.3	0.03	0.45	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
20:45	0.3	0.03	0.45	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
21:00	0.2	0.02	0.44	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
21:15	0.3	0.03	0.44	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
21:30	0.2	0.02	0.43	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
21:45	0.3	0.03	0.43	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
22:00	0.2	0.02	0.42	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
22:15	0.3	0.03	0.42	0.03	0.003	0.005	4.57	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	0.00	0.00	4.57	0.01
22:30	0.2	0.02	0.41	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
22:45	0.2	0.02	0.41	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
23:00	0.2	0.02	0.41	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
23:15	0.2	0.02	0.40	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
23:30	0.2	0.02	0.40	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
23:45	0.2	0.02	0.40	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
24:00	0.2	0.02	0.40	0.02	0.002	0.003	3.05	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	3.05	0.00
					Total volume (CF)		**1524.81**									**Total Overflow (CF)**		**1524.81**	

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Pre-Development

Recurrence Interval	5	year			
Storm Duration (hrs)	1	3	6	24	
5-year NOAA Atlas 14 Point Precipitation (in)	0.811	1.270	1.810	3.620	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Woodland, Grass; fair		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.80	AMC I			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	0				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.80*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*90*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

5 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.36	0.80		0.32	0.036	0.055	16.46	0.00	0.00	0.00	0.00	0.00	16.46	0.00	0.00	0.00	0.00	16.46	0.05
0:10	4.8	0.47	0.80		0.42	0.047	0.071	21.35	0.00	0.00	0.00	0.00	0.00	21.35	0.00	0.00	0.00	0.00	21.35	0.07
0:15	5.1	0.50	0.80		0.45	0.050	0.076	22.69	0.00	0.00	0.00	0.00	0.00	22.69	0.00	0.00	0.00	0.00	22.69	0.08
0:20	4.9	0.48	0.80		0.43	0.048	0.073	21.80	0.00	0.00	0.00	0.00	0.00	21.80	0.00	0.00	0.00	0.00	21.80	0.07
0:25	6.6	0.64	0.80		0.58	0.064	0.098	29.36	0.00	0.00	0.00	0.00	0.00	29.36	0.00	0.00	0.00	0.00	29.36	0.10
0:30	7.3	0.71	0.80		0.64	0.071	0.108	32.47	0.00	0.00	0.00	0.00	0.00	32.47	0.00	0.00	0.00	0.00	32.47	0.11
0:35	8.4	0.82	0.80		0.74	0.082	0.125	37.37	0.00	0.00	0.00	0.00	0.00	37.37	0.00	0.00	0.00	0.00	37.37	0.12
0:40	9.0	0.88	0.80		0.79	0.088	0.133	40.03	0.00	0.00	0.00	0.00	0.00	40.03	0.00	0.00	0.00	0.00	40.03	0.13
0:45	12.3	1.20	0.80	N/A		0.397	0.605	181.48	0.00	0.00	0.00	0.00	0.00	181.48	0.00	0.00	0.00	0.00	181.48	0.60
0:50	17.6	1.71	0.80	N/A		0.913	**1.391**	417.23	0.00	0.00	0.00	0.00	0.00	417.23	0.00	0.00	0.00	0.00	417.23	1.39
0:55	16.1	1.57	0.80	N/A		0.767	1.168	350.51	0.00	0.00	0.00	0.00	0.00	350.51	0.00	0.00	0.00	0.00	350.51	1.17
1:00	4.2	0.41	0.80		0.37	0.041	0.062	18.68	0.00	0.00	0.00	0.00	0.00	18.68	0.00	0.00	0.00	0.00	18.68	0.06
						Total volume (CF)		**1189.43**								**Total Overflow (CF)**			**1189.43**	

5 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.20	0.80	0.18	0.020	0.030	9.06	0.00	0.00	0.00	0.00	0.00	9.06	0.00	0.00	0.00	0.00	9.06	0.03
0:10	1.3	0.20	0.80	0.18	0.020	0.030	9.06	0.00	0.00	0.00	0.00	0.00	9.06	0.00	0.00	0.00	0.00	9.06	0.03
0:15	1.1	0.17	0.80	0.15	0.017	0.026	7.66	0.00	0.00	0.00	0.00	0.00	7.66	0.00	0.00	0.00	0.00	7.66	0.03
0:20	1.5	0.23	0.80	0.21	0.023	0.035	10.45	0.00	0.00	0.00	0.00	0.00	10.45	0.00	0.00	0.00	0.00	10.45	0.03
0:25	1.5	0.23	0.80	0.21	0.023	0.035	10.45	0.00	0.00	0.00	0.00	0.00	10.45	0.00	0.00	0.00	0.00	10.45	0.03
0:30	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
0:35	1.5	0.23	0.80	0.21	0.023	0.035	10.45	0.00	0.00	0.00	0.00	0.00	10.45	0.00	0.00	0.00	0.00	10.45	0.03
0:40	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
0:45	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
0:50	1.5	0.23	0.80	0.21	0.023	0.035	10.45	0.00	0.00	0.00	0.00	0.00	10.45	0.00	0.00	0.00	0.00	10.45	0.03
0:55	1.6	0.24	0.80	0.22	0.024	0.037	11.15	0.00	0.00	0.00	0.00	0.00	11.15	0.00	0.00	0.00	0.00	11.15	0.04
1:00	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
1:05	2.2	0.34	0.80	0.30	0.034	0.051	15.32	0.00	0.00	0.00	0.00	0.00	15.32	0.00	0.00	0.00	0.00	15.32	0.05
1:10	2.2	0.34	0.80	0.30	0.034	0.051	15.32	0.00	0.00	0.00	0.00	0.00	15.32	0.00	0.00	0.00	0.00	15.32	0.05
1:15	2.2	0.34	0.80	0.30	0.034	0.051	15.32	0.00	0.00	0.00	0.00	0.00	15.32	0.00	0.00	0.00	0.00	15.32	0.05
1:20	2.0	0.30	0.80	0.27	0.030	0.046	13.93	0.00	0.00	0.00	0.00	0.00	13.93	0.00	0.00	0.00	0.00	13.93	0.05
1:25	2.6	0.40	0.80	0.36	0.040	0.060	18.11	0.00	0.00	0.00	0.00	0.00	18.11	0.00	0.00	0.00	0.00	18.11	0.06
1:30	2.7	0.41	0.80	0.37	0.041	0.063	18.81	0.00	0.00	0.00	0.00	0.00	18.81	0.00	0.00	0.00	0.00	18.81	0.06
1:35	2.4	0.37	0.80	0.33	0.037	0.056	16.72	0.00	0.00	0.00	0.00	0.00	16.72	0.00	0.00	0.00	0.00	16.72	0.06
1:40	2.7	0.41	0.80	0.37	0.041	0.063	18.81	0.00	0.00	0.00	0.00	0.00	18.81	0.00	0.00	0.00	0.00	18.81	0.06
1:45	3.3	0.50	0.80	0.45	0.050	0.077	22.99	0.00	0.00	0.00	0.00	0.00	22.99	0.00	0.00	0.00	0.00	22.99	0.08
1:50	3.1	0.47	0.80	0.43	0.047	0.072	21.59	0.00	0.00	0.00	0.00	0.00	21.59	0.00	0.00	0.00	0.00	21.59	0.07
1:55	2.9	0.44	0.80	0.40	0.044	0.067	20.20	0.00	0.00	0.00	0.00	0.00	20.20	0.00	0.00	0.00	0.00	20.20	0.07
2:00	3.0	0.46	0.80	0.41	0.046	0.070	20.90	0.00	0.00	0.00	0.00	0.00	20.90	0.00	0.00	0.00	0.00	20.90	0.07
2:05	3.1	0.47	0.80	0.43	0.047	0.072	21.59	0.00	0.00	0.00	0.00	0.00	21.59	0.00	0.00	0.00	0.00	21.59	0.07
2:10	4.2	0.64	0.80	0.58	0.064	0.098	29.26	0.00	0.00	0.00	0.00	0.00	29.26	0.00	0.00	0.00	0.00	29.26	0.10
2:15	5.0	0.76	0.80	0.69	0.076	0.116	34.83	0.00	0.00	0.00	0.00	0.00	34.83	0.00	0.00	0.00	0.00	34.83	0.12
2:20	3.5	0.53	0.80	0.48	0.053	0.081	24.38	0.00	0.00	0.00	0.00	0.00	24.38	0.00	0.00	0.00	0.00	24.38	0.08
2:25	6.8	1.04	0.80 N/A		0.236	0.360	108.02	0.00	0.00	0.00	0.00	0.00	108.02	0.00	0.00	0.00	0.00	108.02	0.36
2:30	7.3	1.11	0.80 N/A		0.313	0.476	142.85	0.00	0.00	0.00	0.00	0.00	142.85	0.00	0.00	0.00	0.00	142.85	0.48
2:35	8.2	1.25	0.80 N/A		0.450	**0.685**	205.54	0.00	0.00	0.00	0.00	0.00	205.54	0.00	0.00	0.00	0.00	205.54	0.69
2:40	5.9	0.90	0.80 N/A		0.099	0.151	45.32	0.00	0.00	0.00	0.00	0.00	45.32	0.00	0.00	0.00	0.00	45.32	0.15
2:45	2.0	0.30	0.80	0.27	0.030	0.046	13.93	0.00	0.00	0.00	0.00	0.00	13.93	0.00	0.00	0.00	0.00	13.93	0.05
2:50	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
2:55	1.8	0.27	0.80	0.25	0.027	0.042	12.54	0.00	0.00	0.00	0.00	0.00	12.54	0.00	0.00	0.00	0.00	12.54	0.04
3:00	0.6	0.09	0.80	0.08	0.009	0.014	4.18	0.00	0.00	0.00	0.00	0.00	4.18	0.00	0.00	0.00	0.00	4.18	0.01
					Total volume (CF)		**1001.87**								**Total Overflow (CF)**			**1001.87**	

5 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.11	0.80	0.10	0.011	0.017	4.96	0.00	0.00	0.00	0.00	0.00	4.96	0.00	0.00	0.00	0.00	4.96	0.02
0:10	0.6	0.13	0.80	0.12	0.013	0.020	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.02
0:15	0.6	0.13	0.80	0.12	0.013	0.020	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.02
0:20	0.6	0.13	0.80	0.12	0.013	0.020	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.02
0:25	0.6	0.13	0.80	0.12	0.013	0.020	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.02
0:30	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
0:35	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
0:40	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
0:45	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
0:50	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
0:55	0.7	0.15	0.80	0.14	0.015	0.023	6.95	0.00	0.00	0.00	0.00	0.00	6.95	0.00	0.00	0.00	0.00	6.95	0.02
1:00	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:05	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:10	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:15	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:20	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:25	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:30	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:35	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:40	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:45	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:50	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
1:55	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
2:00	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:05	0.8	0.17	0.80	0.16	0.017	0.026	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.03
2:10	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:15	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:20	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:25	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:30	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:35	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:40	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
2:45	1.0	0.22	0.80	0.20	0.022	0.033	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.03
2:50	1.0	0.22	0.80	0.20	0.022	0.033	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.03
2:55	1.0	0.22	0.80	0.20	0.022	0.033	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.03
3:00	1.0	0.22	0.80	0.20	0.022	0.033	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.03
3:05	1.0	0.22	0.80	0.20	0.022	0.033	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.03
3:10	1.1	0.24	0.80	0.22	0.024	0.036	10.92	0.00	0.00	0.00	0.00	0.00	10.92	0.00	0.00	0.00	0.00	10.92	0.04
3:15	1.1	0.24	0.80	0.22	0.024	0.036	10.92	0.00	0.00	0.00	0.00	0.00	10.92	0.00	0.00	0.00	0.00	10.92	0.04
3:20	1.1	0.24	0.80	0.22	0.024	0.036	10.92	0.00	0.00	0.00	0.00	0.00	10.92	0.00	0.00	0.00	0.00	10.92	0.04
3:25	1.2	0.26	0.80	0.23	0.026	0.040	11.91	0.00	0.00	0.00	0.00	0.00	11.91	0.00	0.00	0.00	0.00	11.91	0.04
3:30	1.3	0.28	0.80	0.25	0.028	0.043	12.91	0.00	0.00	0.00	0.00	0.00	12.91	0.00	0.00	0.00	0.00	12.91	0.04
3:35	1.4	0.30	0.80	0.27	0.030	0.046	13.90	0.00	0.00	0.00	0.00	0.00	13.90	0.00	0.00	0.00	0.00	13.90	0.05
3:40	1.4	0.30	0.80	0.27	0.030	0.046	13.90	0.00	0.00	0.00	0.00	0.00	13.90	0.00	0.00	0.00	0.00	13.90	0.05
3:45	1.5	0.33	0.80	0.29	0.033	0.050	14.89	0.00	0.00	0.00	0.00	0.00	14.89	0.00	0.00	0.00	0.00	14.89	0.05
3:50	1.5	0.33	0.80	0.29	0.033	0.050	14.89	0.00	0.00	0.00	0.00	0.00	14.89	0.00	0.00	0.00	0.00	14.89	0.05
3:55	1.6	0.35	0.80	0.31	0.035	0.053	15.88	0.00	0.00	0.00	0.00	0.00	15.88	0.00	0.00	0.00	0.00	15.88	0.05
4:00	1.6	0.35	0.80	0.31	0.035	0.053	15.88	0.00	0.00	0.00	0.00	0.00	15.88	0.00	0.00	0.00	0.00	15.88	0.05
4:05	1.7	0.37	0.80	0.33	0.037	0.056	16.88	0.00	0.00	0.00	0.00	0.00	16.88	0.00	0.00	0.00	0.00	16.88	0.06

4:10	1.8	0.39	0.80	0.35	0.039	0.060	17.87	0.00	0.00	0.00	0.00	0.00	17.87	0.00	0.00	0.00	0.00	17.87	0.06
4:15	1.9	0.41	0.80	0.37	0.041	0.063	18.86	0.00	0.00	0.00	0.00	0.00	18.86	0.00	0.00	0.00	0.00	18.86	0.06
4:20	2.0	0.43	0.80	0.39	0.043	0.066	19.86	0.00	0.00	0.00	0.00	0.00	19.86	0.00	0.00	0.00	0.00	19.86	0.07
4:25	2.1	0.46	0.80	0.41	0.046	0.069	20.85	0.00	0.00	0.00	0.00	0.00	20.85	0.00	0.00	0.00	0.00	20.85	0.07
4:30	2.1	0.46	0.80	0.41	0.046	0.069	20.85	0.00	0.00	0.00	0.00	0.00	20.85	0.00	0.00	0.00	0.00	20.85	0.07
4:35	2.2	0.48	0.80	0.43	0.048	0.073	21.84	0.00	0.00	0.00	0.00	0.00	21.84	0.00	0.00	0.00	0.00	21.84	0.07
4:40	2.3	0.50	0.80	0.45	0.050	0.076	22.83	0.00	0.00	0.00	0.00	0.00	22.83	0.00	0.00	0.00	0.00	22.83	0.08
4:45	2.4	0.52	0.80	0.47	0.052	0.079	23.83	0.00	0.00	0.00	0.00	0.00	23.83	0.00	0.00	0.00	0.00	23.83	0.08
4:50	2.4	0.52	0.80	0.47	0.052	0.079	23.83	0.00	0.00	0.00	0.00	0.00	23.83	0.00	0.00	0.00	0.00	23.83	0.08
4:55	2.5	0.54	0.80	0.49	0.054	0.083	24.82	0.00	0.00	0.00	0.00	0.00	24.82	0.00	0.00	0.00	0.00	24.82	0.08
5:00	2.6	0.56	0.80	0.51	0.056	0.086	25.81	0.00	0.00	0.00	0.00	0.00	25.81	0.00	0.00	0.00	0.00	25.81	0.09
5:05	3.1	0.67	0.80	0.61	0.067	0.103	30.78	0.00	0.00	0.00	0.00	0.00	30.78	0.00	0.00	0.00	0.00	30.78	0.10
5:10	3.6	0.78	0.80	0.70	0.078	0.119	35.74	0.00	0.00	0.00	0.00	0.00	35.74	0.00	0.00	0.00	0.00	35.74	0.12
5:15	3.9	0.85	0.80	0.76	0.085	0.129	38.72	0.00	0.00	0.00	0.00	0.00	38.72	0.00	0.00	0.00	0.00	38.72	0.13
5:20	4.2	0.91	0.80	N/A	0.112	0.171	51.30	0.00	0.00	0.00	0.00	0.00	51.30	0.00	0.00	0.00	0.00	51.30	0.17
5:25	4.7	1.02	0.80	N/A	0.221	0.336	100.94	0.00	0.00	0.00	0.00	0.00	100.94	0.00	0.00	0.00	0.00	100.94	0.34
5:30	5.6	1.22	0.80	N/A	0.416	**0.634**	190.29	0.00	0.00	0.00	0.00	0.00	190.29	0.00	0.00	0.00	0.00	190.29	0.63
5:35	1.9	0.41	0.80	0.37	0.041	0.063	18.86	0.00	0.00	0.00	0.00	0.00	18.86	0.00	0.00	0.00	0.00	18.86	0.06
5:40	0.9	0.20	0.80	0.18	0.020	0.030	8.93	0.00	0.00	0.00	0.00	0.00	8.93	0.00	0.00	0.00	0.00	8.93	0.03
5:45	0.6	0.13	0.80	0.12	0.013	0.020	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.02
5:50	0.5	0.11	0.80	0.10	0.011	0.017	4.96	0.00	0.00	0.00	0.00	0.00	4.96	0.00	0.00	0.00	0.00	4.96	0.02
5:55	0.3	0.07	0.80	0.06	0.007	0.010	2.98	0.00	0.00	0.00	0.00	0.00	2.98	0.00	0.00	0.00	0.00	2.98	0.01
6:00	0.2	0.04	0.80	0.04	0.004	0.007	1.99	0.00	0.00	0.00	0.00	0.00	1.99	0.00	0.00	0.00	0.00	1.99	0.01
					Total volume (CF)		**1191.35**								**Total Overflow (CF)**			**1191.35**	

5 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.03	1.40	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
0:30	0.3	0.04	1.39	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
0:45	0.3	0.04	1.37	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
1:00	0.4	0.06	1.36	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
1:15	0.3	0.04	1.34	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
1:30	0.3	0.04	1.32	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
1:45	0.3	0.04	1.31	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
2:00	0.4	0.06	1.29	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
2:15	0.4	0.06	1.28	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
2:30	0.4	0.06	1.26	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
2:45	0.5	0.07	1.25	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
3:00	0.5	0.07	1.23	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
3:15	0.5	0.07	1.21	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
3:30	0.5	0.07	1.20	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
3:45	0.5	0.07	1.18	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
4:00	0.6	0.09	1.17	0.08	0.009	0.013	11.91	0.00	0.00	0.00	0.00	0.00	11.91	0.00	0.00	0.00	0.00	11.91	0.01
4:15	0.6	0.09	1.15	0.08	0.009	0.013	11.91	0.00	0.00	0.00	0.00	0.00	11.91	0.00	0.00	0.00	0.00	11.91	0.01
4:30	0.7	0.10	1.14	0.09	0.010	0.015	13.90	0.00	0.00	0.00	0.00	0.00	13.90	0.00	0.00	0.00	0.00	13.90	0.02
4:45	0.7	0.10	1.13	0.09	0.010	0.015	13.90	0.00	0.00	0.00	0.00	0.00	13.90	0.00	0.00	0.00	0.00	13.90	0.02
5:00	0.8	0.12	1.11	0.10	0.012	0.018	15.88	0.00	0.00	0.00	0.00	0.00	15.88	0.00	0.00	0.00	0.00	15.88	0.02
5:15	0.6	0.09	1.10	0.08	0.009	0.013	11.91	0.00	0.00	0.00	0.00	0.00	11.91	0.00	0.00	0.00	0.00	11.91	0.01
5:30	0.7	0.10	1.08	0.09	0.010	0.015	13.90	0.00	0.00	0.00	0.00	0.00	13.90	0.00	0.00	0.00	0.00	13.90	0.02
5:45	0.8	0.12	1.07	0.10	0.012	0.018	15.88	0.00	0.00	0.00	0.00	0.00	15.88	0.00	0.00	0.00	0.00	15.88	0.02
6:00	0.8	0.12	1.05	0.10	0.012	0.018	15.88	0.00	0.00	0.00	0.00	0.00	15.88	0.00	0.00	0.00	0.00	15.88	0.02
6:15	0.9	0.13	1.04	0.12	0.013	0.020	17.87	0.00	0.00	0.00	0.00	0.00	17.87	0.00	0.00	0.00	0.00	17.87	0.02
6:30	0.9	0.13	1.03	0.12	0.013	0.020	17.87	0.00	0.00	0.00	0.00	0.00	17.87	0.00	0.00	0.00	0.00	17.87	0.02
6:45	1.0	0.14	1.01	0.13	0.014	0.022	19.86	0.00	0.00	0.00	0.00	0.00	19.86	0.00	0.00	0.00	0.00	19.86	0.02
7:00	1.0	0.14	1.00	0.13	0.014	0.022	19.86	0.00	0.00	0.00	0.00	0.00	19.86	0.00	0.00	0.00	0.00	19.86	0.02
7:15	1.0	0.14	0.98	0.13	0.014	0.022	19.86	0.00	0.00	0.00	0.00	0.00	19.86	0.00	0.00	0.00	0.00	19.86	0.02
7:30	1.1	0.16	0.97	0.14	0.016	0.024	21.84	0.00	0.00	0.00	0.00	0.00	21.84	0.00	0.00	0.00	0.00	21.84	0.02
7:45	1.2	0.17	0.96	0.16	0.017	0.026	23.83	0.00	0.00	0.00	0.00	0.00	23.83	0.00	0.00	0.00	0.00	23.83	0.03
8:00	1.3	0.19	0.94	0.17	0.019	0.029	25.81	0.00	0.00	0.00	0.00	0.00	25.81	0.00	0.00	0.00	0.00	25.81	0.03
8:15	1.5	0.22	0.93	0.20	0.022	0.033	29.78	0.00	0.00	0.00	0.00	0.00	29.78	0.00	0.00	0.00	0.00	29.78	0.03
8:30	1.5	0.22	0.92	0.20	0.022	0.033	29.78	0.00	0.00	0.00	0.00	0.00	29.78	0.00	0.00	0.00	0.00	29.78	0.03
8:45	1.6	0.23	0.91	0.21	0.023	0.035	31.77	0.00	0.00	0.00	0.00	0.00	31.77	0.00	0.00	0.00	0.00	31.77	0.04
9:00	1.7	0.25	0.89	0.22	0.025	0.038	33.75	0.00	0.00	0.00	0.00	0.00	33.75	0.00	0.00	0.00	0.00	33.75	0.04
9:15	1.9	0.28	0.88	0.25	0.028	0.042	37.73	0.00	0.00	0.00	0.00	0.00	37.73	0.00	0.00	0.00	0.00	37.73	0.04
9:30	2.0	0.29	0.87	0.26	0.029	0.044	39.71	0.00	0.00	0.00	0.00	0.00	39.71	0.00	0.00	0.00	0.00	39.71	0.04
9:45	2.1	0.30	0.86	0.27	0.030	0.046	41.70	0.00	0.00	0.00	0.00	0.00	41.70	0.00	0.00	0.00	0.00	41.70	0.05
10:00	2.2	0.32	0.84	0.29	0.032	0.049	43.68	0.00	0.00	0.00	0.00	0.00	43.68	0.00	0.00	0.00	0.00	43.68	0.05
10:15	1.5	0.22	0.83	0.20	0.022	0.033	29.78	0.00	0.00	0.00	0.00	0.00	29.78	0.00	0.00	0.00	0.00	29.78	0.03
10:30	1.5	0.22	0.82	0.20	0.022	0.033	29.78	0.00	0.00	0.00	0.00	0.00	29.78	0.00	0.00	0.00	0.00	29.78	0.03
10:45	2.0	0.29	0.81	0.26	0.029	0.044	39.71	0.00	0.00	0.00	0.00	0.00	39.71	0.00	0.00	0.00	0.00	39.71	0.04
11:00	2.0	0.29	0.79	0.26	0.029	0.044	39.71	0.00	0.00	0.00	0.00	0.00	39.71	0.00	0.00	0.00	0.00	39.71	0.04
11:15	1.9	0.28	0.78	0.25	0.028	0.042	37.73	0.00	0.00	0.00	0.00	0.00	37.73	0.00	0.00	0.00	0.00	37.73	0.04
11:30	1.9	0.28	0.77	0.25	0.028	0.042	37.73	0.00	0.00	0.00	0.00	0.00	37.73	0.00	0.00	0.00	0.00	37.73	0.04
11:45	1.7	0.25	0.76	0.22	0.025	0.038	33.75	0.00	0.00	0.00	0.00	0.00	33.75	0.00	0.00	0.00	0.00	33.75	0.04
12:00	1.8	0.26	0.75	0.23	0.026	0.040	35.74	0.00	0.00	0.00	0.00	0.00	35.74	0.00	0.00	0.00	0.00	35.74	0.04
12:15	2.5	0.36	0.74	0.33	0.036	0.055	49.64	0.00	0.00	0.00	0.00	0.00	49.64	0.00	0.00	0.00	0.00	49.64	0.06

12:30	2.6	0.38	0.73	0.34	0.038	0.057	51.62	0.00	0.00	0.00	0.00	0.00	51.62	0.00	0.00	0.00	0.00	51.62	0.06
12:45	2.8	0.41	0.72	0.36	0.041	0.062	55.60	0.00	0.00	0.00	0.00	0.00	55.60	0.00	0.00	0.00	0.00	55.60	0.06
13:00	2.9	0.42	0.70	0.38	0.042	0.064	57.58	0.00	0.00	0.00	0.00	0.00	57.58	0.00	0.00	0.00	0.00	57.58	0.06
13:15	3.4	0.49	0.69	0.44	0.049	**0.075**	67.51	0.00	0.00	0.00	0.00	0.00	67.51	0.00	0.00	0.00	0.00	67.51	0.08
13:30	3.4	0.49	0.68	0.44	0.049	**0.075**	67.51	0.00	0.00	0.00	0.00	0.00	67.51	0.00	0.00	0.00	0.00	67.51	0.08
13:45	2.3	0.33	0.67	0.30	0.033	0.051	45.67	0.00	0.00	0.00	0.00	0.00	45.67	0.00	0.00	0.00	0.00	45.67	0.05
14:00	2.3	0.33	0.66	0.30	0.033	0.051	45.67	0.00	0.00	0.00	0.00	0.00	45.67	0.00	0.00	0.00	0.00	45.67	0.05
14:15	2.7	0.39	0.65	0.35	0.039	0.060	53.61	0.00	0.00	0.00	0.00	0.00	53.61	0.00	0.00	0.00	0.00	53.61	0.06
14:30	2.6	0.38	0.64	0.34	0.038	0.057	51.62	0.00	0.00	0.00	0.00	0.00	51.62	0.00	0.00	0.00	0.00	51.62	0.06
14:45	2.6	0.38	0.63	0.34	0.038	0.057	51.62	0.00	0.00	0.00	0.00	0.00	51.62	0.00	0.00	0.00	0.00	51.62	0.06
15:00	2.5	0.36	0.62	0.33	0.036	0.055	49.64	0.00	0.00	0.00	0.00	0.00	49.64	0.00	0.00	0.00	0.00	49.64	0.06
15:15	2.4	0.35	0.61	0.31	0.035	0.053	47.65	0.00	0.00	0.00	0.00	0.00	47.65	0.00	0.00	0.00	0.00	47.65	0.05
15:30	2.3	0.33	0.60	0.30	0.033	0.051	45.67	0.00	0.00	0.00	0.00	0.00	45.67	0.00	0.00	0.00	0.00	45.67	0.05
15:45	1.9	0.28	0.60	0.25	0.028	0.042	37.73	0.00	0.00	0.00	0.00	0.00	37.73	0.00	0.00	0.00	0.00	37.73	0.04
16:00	1.9	0.28	0.59	0.25	0.028	0.042	37.73	0.00	0.00	0.00	0.00	0.00	37.73	0.00	0.00	0.00	0.00	37.73	0.04
16:15	0.4	0.06	0.58	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
16:30	0.4	0.06	0.57	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
16:45	0.3	0.04	0.56	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
17:00	0.3	0.04	0.55	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
17:15	0.5	0.07	0.54	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
17:30	0.5	0.07	0.53	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
17:45	0.5	0.07	0.53	0.07	0.007	0.011	9.93	0.00	0.00	0.00	0.00	0.00	9.93	0.00	0.00	0.00	0.00	9.93	0.01
18:00	0.4	0.06	0.52	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
18:15	0.4	0.06	0.51	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
18:30	0.4	0.06	0.50	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
18:45	0.3	0.04	0.50	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
19:00	0.2	0.03	0.49	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
19:15	0.3	0.04	0.48	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
19:30	0.4	0.06	0.48	0.05	0.006	0.009	7.94	0.00	0.00	0.00	0.00	0.00	7.94	0.00	0.00	0.00	0.00	7.94	0.01
19:45	0.3	0.04	0.47	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
20:00	0.2	0.03	0.46	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
20:15	0.3	0.04	0.46	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
20:30	0.3	0.04	0.45	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
20:45	0.3	0.04	0.45	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
21:00	0.2	0.03	0.44	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
21:15	0.3	0.04	0.44	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
21:30	0.2	0.03	0.43	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
21:45	0.3	0.04	0.43	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
22:00	0.2	0.03	0.42	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
22:15	0.3	0.04	0.42	0.04	0.004	0.007	5.96	0.00	0.00	0.00	0.00	0.00	5.96	0.00	0.00	0.00	0.00	5.96	0.01
22:30	0.2	0.03	0.41	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
22:45	0.2	0.03	0.41	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
23:00	0.2	0.03	0.41	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
23:15	0.2	0.03	0.40	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
23:30	0.2	0.03	0.40	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
23:45	0.2	0.03	0.40	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
24:00	0.2	0.03	0.40	0.03	0.003	0.004	3.97	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00	3.97	0.00
					Total volume (CF)		**1985.54**									**Total Overflow (CF)**		**1985.54**	

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Pre-Development

Recurrence Interval	10	year			
Storm Duration (hrs)	1	3	6	24	
10-year NOAA Atlas 14 Point Precipitation (in)	1.010	1.520	2.130	4.310	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Woodland, Grass; fair		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.42	AMC II			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	0				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.42*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*90*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

10 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.45	0.42		0.40	0.045	0.068	20.50	0.00	0.00	0.00	0.00	0.00	20.50	0.00	0.00	0.00	0.00	20.50	0.07
0:10	4.8	0.58	0.42	N/A		0.162	0.246	73.94	0.00	0.00	0.00	0.00	0.00	73.94	0.00	0.00	0.00	0.00	73.94	0.25
0:15	5.1	0.62	0.42	N/A		0.198	0.302	90.56	0.00	0.00	0.00	0.00	0.00	90.56	0.00	0.00	0.00	0.00	90.56	0.30
0:20	4.9	0.59	0.42	N/A		0.174	0.265	79.48	0.00	0.00	0.00	0.00	0.00	79.48	0.00	0.00	0.00	0.00	79.48	0.26
0:25	6.6	0.80	0.42	N/A		0.380	0.579	173.65	0.00	0.00	0.00	0.00	0.00	173.65	0.00	0.00	0.00	0.00	173.65	0.58
0:30	7.3	0.88	0.42	N/A		0.465	0.708	212.43	0.00	0.00	0.00	0.00	0.00	212.43	0.00	0.00	0.00	0.00	212.43	0.71
0:35	8.4	1.02	0.42	N/A		0.598	0.911	273.37	0.00	0.00	0.00	0.00	0.00	273.37	0.00	0.00	0.00	0.00	273.37	0.91
0:40	9.0	1.09	0.42	N/A		0.671	1.022	306.61	0.00	0.00	0.00	0.00	0.00	306.61	0.00	0.00	0.00	0.00	306.61	1.02
0:45	12.3	1.49	0.42	N/A		1.071	1.631	489.42	0.00	0.00	0.00	0.00	0.00	489.42	0.00	0.00	0.00	0.00	489.42	1.63
0:50	17.6	2.13	0.42	N/A		1.713	**2.610**	783.03	0.00	0.00	0.00	0.00	0.00	783.03	0.00	0.00	0.00	0.00	783.03	2.61
0:55	16.1	1.95	0.42	N/A		1.531	2.333	699.93	0.00	0.00	0.00	0.00	0.00	699.93	0.00	0.00	0.00	0.00	699.93	2.33
1:00	4.2	0.51	0.42	N/A		0.089	0.136	40.70	0.00	0.00	0.00	0.00	0.00	40.70	0.00	0.00	0.00	0.00	40.70	0.14
						Total volume (CF)		**3243.60**								**Total Overflow (CF)**			**3243.60**	

10 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.24	0.42	0.21	0.024	0.036	10.84	0.00	0.00	0.00	0.00	0.00	10.84	0.00	0.00	0.00	0.00	10.84	0.04
0:10	1.3	0.24	0.42	0.21	0.024	0.036	10.84	0.00	0.00	0.00	0.00	0.00	10.84	0.00	0.00	0.00	0.00	10.84	0.04
0:15	1.1	0.20	0.42	0.18	0.020	0.031	9.17	0.00	0.00	0.00	0.00	0.00	9.17	0.00	0.00	0.00	0.00	9.17	0.03
0:20	1.5	0.27	0.42	0.25	0.027	0.042	12.51	0.00	0.00	0.00	0.00	0.00	12.51	0.00	0.00	0.00	0.00	12.51	0.04
0:25	1.5	0.27	0.42	0.25	0.027	0.042	12.51	0.00	0.00	0.00	0.00	0.00	12.51	0.00	0.00	0.00	0.00	12.51	0.04
0:30	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
0:35	1.5	0.27	0.42	0.25	0.027	0.042	12.51	0.00	0.00	0.00	0.00	0.00	12.51	0.00	0.00	0.00	0.00	12.51	0.04
0:40	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
0:45	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
0:50	1.5	0.27	0.42	0.25	0.027	0.042	12.51	0.00	0.00	0.00	0.00	0.00	12.51	0.00	0.00	0.00	0.00	12.51	0.04
0:55	1.6	0.29	0.42	0.26	0.029	0.044	13.34	0.00	0.00	0.00	0.00	0.00	13.34	0.00	0.00	0.00	0.00	13.34	0.04
1:00	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
1:05	2.2	0.40	0.42	0.36	0.040	0.061	18.34	0.00	0.00	0.00	0.00	0.00	18.34	0.00	0.00	0.00	0.00	18.34	0.06
1:10	2.2	0.40	0.42	0.36	0.040	0.061	18.34	0.00	0.00	0.00	0.00	0.00	18.34	0.00	0.00	0.00	0.00	18.34	0.06
1:15	2.2	0.40	0.42	0.36	0.040	0.061	18.34	0.00	0.00	0.00	0.00	0.00	18.34	0.00	0.00	0.00	0.00	18.34	0.06
1:20	2.0	0.36	0.42	0.33	0.036	0.056	16.67	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00	16.67	0.06
1:25	2.6	0.47	0.42 N/A		0.054	0.083	24.79	0.00	0.00	0.00	0.00	0.00	24.79	0.00	0.00	0.00	0.00	24.79	0.08
1:30	2.7	0.49	0.42 N/A		0.072	0.110	33.13	0.00	0.00	0.00	0.00	0.00	33.13	0.00	0.00	0.00	0.00	33.13	0.11
1:35	2.4	0.44	0.42	0.39	0.044	0.067	20.01	0.00	0.00	0.00	0.00	0.00	20.01	0.00	0.00	0.00	0.00	20.01	0.07
1:40	2.7	0.49	0.42 N/A		0.072	0.110	33.13	0.00	0.00	0.00	0.00	0.00	33.13	0.00	0.00	0.00	0.00	33.13	0.11
1:45	3.3	0.60	0.42 N/A		0.182	0.277	83.15	0.00	0.00	0.00	0.00	0.00	83.15	0.00	0.00	0.00	0.00	83.15	0.28
1:50	3.1	0.57	0.42 N/A		0.145	0.222	66.48	0.00	0.00	0.00	0.00	0.00	66.48	0.00	0.00	0.00	0.00	66.48	0.22
1:55	2.9	0.53	0.42 N/A		0.109	0.166	49.80	0.00	0.00	0.00	0.00	0.00	49.80	0.00	0.00	0.00	0.00	49.80	0.17
2:00	3.0	0.55	0.42 N/A		0.127	0.194	58.14	0.00	0.00	0.00	0.00	0.00	58.14	0.00	0.00	0.00	0.00	58.14	0.19
2:05	3.1	0.57	0.42 N/A		0.145	0.222	66.48	0.00	0.00	0.00	0.00	0.00	66.48	0.00	0.00	0.00	0.00	66.48	0.22
2:10	4.2	0.77	0.42 N/A		0.346	0.527	158.19	0.00	0.00	0.00	0.00	0.00	158.19	0.00	0.00	0.00	0.00	158.19	0.53
2:15	5.0	0.91	0.42 N/A		0.492	0.750	224.88	0.00	0.00	0.00	0.00	0.00	224.88	0.00	0.00	0.00	0.00	224.88	0.75
2:20	3.5	0.64	0.42 N/A		0.218	0.333	99.83	0.00	0.00	0.00	0.00	0.00	99.83	0.00	0.00	0.00	0.00	99.83	0.33
2:25	6.8	1.24	0.42 N/A		0.820	1.250	374.95	0.00	0.00	0.00	0.00	0.00	374.95	0.00	0.00	0.00	0.00	374.95	1.25
2:30	7.3	1.33	0.42 N/A		0.912	1.389	416.63	0.00	0.00	0.00	0.00	0.00	416.63	0.00	0.00	0.00	0.00	416.63	1.39
2:35	8.2	1.50	0.42 N/A		1.076	**1.639**	491.67	0.00	0.00	0.00	0.00	0.00	491.67	0.00	0.00	0.00	0.00	491.67	1.64
2:40	5.9	1.08	0.42 N/A		0.656	1.000	299.92	0.00	0.00	0.00	0.00	0.00	299.92	0.00	0.00	0.00	0.00	299.92	1.00
2:45	2.0	0.36	0.42	0.33	0.036	0.056	16.67	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00	16.67	0.06
2:50	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
2:55	1.8	0.33	0.42	0.30	0.033	0.050	15.01	0.00	0.00	0.00	0.00	0.00	15.01	0.00	0.00	0.00	0.00	15.01	0.05
3:00	0.6	0.11	0.42	0.10	0.011	0.017	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.02
					Total volume (CF)		**2778.79**								**Total Overflow (CF)**			**2778.79**	

10 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.13	0.42	0.12	0.013	0.019	5.84	0.00	0.00	0.00	0.00	0.00	5.84	0.00	0.00	0.00	0.00	5.84	0.02
0:10	0.6	0.15	0.42	0.14	0.015	0.023	7.01	0.00	0.00	0.00	0.00	0.00	7.01	0.00	0.00	0.00	0.00	7.01	0.02
0:15	0.6	0.15	0.42	0.14	0.015	0.023	7.01	0.00	0.00	0.00	0.00	0.00	7.01	0.00	0.00	0.00	0.00	7.01	0.02
0:20	0.6	0.15	0.42	0.14	0.015	0.023	7.01	0.00	0.00	0.00	0.00	0.00	7.01	0.00	0.00	0.00	0.00	7.01	0.02
0:25	0.6	0.15	0.42	0.14	0.015	0.023	7.01	0.00	0.00	0.00	0.00	0.00	7.01	0.00	0.00	0.00	0.00	7.01	0.02
0:30	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
0:35	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
0:40	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
0:45	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
0:50	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
0:55	0.7	0.18	0.42	0.16	0.018	0.027	8.18	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00	0.00	0.00	8.18	0.03
1:00	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:05	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:10	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:15	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:20	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:25	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:30	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:35	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:40	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:45	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:50	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
1:55	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
2:00	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:05	0.8	0.20	0.42	0.18	0.020	0.031	9.35	0.00	0.00	0.00	0.00	0.00	9.35	0.00	0.00	0.00	0.00	9.35	0.03
2:10	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:15	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:20	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:25	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:30	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:35	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:40	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
2:45	1.0	0.26	0.42	0.23	0.026	0.039	11.68	0.00	0.00	0.00	0.00	0.00	11.68	0.00	0.00	0.00	0.00	11.68	0.04
2:50	1.0	0.26	0.42	0.23	0.026	0.039	11.68	0.00	0.00	0.00	0.00	0.00	11.68	0.00	0.00	0.00	0.00	11.68	0.04
2:55	1.0	0.26	0.42	0.23	0.026	0.039	11.68	0.00	0.00	0.00	0.00	0.00	11.68	0.00	0.00	0.00	0.00	11.68	0.04
3:00	1.0	0.26	0.42	0.23	0.026	0.039	11.68	0.00	0.00	0.00	0.00	0.00	11.68	0.00	0.00	0.00	0.00	11.68	0.04
3:05	1.0	0.26	0.42	0.23	0.026	0.039	11.68	0.00	0.00	0.00	0.00	0.00	11.68	0.00	0.00	0.00	0.00	11.68	0.04
3:10	1.1	0.28	0.42	0.25	0.028	0.043	12.85	0.00	0.00	0.00	0.00	0.00	12.85	0.00	0.00	0.00	0.00	12.85	0.04
3:15	1.1	0.28	0.42	0.25	0.028	0.043	12.85	0.00	0.00	0.00	0.00	0.00	12.85	0.00	0.00	0.00	0.00	12.85	0.04
3:20	1.1	0.28	0.42	0.25	0.028	0.043	12.85	0.00	0.00	0.00	0.00	0.00	12.85	0.00	0.00	0.00	0.00	12.85	0.04
3:25	1.2	0.31	0.42	0.28	0.031	0.047	14.02	0.00	0.00	0.00	0.00	0.00	14.02	0.00	0.00	0.00	0.00	14.02	0.05
3:30	1.3	0.33	0.42	0.30	0.033	0.051	15.19	0.00	0.00	0.00	0.00	0.00	15.19	0.00	0.00	0.00	0.00	15.19	0.05
3:35	1.4	0.36	0.42	0.32	0.036	0.055	16.36	0.00	0.00	0.00	0.00	0.00	16.36	0.00	0.00	0.00	0.00	16.36	0.05
3:40	1.4	0.36	0.42	0.32	0.036	0.055	16.36	0.00	0.00	0.00	0.00	0.00	16.36	0.00	0.00	0.00	0.00	16.36	0.05
3:45	1.5	0.38	0.42	0.35	0.038	0.058	17.52	0.00	0.00	0.00	0.00	0.00	17.52	0.00	0.00	0.00	0.00	17.52	0.06
3:50	1.5	0.38	0.42	0.35	0.038	0.058	17.52	0.00	0.00	0.00	0.00	0.00	17.52	0.00	0.00	0.00	0.00	17.52	0.06
3:55	1.6	0.41	0.42	0.37	0.041	0.062	18.69	0.00	0.00	0.00	0.00	0.00	18.69	0.00	0.00	0.00	0.00	18.69	0.06
4:00	1.6	0.41	0.42	0.37	0.041	0.062	18.69	0.00	0.00	0.00	0.00	0.00	18.69	0.00	0.00	0.00	0.00	18.69	0.06
4:05	1.7	0.43	0.42	0.39	0.043	0.066	19.86	0.00	0.00	0.00	0.00	0.00	19.86	0.00	0.00	0.00	0.00	19.86	0.07

4:10	1.8	0.46	0.42	0.41	0.046	0.070	21.03	0.00	0.00	0.00	0.00	0.00	21.03	0.00	0.00	0.00	0.00	21.03	0.07
4:15	1.9	0.49	0.42	N/A	0.066	0.100	30.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00	30.00	0.10
4:20	2.0	0.51	0.42	N/A	0.091	0.139	41.69	0.00	0.00	0.00	0.00	0.00	41.69	0.00	0.00	0.00	0.00	41.69	0.14
4:25	2.1	0.54	0.42	N/A	0.117	0.178	53.37	0.00	0.00	0.00	0.00	0.00	53.37	0.00	0.00	0.00	0.00	53.37	0.18
4:30	2.1	0.54	0.42	N/A	0.117	0.178	53.37	0.00	0.00	0.00	0.00	0.00	53.37	0.00	0.00	0.00	0.00	53.37	0.18
4:35	2.2	0.56	0.42	N/A	0.142	0.217	65.05	0.00	0.00	0.00	0.00	0.00	65.05	0.00	0.00	0.00	0.00	65.05	0.22
4:40	2.3	0.59	0.42	N/A	0.168	0.256	76.73	0.00	0.00	0.00	0.00	0.00	76.73	0.00	0.00	0.00	0.00	76.73	0.26
4:45	2.4	0.61	0.42	N/A	0.193	0.295	88.42	0.00	0.00	0.00	0.00	0.00	88.42	0.00	0.00	0.00	0.00	88.42	0.29
4:50	2.4	0.61	0.42	N/A	0.193	0.295	88.42	0.00	0.00	0.00	0.00	0.00	88.42	0.00	0.00	0.00	0.00	88.42	0.29
4:55	2.5	0.64	0.42	N/A	0.219	0.334	100.10	0.00	0.00	0.00	0.00	0.00	100.10	0.00	0.00	0.00	0.00	100.10	0.33
5:00	2.6	0.66	0.42	N/A	0.245	0.373	111.78	0.00	0.00	0.00	0.00	0.00	111.78	0.00	0.00	0.00	0.00	111.78	0.37
5:05	3.1	0.79	0.42	N/A	0.372	0.567	170.20	0.00	0.00	0.00	0.00	0.00	170.20	0.00	0.00	0.00	0.00	170.20	0.57
5:10	3.6	0.92	0.42	N/A	0.500	0.762	228.61	0.00	0.00	0.00	0.00	0.00	228.61	0.00	0.00	0.00	0.00	228.61	0.76
5:15	3.9	1.00	0.42	N/A	0.577	0.879	263.66	0.00	0.00	0.00	0.00	0.00	263.66	0.00	0.00	0.00	0.00	263.66	0.88
5:20	4.2	1.07	0.42	N/A	0.654	0.996	298.71	0.00	0.00	0.00	0.00	0.00	298.71	0.00	0.00	0.00	0.00	298.71	1.00
5:25	4.7	1.20	0.42	N/A	0.781	1.190	357.12	0.00	0.00	0.00	0.00	0.00	357.12	0.00	0.00	0.00	0.00	357.12	1.19
5:30	5.6	1.43	0.42	N/A	1.011	**1.541**	462.27	0.00	0.00	0.00	0.00	0.00	462.27	0.00	0.00	0.00	0.00	462.27	1.54
5:35	1.9	0.49	0.42	N/A	0.066	0.100	30.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00	30.00	0.10
5:40	0.9	0.23	0.42	0.21	0.023	0.035	10.51	0.00	0.00	0.00	0.00	0.00	10.51	0.00	0.00	0.00	0.00	10.51	0.04
5:45	0.6	0.15	0.42	0.14	0.015	0.023	7.01	0.00	0.00	0.00	0.00	0.00	7.01	0.00	0.00	0.00	0.00	7.01	0.02
5:50	0.5	0.13	0.42	0.12	0.013	0.019	5.84	0.00	0.00	0.00	0.00	0.00	5.84	0.00	0.00	0.00	0.00	5.84	0.02
5:55	0.3	0.08	0.42	0.07	0.008	0.012	3.50	0.00	0.00	0.00	0.00	0.00	3.50	0.00	0.00	0.00	0.00	3.50	0.01
6:00	0.2	0.05	0.42	0.05	0.005	0.008	2.34	0.00	0.00	0.00	0.00	0.00	2.34	0.00	0.00	0.00	0.00	2.34	0.01
					Total volume (CF)		**3109.48**								**Total Overflow (CF)**				**3109.48**	

10 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.03	0.74	0.03	0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
0:30	0.3	0.05	0.73	0.05	0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
0:45	0.3	0.05	0.72	0.05	0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
1:00	0.4	0.07	0.71	0.06	0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
1:15	0.3	0.05	0.70	0.05	0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
1:30	0.3	0.05	0.69	0.05	0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
1:45	0.3	0.05	0.69	0.05	0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
2:00	0.4	0.07	0.68	0.06	0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
2:15	0.4	0.07	0.67	0.06	0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
2:30	0.4	0.07	0.66	0.06	0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
2:45	0.5	0.09	0.65	0.08	0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
3:00	0.5	0.09	0.65	0.08	0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
3:15	0.5	0.09	0.64	0.08	0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
3:30	0.5	0.09	0.63	0.08	0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
3:45	0.5	0.09	0.62	0.08	0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
4:00	0.6	0.10	0.61	0.09	0.010	0.016	14.18	0.00	0.00	0.00	0.00	0.00	14.18	0.00	0.00	0.00	0.00	14.18	0.02
4:15	0.6	0.10	0.61	0.09	0.010	0.016	14.18	0.00	0.00	0.00	0.00	0.00	14.18	0.00	0.00	0.00	0.00	14.18	0.02
4:30	0.7	0.12	0.60	0.11	0.012	0.018	16.55	0.00	0.00	0.00	0.00	0.00	16.55	0.00	0.00	0.00	0.00	16.55	0.02
4:45	0.7	0.12	0.59	0.11	0.012	0.018	16.55	0.00	0.00	0.00	0.00	0.00	16.55	0.00	0.00	0.00	0.00	16.55	0.02
5:00	0.8	0.14	0.58	0.12	0.014	0.021	18.91	0.00	0.00	0.00	0.00	0.00	18.91	0.00	0.00	0.00	0.00	18.91	0.02
5:15	0.6	0.10	0.58	0.09	0.010	0.016	14.18	0.00	0.00	0.00	0.00	0.00	14.18	0.00	0.00	0.00	0.00	14.18	0.02
5:30	0.7	0.12	0.57	0.11	0.012	0.018	16.55	0.00	0.00	0.00	0.00	0.00	16.55	0.00	0.00	0.00	0.00	16.55	0.02
5:45	0.8	0.14	0.56	0.12	0.014	0.021	18.91	0.00	0.00	0.00	0.00	0.00	18.91	0.00	0.00	0.00	0.00	18.91	0.02
6:00	0.8	0.14	0.55	0.12	0.014	0.021	18.91	0.00	0.00	0.00	0.00	0.00	18.91	0.00	0.00	0.00	0.00	18.91	0.02
6:15	0.9	0.16	0.55	0.14	0.016	0.024	21.28	0.00	0.00	0.00	0.00	0.00	21.28	0.00	0.00	0.00	0.00	21.28	0.02
6:30	0.9	0.16	0.54	0.14	0.016	0.024	21.28	0.00	0.00	0.00	0.00	0.00	21.28	0.00	0.00	0.00	0.00	21.28	0.02
6:45	1.0	0.17	0.53	0.16	0.017	0.026	23.64	0.00	0.00	0.00	0.00	0.00	23.64	0.00	0.00	0.00	0.00	23.64	0.03
7:00	1.0	0.17	0.52	0.16	0.017	0.026	23.64	0.00	0.00	0.00	0.00	0.00	23.64	0.00	0.00	0.00	0.00	23.64	0.03
7:15	1.0	0.17	0.52	0.16	0.017	0.026	23.64	0.00	0.00	0.00	0.00	0.00	23.64	0.00	0.00	0.00	0.00	23.64	0.03
7:30	1.1	0.19	0.51	0.17	0.019	0.029	26.00	0.00	0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00	0.00	26.00	0.03
7:45	1.2	0.21	0.50	0.19	0.021	0.032	28.37	0.00	0.00	0.00	0.00	0.00	28.37	0.00	0.00	0.00	0.00	28.37	0.03
8:00	1.3	0.22	0.50	0.20	0.022	0.034	30.73	0.00	0.00	0.00	0.00	0.00	30.73	0.00	0.00	0.00	0.00	30.73	0.03
8:15	1.5	0.26	0.49	0.23	0.026	0.039	35.46	0.00	0.00	0.00	0.00	0.00	35.46	0.00	0.00	0.00	0.00	35.46	0.04
8:30	1.5	0.26	0.48	0.23	0.026	0.039	35.46	0.00	0.00	0.00	0.00	0.00	35.46	0.00	0.00	0.00	0.00	35.46	0.04
8:45	1.6	0.28	0.48	0.25	0.028	0.042	37.82	0.00	0.00	0.00	0.00	0.00	37.82	0.00	0.00	0.00	0.00	37.82	0.04
9:00	1.7	0.29	0.47	0.26	0.029	0.045	40.19	0.00	0.00	0.00	0.00	0.00	40.19	0.00	0.00	0.00	0.00	40.19	0.04
9:15	1.9	0.33	0.46	0.29	0.033	0.050	44.92	0.00	0.00	0.00	0.00	0.00	44.92	0.00	0.00	0.00	0.00	44.92	0.05
9:30	2.0	0.34	0.46	0.31	0.034	0.053	47.28	0.00	0.00	0.00	0.00	0.00	47.28	0.00	0.00	0.00	0.00	47.28	0.05
9:45	2.1	0.36	0.45	0.33	0.036	0.055	49.64	0.00	0.00	0.00	0.00	0.00	49.64	0.00	0.00	0.00	0.00	49.64	0.06
10:00	2.2	0.38	0.44	0.34	0.038	0.058	52.01	0.00	0.00	0.00	0.00	0.00	52.01	0.00	0.00	0.00	0.00	52.01	0.06
10:15	1.5	0.26	0.44	0.23	0.026	0.039	35.46	0.00	0.00	0.00	0.00	0.00	35.46	0.00	0.00	0.00	0.00	35.46	0.04
10:30	1.5	0.26	0.43	0.23	0.026	0.039	35.46	0.00	0.00	0.00	0.00	0.00	35.46	0.00	0.00	0.00	0.00	35.46	0.04
10:45	2.0	0.34	0.42	0.31	0.034	0.053	47.28	0.00	0.00	0.00	0.00	0.00	47.28	0.00	0.00	0.00	0.00	47.28	0.05
11:00	2.0	0.34	0.42	0.31	0.034	0.053	47.28	0.00	0.00	0.00	0.00	0.00	47.28	0.00	0.00	0.00	0.00	47.28	0.05
11:15	1.9	0.33	0.41	0.29	0.033	0.050	44.92	0.00	0.00	0.00	0.00	0.00	44.92	0.00	0.00	0.00	0.00	44.92	0.05
11:30	1.9	0.33	0.41	0.29	0.033	0.050	44.92	0.00	0.00	0.00	0.00	0.00	44.92	0.00	0.00	0.00	0.00	44.92	0.05
11:45	1.7	0.29	0.40	0.26	0.029	0.045	40.19	0.00	0.00	0.00	0.00	0.00	40.19	0.00	0.00	0.00	0.00	40.19	0.04
12:00	1.8	0.31	0.39	0.28	0.031	0.047	42.55	0.00	0.00	0.00	0.00	0.00	42.55	0.00	0.00	0.00	0.00	42.55	0.05
12:15	2.5	0.43	0.39	N/A	0.044	0.067	60.10	0.00	0.00	0.00	0.00	0.00	60.10	0.00	0.00	0.00	0.00	60.10	0.07

12:30	2.6	0.45	0.38	N/A		0.067	0.102	91.71	0.00	0.00	0.00	0.00	0.00	91.71	0.00	0.00	0.00	0.00	91.71	0.10
12:45	2.8	0.48	0.38	N/A		0.107	0.163	146.86	0.00	0.00	0.00	0.00	0.00	146.86	0.00	0.00	0.00	0.00	146.86	0.16
13:00	2.9	0.50	0.37	N/A		0.130	0.198	178.27	0.00	0.00	0.00	0.00	0.00	178.27	0.00	0.00	0.00	0.00	178.27	0.20
13:15	3.4	0.59	0.36	N/A		0.222	0.338	304.15	0.00	0.00	0.00	0.00	0.00	304.15	0.00	0.00	0.00	0.00	304.15	0.34
13:30	3.4	0.59	0.36	N/A		0.227	**0.346**	311.73	0.00	0.00	0.00	0.00	0.00	311.73	0.00	0.00	0.00	0.00	311.73	0.35
13:45	2.3	0.40	0.35	N/A		0.043	0.066	59.17	0.00	0.00	0.00	0.00	0.00	59.17	0.00	0.00	0.00	0.00	59.17	0.07
14:00	2.3	0.40	0.35	N/A		0.049	0.074	66.56	0.00	0.00	0.00	0.00	0.00	66.56	0.00	0.00	0.00	0.00	66.56	0.07
14:15	2.7	0.47	0.34	N/A		0.123	0.187	168.40	0.00	0.00	0.00	0.00	0.00	168.40	0.00	0.00	0.00	0.00	168.40	0.19
14:30	2.6	0.45	0.34	N/A		0.111	0.169	151.94	0.00	0.00	0.00	0.00	0.00	151.94	0.00	0.00	0.00	0.00	151.94	0.17
14:45	2.6	0.45	0.33	N/A		0.116	0.177	159.01	0.00	0.00	0.00	0.00	0.00	159.01	0.00	0.00	0.00	0.00	159.01	0.18
15:00	2.5	0.43	0.33	N/A		0.104	0.158	142.34	0.00	0.00	0.00	0.00	0.00	142.34	0.00	0.00	0.00	0.00	142.34	0.16
15:15	2.4	0.41	0.32	N/A		0.092	0.140	125.57	0.00	0.00	0.00	0.00	0.00	125.57	0.00	0.00	0.00	0.00	125.57	0.14
15:30	2.3	0.40	0.32	N/A		0.079	0.121	108.69	0.00	0.00	0.00	0.00	0.00	108.69	0.00	0.00	0.00	0.00	108.69	0.12
15:45	1.9	0.33	0.31	0.29		0.033	0.050	44.92	0.00	0.00	0.00	0.00	0.00	44.92	0.00	0.00	0.00	0.00	44.92	0.05
16:00	1.9	0.33	0.31	0.29		0.033	0.050	44.92	0.00	0.00	0.00	0.00	0.00	44.92	0.00	0.00	0.00	0.00	44.92	0.05
16:15	0.4	0.07	0.30	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
16:30	0.4	0.07	0.30	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
16:45	0.3	0.05	0.29	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
17:00	0.3	0.05	0.29	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
17:15	0.5	0.09	0.29	0.08		0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
17:30	0.5	0.09	0.28	0.08		0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
17:45	0.5	0.09	0.28	0.08		0.009	0.013	11.82	0.00	0.00	0.00	0.00	0.00	11.82	0.00	0.00	0.00	0.00	11.82	0.01
18:00	0.4	0.07	0.27	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
18:15	0.4	0.07	0.27	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
18:30	0.4	0.07	0.26	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
18:45	0.3	0.05	0.26	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
19:00	0.2	0.03	0.26	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
19:15	0.3	0.05	0.25	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
19:30	0.4	0.07	0.25	0.06		0.007	0.011	9.46	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	9.46	0.01
19:45	0.3	0.05	0.25	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
20:00	0.2	0.03	0.24	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
20:15	0.3	0.05	0.24	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
20:30	0.3	0.05	0.24	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
20:45	0.3	0.05	0.23	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
21:00	0.2	0.03	0.23	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
21:15	0.3	0.05	0.23	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
21:30	0.2	0.03	0.23	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
21:45	0.3	0.05	0.22	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
22:00	0.2	0.03	0.22	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
22:15	0.3	0.05	0.22	0.05		0.005	0.008	7.09	0.00	0.00	0.00	0.00	0.00	7.09	0.00	0.00	0.00	0.00	7.09	0.01
22:30	0.2	0.03	0.22	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
22:45	0.2	0.03	0.22	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
23:00	0.2	0.03	0.21	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
23:15	0.2	0.03	0.21	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
23:30	0.2	0.03	0.21	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
23:45	0.2	0.03	0.21	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
24:00	0.2	0.03	0.21	0.03		0.003	0.005	4.73	0.00	0.00	0.00	0.00	0.00	4.73	0.00	0.00	0.00	0.00	4.73	0.01
					Total volume (CF)			**3556.73**									**Total Overflow (CF)**		**3556.73**	

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Pre-Development

Recurrence Interval	100	year			
Storm Duration (hrs)	1	3	6	24	
100-year NOAA Atlas 14 Point Precipitation (in)	1.920	2.570	3.460	6.730	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Woodland, Grass; fair		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.42	AMC II			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	0				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.42*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*90*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

100 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.85	0.42		N/A	0.432	0.659	197.68	0.00	0.00	0.00	0.00	0.00	197.68	0.00	0.00	0.00	0.00	197.68	0.66
0:10	4.8	1.11	0.42		N/A	0.686	1.045	313.52	0.00	0.00	0.00	0.00	0.00	313.52	0.00	0.00	0.00	0.00	313.52	1.05
0:15	5.1	1.18	0.42		N/A	0.755	1.150	345.11	0.00	0.00	0.00	0.00	0.00	345.11	0.00	0.00	0.00	0.00	345.11	1.15
0:20	4.9	1.13	0.42		N/A	0.709	1.080	324.05	0.00	0.00	0.00	0.00	0.00	324.05	0.00	0.00	0.00	0.00	324.05	1.08
0:25	6.6	1.52	0.42		N/A	1.101	1.677	503.08	0.00	0.00	0.00	0.00	0.00	503.08	0.00	0.00	0.00	0.00	503.08	1.68
0:30	7.3	1.68	0.42		N/A	1.262	1.923	576.79	0.00	0.00	0.00	0.00	0.00	576.79	0.00	0.00	0.00	0.00	576.79	1.92
0:35	8.4	1.94	0.42		N/A	1.515	2.309	692.64	0.00	0.00	0.00	0.00	0.00	692.64	0.00	0.00	0.00	0.00	692.64	2.31
0:40	9.0	2.07	0.42		N/A	1.654	2.519	755.82	0.00	0.00	0.00	0.00	0.00	755.82	0.00	0.00	0.00	0.00	755.82	2.52
0:45	12.3	2.83	0.42		N/A	2.414	3.678	1103.35	0.00	0.00	0.00	0.00	0.00	1103.35	0.00	0.00	0.00	0.00	1103.35	3.68
0:50	17.6	4.06	0.42		N/A	3.635	**5.538**	1661.49	0.00	0.00	0.00	0.00	0.00	1661.49	0.00	0.00	0.00	0.00	1661.49	5.54
0:55	16.1	3.71	0.42		N/A	3.289	5.012	1503.53	0.00	0.00	0.00	0.00	0.00	1503.53	0.00	0.00	0.00	0.00	1503.53	5.01
1:00	4.2	0.97	0.42		N/A	0.548	0.834	250.33	0.00	0.00	0.00	0.00	0.00	250.33	0.00	0.00	0.00	0.00	250.33	0.83
						Total volume (CF)		**8227.38**								**Total Overflow (CF)**			**8227.38**	

100 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.40	0.42	0.36	0.040	0.061	18.33	0.00	0.00	0.00	0.00	0.00	18.33	0.00	0.00	0.00	0.00	18.33	0.06
0:10	1.3	0.40	0.42	0.36	0.040	0.061	18.33	0.00	0.00	0.00	0.00	0.00	18.33	0.00	0.00	0.00	0.00	18.33	0.06
0:15	1.1	0.34	0.42	0.31	0.034	0.052	15.51	0.00	0.00	0.00	0.00	0.00	15.51	0.00	0.00	0.00	0.00	15.51	0.05
0:20	1.5	0.46	0.42	0.42	0.046	0.070	21.14	0.00	0.00	0.00	0.00	0.00	21.14	0.00	0.00	0.00	0.00	21.14	0.07
0:25	1.5	0.46	0.42	0.42	0.046	0.070	21.14	0.00	0.00	0.00	0.00	0.00	21.14	0.00	0.00	0.00	0.00	21.14	0.07
0:30	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
0:35	1.5	0.46	0.42	0.42	0.046	0.070	21.14	0.00	0.00	0.00	0.00	0.00	21.14	0.00	0.00	0.00	0.00	21.14	0.07
0:40	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
0:45	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
0:50	1.5	0.46	0.42	0.42	0.046	0.070	21.14	0.00	0.00	0.00	0.00	0.00	21.14	0.00	0.00	0.00	0.00	21.14	0.07
0:55	1.6	0.49	0.42	N/A	0.073	0.112	33.57	0.00	0.00	0.00	0.00	0.00	33.57	0.00	0.00	0.00	0.00	33.57	0.11
1:00	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
1:05	2.2	0.68	0.42	N/A	0.258	0.394	118.15	0.00	0.00	0.00	0.00	0.00	118.15	0.00	0.00	0.00	0.00	118.15	0.39
1:10	2.2	0.68	0.42	N/A	0.258	0.394	118.15	0.00	0.00	0.00	0.00	0.00	118.15	0.00	0.00	0.00	0.00	118.15	0.39
1:15	2.2	0.68	0.42	N/A	0.258	0.394	118.15	0.00	0.00	0.00	0.00	0.00	118.15	0.00	0.00	0.00	0.00	118.15	0.39
1:20	2.0	0.62	0.42	N/A	0.197	0.300	89.95	0.00	0.00	0.00	0.00	0.00	89.95	0.00	0.00	0.00	0.00	89.95	0.30
1:25	2.6	0.80	0.42	N/A	0.382	0.582	174.53	0.00	0.00	0.00	0.00	0.00	174.53	0.00	0.00	0.00	0.00	174.53	0.58
1:30	2.7	0.83	0.42	N/A	0.413	0.629	188.63	0.00	0.00	0.00	0.00	0.00	188.63	0.00	0.00	0.00	0.00	188.63	0.63
1:35	2.4	0.74	0.42	N/A	0.320	0.488	146.34	0.00	0.00	0.00	0.00	0.00	146.34	0.00	0.00	0.00	0.00	146.34	0.49
1:40	2.7	0.83	0.42	N/A	0.413	0.629	188.63	0.00	0.00	0.00	0.00	0.00	188.63	0.00	0.00	0.00	0.00	188.63	0.63
1:45	3.3	1.02	0.42	N/A	0.598	0.911	273.20	0.00	0.00	0.00	0.00	0.00	273.20	0.00	0.00	0.00	0.00	273.20	0.91
1:50	3.1	0.96	0.42	N/A	0.536	0.817	245.01	0.00	0.00	0.00	0.00	0.00	245.01	0.00	0.00	0.00	0.00	245.01	0.82
1:55	2.9	0.89	0.42	N/A	0.474	0.723	216.82	0.00	0.00	0.00	0.00	0.00	216.82	0.00	0.00	0.00	0.00	216.82	0.72
2:00	3.0	0.93	0.42	N/A	0.505	0.770	230.92	0.00	0.00	0.00	0.00	0.00	230.92	0.00	0.00	0.00	0.00	230.92	0.77
2:05	3.1	0.96	0.42	N/A	0.536	0.817	245.01	0.00	0.00	0.00	0.00	0.00	245.01	0.00	0.00	0.00	0.00	245.01	0.82
2:10	4.2	1.30	0.42	N/A	0.875	1.334	400.07	0.00	0.00	0.00	0.00	0.00	400.07	0.00	0.00	0.00	0.00	400.07	1.33
2:15	5.0	1.54	0.42	N/A	1.122	1.709	512.84	0.00	0.00	0.00	0.00	0.00	512.84	0.00	0.00	0.00	0.00	512.84	1.71
2:20	3.5	1.08	0.42	N/A	0.659	1.005	301.40	0.00	0.00	0.00	0.00	0.00	301.40	0.00	0.00	0.00	0.00	301.40	1.00
2:25	6.8	2.10	0.42	N/A	1.677	2.555	766.57	0.00	0.00	0.00	0.00	0.00	766.57	0.00	0.00	0.00	0.00	766.57	2.56
2:30	7.3	2.25	0.42	N/A	1.831	2.790	837.05	0.00	0.00	0.00	0.00	0.00	837.05	0.00	0.00	0.00	0.00	837.05	2.79
2:35	8.2	2.53	0.42	N/A	2.109	**3.213**	963.92	0.00	0.00	0.00	0.00	0.00	963.92	0.00	0.00	0.00	0.00	963.92	3.21
2:40	5.9	1.82	0.42	N/A	1.400	2.132	639.71	0.00	0.00	0.00	0.00	0.00	639.71	0.00	0.00	0.00	0.00	639.71	2.13
2:45	2.0	0.62	0.42	N/A	0.197	0.300	89.95	0.00	0.00	0.00	0.00	0.00	89.95	0.00	0.00	0.00	0.00	89.95	0.30
2:50	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
2:55	1.8	0.56	0.42	N/A	0.135	0.206	61.76	0.00	0.00	0.00	0.00	0.00	61.76	0.00	0.00	0.00	0.00	61.76	0.21
3:00	0.6	0.19	0.42	0.17	0.019	0.028	8.46	0.00	0.00	0.00	0.00	0.00	8.46	0.00	0.00	0.00	0.00	8.46	0.03
					Total volume (CF)		**7414.30**								**Total Overflow (CF)**			**7414.30**	

100 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.21	0.42	0.19	0.021	0.032	9.49	0.00	0.00	0.00	0.00	0.00	9.49	0.00	0.00	0.00	0.00	9.49	0.03
0:10	0.6	0.25	0.42	0.22	0.025	0.038	11.39	0.00	0.00	0.00	0.00	0.00	11.39	0.00	0.00	0.00	0.00	11.39	0.04
0:15	0.6	0.25	0.42	0.22	0.025	0.038	11.39	0.00	0.00	0.00	0.00	0.00	11.39	0.00	0.00	0.00	0.00	11.39	0.04
0:20	0.6	0.25	0.42	0.22	0.025	0.038	11.39	0.00	0.00	0.00	0.00	0.00	11.39	0.00	0.00	0.00	0.00	11.39	0.04
0:25	0.6	0.25	0.42	0.22	0.025	0.038	11.39	0.00	0.00	0.00	0.00	0.00	11.39	0.00	0.00	0.00	0.00	11.39	0.04
0:30	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
0:35	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
0:40	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
0:45	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
0:50	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
0:55	0.7	0.29	0.42	0.26	0.029	0.044	13.28	0.00	0.00	0.00	0.00	0.00	13.28	0.00	0.00	0.00	0.00	13.28	0.04
1:00	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:05	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:10	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:15	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:20	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:25	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:30	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:35	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:40	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:45	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:50	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
1:55	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
2:00	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:05	0.8	0.33	0.42	0.30	0.033	0.051	15.18	0.00	0.00	0.00	0.00	0.00	15.18	0.00	0.00	0.00	0.00	15.18	0.05
2:10	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:15	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:20	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:25	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:30	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:35	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:40	0.9	0.37	0.42	0.34	0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
2:45	1.0	0.42	0.42	0.37	0.042	0.063	18.98	0.00	0.00	0.00	0.00	0.00	18.98	0.00	0.00	0.00	0.00	18.98	0.06
2:50	1.0	0.42	0.42	0.37	0.042	0.063	18.98	0.00	0.00	0.00	0.00	0.00	18.98	0.00	0.00	0.00	0.00	18.98	0.06
2:55	1.0	0.42	0.42	0.37	0.042	0.063	18.98	0.00	0.00	0.00	0.00	0.00	18.98	0.00	0.00	0.00	0.00	18.98	0.06
3:00	1.0	0.42	0.42	0.37	0.042	0.063	18.98	0.00	0.00	0.00	0.00	0.00	18.98	0.00	0.00	0.00	0.00	18.98	0.06
3:05	1.0	0.42	0.42	0.37	0.042	0.063	18.98	0.00	0.00	0.00	0.00	0.00	18.98	0.00	0.00	0.00	0.00	18.98	0.06
3:10	1.1	0.46	0.42	0.41	0.046	0.070	20.88	0.00	0.00	0.00	0.00	0.00	20.88	0.00	0.00	0.00	0.00	20.88	0.07
3:15	1.1	0.46	0.42	0.41	0.046	0.070	20.88	0.00	0.00	0.00	0.00	0.00	20.88	0.00	0.00	0.00	0.00	20.88	0.07
3:20	1.1	0.46	0.42	0.41	0.046	0.070	20.88	0.00	0.00	0.00	0.00	0.00	20.88	0.00	0.00	0.00	0.00	20.88	0.07
3:25	1.2	0.50	0.42	N/A	0.078	0.119	35.76	0.00	0.00	0.00	0.00	0.00	35.76	0.00	0.00	0.00	0.00	35.76	0.12
3:30	1.3	0.54	0.42	N/A	0.120	0.182	54.74	0.00	0.00	0.00	0.00	0.00	54.74	0.00	0.00	0.00	0.00	54.74	0.18
3:35	1.4	0.58	0.42	N/A	0.161	0.246	73.72	0.00	0.00	0.00	0.00	0.00	73.72	0.00	0.00	0.00	0.00	73.72	0.25
3:40	1.4	0.58	0.42	N/A	0.161	0.246	73.72	0.00	0.00	0.00	0.00	0.00	73.72	0.00	0.00	0.00	0.00	73.72	0.25
3:45	1.5	0.62	0.42	N/A	0.203	0.309	92.70	0.00	0.00	0.00	0.00	0.00	92.70	0.00	0.00	0.00	0.00	92.70	0.31
3:50	1.5	0.62	0.42	N/A	0.203	0.309	92.70	0.00	0.00	0.00	0.00	0.00	92.70	0.00	0.00	0.00	0.00	92.70	0.31
3:55	1.6	0.66	0.42	N/A	0.244	0.372	111.67	0.00	0.00	0.00	0.00	0.00	111.67	0.00	0.00	0.00	0.00	111.67	0.37
4:00	1.6	0.66	0.42	N/A	0.244	0.372	111.67	0.00	0.00	0.00	0.00	0.00	111.67	0.00	0.00	0.00	0.00	111.67	0.37
4:05	1.7	0.71	0.42	N/A	0.286	0.436	130.65	0.00	0.00	0.00	0.00	0.00	130.65	0.00	0.00	0.00	0.00	130.65	0.44

4:10	1.8	0.75	0.42	N/A		0.327	0.499	149.63	0.00	0.00	0.00	0.00	0.00	149.63	0.00	0.00	0.00	0.00	149.63	0.50
4:15	1.9	0.79	0.42	N/A		0.369	0.562	168.61	0.00	0.00	0.00	0.00	0.00	168.61	0.00	0.00	0.00	0.00	168.61	0.56
4:20	2.0	0.83	0.42	N/A		0.410	0.625	187.58	0.00	0.00	0.00	0.00	0.00	187.58	0.00	0.00	0.00	0.00	187.58	0.63
4:25	2.1	0.87	0.42	N/A		0.452	0.689	206.56	0.00	0.00	0.00	0.00	0.00	206.56	0.00	0.00	0.00	0.00	206.56	0.69
4:30	2.1	0.87	0.42	N/A		0.452	0.689	206.56	0.00	0.00	0.00	0.00	0.00	206.56	0.00	0.00	0.00	0.00	206.56	0.69
4:35	2.2	0.91	0.42	N/A		0.493	0.752	225.54	0.00	0.00	0.00	0.00	0.00	225.54	0.00	0.00	0.00	0.00	225.54	0.75
4:40	2.3	0.95	0.42	N/A		0.535	0.815	244.52	0.00	0.00	0.00	0.00	0.00	244.52	0.00	0.00	0.00	0.00	244.52	0.82
4:45	2.4	1.00	0.42	N/A		0.576	0.878	263.50	0.00	0.00	0.00	0.00	0.00	263.50	0.00	0.00	0.00	0.00	263.50	0.88
4:50	2.4	1.00	0.42	N/A		0.576	0.878	263.50	0.00	0.00	0.00	0.00	0.00	263.50	0.00	0.00	0.00	0.00	263.50	0.88
4:55	2.5	1.04	0.42	N/A		0.618	0.942	282.47	0.00	0.00	0.00	0.00	0.00	282.47	0.00	0.00	0.00	0.00	282.47	0.94
5:00	2.6	1.08	0.42	N/A		0.660	1.005	301.45	0.00	0.00	0.00	0.00	0.00	301.45	0.00	0.00	0.00	0.00	301.45	1.00
5:05	3.1	1.29	0.42	N/A		0.867	1.321	396.34	0.00	0.00	0.00	0.00	0.00	396.34	0.00	0.00	0.00	0.00	396.34	1.32
5:10	3.6	1.49	0.42	N/A		1.075	1.637	491.23	0.00	0.00	0.00	0.00	0.00	491.23	0.00	0.00	0.00	0.00	491.23	1.64
5:15	3.9	1.62	0.42	N/A		1.199	1.827	548.16	0.00	0.00	0.00	0.00	0.00	548.16	0.00	0.00	0.00	0.00	548.16	1.83
5:20	4.2	1.74	0.42	N/A		1.324	2.017	605.10	0.00	0.00	0.00	0.00	0.00	605.10	0.00	0.00	0.00	0.00	605.10	2.02
5:25	4.7	1.95	0.42	N/A		1.531	2.333	699.99	0.00	0.00	0.00	0.00	0.00	699.99	0.00	0.00	0.00	0.00	699.99	2.33
5:30	5.6	2.33	0.42	N/A		1.905	**2.903**	870.79	0.00	0.00	0.00	0.00	0.00	870.79	0.00	0.00	0.00	0.00	870.79	2.90
5:35	1.9	0.79	0.42	N/A		0.369	0.562	168.61	0.00	0.00	0.00	0.00	0.00	168.61	0.00	0.00	0.00	0.00	168.61	0.56
5:40	0.9	0.37	0.42	0.34		0.037	0.057	17.08	0.00	0.00	0.00	0.00	0.00	17.08	0.00	0.00	0.00	0.00	17.08	0.06
5:45	0.6	0.25	0.42	0.22		0.025	0.038	11.39	0.00	0.00	0.00	0.00	0.00	11.39	0.00	0.00	0.00	0.00	11.39	0.04
5:50	0.5	0.21	0.42	0.19		0.021	0.032	9.49	0.00	0.00	0.00	0.00	0.00	9.49	0.00	0.00	0.00	0.00	9.49	0.03
5:55	0.3	0.12	0.42	0.11		0.012	0.019	5.69	0.00	0.00	0.00	0.00	0.00	5.69	0.00	0.00	0.00	0.00	5.69	0.02
6:00	0.2	0.08	0.42	0.07		0.008	0.013	3.80	0.00	0.00	0.00	0.00	0.00	3.80	0.00	0.00	0.00	0.00	3.80	0.01
					Total volume (CF)			**7731.16**								**Total Overflow (CF)**			**7731.16**	

100 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.05	0.74	0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
0:30	0.3	0.08	0.73	0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
0:45	0.3	0.08	0.72	0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
1:00	0.4	0.11	0.71	0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
1:15	0.3	0.08	0.70	0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
1:30	0.3	0.08	0.69	0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
1:45	0.3	0.08	0.69	0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
2:00	0.4	0.11	0.68	0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
2:15	0.4	0.11	0.67	0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
2:30	0.4	0.11	0.66	0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
2:45	0.5	0.13	0.65	0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
3:00	0.5	0.13	0.65	0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
3:15	0.5	0.13	0.64	0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
3:30	0.5	0.13	0.63	0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
3:45	0.5	0.13	0.62	0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
4:00	0.6	0.16	0.61	0.15	0.016	0.025	22.15	0.00	0.00	0.00	0.00	0.00	22.15	0.00	0.00	0.00	0.00	22.15	0.02
4:15	0.6	0.16	0.61	0.15	0.016	0.025	22.15	0.00	0.00	0.00	0.00	0.00	22.15	0.00	0.00	0.00	0.00	22.15	0.02
4:30	0.7	0.19	0.60	0.17	0.019	0.029	25.84	0.00	0.00	0.00	0.00	0.00	25.84	0.00	0.00	0.00	0.00	25.84	0.03
4:45	0.7	0.19	0.59	0.17	0.019	0.029	25.84	0.00	0.00	0.00	0.00	0.00	25.84	0.00	0.00	0.00	0.00	25.84	0.03
5:00	0.8	0.22	0.58	0.19	0.022	0.033	29.53	0.00	0.00	0.00	0.00	0.00	29.53	0.00	0.00	0.00	0.00	29.53	0.03
5:15	0.6	0.16	0.58	0.15	0.016	0.025	22.15	0.00	0.00	0.00	0.00	0.00	22.15	0.00	0.00	0.00	0.00	22.15	0.02
5:30	0.7	0.19	0.57	0.17	0.019	0.029	25.84	0.00	0.00	0.00	0.00	0.00	25.84	0.00	0.00	0.00	0.00	25.84	0.03
5:45	0.8	0.22	0.56	0.19	0.022	0.033	29.53	0.00	0.00	0.00	0.00	0.00	29.53	0.00	0.00	0.00	0.00	29.53	0.03
6:00	0.8	0.22	0.55	0.19	0.022	0.033	29.53	0.00	0.00	0.00	0.00	0.00	29.53	0.00	0.00	0.00	0.00	29.53	0.03
6:15	0.9	0.24	0.55	0.22	0.024	0.037	33.22	0.00	0.00	0.00	0.00	0.00	33.22	0.00	0.00	0.00	0.00	33.22	0.04
6:30	0.9	0.24	0.54	0.22	0.024	0.037	33.22	0.00	0.00	0.00	0.00	0.00	33.22	0.00	0.00	0.00	0.00	33.22	0.04
6:45	1.0	0.27	0.53	0.24	0.027	0.041	36.91	0.00	0.00	0.00	0.00	0.00	36.91	0.00	0.00	0.00	0.00	36.91	0.04
7:00	1.0	0.27	0.52	0.24	0.027	0.041	36.91	0.00	0.00	0.00	0.00	0.00	36.91	0.00	0.00	0.00	0.00	36.91	0.04
7:15	1.0	0.27	0.52	0.24	0.027	0.041	36.91	0.00	0.00	0.00	0.00	0.00	36.91	0.00	0.00	0.00	0.00	36.91	0.04
7:30	1.1	0.30	0.51	0.27	0.030	0.045	40.60	0.00	0.00	0.00	0.00	0.00	40.60	0.00	0.00	0.00	0.00	40.60	0.05
7:45	1.2	0.32	0.50	0.29	0.032	0.049	44.30	0.00	0.00	0.00	0.00	0.00	44.30	0.00	0.00	0.00	0.00	44.30	0.05
8:00	1.3	0.35	0.50	0.31	0.035	0.053	47.99	0.00	0.00	0.00	0.00	0.00	47.99	0.00	0.00	0.00	0.00	47.99	0.05
8:15	1.5	0.40	0.49	0.36	0.040	0.062	55.37	0.00	0.00	0.00	0.00	0.00	55.37	0.00	0.00	0.00	0.00	55.37	0.06
8:30	1.5	0.40	0.48	0.36	0.040	0.062	55.37	0.00	0.00	0.00	0.00	0.00	55.37	0.00	0.00	0.00	0.00	55.37	0.06
8:45	1.6	0.43	0.48	0.39	0.043	0.066	59.06	0.00	0.00	0.00	0.00	0.00	59.06	0.00	0.00	0.00	0.00	59.06	0.07
9:00	1.7	0.46	0.47	0.41	0.046	0.070	62.75	0.00	0.00	0.00	0.00	0.00	62.75	0.00	0.00	0.00	0.00	62.75	0.07
9:15	1.9	0.51	0.46	0.46	0.051	0.078	70.14	0.00	0.00	0.00	0.00	0.00	70.14	0.00	0.00	0.00	0.00	70.14	0.08
9:30	2.0	0.54	0.46 N/A		0.083	0.126	113.76	0.00	0.00	0.00	0.00	0.00	113.76	0.00	0.00	0.00	0.00	113.76	0.13
9:45	2.1	0.57	0.45 N/A		0.116	0.177	159.62	0.00	0.00	0.00	0.00	0.00	159.62	0.00	0.00	0.00	0.00	159.62	0.18
10:00	2.2	0.59	0.44 N/A		0.150	0.228	205.40	0.00	0.00	0.00	0.00	0.00	205.40	0.00	0.00	0.00	0.00	205.40	0.23
10:15	1.5	0.40	0.44	0.36	0.040	0.062	55.37	0.00	0.00	0.00	0.00	0.00	55.37	0.00	0.00	0.00	0.00	55.37	0.06
10:30	1.5	0.40	0.43	0.36	0.040	0.062	55.37	0.00	0.00	0.00	0.00	0.00	55.37	0.00	0.00	0.00	0.00	55.37	0.06
10:45	2.0	0.54	0.42 N/A		0.115	0.175	157.65	0.00	0.00	0.00	0.00	0.00	157.65	0.00	0.00	0.00	0.00	157.65	0.18
11:00	2.0	0.54	0.42 N/A		0.121	0.185	166.16	0.00	0.00	0.00	0.00	0.00	166.16	0.00	0.00	0.00	0.00	166.16	0.18
11:15	1.9	0.51	0.41 N/A		0.100	0.153	137.67	0.00	0.00	0.00	0.00	0.00	137.67	0.00	0.00	0.00	0.00	137.67	0.15
11:30	1.9	0.51	0.41 N/A		0.106	0.162	146.01	0.00	0.00	0.00	0.00	0.00	146.01	0.00	0.00	0.00	0.00	146.01	0.16
11:45	1.7	0.46	0.40 N/A		0.059	0.089	80.42	0.00	0.00	0.00	0.00	0.00	80.42	0.00	0.00	0.00	0.00	80.42	0.09
12:00	1.8	0.48	0.39 N/A		0.092	0.139	125.49	0.00	0.00	0.00	0.00	0.00	125.49	0.00	0.00	0.00	0.00	125.49	0.14
12:15	2.5	0.67	0.39 N/A		0.286	0.435	391.94	0.00	0.00	0.00	0.00	0.00	391.94	0.00	0.00	0.00	0.00	391.94	0.44

12:30	2.6	0.70	0.38	N/A		0.319	0.485	436.82	0.00	0.00	0.00	0.00	0.00	436.82	0.00	0.00	0.00	0.00	436.82	0.49
12:45	2.8	0.75	0.38	N/A		0.378	0.576	518.52	0.00	0.00	0.00	0.00	0.00	518.52	0.00	0.00	0.00	0.00	518.52	0.58
13:00	2.9	0.78	0.37	N/A		0.411	0.626	563.21	0.00	0.00	0.00	0.00	0.00	563.21	0.00	0.00	0.00	0.00	563.21	0.63
13:15	3.4	0.92	0.36	N/A		0.551	0.839	755.45	0.00	0.00	0.00	0.00	0.00	755.45	0.00	0.00	0.00	0.00	755.45	0.84
13:30	3.4	0.92	0.36	N/A		0.556	**0.848**	763.03	0.00	0.00	0.00	0.00	0.00	763.03	0.00	0.00	0.00	0.00	763.03	0.85
13:45	2.3	0.62	0.35	N/A		0.266	0.405	364.46	0.00	0.00	0.00	0.00	0.00	364.46	0.00	0.00	0.00	0.00	364.46	0.40
14:00	2.3	0.62	0.35	N/A		0.271	0.413	371.85	0.00	0.00	0.00	0.00	0.00	371.85	0.00	0.00	0.00	0.00	371.85	0.41
14:15	2.7	0.73	0.34	N/A		0.384	0.585	526.78	0.00	0.00	0.00	0.00	0.00	526.78	0.00	0.00	0.00	0.00	526.78	0.59
14:30	2.6	0.70	0.34	N/A		0.362	0.552	497.05	0.00	0.00	0.00	0.00	0.00	497.05	0.00	0.00	0.00	0.00	497.05	0.55
14:45	2.6	0.70	0.33	N/A		0.368	0.560	504.12	0.00	0.00	0.00	0.00	0.00	504.12	0.00	0.00	0.00	0.00	504.12	0.56
15:00	2.5	0.67	0.33	N/A		0.346	0.527	474.18	0.00	0.00	0.00	0.00	0.00	474.18	0.00	0.00	0.00	0.00	474.18	0.53
15:15	2.4	0.65	0.32	N/A		0.324	0.493	444.13	0.00	0.00	0.00	0.00	0.00	444.13	0.00	0.00	0.00	0.00	444.13	0.49
15:30	2.3	0.62	0.32	N/A		0.302	0.460	413.98	0.00	0.00	0.00	0.00	0.00	413.98	0.00	0.00	0.00	0.00	413.98	0.46
15:45	1.9	0.51	0.31	N/A		0.199	0.303	272.98	0.00	0.00	0.00	0.00	0.00	272.98	0.00	0.00	0.00	0.00	272.98	0.30
16:00	1.9	0.51	0.31	N/A		0.204	0.311	279.52	0.00	0.00	0.00	0.00	0.00	279.52	0.00	0.00	0.00	0.00	279.52	0.31
16:15	0.4	0.11	0.30		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
16:30	0.4	0.11	0.30		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
16:45	0.3	0.08	0.29		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
17:00	0.3	0.08	0.29		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
17:15	0.5	0.13	0.29		0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
17:30	0.5	0.13	0.28		0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
17:45	0.5	0.13	0.28		0.12	0.013	0.021	18.46	0.00	0.00	0.00	0.00	0.00	18.46	0.00	0.00	0.00	0.00	18.46	0.02
18:00	0.4	0.11	0.27		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
18:15	0.4	0.11	0.27		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
18:30	0.4	0.11	0.26		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
18:45	0.3	0.08	0.26		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
19:00	0.2	0.05	0.26		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
19:15	0.3	0.08	0.25		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
19:30	0.4	0.11	0.25		0.10	0.011	0.016	14.77	0.00	0.00	0.00	0.00	0.00	14.77	0.00	0.00	0.00	0.00	14.77	0.02
19:45	0.3	0.08	0.25		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
20:00	0.2	0.05	0.24		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
20:15	0.3	0.08	0.24		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
20:30	0.3	0.08	0.24		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
20:45	0.3	0.08	0.23		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
21:00	0.2	0.05	0.23		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
21:15	0.3	0.08	0.23		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
21:30	0.2	0.05	0.23		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
21:45	0.3	0.08	0.22		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
22:00	0.2	0.05	0.22		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
22:15	0.3	0.08	0.22		0.07	0.008	0.012	11.07	0.00	0.00	0.00	0.00	0.00	11.07	0.00	0.00	0.00	0.00	11.07	0.01
22:30	0.2	0.05	0.22		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
22:45	0.2	0.05	0.22		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
23:00	0.2	0.05	0.21		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
23:15	0.2	0.05	0.21		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
23:30	0.2	0.05	0.21		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
23:45	0.2	0.05	0.21		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
24:00	0.2	0.05	0.21		0.05	0.005	0.008	7.38	0.00	0.00	0.00	0.00	0.00	7.38	0.00	0.00	0.00	0.00	7.38	0.01
						Total volume (CF)		**10394.72**								**Total Overflow (CF)**			**10394.72**	

Appendix F - Post-Development Hydrology Calculations

2-Year Frequency Storm Hydrology
5-year Frequency Strom Hydrology
10-Year Frequency Storm Hydrology
100-Year Frequency Storm Hydrology

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Post-Development

Recurrence Interval	2	year			
Storm Duration (hrs)	1	3	6	24	
2-year NOAA Atlas 14 Point Precipitation (in)	0.600	0.995	1.440	2.780	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	36	Type:	Urban Covers; good		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.86	AMC I			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	83				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.22*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*24*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

2 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.27	0.22		0.06	0.203	0.309	92.83	0.00	0.00	0.00	0.00	0.00	92.83	0.00	0.00	0.00	0.00	92.83	0.31
0:10	4.8	0.35	0.22		0.08	0.263	0.401	120.43	0.00	0.00	0.00	0.00	0.00	120.43	0.00	0.00	0.00	0.00	120.43	0.40
0:15	5.1	0.37	0.22		0.09	0.280	0.427	127.96	0.00	0.00	0.00	0.00	0.00	127.96	0.00	0.00	0.00	0.00	127.96	0.43
0:20	4.9	0.35	0.22		0.08	0.269	0.410	122.94	0.00	0.00	0.00	0.00	0.00	122.94	0.00	0.00	0.00	0.00	122.94	0.41
0:25	6.6	0.48	0.22		0.11	0.362	0.552	165.60	0.00	0.00	0.00	0.00	0.00	165.60	0.00	0.00	0.00	0.00	165.60	0.55
0:30	7.3	0.53	0.22		0.12	0.401	0.611	183.16	0.00	0.00	0.00	0.00	0.00	183.16	0.00	0.00	0.00	0.00	183.16	0.61
0:35	8.4	0.60	0.22		0.14	0.461	0.703	210.76	0.00	0.00	0.00	0.00	0.00	210.76	0.00	0.00	0.00	0.00	210.76	0.70
0:40	9.0	0.65	0.22		0.15	0.494	0.753	225.81	0.00	0.00	0.00	0.00	0.00	225.81	0.00	0.00	0.00	0.00	225.81	0.75
0:45	12.3	0.89	0.22		0.21	0.675	1.029	308.61	0.00	0.00	0.00	0.00	0.00	308.61	0.00	0.00	0.00	0.00	308.61	1.03
0:50	17.6	1.27	0.22	N/A		1.048	**1.597**	479.05	0.00	0.00	0.00	0.00	0.00	479.05	0.00	0.00	0.00	0.00	479.05	1.60
0:55	16.1	1.16	0.22	N/A		0.940	1.432	429.68	0.00	0.00	0.00	0.00	0.00	429.68	0.00	0.00	0.00	0.00	429.68	1.43
1:00	4.2	0.30	0.22		0.07	0.231	0.351	105.38	0.00	0.00	0.00	0.00	0.00	105.38	0.00	0.00	0.00	0.00	105.38	0.35
						Total volume (CF)		**2572.22**								**Total Overflow (CF)**			**2572.22**	

2 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.16	0.22	0.04	0.118	0.180	54.09	0.00	0.00	0.00	0.00	0.00	54.09	0.00	0.00	0.00	0.00	54.09	0.18
0:10	1.3	0.16	0.22	0.04	0.118	0.180	54.09	0.00	0.00	0.00	0.00	0.00	54.09	0.00	0.00	0.00	0.00	54.09	0.18
0:15	1.1	0.13	0.22	0.03	0.100	0.153	45.77	0.00	0.00	0.00	0.00	0.00	45.77	0.00	0.00	0.00	0.00	45.77	0.15
0:20	1.5	0.18	0.22	0.04	0.137	0.208	62.41	0.00	0.00	0.00	0.00	0.00	62.41	0.00	0.00	0.00	0.00	62.41	0.21
0:25	1.5	0.18	0.22	0.04	0.137	0.208	62.41	0.00	0.00	0.00	0.00	0.00	62.41	0.00	0.00	0.00	0.00	62.41	0.21
0:30	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
0:35	1.5	0.18	0.22	0.04	0.137	0.208	62.41	0.00	0.00	0.00	0.00	0.00	62.41	0.00	0.00	0.00	0.00	62.41	0.21
0:40	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
0:45	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
0:50	1.5	0.18	0.22	0.04	0.137	0.208	62.41	0.00	0.00	0.00	0.00	0.00	62.41	0.00	0.00	0.00	0.00	62.41	0.21
0:55	1.6	0.19	0.22	0.05	0.146	0.222	66.57	0.00	0.00	0.00	0.00	0.00	66.57	0.00	0.00	0.00	0.00	66.57	0.22
1:00	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
1:05	2.2	0.26	0.22	0.06	0.200	0.305	91.54	0.00	0.00	0.00	0.00	0.00	91.54	0.00	0.00	0.00	0.00	91.54	0.31
1:10	2.2	0.26	0.22	0.06	0.200	0.305	91.54	0.00	0.00	0.00	0.00	0.00	91.54	0.00	0.00	0.00	0.00	91.54	0.31
1:15	2.2	0.26	0.22	0.06	0.200	0.305	91.54	0.00	0.00	0.00	0.00	0.00	91.54	0.00	0.00	0.00	0.00	91.54	0.31
1:20	2.0	0.24	0.22	0.06	0.182	0.277	83.22	0.00	0.00	0.00	0.00	0.00	83.22	0.00	0.00	0.00	0.00	83.22	0.28
1:25	2.6	0.31	0.22	0.07	0.237	0.361	108.18	0.00	0.00	0.00	0.00	0.00	108.18	0.00	0.00	0.00	0.00	108.18	0.36
1:30	2.7	0.32	0.22	0.08	0.246	0.374	112.34	0.00	0.00	0.00	0.00	0.00	112.34	0.00	0.00	0.00	0.00	112.34	0.37
1:35	2.4	0.29	0.22	0.07	0.218	0.333	99.86	0.00	0.00	0.00	0.00	0.00	99.86	0.00	0.00	0.00	0.00	99.86	0.33
1:40	2.7	0.32	0.22	0.08	0.246	0.374	112.34	0.00	0.00	0.00	0.00	0.00	112.34	0.00	0.00	0.00	0.00	112.34	0.37
1:45	3.3	0.39	0.22	0.09	0.300	0.458	137.31	0.00	0.00	0.00	0.00	0.00	137.31	0.00	0.00	0.00	0.00	137.31	0.46
1:50	3.1	0.37	0.22	0.09	0.282	0.430	128.98	0.00	0.00	0.00	0.00	0.00	128.98	0.00	0.00	0.00	0.00	128.98	0.43
1:55	2.9	0.35	0.22	0.08	0.264	0.402	120.66	0.00	0.00	0.00	0.00	0.00	120.66	0.00	0.00	0.00	0.00	120.66	0.40
2:00	3.0	0.36	0.22	0.09	0.273	0.416	124.82	0.00	0.00	0.00	0.00	0.00	124.82	0.00	0.00	0.00	0.00	124.82	0.42
2:05	3.1	0.37	0.22	0.09	0.282	0.430	128.98	0.00	0.00	0.00	0.00	0.00	128.98	0.00	0.00	0.00	0.00	128.98	0.43
2:10	4.2	0.50	0.22	0.12	0.382	0.583	174.75	0.00	0.00	0.00	0.00	0.00	174.75	0.00	0.00	0.00	0.00	174.75	0.58
2:15	5.0	0.60	0.22	0.14	0.455	0.693	208.04	0.00	0.00	0.00	0.00	0.00	208.04	0.00	0.00	0.00	0.00	208.04	0.69
2:20	3.5	0.42	0.22	0.10	0.319	0.485	145.63	0.00	0.00	0.00	0.00	0.00	145.63	0.00	0.00	0.00	0.00	145.63	0.49
2:25	6.8	0.81	0.22	0.19	0.619	0.943	282.93	0.00	0.00	0.00	0.00	0.00	282.93	0.00	0.00	0.00	0.00	282.93	0.94
2:30	7.3	0.87	0.22	0.21	0.665	1.012	303.74	0.00	0.00	0.00	0.00	0.00	303.74	0.00	0.00	0.00	0.00	303.74	1.01
2:35	8.2	0.98	0.22	N/A	0.760	**1.158**	347.36	0.00	0.00	0.00	0.00	0.00	347.36	0.00	0.00	0.00	0.00	347.36	1.16
2:40	5.9	0.70	0.22	0.17	0.537	0.818	245.49	0.00	0.00	0.00	0.00	0.00	245.49	0.00	0.00	0.00	0.00	245.49	0.82
2:45	2.0	0.24	0.22	0.06	0.182	0.277	83.22	0.00	0.00	0.00	0.00	0.00	83.22	0.00	0.00	0.00	0.00	83.22	0.28
2:50	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
2:55	1.8	0.21	0.22	0.05	0.164	0.250	74.89	0.00	0.00	0.00	0.00	0.00	74.89	0.00	0.00	0.00	0.00	74.89	0.25
3:00	0.6	0.07	0.22	0.02	0.055	0.083	24.96	0.00	0.00	0.00	0.00	0.00	24.96	0.00	0.00	0.00	0.00	24.96	0.08
					Total volume (CF)		**4166.97**											**Total Overflow (CF)**	**4166.97**

2 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.09	0.22	0.02	0.066	0.100	30.11	0.00	0.00	0.00	0.00	0.00	30.11	0.00	0.00	0.00	0.00	30.11	0.10
0:10	0.6	0.10	0.22	0.02	0.079	0.120	36.13	0.00	0.00	0.00	0.00	0.00	36.13	0.00	0.00	0.00	0.00	36.13	0.12
0:15	0.6	0.10	0.22	0.02	0.079	0.120	36.13	0.00	0.00	0.00	0.00	0.00	36.13	0.00	0.00	0.00	0.00	36.13	0.12
0:20	0.6	0.10	0.22	0.02	0.079	0.120	36.13	0.00	0.00	0.00	0.00	0.00	36.13	0.00	0.00	0.00	0.00	36.13	0.12
0:25	0.6	0.10	0.22	0.02	0.079	0.120	36.13	0.00	0.00	0.00	0.00	0.00	36.13	0.00	0.00	0.00	0.00	36.13	0.12
0:30	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
0:35	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
0:40	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
0:45	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
0:50	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
0:55	0.7	0.12	0.22	0.03	0.092	0.141	42.15	0.00	0.00	0.00	0.00	0.00	42.15	0.00	0.00	0.00	0.00	42.15	0.14
1:00	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:05	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:10	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:15	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:20	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:25	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:30	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:35	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:40	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:45	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:50	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
1:55	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
2:00	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:05	0.8	0.14	0.22	0.03	0.105	0.161	48.17	0.00	0.00	0.00	0.00	0.00	48.17	0.00	0.00	0.00	0.00	48.17	0.16
2:10	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:15	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:20	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:25	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:30	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:35	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:40	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
2:45	1.0	0.17	0.22	0.04	0.132	0.201	60.22	0.00	0.00	0.00	0.00	0.00	60.22	0.00	0.00	0.00	0.00	60.22	0.20
2:50	1.0	0.17	0.22	0.04	0.132	0.201	60.22	0.00	0.00	0.00	0.00	0.00	60.22	0.00	0.00	0.00	0.00	60.22	0.20
2:55	1.0	0.17	0.22	0.04	0.132	0.201	60.22	0.00	0.00	0.00	0.00	0.00	60.22	0.00	0.00	0.00	0.00	60.22	0.20
3:00	1.0	0.17	0.22	0.04	0.132	0.201	60.22	0.00	0.00	0.00	0.00	0.00	60.22	0.00	0.00	0.00	0.00	60.22	0.20
3:05	1.0	0.17	0.22	0.04	0.132	0.201	60.22	0.00	0.00	0.00	0.00	0.00	60.22	0.00	0.00	0.00	0.00	60.22	0.20
3:10	1.1	0.19	0.22	0.05	0.145	0.221	66.24	0.00	0.00	0.00	0.00	0.00	66.24	0.00	0.00	0.00	0.00	66.24	0.22
3:15	1.1	0.19	0.22	0.05	0.145	0.221	66.24	0.00	0.00	0.00	0.00	0.00	66.24	0.00	0.00	0.00	0.00	66.24	0.22
3:20	1.1	0.19	0.22	0.05	0.145	0.221	66.24	0.00	0.00	0.00	0.00	0.00	66.24	0.00	0.00	0.00	0.00	66.24	0.22
3:25	1.2	0.21	0.22	0.05	0.158	0.241	72.26	0.00	0.00	0.00	0.00	0.00	72.26	0.00	0.00	0.00	0.00	72.26	0.24
3:30	1.3	0.22	0.22	0.05	0.171	0.261	78.28	0.00	0.00	0.00	0.00	0.00	78.28	0.00	0.00	0.00	0.00	78.28	0.26
3:35	1.4	0.24	0.22	0.06	0.184	0.281	84.30	0.00	0.00	0.00	0.00	0.00	84.30	0.00	0.00	0.00	0.00	84.30	0.28
3:40	1.4	0.24	0.22	0.06	0.184	0.281	84.30	0.00	0.00	0.00	0.00	0.00	84.30	0.00	0.00	0.00	0.00	84.30	0.28
3:45	1.5	0.26	0.22	0.06	0.198	0.301	90.32	0.00	0.00	0.00	0.00	0.00	90.32	0.00	0.00	0.00	0.00	90.32	0.30
3:50	1.5	0.26	0.22	0.06	0.198	0.301	90.32	0.00	0.00	0.00	0.00	0.00	90.32	0.00	0.00	0.00	0.00	90.32	0.30
3:55	1.6	0.28	0.22	0.07	0.211	0.321	96.35	0.00	0.00	0.00	0.00	0.00	96.35	0.00	0.00	0.00	0.00	96.35	0.32
4:00	1.6	0.28	0.22	0.07	0.211	0.321	96.35	0.00	0.00	0.00	0.00	0.00	96.35	0.00	0.00	0.00	0.00	96.35	0.32
4:05	1.7	0.29	0.22	0.07	0.224	0.341	102.37	0.00	0.00	0.00	0.00	0.00	102.37	0.00	0.00	0.00	0.00	102.37	0.34

4:10	1.8	0.31	0.22	0.07	0.237	0.361	108.39	0.00	0.00	0.00	0.00	0.00	108.39	0.00	0.00	0.00	0.00	108.39	0.36
4:15	1.9	0.33	0.22	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
4:20	2.0	0.35	0.22	0.08	0.263	0.401	120.43	0.00	0.00	0.00	0.00	0.00	120.43	0.00	0.00	0.00	0.00	120.43	0.40
4:25	2.1	0.36	0.22	0.09	0.277	0.422	126.45	0.00	0.00	0.00	0.00	0.00	126.45	0.00	0.00	0.00	0.00	126.45	0.42
4:30	2.1	0.36	0.22	0.09	0.277	0.422	126.45	0.00	0.00	0.00	0.00	0.00	126.45	0.00	0.00	0.00	0.00	126.45	0.42
4:35	2.2	0.38	0.22	0.09	0.290	0.442	132.48	0.00	0.00	0.00	0.00	0.00	132.48	0.00	0.00	0.00	0.00	132.48	0.44
4:40	2.3	0.40	0.22	0.09	0.303	0.462	138.50	0.00	0.00	0.00	0.00	0.00	138.50	0.00	0.00	0.00	0.00	138.50	0.46
4:45	2.4	0.41	0.22	0.10	0.316	0.482	144.52	0.00	0.00	0.00	0.00	0.00	144.52	0.00	0.00	0.00	0.00	144.52	0.48
4:50	2.4	0.41	0.22	0.10	0.316	0.482	144.52	0.00	0.00	0.00	0.00	0.00	144.52	0.00	0.00	0.00	0.00	144.52	0.48
4:55	2.5	0.43	0.22	0.10	0.329	0.502	150.54	0.00	0.00	0.00	0.00	0.00	150.54	0.00	0.00	0.00	0.00	150.54	0.50
5:00	2.6	0.45	0.22	0.11	0.343	0.522	156.56	0.00	0.00	0.00	0.00	0.00	156.56	0.00	0.00	0.00	0.00	156.56	0.52
5:05	3.1	0.54	0.22	0.13	0.408	0.622	186.67	0.00	0.00	0.00	0.00	0.00	186.67	0.00	0.00	0.00	0.00	186.67	0.62
5:10	3.6	0.62	0.22	0.15	0.474	0.723	216.78	0.00	0.00	0.00	0.00	0.00	216.78	0.00	0.00	0.00	0.00	216.78	0.72
5:15	3.9	0.67	0.22	0.16	0.514	0.783	234.84	0.00	0.00	0.00	0.00	0.00	234.84	0.00	0.00	0.00	0.00	234.84	0.78
5:20	4.2	0.73	0.22	0.17	0.553	0.843	252.91	0.00	0.00	0.00	0.00	0.00	252.91	0.00	0.00	0.00	0.00	252.91	0.84
5:25	4.7	0.81	0.22	0.19	0.619	0.943	283.02	0.00	0.00	0.00	0.00	0.00	283.02	0.00	0.00	0.00	0.00	283.02	0.94
5:30	5.6	0.97	0.22	N/A	0.749	**1.140**	342.15	0.00	0.00	0.00	0.00	0.00	342.15	0.00	0.00	0.00	0.00	342.15	1.14
5:35	1.9	0.33	0.22	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
5:40	0.9	0.16	0.22	0.04	0.119	0.181	54.19	0.00	0.00	0.00	0.00	0.00	54.19	0.00	0.00	0.00	0.00	54.19	0.18
5:45	0.6	0.10	0.22	0.02	0.079	0.120	36.13	0.00	0.00	0.00	0.00	0.00	36.13	0.00	0.00	0.00	0.00	36.13	0.12
5:50	0.5	0.09	0.22	0.02	0.066	0.100	30.11	0.00	0.00	0.00	0.00	0.00	30.11	0.00	0.00	0.00	0.00	30.11	0.10
5:55	0.3	0.05	0.22	0.01	0.040	0.060	18.06	0.00	0.00	0.00	0.00	0.00	18.06	0.00	0.00	0.00	0.00	18.06	0.06
6:00	0.2	0.03	0.22	0.01	0.026	0.040	12.04	0.00	0.00	0.00	0.00	0.00	12.04	0.00	0.00	0.00	0.00	12.04	0.04
					Total volume (CF)		**6026.59**								**Total Overflow (CF)**			**6026.59**	

2 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.02	0.38	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
0:30	0.3	0.03	0.38	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
0:45	0.3	0.03	0.38	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
1:00	0.4	0.04	0.37	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
1:15	0.3	0.03	0.37	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
1:30	0.3	0.03	0.36	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
1:45	0.3	0.03	0.36	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
2:00	0.4	0.04	0.35	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
2:15	0.4	0.04	0.35	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
2:30	0.4	0.04	0.35	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
2:45	0.5	0.06	0.34	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
3:00	0.5	0.06	0.34	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
3:15	0.5	0.06	0.33	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
3:30	0.5	0.06	0.33	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
3:45	0.5	0.06	0.32	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
4:00	0.6	0.07	0.32	0.02	0.051	0.078	69.75	0.00	0.00	0.00	0.00	0.00	69.75	0.00	0.00	0.00	0.00	69.75	0.08
4:15	0.6	0.07	0.32	0.02	0.051	0.078	69.75	0.00	0.00	0.00	0.00	0.00	69.75	0.00	0.00	0.00	0.00	69.75	0.08
4:30	0.7	0.08	0.31	0.02	0.059	0.090	81.38	0.00	0.00	0.00	0.00	0.00	81.38	0.00	0.00	0.00	0.00	81.38	0.09
4:45	0.7	0.08	0.31	0.02	0.059	0.090	81.38	0.00	0.00	0.00	0.00	0.00	81.38	0.00	0.00	0.00	0.00	81.38	0.09
5:00	0.8	0.09	0.30	0.02	0.068	0.103	93.00	0.00	0.00	0.00	0.00	0.00	93.00	0.00	0.00	0.00	0.00	93.00	0.10
5:15	0.6	0.07	0.30	0.02	0.051	0.078	69.75	0.00	0.00	0.00	0.00	0.00	69.75	0.00	0.00	0.00	0.00	69.75	0.08
5:30	0.7	0.08	0.30	0.02	0.059	0.090	81.38	0.00	0.00	0.00	0.00	0.00	81.38	0.00	0.00	0.00	0.00	81.38	0.09
5:45	0.8	0.09	0.29	0.02	0.068	0.103	93.00	0.00	0.00	0.00	0.00	0.00	93.00	0.00	0.00	0.00	0.00	93.00	0.10
6:00	0.8	0.09	0.29	0.02	0.068	0.103	93.00	0.00	0.00	0.00	0.00	0.00	93.00	0.00	0.00	0.00	0.00	93.00	0.10
6:15	0.9	0.10	0.28	0.02	0.076	0.116	104.63	0.00	0.00	0.00	0.00	0.00	104.63	0.00	0.00	0.00	0.00	104.63	0.12
6:30	0.9	0.10	0.28	0.02	0.076	0.116	104.63	0.00	0.00	0.00	0.00	0.00	104.63	0.00	0.00	0.00	0.00	104.63	0.12
6:45	1.0	0.11	0.28	0.03	0.085	0.129	116.25	0.00	0.00	0.00	0.00	0.00	116.25	0.00	0.00	0.00	0.00	116.25	0.13
7:00	1.0	0.11	0.27	0.03	0.085	0.129	116.25	0.00	0.00	0.00	0.00	0.00	116.25	0.00	0.00	0.00	0.00	116.25	0.13
7:15	1.0	0.11	0.27	0.03	0.085	0.129	116.25	0.00	0.00	0.00	0.00	0.00	116.25	0.00	0.00	0.00	0.00	116.25	0.13
7:30	1.1	0.12	0.27	0.03	0.093	0.142	127.88	0.00	0.00	0.00	0.00	0.00	127.88	0.00	0.00	0.00	0.00	127.88	0.14
7:45	1.2	0.13	0.26	0.03	0.102	0.155	139.50	0.00	0.00	0.00	0.00	0.00	139.50	0.00	0.00	0.00	0.00	139.50	0.16
8:00	1.3	0.14	0.26	0.03	0.110	0.168	151.13	0.00	0.00	0.00	0.00	0.00	151.13	0.00	0.00	0.00	0.00	151.13	0.17
8:15	1.5	0.17	0.26	0.04	0.127	0.194	174.38	0.00	0.00	0.00	0.00	0.00	174.38	0.00	0.00	0.00	0.00	174.38	0.19
8:30	1.5	0.17	0.25	0.04	0.127	0.194	174.38	0.00	0.00	0.00	0.00	0.00	174.38	0.00	0.00	0.00	0.00	174.38	0.19
8:45	1.6	0.18	0.25	0.04	0.136	0.207	186.00	0.00	0.00	0.00	0.00	0.00	186.00	0.00	0.00	0.00	0.00	186.00	0.21
9:00	1.7	0.19	0.24	0.04	0.144	0.220	197.63	0.00	0.00	0.00	0.00	0.00	197.63	0.00	0.00	0.00	0.00	197.63	0.22
9:15	1.9	0.21	0.24	0.05	0.161	0.245	220.88	0.00	0.00	0.00	0.00	0.00	220.88	0.00	0.00	0.00	0.00	220.88	0.25
9:30	2.0	0.22	0.24	0.05	0.170	0.258	232.50	0.00	0.00	0.00	0.00	0.00	232.50	0.00	0.00	0.00	0.00	232.50	0.26
9:45	2.1	0.23	0.23	0.06	0.178	0.271	244.13	0.00	0.00	0.00	0.00	0.00	244.13	0.00	0.00	0.00	0.00	244.13	0.27
10:00	2.2	0.24	0.23	0.06	0.187	0.284	255.75	0.00	0.00	0.00	0.00	0.00	255.75	0.00	0.00	0.00	0.00	255.75	0.28
10:15	1.5	0.17	0.23	0.04	0.127	0.194	174.38	0.00	0.00	0.00	0.00	0.00	174.38	0.00	0.00	0.00	0.00	174.38	0.19
10:30	1.5	0.17	0.22	0.04	0.127	0.194	174.38	0.00	0.00	0.00	0.00	0.00	174.38	0.00	0.00	0.00	0.00	174.38	0.19
10:45	2.0	0.22	0.22	0.05	0.170	0.258	232.50	0.00	0.00	0.00	0.00	0.00	232.50	0.00	0.00	0.00	0.00	232.50	0.26
11:00	2.0	0.22	0.22	0.05	0.170	0.258	232.50	0.00	0.00	0.00	0.00	0.00	232.50	0.00	0.00	0.00	0.00	232.50	0.26
11:15	1.9	0.21	0.21	0.05	0.161	0.245	220.88	0.00	0.00	0.00	0.00	0.00	220.88	0.00	0.00	0.00	0.00	220.88	0.25
11:30	1.9	0.21	0.21	0.05	0.161	0.245	220.88	0.00	0.00	0.00	0.00	0.00	220.88	0.00	0.00	0.00	0.00	220.88	0.25
11:45	1.7	0.19	0.21	0.04	0.144	0.220	197.63	0.00	0.00	0.00	0.00	0.00	197.63	0.00	0.00	0.00	0.00	197.63	0.22
12:00	1.8	0.20	0.21	0.05	0.153	0.233	209.25	0.00	0.00	0.00	0.00	0.00	209.25	0.00	0.00	0.00	0.00	209.25	0.23
12:15	2.5	0.28	0.20	0.07	0.212	0.323	290.63	0.00	0.00	0.00	0.00	0.00	290.63	0.00	0.00	0.00	0.00	290.63	0.32

12:30	2.6	0.29	0.20	0.07	0.220	0.336	302.25	0.00	0.00	0.00	0.00	0.00	302.25	0.00	0.00	0.00	0.00	302.25	0.34
12:45	2.8	0.31	0.20	0.07	0.237	0.362	325.50	0.00	0.00	0.00	0.00	0.00	325.50	0.00	0.00	0.00	0.00	325.50	0.36
13:00	2.9	0.32	0.19	0.08	0.246	0.375	337.13	0.00	0.00	0.00	0.00	0.00	337.13	0.00	0.00	0.00	0.00	337.13	0.37
13:15	3.4	0.38	0.19	0.09	0.288	**0.439**	395.25	0.00	0.00	0.00	0.00	0.00	395.25	0.00	0.00	0.00	0.00	395.25	0.44
13:30	3.4	0.38	0.19	0.09	0.288	**0.439**	395.25	0.00	0.00	0.00	0.00	0.00	395.25	0.00	0.00	0.00	0.00	395.25	0.44
13:45	2.3	0.26	0.18	0.06	0.195	0.297	267.38	0.00	0.00	0.00	0.00	0.00	267.38	0.00	0.00	0.00	0.00	267.38	0.30
14:00	2.3	0.26	0.18	0.06	0.195	0.297	267.38	0.00	0.00	0.00	0.00	0.00	267.38	0.00	0.00	0.00	0.00	267.38	0.30
14:15	2.7	0.30	0.18	0.07	0.229	0.349	313.88	0.00	0.00	0.00	0.00	0.00	313.88	0.00	0.00	0.00	0.00	313.88	0.35
14:30	2.6	0.29	0.18	0.07	0.220	0.336	302.25	0.00	0.00	0.00	0.00	0.00	302.25	0.00	0.00	0.00	0.00	302.25	0.34
14:45	2.6	0.29	0.17	0.07	0.220	0.336	302.25	0.00	0.00	0.00	0.00	0.00	302.25	0.00	0.00	0.00	0.00	302.25	0.34
15:00	2.5	0.28	0.17	0.07	0.212	0.323	290.63	0.00	0.00	0.00	0.00	0.00	290.63	0.00	0.00	0.00	0.00	290.63	0.32
15:15	2.4	0.27	0.17	0.06	0.203	0.310	279.00	0.00	0.00	0.00	0.00	0.00	279.00	0.00	0.00	0.00	0.00	279.00	0.31
15:30	2.3	0.26	0.17	0.06	0.195	0.297	267.38	0.00	0.00	0.00	0.00	0.00	267.38	0.00	0.00	0.00	0.00	267.38	0.30
15:45	1.9	0.21	0.16	0.05	0.161	0.245	220.88	0.00	0.00	0.00	0.00	0.00	220.88	0.00	0.00	0.00	0.00	220.88	0.25
16:00	1.9	0.21	0.16	0.05	0.161	0.245	220.88	0.00	0.00	0.00	0.00	0.00	220.88	0.00	0.00	0.00	0.00	220.88	0.25
16:15	0.4	0.04	0.16	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
16:30	0.4	0.04	0.16	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
16:45	0.3	0.03	0.15	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
17:00	0.3	0.03	0.15	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
17:15	0.5	0.06	0.15	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
17:30	0.5	0.06	0.15	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
17:45	0.5	0.06	0.14	0.01	0.042	0.065	58.13	0.00	0.00	0.00	0.00	0.00	58.13	0.00	0.00	0.00	0.00	58.13	0.06
18:00	0.4	0.04	0.14	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
18:15	0.4	0.04	0.14	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
18:30	0.4	0.04	0.14	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
18:45	0.3	0.03	0.14	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
19:00	0.2	0.02	0.13	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
19:15	0.3	0.03	0.13	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
19:30	0.4	0.04	0.13	0.01	0.034	0.052	46.50	0.00	0.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00	0.00	46.50	0.05
19:45	0.3	0.03	0.13	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
20:00	0.2	0.02	0.13	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
20:15	0.3	0.03	0.13	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
20:30	0.3	0.03	0.12	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
20:45	0.3	0.03	0.12	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
21:00	0.2	0.02	0.12	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
21:15	0.3	0.03	0.12	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
21:30	0.2	0.02	0.12	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
21:45	0.3	0.03	0.12	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
22:00	0.2	0.02	0.12	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
22:15	0.3	0.03	0.11	0.01	0.025	0.039	34.88	0.00	0.00	0.00	0.00	0.00	34.88	0.00	0.00	0.00	0.00	34.88	0.04
22:30	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
22:45	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
23:00	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
23:15	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
23:30	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
23:45	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
24:00	0.2	0.02	0.11	0.01	0.017	0.026	23.25	0.00	0.00	0.00	0.00	0.00	23.25	0.00	0.00	0.00	0.00	23.25	0.03
					Total volume (CF)		**11625.13**										**Total Overflow (CF)**		**11625.13**

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Post-Development

Recurrence Interval	5	year			
Storm Duration (hrs)	1	3	6	24	
5-year NOAA Atlas 14 Point Precipitation (in)	0.811	1.270	1.810	3.620	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	36	Type:	Urban Covers; good		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.86	AMC I			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	83				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.22*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*24*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

5 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.36	0.22		0.09	0.275	0.418	125.48	0.00	0.00	0.00	0.00	0.00	125.48	0.00	0.00	0.00	0.00	125.48	0.42
0:10	4.8	0.47	0.22		0.11	0.356	0.543	162.79	0.00	0.00	0.00	0.00	0.00	162.79	0.00	0.00	0.00	0.00	162.79	0.54
0:15	5.1	0.50	0.22		0.12	0.378	0.577	172.96	0.00	0.00	0.00	0.00	0.00	172.96	0.00	0.00	0.00	0.00	172.96	0.58
0:20	4.9	0.48	0.22		0.11	0.364	0.554	166.18	0.00	0.00	0.00	0.00	0.00	166.18	0.00	0.00	0.00	0.00	166.18	0.55
0:25	6.6	0.64	0.22		0.15	0.490	0.746	223.83	0.00	0.00	0.00	0.00	0.00	223.83	0.00	0.00	0.00	0.00	223.83	0.75
0:30	7.3	0.71	0.22		0.17	0.542	0.825	247.57	0.00	0.00	0.00	0.00	0.00	247.57	0.00	0.00	0.00	0.00	247.57	0.83
0:35	8.4	0.82	0.22		0.19	0.623	0.950	284.87	0.00	0.00	0.00	0.00	0.00	284.87	0.00	0.00	0.00	0.00	284.87	0.95
0:40	9.0	0.88	0.22		0.21	0.668	1.017	305.22	0.00	0.00	0.00	0.00	0.00	305.22	0.00	0.00	0.00	0.00	305.22	1.02
0:45	12.3	1.20	0.22	N/A		0.978	1.490	446.98	0.00	0.00	0.00	0.00	0.00	446.98	0.00	0.00	0.00	0.00	446.98	1.49
0:50	17.6	1.71	0.22	N/A		1.494	**2.276**	682.74	0.00	0.00	0.00	0.00	0.00	682.74	0.00	0.00	0.00	0.00	682.74	2.28
0:55	16.1	1.57	0.22	N/A		1.348	2.053	616.01	0.00	0.00	0.00	0.00	0.00	616.01	0.00	0.00	0.00	0.00	616.01	2.05
1:00	4.2	0.41	0.22		0.10	0.312	0.475	142.44	0.00	0.00	0.00	0.00	0.00	142.44	0.00	0.00	0.00	0.00	142.44	0.47
						Total volume (CF)		**3577.06**											**Total Overflow (CF)**	**3577.06**

5 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.20	0.22	0.05	0.151	0.230	69.04	0.00	0.00	0.00	0.00	0.00	69.04	0.00	0.00	0.00	0.00	69.04	0.23
0:10	1.3	0.20	0.22	0.05	0.151	0.230	69.04	0.00	0.00	0.00	0.00	0.00	69.04	0.00	0.00	0.00	0.00	69.04	0.23
0:15	1.1	0.17	0.22	0.04	0.128	0.195	58.42	0.00	0.00	0.00	0.00	0.00	58.42	0.00	0.00	0.00	0.00	58.42	0.19
0:20	1.5	0.23	0.22	0.05	0.174	0.266	79.66	0.00	0.00	0.00	0.00	0.00	79.66	0.00	0.00	0.00	0.00	79.66	0.27
0:25	1.5	0.23	0.22	0.05	0.174	0.266	79.66	0.00	0.00	0.00	0.00	0.00	79.66	0.00	0.00	0.00	0.00	79.66	0.27
0:30	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
0:35	1.5	0.23	0.22	0.05	0.174	0.266	79.66	0.00	0.00	0.00	0.00	0.00	79.66	0.00	0.00	0.00	0.00	79.66	0.27
0:40	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
0:45	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
0:50	1.5	0.23	0.22	0.05	0.174	0.266	79.66	0.00	0.00	0.00	0.00	0.00	79.66	0.00	0.00	0.00	0.00	79.66	0.27
0:55	1.6	0.24	0.22	0.06	0.186	0.283	84.97	0.00	0.00	0.00	0.00	0.00	84.97	0.00	0.00	0.00	0.00	84.97	0.28
1:00	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
1:05	2.2	0.34	0.22	0.08	0.256	0.389	116.84	0.00	0.00	0.00	0.00	0.00	116.84	0.00	0.00	0.00	0.00	116.84	0.39
1:10	2.2	0.34	0.22	0.08	0.256	0.389	116.84	0.00	0.00	0.00	0.00	0.00	116.84	0.00	0.00	0.00	0.00	116.84	0.39
1:15	2.2	0.34	0.22	0.08	0.256	0.389	116.84	0.00	0.00	0.00	0.00	0.00	116.84	0.00	0.00	0.00	0.00	116.84	0.39
1:20	2.0	0.30	0.22	0.07	0.232	0.354	106.22	0.00	0.00	0.00	0.00	0.00	106.22	0.00	0.00	0.00	0.00	106.22	0.35
1:25	2.6	0.40	0.22	0.09	0.302	0.460	138.08	0.00	0.00	0.00	0.00	0.00	138.08	0.00	0.00	0.00	0.00	138.08	0.46
1:30	2.7	0.41	0.22	0.10	0.314	0.478	143.39	0.00	0.00	0.00	0.00	0.00	143.39	0.00	0.00	0.00	0.00	143.39	0.48
1:35	2.4	0.37	0.22	0.09	0.279	0.425	127.46	0.00	0.00	0.00	0.00	0.00	127.46	0.00	0.00	0.00	0.00	127.46	0.42
1:40	2.7	0.41	0.22	0.10	0.314	0.478	143.39	0.00	0.00	0.00	0.00	0.00	143.39	0.00	0.00	0.00	0.00	143.39	0.48
1:45	3.3	0.50	0.22	0.12	0.383	0.584	175.26	0.00	0.00	0.00	0.00	0.00	175.26	0.00	0.00	0.00	0.00	175.26	0.58
1:50	3.1	0.47	0.22	0.11	0.360	0.549	164.63	0.00	0.00	0.00	0.00	0.00	164.63	0.00	0.00	0.00	0.00	164.63	0.55
1:55	2.9	0.44	0.22	0.11	0.337	0.513	154.01	0.00	0.00	0.00	0.00	0.00	154.01	0.00	0.00	0.00	0.00	154.01	0.51
2:00	3.0	0.46	0.22	0.11	0.349	0.531	159.32	0.00	0.00	0.00	0.00	0.00	159.32	0.00	0.00	0.00	0.00	159.32	0.53
2:05	3.1	0.47	0.22	0.11	0.360	0.549	164.63	0.00	0.00	0.00	0.00	0.00	164.63	0.00	0.00	0.00	0.00	164.63	0.55
2:10	4.2	0.64	0.22	0.15	0.488	0.744	223.05	0.00	0.00	0.00	0.00	0.00	223.05	0.00	0.00	0.00	0.00	223.05	0.74
2:15	5.0	0.76	0.22	0.18	0.581	0.885	265.54	0.00	0.00	0.00	0.00	0.00	265.54	0.00	0.00	0.00	0.00	265.54	0.89
2:20	3.5	0.53	0.22	0.13	0.407	0.620	185.88	0.00	0.00	0.00	0.00	0.00	185.88	0.00	0.00	0.00	0.00	185.88	0.62
2:25	6.8	1.04	0.22	N/A	0.817	1.245	373.52	0.00	0.00	0.00	0.00	0.00	373.52	0.00	0.00	0.00	0.00	373.52	1.25
2:30	7.3	1.11	0.22	N/A	0.893	1.361	408.35	0.00	0.00	0.00	0.00	0.00	408.35	0.00	0.00	0.00	0.00	408.35	1.36
2:35	8.2	1.25	0.22	N/A	1.031	**1.570**	471.04	0.00	0.00	0.00	0.00	0.00	471.04	0.00	0.00	0.00	0.00	471.04	1.57
2:40	5.9	0.90	0.22	0.21	0.686	1.044	313.34	0.00	0.00	0.00	0.00	0.00	313.34	0.00	0.00	0.00	0.00	313.34	1.04
2:45	2.0	0.30	0.22	0.07	0.232	0.354	106.22	0.00	0.00	0.00	0.00	0.00	106.22	0.00	0.00	0.00	0.00	106.22	0.35
2:50	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
2:55	1.8	0.27	0.22	0.07	0.209	0.319	95.59	0.00	0.00	0.00	0.00	0.00	95.59	0.00	0.00	0.00	0.00	95.59	0.32
3:00	0.6	0.09	0.22	0.02	0.070	0.106	31.86	0.00	0.00	0.00	0.00	0.00	31.86	0.00	0.00	0.00	0.00	31.86	0.11
					Total volume (CF)		**5379.37**								**Total Overflow (CF)**			**5379.37**	

5 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.11	0.22	0.03	0.083	0.126	37.84	0.00	0.00	0.00	0.00	0.00	37.84	0.00	0.00	0.00	0.00	37.84	0.13
0:10	0.6	0.13	0.22	0.03	0.099	0.151	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.15
0:15	0.6	0.13	0.22	0.03	0.099	0.151	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.15
0:20	0.6	0.13	0.22	0.03	0.099	0.151	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.15
0:25	0.6	0.13	0.22	0.03	0.099	0.151	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.15
0:30	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
0:35	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
0:40	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
0:45	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
0:50	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
0:55	0.7	0.15	0.22	0.04	0.116	0.177	52.98	0.00	0.00	0.00	0.00	0.00	52.98	0.00	0.00	0.00	0.00	52.98	0.18
1:00	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:05	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:10	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:15	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:20	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:25	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:30	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:35	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:40	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:45	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:50	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
1:55	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
2:00	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:05	0.8	0.17	0.22	0.04	0.132	0.202	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.20
2:10	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:15	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:20	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:25	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:30	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:35	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:40	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
2:45	1.0	0.22	0.22	0.05	0.166	0.252	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.25
2:50	1.0	0.22	0.22	0.05	0.166	0.252	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.25
2:55	1.0	0.22	0.22	0.05	0.166	0.252	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.25
3:00	1.0	0.22	0.22	0.05	0.166	0.252	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.25
3:05	1.0	0.22	0.22	0.05	0.166	0.252	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.25
3:10	1.1	0.24	0.22	0.06	0.182	0.278	83.26	0.00	0.00	0.00	0.00	0.00	83.26	0.00	0.00	0.00	0.00	83.26	0.28
3:15	1.1	0.24	0.22	0.06	0.182	0.278	83.26	0.00	0.00	0.00	0.00	0.00	83.26	0.00	0.00	0.00	0.00	83.26	0.28
3:20	1.1	0.24	0.22	0.06	0.182	0.278	83.26	0.00	0.00	0.00	0.00	0.00	83.26	0.00	0.00	0.00	0.00	83.26	0.28
3:25	1.2	0.26	0.22	0.06	0.199	0.303	90.83	0.00	0.00	0.00	0.00	0.00	90.83	0.00	0.00	0.00	0.00	90.83	0.30
3:30	1.3	0.28	0.22	0.07	0.215	0.328	98.40	0.00	0.00	0.00	0.00	0.00	98.40	0.00	0.00	0.00	0.00	98.40	0.33
3:35	1.4	0.30	0.22	0.07	0.232	0.353	105.96	0.00	0.00	0.00	0.00	0.00	105.96	0.00	0.00	0.00	0.00	105.96	0.35
3:40	1.4	0.30	0.22	0.07	0.232	0.353	105.96	0.00	0.00	0.00	0.00	0.00	105.96	0.00	0.00	0.00	0.00	105.96	0.35
3:45	1.5	0.33	0.22	0.08	0.248	0.378	113.53	0.00	0.00	0.00	0.00	0.00	113.53	0.00	0.00	0.00	0.00	113.53	0.38
3:50	1.5	0.33	0.22	0.08	0.248	0.378	113.53	0.00	0.00	0.00	0.00	0.00	113.53	0.00	0.00	0.00	0.00	113.53	0.38
3:55	1.6	0.35	0.22	0.08	0.265	0.404	121.10	0.00	0.00	0.00	0.00	0.00	121.10	0.00	0.00	0.00	0.00	121.10	0.40
4:00	1.6	0.35	0.22	0.08	0.265	0.404	121.10	0.00	0.00	0.00	0.00	0.00	121.10	0.00	0.00	0.00	0.00	121.10	0.40
4:05	1.7	0.37	0.22	0.09	0.282	0.429	128.67	0.00	0.00	0.00	0.00	0.00	128.67	0.00	0.00	0.00	0.00	128.67	0.43

4:10	1.8	0.39	0.22	0.09	0.298	0.454	136.24	0.00	0.00	0.00	0.00	0.00	136.24	0.00	0.00	0.00	0.00	136.24	0.45
4:15	1.9	0.41	0.22	0.10	0.315	0.479	143.81	0.00	0.00	0.00	0.00	0.00	143.81	0.00	0.00	0.00	0.00	143.81	0.48
4:20	2.0	0.43	0.22	0.10	0.331	0.505	151.38	0.00	0.00	0.00	0.00	0.00	151.38	0.00	0.00	0.00	0.00	151.38	0.50
4:25	2.1	0.46	0.22	0.11	0.348	0.530	158.95	0.00	0.00	0.00	0.00	0.00	158.95	0.00	0.00	0.00	0.00	158.95	0.53
4:30	2.1	0.46	0.22	0.11	0.348	0.530	158.95	0.00	0.00	0.00	0.00	0.00	158.95	0.00	0.00	0.00	0.00	158.95	0.53
4:35	2.2	0.48	0.22	0.11	0.364	0.555	166.52	0.00	0.00	0.00	0.00	0.00	166.52	0.00	0.00	0.00	0.00	166.52	0.56
4:40	2.3	0.50	0.22	0.12	0.381	0.580	174.08	0.00	0.00	0.00	0.00	0.00	174.08	0.00	0.00	0.00	0.00	174.08	0.58
4:45	2.4	0.52	0.22	0.12	0.397	0.606	181.65	0.00	0.00	0.00	0.00	0.00	181.65	0.00	0.00	0.00	0.00	181.65	0.61
4:50	2.4	0.52	0.22	0.12	0.397	0.606	181.65	0.00	0.00	0.00	0.00	0.00	181.65	0.00	0.00	0.00	0.00	181.65	0.61
4:55	2.5	0.54	0.22	0.13	0.414	0.631	189.22	0.00	0.00	0.00	0.00	0.00	189.22	0.00	0.00	0.00	0.00	189.22	0.63
5:00	2.6	0.56	0.22	0.13	0.431	0.656	196.79	0.00	0.00	0.00	0.00	0.00	196.79	0.00	0.00	0.00	0.00	196.79	0.66
5:05	3.1	0.67	0.22	0.16	0.513	0.782	234.64	0.00	0.00	0.00	0.00	0.00	234.64	0.00	0.00	0.00	0.00	234.64	0.78
5:10	3.6	0.78	0.22	0.19	0.596	0.908	272.48	0.00	0.00	0.00	0.00	0.00	272.48	0.00	0.00	0.00	0.00	272.48	0.91
5:15	3.9	0.85	0.22	0.20	0.646	0.984	295.19	0.00	0.00	0.00	0.00	0.00	295.19	0.00	0.00	0.00	0.00	295.19	0.98
5:20	4.2	0.91	0.22	0.22	0.695	1.060	317.89	0.00	0.00	0.00	0.00	0.00	317.89	0.00	0.00	0.00	0.00	317.89	1.06
5:25	4.7	1.02	0.22	N/A	0.802	1.221	366.44	0.00	0.00	0.00	0.00	0.00	366.44	0.00	0.00	0.00	0.00	366.44	1.22
5:30	5.6	1.22	0.22	N/A	0.997	**1.519**	455.79	0.00	0.00	0.00	0.00	0.00	455.79	0.00	0.00	0.00	0.00	455.79	1.52
5:35	1.9	0.41	0.22	0.10	0.315	0.479	143.81	0.00	0.00	0.00	0.00	0.00	143.81	0.00	0.00	0.00	0.00	143.81	0.48
5:40	0.9	0.20	0.22	0.05	0.149	0.227	68.12	0.00	0.00	0.00	0.00	0.00	68.12	0.00	0.00	0.00	0.00	68.12	0.23
5:45	0.6	0.13	0.22	0.03	0.099	0.151	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.15
5:50	0.5	0.11	0.22	0.03	0.083	0.126	37.84	0.00	0.00	0.00	0.00	0.00	37.84	0.00	0.00	0.00	0.00	37.84	0.13
5:55	0.3	0.07	0.22	0.02	0.050	0.076	22.71	0.00	0.00	0.00	0.00	0.00	22.71	0.00	0.00	0.00	0.00	22.71	0.08
6:00	0.2	0.04	0.22	0.01	0.033	0.050	15.14	0.00	0.00	0.00	0.00	0.00	15.14	0.00	0.00	0.00	0.00	15.14	0.05
					Total volume (CF)		**7611.52**								**Total Overflow (CF)**			**7611.52**	

5 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.03	0.38	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
0:30	0.3	0.04	0.38	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
0:45	0.3	0.04	0.38	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
1:00	0.4	0.06	0.37	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
1:15	0.3	0.04	0.37	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
1:30	0.3	0.04	0.36	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
1:45	0.3	0.04	0.36	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
2:00	0.4	0.06	0.35	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
2:15	0.4	0.06	0.35	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
2:30	0.4	0.06	0.35	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
2:45	0.5	0.07	0.34	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
3:00	0.5	0.07	0.34	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
3:15	0.5	0.07	0.33	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
3:30	0.5	0.07	0.33	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
3:45	0.5	0.07	0.32	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
4:00	0.6	0.09	0.32	0.02	0.066	0.101	90.83	0.00	0.00	0.00	0.00	0.00	90.83	0.00	0.00	0.00	0.00	90.83	0.10
4:15	0.6	0.09	0.32	0.02	0.066	0.101	90.83	0.00	0.00	0.00	0.00	0.00	90.83	0.00	0.00	0.00	0.00	90.83	0.10
4:30	0.7	0.10	0.31	0.02	0.077	0.118	105.96	0.00	0.00	0.00	0.00	0.00	105.96	0.00	0.00	0.00	0.00	105.96	0.12
4:45	0.7	0.10	0.31	0.02	0.077	0.118	105.96	0.00	0.00	0.00	0.00	0.00	105.96	0.00	0.00	0.00	0.00	105.96	0.12
5:00	0.8	0.12	0.30	0.03	0.088	0.135	121.10	0.00	0.00	0.00	0.00	0.00	121.10	0.00	0.00	0.00	0.00	121.10	0.13
5:15	0.6	0.09	0.30	0.02	0.066	0.101	90.83	0.00	0.00	0.00	0.00	0.00	90.83	0.00	0.00	0.00	0.00	90.83	0.10
5:30	0.7	0.10	0.30	0.02	0.077	0.118	105.96	0.00	0.00	0.00	0.00	0.00	105.96	0.00	0.00	0.00	0.00	105.96	0.12
5:45	0.8	0.12	0.29	0.03	0.088	0.135	121.10	0.00	0.00	0.00	0.00	0.00	121.10	0.00	0.00	0.00	0.00	121.10	0.13
6:00	0.8	0.12	0.29	0.03	0.088	0.135	121.10	0.00	0.00	0.00	0.00	0.00	121.10	0.00	0.00	0.00	0.00	121.10	0.13
6:15	0.9	0.13	0.28	0.03	0.099	0.151	136.24	0.00	0.00	0.00	0.00	0.00	136.24	0.00	0.00	0.00	0.00	136.24	0.15
6:30	0.9	0.13	0.28	0.03	0.099	0.151	136.24	0.00	0.00	0.00	0.00	0.00	136.24	0.00	0.00	0.00	0.00	136.24	0.15
6:45	1.0	0.14	0.28	0.03	0.110	0.168	151.38	0.00	0.00	0.00	0.00	0.00	151.38	0.00	0.00	0.00	0.00	151.38	0.17
7:00	1.0	0.14	0.27	0.03	0.110	0.168	151.38	0.00	0.00	0.00	0.00	0.00	151.38	0.00	0.00	0.00	0.00	151.38	0.17
7:15	1.0	0.14	0.27	0.03	0.110	0.168	151.38	0.00	0.00	0.00	0.00	0.00	151.38	0.00	0.00	0.00	0.00	151.38	0.17
7:30	1.1	0.16	0.27	0.04	0.121	0.185	166.52	0.00	0.00	0.00	0.00	0.00	166.52	0.00	0.00	0.00	0.00	166.52	0.19
7:45	1.2	0.17	0.26	0.04	0.132	0.202	181.65	0.00	0.00	0.00	0.00	0.00	181.65	0.00	0.00	0.00	0.00	181.65	0.20
8:00	1.3	0.19	0.26	0.04	0.144	0.219	196.79	0.00	0.00	0.00	0.00	0.00	196.79	0.00	0.00	0.00	0.00	196.79	0.22
8:15	1.5	0.22	0.26	0.05	0.166	0.252	227.07	0.00	0.00	0.00	0.00	0.00	227.07	0.00	0.00	0.00	0.00	227.07	0.25
8:30	1.5	0.22	0.25	0.05	0.166	0.252	227.07	0.00	0.00	0.00	0.00	0.00	227.07	0.00	0.00	0.00	0.00	227.07	0.25
8:45	1.6	0.23	0.25	0.06	0.177	0.269	242.20	0.00	0.00	0.00	0.00	0.00	242.20	0.00	0.00	0.00	0.00	242.20	0.27
9:00	1.7	0.25	0.24	0.06	0.188	0.286	257.34	0.00	0.00	0.00	0.00	0.00	257.34	0.00	0.00	0.00	0.00	257.34	0.29
9:15	1.9	0.28	0.24	0.07	0.210	0.320	287.62	0.00	0.00	0.00	0.00	0.00	287.62	0.00	0.00	0.00	0.00	287.62	0.32
9:30	2.0	0.29	0.24	0.07	0.221	0.336	302.76	0.00	0.00	0.00	0.00	0.00	302.76	0.00	0.00	0.00	0.00	302.76	0.34
9:45	2.1	0.30	0.23	0.07	0.232	0.353	317.89	0.00	0.00	0.00	0.00	0.00	317.89	0.00	0.00	0.00	0.00	317.89	0.35
10:00	2.2	0.32	0.23	0.08	0.243	0.370	333.03	0.00	0.00	0.00	0.00	0.00	333.03	0.00	0.00	0.00	0.00	333.03	0.37
10:15	1.5	0.22	0.23	0.05	0.166	0.252	227.07	0.00	0.00	0.00	0.00	0.00	227.07	0.00	0.00	0.00	0.00	227.07	0.25
10:30	1.5	0.22	0.22	0.05	0.166	0.252	227.07	0.00	0.00	0.00	0.00	0.00	227.07	0.00	0.00	0.00	0.00	227.07	0.25
10:45	2.0	0.29	0.22	0.07	0.221	0.336	302.76	0.00	0.00	0.00	0.00	0.00	302.76	0.00	0.00	0.00	0.00	302.76	0.34
11:00	2.0	0.29	0.22	0.07	0.221	0.336	302.76	0.00	0.00	0.00	0.00	0.00	302.76	0.00	0.00	0.00	0.00	302.76	0.34
11:15	1.9	0.28	0.21	0.07	0.210	0.320	287.62	0.00	0.00	0.00	0.00	0.00	287.62	0.00	0.00	0.00	0.00	287.62	0.32
11:30	1.9	0.28	0.21	0.07	0.210	0.320	287.62	0.00	0.00	0.00	0.00	0.00	287.62	0.00	0.00	0.00	0.00	287.62	0.32
11:45	1.7	0.25	0.21	0.06	0.188	0.286	257.34	0.00	0.00	0.00	0.00	0.00	257.34	0.00	0.00	0.00	0.00	257.34	0.29
12:00	1.8	0.26	0.21	0.06	0.199	0.303	272.48	0.00	0.00	0.00	0.00	0.00	272.48	0.00	0.00	0.00	0.00	272.48	0.30
12:15	2.5	0.36	0.20	0.09	0.276	0.420	378.44	0.00	0.00	0.00	0.00	0.00	378.44	0.00	0.00	0.00	0.00	378.44	0.42

12:30	2.6	0.38	0.20	0.09	0.287	0.437	393.58	0.00	0.00	0.00	0.00	0.00	393.58	0.00	0.00	0.00	0.00	393.58	0.44
12:45	2.8	0.41	0.20	0.10	0.309	0.471	423.86	0.00	0.00	0.00	0.00	0.00	423.86	0.00	0.00	0.00	0.00	423.86	0.47
13:00	2.9	0.42	0.19	0.10	0.320	0.488	439.00	0.00	0.00	0.00	0.00	0.00	439.00	0.00	0.00	0.00	0.00	439.00	0.49
13:15	3.4	0.49	0.19	0.12	0.375	**0.572**	514.68	0.00	0.00	0.00	0.00	0.00	514.68	0.00	0.00	0.00	0.00	514.68	0.57
13:30	3.4	0.49	0.19	0.12	0.375	**0.572**	514.68	0.00	0.00	0.00	0.00	0.00	514.68	0.00	0.00	0.00	0.00	514.68	0.57
13:45	2.3	0.33	0.18	0.08	0.254	0.387	348.17	0.00	0.00	0.00	0.00	0.00	348.17	0.00	0.00	0.00	0.00	348.17	0.39
14:00	2.3	0.33	0.18	0.08	0.254	0.387	348.17	0.00	0.00	0.00	0.00	0.00	348.17	0.00	0.00	0.00	0.00	348.17	0.39
14:15	2.7	0.39	0.18	0.09	0.298	0.454	408.72	0.00	0.00	0.00	0.00	0.00	408.72	0.00	0.00	0.00	0.00	408.72	0.45
14:30	2.6	0.38	0.18	0.09	0.287	0.437	393.58	0.00	0.00	0.00	0.00	0.00	393.58	0.00	0.00	0.00	0.00	393.58	0.44
14:45	2.6	0.38	0.17	0.09	0.287	0.437	393.58	0.00	0.00	0.00	0.00	0.00	393.58	0.00	0.00	0.00	0.00	393.58	0.44
15:00	2.5	0.36	0.17	0.09	0.276	0.420	378.44	0.00	0.00	0.00	0.00	0.00	378.44	0.00	0.00	0.00	0.00	378.44	0.42
15:15	2.4	0.35	0.17	0.08	0.265	0.404	363.31	0.00	0.00	0.00	0.00	0.00	363.31	0.00	0.00	0.00	0.00	363.31	0.40
15:30	2.3	0.33	0.17	0.08	0.254	0.387	348.17	0.00	0.00	0.00	0.00	0.00	348.17	0.00	0.00	0.00	0.00	348.17	0.39
15:45	1.9	0.28	0.16	0.07	0.210	0.320	287.62	0.00	0.00	0.00	0.00	0.00	287.62	0.00	0.00	0.00	0.00	287.62	0.32
16:00	1.9	0.28	0.16	0.07	0.210	0.320	287.62	0.00	0.00	0.00	0.00	0.00	287.62	0.00	0.00	0.00	0.00	287.62	0.32
16:15	0.4	0.06	0.16	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
16:30	0.4	0.06	0.16	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
16:45	0.3	0.04	0.15	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
17:00	0.3	0.04	0.15	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
17:15	0.5	0.07	0.15	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
17:30	0.5	0.07	0.15	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
17:45	0.5	0.07	0.14	0.02	0.055	0.084	75.69	0.00	0.00	0.00	0.00	0.00	75.69	0.00	0.00	0.00	0.00	75.69	0.08
18:00	0.4	0.06	0.14	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
18:15	0.4	0.06	0.14	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
18:30	0.4	0.06	0.14	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
18:45	0.3	0.04	0.14	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
19:00	0.2	0.03	0.13	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
19:15	0.3	0.04	0.13	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
19:30	0.4	0.06	0.13	0.01	0.044	0.067	60.55	0.00	0.00	0.00	0.00	0.00	60.55	0.00	0.00	0.00	0.00	60.55	0.07
19:45	0.3	0.04	0.13	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
20:00	0.2	0.03	0.13	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
20:15	0.3	0.04	0.13	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
20:30	0.3	0.04	0.12	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
20:45	0.3	0.04	0.12	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
21:00	0.2	0.03	0.12	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
21:15	0.3	0.04	0.12	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
21:30	0.2	0.03	0.12	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
21:45	0.3	0.04	0.12	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
22:00	0.2	0.03	0.12	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
22:15	0.3	0.04	0.11	0.01	0.033	0.050	45.41	0.00	0.00	0.00	0.00	0.00	45.41	0.00	0.00	0.00	0.00	45.41	0.05
22:30	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
22:45	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
23:00	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
23:15	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
23:30	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
23:45	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
24:00	0.2	0.03	0.11	0.01	0.022	0.034	30.28	0.00	0.00	0.00	0.00	0.00	30.28	0.00	0.00	0.00	0.00	30.28	0.03
					Total volume (CF)		**15137.76**									**Total Overflow (CF)**		**15137.76**	

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Post-Development

Recurrence Interval	10	year			
Storm Duration (hrs)	1	3	6	24	
10-year NOAA Atlas 14 Point Precipitation (in)	1.010	1.520	2.130	4.310	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Urban Covers; good		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.51	AMC II			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	83				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.13*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*24*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

10 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.45	0.13		0.11	0.342	0.521	156.27	0.00	0.00	0.00	0.00	0.00	156.27	0.00	0.00	0.00	0.00	156.27	0.52
0:10	4.8	0.58	0.13	N/A		0.452	0.688	206.51	0.00	0.00	0.00	0.00	0.00	206.51	0.00	0.00	0.00	0.00	206.51	0.69
0:15	5.1	0.62	0.13	N/A		0.488	0.744	223.13	0.00	0.00	0.00	0.00	0.00	223.13	0.00	0.00	0.00	0.00	223.13	0.74
0:20	4.9	0.59	0.13	N/A		0.464	0.707	212.05	0.00	0.00	0.00	0.00	0.00	212.05	0.00	0.00	0.00	0.00	212.05	0.71
0:25	6.6	0.80	0.13	N/A		0.670	1.021	306.23	0.00	0.00	0.00	0.00	0.00	306.23	0.00	0.00	0.00	0.00	306.23	1.02
0:30	7.3	0.88	0.13	N/A		0.755	1.150	345.01	0.00	0.00	0.00	0.00	0.00	345.01	0.00	0.00	0.00	0.00	345.01	1.15
0:35	8.4	1.02	0.13	N/A		0.888	1.353	405.94	0.00	0.00	0.00	0.00	0.00	405.94	0.00	0.00	0.00	0.00	405.94	1.35
0:40	9.0	1.09	0.13	N/A		0.961	1.464	439.18	0.00	0.00	0.00	0.00	0.00	439.18	0.00	0.00	0.00	0.00	439.18	1.46
0:45	12.3	1.49	0.13	N/A		1.361	2.073	622.00	0.00	0.00	0.00	0.00	0.00	622.00	0.00	0.00	0.00	0.00	622.00	2.07
0:50	17.6	2.13	0.13	N/A		2.003	**3.052**	915.60	0.00	0.00	0.00	0.00	0.00	915.60	0.00	0.00	0.00	0.00	915.60	3.05
0:55	16.1	1.95	0.13	N/A		1.821	2.775	832.51	0.00	0.00	0.00	0.00	0.00	832.51	0.00	0.00	0.00	0.00	832.51	2.78
1:00	4.2	0.51	0.13		0.12	0.388	0.591	177.39	0.00	0.00	0.00	0.00	0.00	177.39	0.00	0.00	0.00	0.00	177.39	0.59
						Total volume (CF)		**4841.82**								**Total Overflow (CF)**			**4841.82**	

10 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.24	0.13	0.06	0.181	0.275	82.63	0.00	0.00	0.00	0.00	0.00	82.63	0.00	0.00	0.00	0.00	82.63	0.28
0:10	1.3	0.24	0.13	0.06	0.181	0.275	82.63	0.00	0.00	0.00	0.00	0.00	82.63	0.00	0.00	0.00	0.00	82.63	0.28
0:15	1.1	0.20	0.13	0.05	0.153	0.233	69.92	0.00	0.00	0.00	0.00	0.00	69.92	0.00	0.00	0.00	0.00	69.92	0.23
0:20	1.5	0.27	0.13	0.07	0.209	0.318	95.34	0.00	0.00	0.00	0.00	0.00	95.34	0.00	0.00	0.00	0.00	95.34	0.32
0:25	1.5	0.27	0.13	0.07	0.209	0.318	95.34	0.00	0.00	0.00	0.00	0.00	95.34	0.00	0.00	0.00	0.00	95.34	0.32
0:30	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
0:35	1.5	0.27	0.13	0.07	0.209	0.318	95.34	0.00	0.00	0.00	0.00	0.00	95.34	0.00	0.00	0.00	0.00	95.34	0.32
0:40	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
0:45	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
0:50	1.5	0.27	0.13	0.07	0.209	0.318	95.34	0.00	0.00	0.00	0.00	0.00	95.34	0.00	0.00	0.00	0.00	95.34	0.32
0:55	1.6	0.29	0.13	0.07	0.222	0.339	101.70	0.00	0.00	0.00	0.00	0.00	101.70	0.00	0.00	0.00	0.00	101.70	0.34
1:00	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
1:05	2.2	0.40	0.13	0.10	0.306	0.466	139.84	0.00	0.00	0.00	0.00	0.00	139.84	0.00	0.00	0.00	0.00	139.84	0.47
1:10	2.2	0.40	0.13	0.10	0.306	0.466	139.84	0.00	0.00	0.00	0.00	0.00	139.84	0.00	0.00	0.00	0.00	139.84	0.47
1:15	2.2	0.40	0.13	0.10	0.306	0.466	139.84	0.00	0.00	0.00	0.00	0.00	139.84	0.00	0.00	0.00	0.00	139.84	0.47
1:20	2.0	0.36	0.13	0.09	0.278	0.424	127.12	0.00	0.00	0.00	0.00	0.00	127.12	0.00	0.00	0.00	0.00	127.12	0.42
1:25	2.6	0.47	0.13	0.11	0.362	0.551	165.26	0.00	0.00	0.00	0.00	0.00	165.26	0.00	0.00	0.00	0.00	165.26	0.55
1:30	2.7	0.49	0.13	0.12	0.375	0.572	171.62	0.00	0.00	0.00	0.00	0.00	171.62	0.00	0.00	0.00	0.00	171.62	0.57
1:35	2.4	0.44	0.13	0.10	0.334	0.508	152.55	0.00	0.00	0.00	0.00	0.00	152.55	0.00	0.00	0.00	0.00	152.55	0.51
1:40	2.7	0.49	0.13	0.12	0.375	0.572	171.62	0.00	0.00	0.00	0.00	0.00	171.62	0.00	0.00	0.00	0.00	171.62	0.57
1:45	3.3	0.60	0.13	N/A	0.472	0.719	215.73	0.00	0.00	0.00	0.00	0.00	215.73	0.00	0.00	0.00	0.00	215.73	0.72
1:50	3.1	0.57	0.13	N/A	0.435	0.664	199.05	0.00	0.00	0.00	0.00	0.00	199.05	0.00	0.00	0.00	0.00	199.05	0.66
1:55	2.9	0.53	0.13	0.13	0.403	0.614	184.33	0.00	0.00	0.00	0.00	0.00	184.33	0.00	0.00	0.00	0.00	184.33	0.61
2:00	3.0	0.55	0.13	N/A	0.417	0.636	190.72	0.00	0.00	0.00	0.00	0.00	190.72	0.00	0.00	0.00	0.00	190.72	0.64
2:05	3.1	0.57	0.13	N/A	0.435	0.664	199.05	0.00	0.00	0.00	0.00	0.00	199.05	0.00	0.00	0.00	0.00	199.05	0.66
2:10	4.2	0.77	0.13	N/A	0.636	0.969	290.76	0.00	0.00	0.00	0.00	0.00	290.76	0.00	0.00	0.00	0.00	290.76	0.97
2:15	5.0	0.91	0.13	N/A	0.782	1.192	357.46	0.00	0.00	0.00	0.00	0.00	357.46	0.00	0.00	0.00	0.00	357.46	1.19
2:20	3.5	0.64	0.13	N/A	0.508	0.775	232.40	0.00	0.00	0.00	0.00	0.00	232.40	0.00	0.00	0.00	0.00	232.40	0.77
2:25	6.8	1.24	0.13	N/A	1.110	1.692	507.53	0.00	0.00	0.00	0.00	0.00	507.53	0.00	0.00	0.00	0.00	507.53	1.69
2:30	7.3	1.33	0.13	N/A	1.202	1.831	549.21	0.00	0.00	0.00	0.00	0.00	549.21	0.00	0.00	0.00	0.00	549.21	1.83
2:35	8.2	1.50	0.13	N/A	1.366	**2.081**	624.24	0.00	0.00	0.00	0.00	0.00	624.24	0.00	0.00	0.00	0.00	624.24	2.08
2:40	5.9	1.08	0.13	N/A	0.946	1.442	432.49	0.00	0.00	0.00	0.00	0.00	432.49	0.00	0.00	0.00	0.00	432.49	1.44
2:45	2.0	0.36	0.13	0.09	0.278	0.424	127.12	0.00	0.00	0.00	0.00	0.00	127.12	0.00	0.00	0.00	0.00	127.12	0.42
2:50	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
2:55	1.8	0.33	0.13	0.08	0.250	0.381	114.41	0.00	0.00	0.00	0.00	0.00	114.41	0.00	0.00	0.00	0.00	114.41	0.38
3:00	0.6	0.11	0.13	0.03	0.083	0.127	38.14	0.00	0.00	0.00	0.00	0.00	38.14	0.00	0.00	0.00	0.00	38.14	0.13
					Total volume (CF)		**6760.63**											**6760.63**	

10 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.13	0.13	0.03	0.097	0.148	44.54	0.00	0.00	0.00	0.00	0.00	44.54	0.00	0.00	0.00	0.00	44.54	0.15
0:10	0.6	0.15	0.13	0.04	0.117	0.178	53.44	0.00	0.00	0.00	0.00	0.00	53.44	0.00	0.00	0.00	0.00	53.44	0.18
0:15	0.6	0.15	0.13	0.04	0.117	0.178	53.44	0.00	0.00	0.00	0.00	0.00	53.44	0.00	0.00	0.00	0.00	53.44	0.18
0:20	0.6	0.15	0.13	0.04	0.117	0.178	53.44	0.00	0.00	0.00	0.00	0.00	53.44	0.00	0.00	0.00	0.00	53.44	0.18
0:25	0.6	0.15	0.13	0.04	0.117	0.178	53.44	0.00	0.00	0.00	0.00	0.00	53.44	0.00	0.00	0.00	0.00	53.44	0.18
0:30	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
0:35	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
0:40	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
0:45	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
0:50	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
0:55	0.7	0.18	0.13	0.04	0.136	0.208	62.35	0.00	0.00	0.00	0.00	0.00	62.35	0.00	0.00	0.00	0.00	62.35	0.21
1:00	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:05	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:10	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:15	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:20	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:25	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:30	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:35	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:40	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:45	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:50	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
1:55	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
2:00	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:05	0.8	0.20	0.13	0.05	0.156	0.238	71.26	0.00	0.00	0.00	0.00	0.00	71.26	0.00	0.00	0.00	0.00	71.26	0.24
2:10	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:15	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:20	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:25	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:30	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:35	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:40	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
2:45	1.0	0.26	0.13	0.06	0.195	0.297	89.07	0.00	0.00	0.00	0.00	0.00	89.07	0.00	0.00	0.00	0.00	89.07	0.30
2:50	1.0	0.26	0.13	0.06	0.195	0.297	89.07	0.00	0.00	0.00	0.00	0.00	89.07	0.00	0.00	0.00	0.00	89.07	0.30
2:55	1.0	0.26	0.13	0.06	0.195	0.297	89.07	0.00	0.00	0.00	0.00	0.00	89.07	0.00	0.00	0.00	0.00	89.07	0.30
3:00	1.0	0.26	0.13	0.06	0.195	0.297	89.07	0.00	0.00	0.00	0.00	0.00	89.07	0.00	0.00	0.00	0.00	89.07	0.30
3:05	1.0	0.26	0.13	0.06	0.195	0.297	89.07	0.00	0.00	0.00	0.00	0.00	89.07	0.00	0.00	0.00	0.00	89.07	0.30
3:10	1.1	0.28	0.13	0.07	0.214	0.327	97.98	0.00	0.00	0.00	0.00	0.00	97.98	0.00	0.00	0.00	0.00	97.98	0.33
3:15	1.1	0.28	0.13	0.07	0.214	0.327	97.98	0.00	0.00	0.00	0.00	0.00	97.98	0.00	0.00	0.00	0.00	97.98	0.33
3:20	1.1	0.28	0.13	0.07	0.214	0.327	97.98	0.00	0.00	0.00	0.00	0.00	97.98	0.00	0.00	0.00	0.00	97.98	0.33
3:25	1.2	0.31	0.13	0.07	0.234	0.356	106.88	0.00	0.00	0.00	0.00	0.00	106.88	0.00	0.00	0.00	0.00	106.88	0.36
3:30	1.3	0.33	0.13	0.08	0.253	0.386	115.79	0.00	0.00	0.00	0.00	0.00	115.79	0.00	0.00	0.00	0.00	115.79	0.39
3:35	1.4	0.36	0.13	0.09	0.273	0.416	124.70	0.00	0.00	0.00	0.00	0.00	124.70	0.00	0.00	0.00	0.00	124.70	0.42
3:40	1.4	0.36	0.13	0.09	0.273	0.416	124.70	0.00	0.00	0.00	0.00	0.00	124.70	0.00	0.00	0.00	0.00	124.70	0.42
3:45	1.5	0.38	0.13	0.09	0.292	0.445	133.61	0.00	0.00	0.00	0.00	0.00	133.61	0.00	0.00	0.00	0.00	133.61	0.45
3:50	1.5	0.38	0.13	0.09	0.292	0.445	133.61	0.00	0.00	0.00	0.00	0.00	133.61	0.00	0.00	0.00	0.00	133.61	0.45
3:55	1.6	0.41	0.13	0.10	0.312	0.475	142.51	0.00	0.00	0.00	0.00	0.00	142.51	0.00	0.00	0.00	0.00	142.51	0.48
4:00	1.6	0.41	0.13	0.10	0.312	0.475	142.51	0.00	0.00	0.00	0.00	0.00	142.51	0.00	0.00	0.00	0.00	142.51	0.48
4:05	1.7	0.43	0.13	0.10	0.331	0.505	151.42	0.00	0.00	0.00	0.00	0.00	151.42	0.00	0.00	0.00	0.00	151.42	0.50

4:10	1.8	0.46	0.13	0.11	0.351	0.534	160.33	0.00	0.00	0.00	0.00	0.00	160.33	0.00	0.00	0.00	0.00	160.33	0.53
4:15	1.9	0.49	0.13	0.12	0.370	0.564	169.23	0.00	0.00	0.00	0.00	0.00	169.23	0.00	0.00	0.00	0.00	169.23	0.56
4:20	2.0	0.51	0.13	0.12	0.390	0.594	178.14	0.00	0.00	0.00	0.00	0.00	178.14	0.00	0.00	0.00	0.00	178.14	0.59
4:25	2.1	0.54	0.13	0.13	0.409	0.623	187.05	0.00	0.00	0.00	0.00	0.00	187.05	0.00	0.00	0.00	0.00	187.05	0.62
4:30	2.1	0.54	0.13	0.13	0.409	0.623	187.05	0.00	0.00	0.00	0.00	0.00	187.05	0.00	0.00	0.00	0.00	187.05	0.62
4:35	2.2	0.56	0.13	N/A	0.432	0.659	197.63	0.00	0.00	0.00	0.00	0.00	197.63	0.00	0.00	0.00	0.00	197.63	0.66
4:40	2.3	0.59	0.13	N/A	0.458	0.698	209.31	0.00	0.00	0.00	0.00	0.00	209.31	0.00	0.00	0.00	0.00	209.31	0.70
4:45	2.4	0.61	0.13	N/A	0.483	0.737	220.99	0.00	0.00	0.00	0.00	0.00	220.99	0.00	0.00	0.00	0.00	220.99	0.74
4:50	2.4	0.61	0.13	N/A	0.483	0.737	220.99	0.00	0.00	0.00	0.00	0.00	220.99	0.00	0.00	0.00	0.00	220.99	0.74
4:55	2.5	0.64	0.13	N/A	0.509	0.776	232.68	0.00	0.00	0.00	0.00	0.00	232.68	0.00	0.00	0.00	0.00	232.68	0.78
5:00	2.6	0.66	0.13	N/A	0.535	0.815	244.36	0.00	0.00	0.00	0.00	0.00	244.36	0.00	0.00	0.00	0.00	244.36	0.81
5:05	3.1	0.79	0.13	N/A	0.662	1.009	302.77	0.00	0.00	0.00	0.00	0.00	302.77	0.00	0.00	0.00	0.00	302.77	1.01
5:10	3.6	0.92	0.13	N/A	0.790	1.204	361.19	0.00	0.00	0.00	0.00	0.00	361.19	0.00	0.00	0.00	0.00	361.19	1.20
5:15	3.9	1.00	0.13	N/A	0.867	1.321	396.24	0.00	0.00	0.00	0.00	0.00	396.24	0.00	0.00	0.00	0.00	396.24	1.32
5:20	4.2	1.07	0.13	N/A	0.944	1.438	431.28	0.00	0.00	0.00	0.00	0.00	431.28	0.00	0.00	0.00	0.00	431.28	1.44
5:25	4.7	1.20	0.13	N/A	1.071	1.632	489.70	0.00	0.00	0.00	0.00	0.00	489.70	0.00	0.00	0.00	0.00	489.70	1.63
5:30	5.6	1.43	0.13	N/A	1.301	**1.983**	594.85	0.00	0.00	0.00	0.00	0.00	594.85	0.00	0.00	0.00	0.00	594.85	1.98
5:35	1.9	0.49	0.13	0.12	0.370	0.564	169.23	0.00	0.00	0.00	0.00	0.00	169.23	0.00	0.00	0.00	0.00	169.23	0.56
5:40	0.9	0.23	0.13	0.05	0.175	0.267	80.16	0.00	0.00	0.00	0.00	0.00	80.16	0.00	0.00	0.00	0.00	80.16	0.27
5:45	0.6	0.15	0.13	0.04	0.117	0.178	53.44	0.00	0.00	0.00	0.00	0.00	53.44	0.00	0.00	0.00	0.00	53.44	0.18
5:50	0.5	0.13	0.13	0.03	0.097	0.148	44.54	0.00	0.00	0.00	0.00	0.00	44.54	0.00	0.00	0.00	0.00	44.54	0.15
5:55	0.3	0.08	0.13	0.02	0.058	0.089	26.72	0.00	0.00	0.00	0.00	0.00	26.72	0.00	0.00	0.00	0.00	26.72	0.09
6:00	0.2	0.05	0.13	0.01	0.039	0.059	17.81	0.00	0.00	0.00	0.00	0.00	17.81	0.00	0.00	0.00	0.00	17.81	0.06
					Total volume (CF)		**9290.73**								**Total Overflow (CF)**			**9290.73**	

10 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.03	0.23	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
0:30	0.3	0.05	0.23	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
0:45	0.3	0.05	0.22	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
1:00	0.4	0.07	0.22	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
1:15	0.3	0.05	0.22	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
1:30	0.3	0.05	0.22	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
1:45	0.3	0.05	0.21	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
2:00	0.4	0.07	0.21	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
2:15	0.4	0.07	0.21	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
2:30	0.4	0.07	0.20	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
2:45	0.5	0.09	0.20	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
3:00	0.5	0.09	0.20	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
3:15	0.5	0.09	0.20	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
3:30	0.5	0.09	0.19	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
3:45	0.5	0.09	0.19	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
4:00	0.6	0.10	0.19	0.02	0.079	0.120	108.14	0.00	0.00	0.00	0.00	0.00	108.14	0.00	0.00	0.00	0.00	108.14	0.12
4:15	0.6	0.10	0.19	0.02	0.079	0.120	108.14	0.00	0.00	0.00	0.00	0.00	108.14	0.00	0.00	0.00	0.00	108.14	0.12
4:30	0.7	0.12	0.19	0.03	0.092	0.140	126.16	0.00	0.00	0.00	0.00	0.00	126.16	0.00	0.00	0.00	0.00	126.16	0.14
4:45	0.7	0.12	0.18	0.03	0.092	0.140	126.16	0.00	0.00	0.00	0.00	0.00	126.16	0.00	0.00	0.00	0.00	126.16	0.14
5:00	0.8	0.14	0.18	0.03	0.105	0.160	144.19	0.00	0.00	0.00	0.00	0.00	144.19	0.00	0.00	0.00	0.00	144.19	0.16
5:15	0.6	0.10	0.18	0.02	0.079	0.120	108.14	0.00	0.00	0.00	0.00	0.00	108.14	0.00	0.00	0.00	0.00	108.14	0.12
5:30	0.7	0.12	0.18	0.03	0.092	0.140	126.16	0.00	0.00	0.00	0.00	0.00	126.16	0.00	0.00	0.00	0.00	126.16	0.14
5:45	0.8	0.14	0.17	0.03	0.105	0.160	144.19	0.00	0.00	0.00	0.00	0.00	144.19	0.00	0.00	0.00	0.00	144.19	0.16
6:00	0.8	0.14	0.17	0.03	0.105	0.160	144.19	0.00	0.00	0.00	0.00	0.00	144.19	0.00	0.00	0.00	0.00	144.19	0.16
6:15	0.9	0.16	0.17	0.04	0.118	0.180	162.21	0.00	0.00	0.00	0.00	0.00	162.21	0.00	0.00	0.00	0.00	162.21	0.18
6:30	0.9	0.16	0.17	0.04	0.118	0.180	162.21	0.00	0.00	0.00	0.00	0.00	162.21	0.00	0.00	0.00	0.00	162.21	0.18
6:45	1.0	0.17	0.16	0.04	0.131	0.200	180.23	0.00	0.00	0.00	0.00	0.00	180.23	0.00	0.00	0.00	0.00	180.23	0.20
7:00	1.0	0.17	0.16	0.04	0.131	0.200	180.23	0.00	0.00	0.00	0.00	0.00	180.23	0.00	0.00	0.00	0.00	180.23	0.20
7:15	1.0	0.17	0.16	0.04	0.131	0.200	180.23	0.00	0.00	0.00	0.00	0.00	180.23	0.00	0.00	0.00	0.00	180.23	0.20
7:30	1.1	0.19	0.16	0.05	0.145	0.220	198.25	0.00	0.00	0.00	0.00	0.00	198.25	0.00	0.00	0.00	0.00	198.25	0.22
7:45	1.2	0.21	0.16	0.05	0.158	0.240	216.28	0.00	0.00	0.00	0.00	0.00	216.28	0.00	0.00	0.00	0.00	216.28	0.24
8:00	1.3	0.22	0.15	0.05	0.171	0.260	234.30	0.00	0.00	0.00	0.00	0.00	234.30	0.00	0.00	0.00	0.00	234.30	0.26
8:15	1.5	0.26	0.15	0.06	0.197	0.300	270.35	0.00	0.00	0.00	0.00	0.00	270.35	0.00	0.00	0.00	0.00	270.35	0.30
8:30	1.5	0.26	0.15	0.06	0.197	0.300	270.35	0.00	0.00	0.00	0.00	0.00	270.35	0.00	0.00	0.00	0.00	270.35	0.30
8:45	1.6	0.28	0.15	0.07	0.210	0.320	288.37	0.00	0.00	0.00	0.00	0.00	288.37	0.00	0.00	0.00	0.00	288.37	0.32
9:00	1.7	0.29	0.15	0.07	0.223	0.340	306.39	0.00	0.00	0.00	0.00	0.00	306.39	0.00	0.00	0.00	0.00	306.39	0.34
9:15	1.9	0.33	0.14	0.08	0.250	0.380	342.44	0.00	0.00	0.00	0.00	0.00	342.44	0.00	0.00	0.00	0.00	342.44	0.38
9:30	2.0	0.34	0.14	0.08	0.263	0.401	360.46	0.00	0.00	0.00	0.00	0.00	360.46	0.00	0.00	0.00	0.00	360.46	0.40
9:45	2.1	0.36	0.14	0.09	0.276	0.421	378.49	0.00	0.00	0.00	0.00	0.00	378.49	0.00	0.00	0.00	0.00	378.49	0.42
10:00	2.2	0.38	0.14	0.09	0.289	0.441	396.51	0.00	0.00	0.00	0.00	0.00	396.51	0.00	0.00	0.00	0.00	396.51	0.44
10:15	1.5	0.26	0.13	0.06	0.197	0.300	270.35	0.00	0.00	0.00	0.00	0.00	270.35	0.00	0.00	0.00	0.00	270.35	0.30
10:30	1.5	0.26	0.13	0.06	0.197	0.300	270.35	0.00	0.00	0.00	0.00	0.00	270.35	0.00	0.00	0.00	0.00	270.35	0.30
10:45	2.0	0.34	0.13	0.08	0.263	0.401	360.46	0.00	0.00	0.00	0.00	0.00	360.46	0.00	0.00	0.00	0.00	360.46	0.40
11:00	2.0	0.34	0.13	0.08	0.263	0.401	360.46	0.00	0.00	0.00	0.00	0.00	360.46	0.00	0.00	0.00	0.00	360.46	0.40
11:15	1.9	0.33	0.13	0.08	0.250	0.380	342.44	0.00	0.00	0.00	0.00	0.00	342.44	0.00	0.00	0.00	0.00	342.44	0.38
11:30	1.9	0.33	0.13	0.08	0.250	0.380	342.44	0.00	0.00	0.00	0.00	0.00	342.44	0.00	0.00	0.00	0.00	342.44	0.38
11:45	1.7	0.29	0.12	0.07	0.223	0.340	306.39	0.00	0.00	0.00	0.00	0.00	306.39	0.00	0.00	0.00	0.00	306.39	0.34
12:00	1.8	0.31	0.12	0.07	0.237	0.360	324.42	0.00	0.00	0.00	0.00	0.00	324.42	0.00	0.00	0.00	0.00	324.42	0.36
12:15	2.5	0.43	0.12	0.10	0.329	0.501	450.58	0.00	0.00	0.00	0.00	0.00	450.58	0.00	0.00	0.00	0.00	450.58	0.50

12:30	2.6	0.45	0.12	0.11	0.342	0.521	468.60	0.00	0.00	0.00	0.00	0.00	468.60	0.00	0.00	0.00	0.00	468.60	0.52
12:45	2.8	0.48	0.12	0.11	0.368	0.561	504.65	0.00	0.00	0.00	0.00	0.00	504.65	0.00	0.00	0.00	0.00	504.65	0.56
13:00	2.9	0.50	0.11	N/A	0.385	0.587	528.61	0.00	0.00	0.00	0.00	0.00	528.61	0.00	0.00	0.00	0.00	528.61	0.59
13:15	3.4	0.59	0.11	N/A	0.473	0.721	649.18	0.00	0.00	0.00	0.00	0.00	649.18	0.00	0.00	0.00	0.00	649.18	0.72
13:30	3.4	0.59	0.11	N/A	0.475	**0.724**	651.53	0.00	0.00	0.00	0.00	0.00	651.53	0.00	0.00	0.00	0.00	651.53	0.72
13:45	2.3	0.40	0.11	0.09	0.302	0.461	414.53	0.00	0.00	0.00	0.00	0.00	414.53	0.00	0.00	0.00	0.00	414.53	0.46
14:00	2.3	0.40	0.11	0.09	0.302	0.461	414.53	0.00	0.00	0.00	0.00	0.00	414.53	0.00	0.00	0.00	0.00	414.53	0.46
14:15	2.7	0.47	0.11	N/A	0.359	0.548	492.90	0.00	0.00	0.00	0.00	0.00	492.90	0.00	0.00	0.00	0.00	492.90	0.55
14:30	2.6	0.45	0.10	N/A	0.344	0.524	471.48	0.00	0.00	0.00	0.00	0.00	471.48	0.00	0.00	0.00	0.00	471.48	0.52
14:45	2.6	0.45	0.10	N/A	0.345	0.526	473.67	0.00	0.00	0.00	0.00	0.00	473.67	0.00	0.00	0.00	0.00	473.67	0.53
15:00	2.5	0.43	0.10	N/A	0.330	0.502	452.19	0.00	0.00	0.00	0.00	0.00	452.19	0.00	0.00	0.00	0.00	452.19	0.50
15:15	2.4	0.41	0.10	0.10	0.315	0.481	432.56	0.00	0.00	0.00	0.00	0.00	432.56	0.00	0.00	0.00	0.00	432.56	0.48
15:30	2.3	0.40	0.10	0.09	0.302	0.461	414.53	0.00	0.00	0.00	0.00	0.00	414.53	0.00	0.00	0.00	0.00	414.53	0.46
15:45	1.9	0.33	0.10	0.08	0.250	0.380	342.44	0.00	0.00	0.00	0.00	0.00	342.44	0.00	0.00	0.00	0.00	342.44	0.38
16:00	1.9	0.33	0.10	0.08	0.250	0.380	342.44	0.00	0.00	0.00	0.00	0.00	342.44	0.00	0.00	0.00	0.00	342.44	0.38
16:15	0.4	0.07	0.09	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
16:30	0.4	0.07	0.09	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
16:45	0.3	0.05	0.09	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
17:00	0.3	0.05	0.09	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
17:15	0.5	0.09	0.09	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
17:30	0.5	0.09	0.09	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
17:45	0.5	0.09	0.09	0.02	0.066	0.100	90.12	0.00	0.00	0.00	0.00	0.00	90.12	0.00	0.00	0.00	0.00	90.12	0.10
18:00	0.4	0.07	0.08	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
18:15	0.4	0.07	0.08	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
18:30	0.4	0.07	0.08	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
18:45	0.3	0.05	0.08	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
19:00	0.2	0.03	0.08	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
19:15	0.3	0.05	0.08	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
19:30	0.4	0.07	0.08	0.02	0.053	0.080	72.09	0.00	0.00	0.00	0.00	0.00	72.09	0.00	0.00	0.00	0.00	72.09	0.08
19:45	0.3	0.05	0.08	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
20:00	0.2	0.03	0.08	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
20:15	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
20:30	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
20:45	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
21:00	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
21:15	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
21:30	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
21:45	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
22:00	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
22:15	0.3	0.05	0.07	0.01	0.039	0.060	54.07	0.00	0.00	0.00	0.00	0.00	54.07	0.00	0.00	0.00	0.00	54.07	0.06
22:30	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
22:45	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
23:00	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
23:15	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
23:30	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
23:45	0.2	0.03	0.07	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
24:00	0.2	0.03	0.06	0.01	0.026	0.040	36.05	0.00	0.00	0.00	0.00	0.00	36.05	0.00	0.00	0.00	0.00	36.05	0.04
					Total volume (CF)		**18120.03**									**Total Overflow (CF)**		**18120.03**	

RCFC&WCD Short Cut Unit Hydrograph Method

Project: Beaumont Post-Development

Recurrence Interval	100	year			
Storm Duration (hrs)	1	3	6	24	
100-year NOAA Atlas 14 Point Precipitation (in)	1.920	2.570	3.460	6.730	
Unit time (minutes)	5	5	5	15	
Drainage Area	65819	SF	*1.511*	Ac.	
Soils Group	B				
AMC index Runoff Number (plate E-6.1)	65	Type:	Urban Covers; good		
Pervious Area Loss Rate (Fp)(in/hr) (plate E-6.2)	0.51	AMC II			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	83				
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	*0.13*	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	*24*				
Percolation Rate (in/hr)	1.00	(Used for retention basin and drywell)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
*Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))*
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors

Upper sec. (FT)=	0.0001	Lower sec. (FT)=	0.0001	Ring diam. (FT) =	0.0001	Gravel bed width around drywell=	0.0001
Drywell lower max. (CF)=	0.00	Upper max.(CF)=	0.00	Drywell total(CF)=	0.00		

Retention Basin design factors

Top (SF)=	0.0001	Bot. (SF)=	0.0001	Max. Depth (FT)=	0.0001
Max. storage (CF)=	0.00	(d/3)*(bottom+top+(bottom*top)^0.50)			

Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5)

100 -year 1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value	Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	3.7	0.85	0.13		N/A	0.723	1.101	330.25	0.00	0.00	0.00	0.00	0.00	330.25	0.00	0.00	0.00	0.00	330.25	1.10
0:10	4.8	1.11	0.13		N/A	0.976	1.487	446.09	0.00	0.00	0.00	0.00	0.00	446.09	0.00	0.00	0.00	0.00	446.09	1.49
0:15	5.1	1.18	0.13		N/A	1.045	1.592	477.69	0.00	0.00	0.00	0.00	0.00	477.69	0.00	0.00	0.00	0.00	477.69	1.59
0:20	4.9	1.13	0.13		N/A	0.999	1.522	456.63	0.00	0.00	0.00	0.00	0.00	456.63	0.00	0.00	0.00	0.00	456.63	1.52
0:25	6.6	1.52	0.13		N/A	1.391	2.119	635.65	0.00	0.00	0.00	0.00	0.00	635.65	0.00	0.00	0.00	0.00	635.65	2.12
0:30	7.3	1.68	0.13		N/A	1.552	2.365	709.37	0.00	0.00	0.00	0.00	0.00	709.37	0.00	0.00	0.00	0.00	709.37	2.36
0:35	8.4	1.94	0.13		N/A	1.805	2.751	825.21	0.00	0.00	0.00	0.00	0.00	825.21	0.00	0.00	0.00	0.00	825.21	2.75
0:40	9.0	2.07	0.13		N/A	1.944	2.961	888.40	0.00	0.00	0.00	0.00	0.00	888.40	0.00	0.00	0.00	0.00	888.40	2.96
0:45	12.3	2.83	0.13		N/A	2.704	4.120	1235.92	0.00	0.00	0.00	0.00	0.00	1235.92	0.00	0.00	0.00	0.00	1235.92	4.12
0:50	17.6	4.06	0.13		N/A	3.925	**5.980**	1794.07	0.00	0.00	0.00	0.00	0.00	1794.07	0.00	0.00	0.00	0.00	1794.07	5.98
0:55	16.1	3.71	0.13		N/A	3.579	5.454	1636.10	0.00	0.00	0.00	0.00	0.00	1636.10	0.00	0.00	0.00	0.00	1636.10	5.45
1:00	4.2	0.97	0.13		N/A	0.838	1.276	382.91	0.00	0.00	0.00	0.00	0.00	382.91	0.00	0.00	0.00	0.00	382.91	1.28
						Total volume (CF)		**9818.29**								**Total Overflow (CF)**			**9818.29**	

100 -year 3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.		Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	1.3	0.40	0.13		0.10	0.306	0.466	139.71	0.00	0.00	0.00	0.00	0.00	139.71	0.00	0.00	0.00	0.00	139.71	0.47
0:10	1.3	0.40	0.13		0.10	0.306	0.466	139.71	0.00	0.00	0.00	0.00	0.00	139.71	0.00	0.00	0.00	0.00	139.71	0.47
0:15	1.1	0.34	0.13		0.08	0.259	0.394	118.22	0.00	0.00	0.00	0.00	0.00	118.22	0.00	0.00	0.00	0.00	118.22	0.39
0:20	1.5	0.46	0.13		0.11	0.353	0.537	161.20	0.00	0.00	0.00	0.00	0.00	161.20	0.00	0.00	0.00	0.00	161.20	0.54
0:25	1.5	0.46	0.13		0.11	0.353	0.537	161.20	0.00	0.00	0.00	0.00	0.00	161.20	0.00	0.00	0.00	0.00	161.20	0.54
0:30	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
0:35	1.5	0.46	0.13		0.11	0.353	0.537	161.20	0.00	0.00	0.00	0.00	0.00	161.20	0.00	0.00	0.00	0.00	161.20	0.54
0:40	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
0:45	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
0:50	1.5	0.46	0.13		0.11	0.353	0.537	161.20	0.00	0.00	0.00	0.00	0.00	161.20	0.00	0.00	0.00	0.00	161.20	0.54
0:55	1.6	0.49	0.13		0.12	0.376	0.573	171.95	0.00	0.00	0.00	0.00	0.00	171.95	0.00	0.00	0.00	0.00	171.95	0.57
1:00	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
1:05	2.2	0.68	0.13	N/A		0.549	0.836	250.72	0.00	0.00	0.00	0.00	0.00	250.72	0.00	0.00	0.00	0.00	250.72	0.84
1:10	2.2	0.68	0.13	N/A		0.549	0.836	250.72	0.00	0.00	0.00	0.00	0.00	250.72	0.00	0.00	0.00	0.00	250.72	0.84
1:15	2.2	0.68	0.13	N/A		0.549	0.836	250.72	0.00	0.00	0.00	0.00	0.00	250.72	0.00	0.00	0.00	0.00	250.72	0.84
1:20	2.0	0.62	0.13	N/A		0.487	0.742	222.53	0.00	0.00	0.00	0.00	0.00	222.53	0.00	0.00	0.00	0.00	222.53	0.74
1:25	2.6	0.80	0.13	N/A		0.672	1.024	307.11	0.00	0.00	0.00	0.00	0.00	307.11	0.00	0.00	0.00	0.00	307.11	1.02
1:30	2.7	0.83	0.13	N/A		0.703	1.071	321.20	0.00	0.00	0.00	0.00	0.00	321.20	0.00	0.00	0.00	0.00	321.20	1.07
1:35	2.4	0.74	0.13	N/A		0.610	0.930	278.91	0.00	0.00	0.00	0.00	0.00	278.91	0.00	0.00	0.00	0.00	278.91	0.93
1:40	2.7	0.83	0.13	N/A		0.703	1.071	321.20	0.00	0.00	0.00	0.00	0.00	321.20	0.00	0.00	0.00	0.00	321.20	1.07
1:45	3.3	1.02	0.13	N/A		0.888	1.353	405.78	0.00	0.00	0.00	0.00	0.00	405.78	0.00	0.00	0.00	0.00	405.78	1.35
1:50	3.1	0.96	0.13	N/A		0.826	1.259	377.59	0.00	0.00	0.00	0.00	0.00	377.59	0.00	0.00	0.00	0.00	377.59	1.26
1:55	2.9	0.89	0.13	N/A		0.764	1.165	349.39	0.00	0.00	0.00	0.00	0.00	349.39	0.00	0.00	0.00	0.00	349.39	1.16
2:00	3.0	0.93	0.13	N/A		0.795	1.212	363.49	0.00	0.00	0.00	0.00	0.00	363.49	0.00	0.00	0.00	0.00	363.49	1.21
2:05	3.1	0.96	0.13	N/A		0.826	1.259	377.59	0.00	0.00	0.00	0.00	0.00	377.59	0.00	0.00	0.00	0.00	377.59	1.26
2:10	4.2	1.30	0.13	N/A		1.165	1.775	532.65	0.00	0.00	0.00	0.00	0.00	532.65	0.00	0.00	0.00	0.00	532.65	1.78
2:15	5.0	1.54	0.13	N/A		1.412	2.151	645.42	0.00	0.00	0.00	0.00	0.00	645.42	0.00	0.00	0.00	0.00	645.42	2.15
2:20	3.5	1.08	0.13	N/A		0.949	1.447	433.97	0.00	0.00	0.00	0.00	0.00	433.97	0.00	0.00	0.00	0.00	433.97	1.45
2:25	6.8	2.10	0.13	N/A		1.967	2.997	899.15	0.00	0.00	0.00	0.00	0.00	899.15	0.00	0.00	0.00	0.00	899.15	3.00
2:30	7.3	2.25	0.13	N/A		2.121	3.232	969.63	0.00	0.00	0.00	0.00	0.00	969.63	0.00	0.00	0.00	0.00	969.63	3.23
2:35	8.2	2.53	0.13	N/A		2.399	**3.655**	1096.50	0.00	0.00	0.00	0.00	0.00	1096.50	0.00	0.00	0.00	0.00	1096.50	3.65
2:40	5.9	1.82	0.13	N/A		1.690	2.574	772.28	0.00	0.00	0.00	0.00	0.00	772.28	0.00	0.00	0.00	0.00	772.28	2.57
2:45	2.0	0.62	0.13	N/A		0.487	0.742	222.53	0.00	0.00	0.00	0.00	0.00	222.53	0.00	0.00	0.00	0.00	222.53	0.74
2:50	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
2:55	1.8	0.56	0.13	N/A		0.425	0.648	194.34	0.00	0.00	0.00	0.00	0.00	194.34	0.00	0.00	0.00	0.00	194.34	0.65
3:00	0.6	0.19	0.13		0.04	0.141	0.215	64.48	0.00	0.00	0.00	0.00	0.00	64.48	0.00	0.00	0.00	0.00	64.48	0.21
						Total volume (CF)		**12093.98**								**Total Overflow (CF)**			**12093.98**	

100 -year 6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:05	0.5	0.21	0.13	0.05	0.158	0.241	72.34	0.00	0.00	0.00	0.00	0.00	72.34	0.00	0.00	0.00	0.00	72.34	0.24
0:10	0.6	0.25	0.13	0.06	0.190	0.289	86.81	0.00	0.00	0.00	0.00	0.00	86.81	0.00	0.00	0.00	0.00	86.81	0.29
0:15	0.6	0.25	0.13	0.06	0.190	0.289	86.81	0.00	0.00	0.00	0.00	0.00	86.81	0.00	0.00	0.00	0.00	86.81	0.29
0:20	0.6	0.25	0.13	0.06	0.190	0.289	86.81	0.00	0.00	0.00	0.00	0.00	86.81	0.00	0.00	0.00	0.00	86.81	0.29
0:25	0.6	0.25	0.13	0.06	0.190	0.289	86.81	0.00	0.00	0.00	0.00	0.00	86.81	0.00	0.00	0.00	0.00	86.81	0.29
0:30	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
0:35	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
0:40	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
0:45	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
0:50	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
0:55	0.7	0.29	0.13	0.07	0.222	0.338	101.28	0.00	0.00	0.00	0.00	0.00	101.28	0.00	0.00	0.00	0.00	101.28	0.34
1:00	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:05	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:10	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:15	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:20	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:25	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:30	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:35	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:40	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:45	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:50	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
1:55	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
2:00	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:05	0.8	0.33	0.13	0.08	0.253	0.386	115.75	0.00	0.00	0.00	0.00	0.00	115.75	0.00	0.00	0.00	0.00	115.75	0.39
2:10	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:15	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:20	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:25	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:30	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:35	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:40	0.9	0.37	0.13	0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
2:45	1.0	0.42	0.13	0.10	0.317	0.482	144.69	0.00	0.00	0.00	0.00	0.00	144.69	0.00	0.00	0.00	0.00	144.69	0.48
2:50	1.0	0.42	0.13	0.10	0.317	0.482	144.69	0.00	0.00	0.00	0.00	0.00	144.69	0.00	0.00	0.00	0.00	144.69	0.48
2:55	1.0	0.42	0.13	0.10	0.317	0.482	144.69	0.00	0.00	0.00	0.00	0.00	144.69	0.00	0.00	0.00	0.00	144.69	0.48
3:00	1.0	0.42	0.13	0.10	0.317	0.482	144.69	0.00	0.00	0.00	0.00	0.00	144.69	0.00	0.00	0.00	0.00	144.69	0.48
3:05	1.0	0.42	0.13	0.10	0.317	0.482	144.69	0.00	0.00	0.00	0.00	0.00	144.69	0.00	0.00	0.00	0.00	144.69	0.48
3:10	1.1	0.46	0.13	0.11	0.348	0.531	159.16	0.00	0.00	0.00	0.00	0.00	159.16	0.00	0.00	0.00	0.00	159.16	0.53
3:15	1.1	0.46	0.13	0.11	0.348	0.531	159.16	0.00	0.00	0.00	0.00	0.00	159.16	0.00	0.00	0.00	0.00	159.16	0.53
3:20	1.1	0.46	0.13	0.11	0.348	0.531	159.16	0.00	0.00	0.00	0.00	0.00	159.16	0.00	0.00	0.00	0.00	159.16	0.53
3:25	1.2	0.50	0.13	0.12	0.380	0.579	173.62	0.00	0.00	0.00	0.00	0.00	173.62	0.00	0.00	0.00	0.00	173.62	0.58
3:30	1.3	0.54	0.13	0.13	0.412	0.627	188.09	0.00	0.00	0.00	0.00	0.00	188.09	0.00	0.00	0.00	0.00	188.09	0.63
3:35	1.4	0.58	0.13	N/A	0.451	0.688	206.29	0.00	0.00	0.00	0.00	0.00	206.29	0.00	0.00	0.00	0.00	206.29	0.69
3:40	1.4	0.58	0.13	N/A	0.451	0.688	206.29	0.00	0.00	0.00	0.00	0.00	206.29	0.00	0.00	0.00	0.00	206.29	0.69
3:45	1.5	0.62	0.13	N/A	0.493	0.751	225.27	0.00	0.00	0.00	0.00	0.00	225.27	0.00	0.00	0.00	0.00	225.27	0.75
3:50	1.5	0.62	0.13	N/A	0.493	0.751	225.27	0.00	0.00	0.00	0.00	0.00	225.27	0.00	0.00	0.00	0.00	225.27	0.75
3:55	1.6	0.66	0.13	N/A	0.534	0.814	244.25	0.00	0.00	0.00	0.00	0.00	244.25	0.00	0.00	0.00	0.00	244.25	0.81
4:00	1.6	0.66	0.13	N/A	0.534	0.814	244.25	0.00	0.00	0.00	0.00	0.00	244.25	0.00	0.00	0.00	0.00	244.25	0.81
4:05	1.7	0.71	0.13	N/A	0.576	0.877	263.23	0.00	0.00	0.00	0.00	0.00	263.23	0.00	0.00	0.00	0.00	263.23	0.88

4:10	1.8	0.75	0.13	N/A		0.617	0.941	282.20	0.00	0.00	0.00	0.00	0.00	282.20	0.00	0.00	0.00	0.00	282.20	0.94
4:15	1.9	0.79	0.13	N/A		0.659	1.004	301.18	0.00	0.00	0.00	0.00	0.00	301.18	0.00	0.00	0.00	0.00	301.18	1.00
4:20	2.0	0.83	0.13	N/A		0.700	1.067	320.16	0.00	0.00	0.00	0.00	0.00	320.16	0.00	0.00	0.00	0.00	320.16	1.07
4:25	2.1	0.87	0.13	N/A		0.742	1.130	339.14	0.00	0.00	0.00	0.00	0.00	339.14	0.00	0.00	0.00	0.00	339.14	1.13
4:30	2.1	0.87	0.13	N/A		0.742	1.130	339.14	0.00	0.00	0.00	0.00	0.00	339.14	0.00	0.00	0.00	0.00	339.14	1.13
4:35	2.2	0.91	0.13	N/A		0.783	1.194	358.12	0.00	0.00	0.00	0.00	0.00	358.12	0.00	0.00	0.00	0.00	358.12	1.19
4:40	2.3	0.95	0.13	N/A		0.825	1.257	377.09	0.00	0.00	0.00	0.00	0.00	377.09	0.00	0.00	0.00	0.00	377.09	1.26
4:45	2.4	1.00	0.13	N/A		0.867	1.320	396.07	0.00	0.00	0.00	0.00	0.00	396.07	0.00	0.00	0.00	0.00	396.07	1.32
4:50	2.4	1.00	0.13	N/A		0.867	1.320	396.07	0.00	0.00	0.00	0.00	0.00	396.07	0.00	0.00	0.00	0.00	396.07	1.32
4:55	2.5	1.04	0.13	N/A		0.908	1.383	415.05	0.00	0.00	0.00	0.00	0.00	415.05	0.00	0.00	0.00	0.00	415.05	1.38
5:00	2.6	1.08	0.13	N/A		0.950	1.447	434.03	0.00	0.00	0.00	0.00	0.00	434.03	0.00	0.00	0.00	0.00	434.03	1.45
5:05	3.1	1.29	0.13	N/A		1.157	1.763	528.92	0.00	0.00	0.00	0.00	0.00	528.92	0.00	0.00	0.00	0.00	528.92	1.76
5:10	3.6	1.49	0.13	N/A		1.365	2.079	623.81	0.00	0.00	0.00	0.00	0.00	623.81	0.00	0.00	0.00	0.00	623.81	2.08
5:15	3.9	1.62	0.13	N/A		1.489	2.269	680.74	0.00	0.00	0.00	0.00	0.00	680.74	0.00	0.00	0.00	0.00	680.74	2.27
5:20	4.2	1.74	0.13	N/A		1.614	2.459	737.67	0.00	0.00	0.00	0.00	0.00	737.67	0.00	0.00	0.00	0.00	737.67	2.46
5:25	4.7	1.95	0.13	N/A		1.821	2.775	832.56	0.00	0.00	0.00	0.00	0.00	832.56	0.00	0.00	0.00	0.00	832.56	2.78
5:30	5.6	2.33	0.13	N/A		2.195	**3.345**	1003.36	0.00	0.00	0.00	0.00	0.00	1003.36	0.00	0.00	0.00	0.00	1003.36	3.34
5:35	1.9	0.79	0.13	N/A		0.659	1.004	301.18	0.00	0.00	0.00	0.00	0.00	301.18	0.00	0.00	0.00	0.00	301.18	1.00
5:40	0.9	0.37	0.13		0.09	0.285	0.434	130.22	0.00	0.00	0.00	0.00	0.00	130.22	0.00	0.00	0.00	0.00	130.22	0.43
5:45	0.6	0.25	0.13		0.06	0.190	0.289	86.81	0.00	0.00	0.00	0.00	0.00	86.81	0.00	0.00	0.00	0.00	86.81	0.29
5:50	0.5	0.21	0.13		0.05	0.158	0.241	72.34	0.00	0.00	0.00	0.00	0.00	72.34	0.00	0.00	0.00	0.00	72.34	0.24
5:55	0.3	0.12	0.13		0.03	0.095	0.145	43.41	0.00	0.00	0.00	0.00	0.00	43.41	0.00	0.00	0.00	0.00	43.41	0.14
6:00	0.2	0.08	0.13		0.02	0.063	0.096	28.94	0.00	0.00	0.00	0.00	0.00	28.94	0.00	0.00	0.00	0.00	28.94	0.10
						Total volume (CF)		**15779.45**								**Total Overflow (CF)**			**15779.45**	

100 -year 24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (CFS)	Flow Vol. (CF)	Outside Input (CF)	Drywell Retention Area (sf)	Drywell Period Perc. (CF)	Drywell Storage Vol. (CF)	Drywell Storage Depth (ft)	Overflow To Basin (CF)	Retention Area (sf)	Basin Period Perc. (CF)	Basin Storage Vol. (CF)	Basin Storage Depth (ft)	Overflow Vol. (CF)	Overflow Rate (CFS)
0:15	0.2	0.05	0.23	0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
0:30	0.3	0.08	0.23	0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
0:45	0.3	0.08	0.22	0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
1:00	0.4	0.11	0.22	0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
1:15	0.3	0.08	0.22	0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
1:30	0.3	0.08	0.22	0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
1:45	0.3	0.08	0.21	0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
2:00	0.4	0.11	0.21	0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
2:15	0.4	0.11	0.21	0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
2:30	0.4	0.11	0.20	0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
2:45	0.5	0.13	0.20	0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
3:00	0.5	0.13	0.20	0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
3:15	0.5	0.13	0.20	0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
3:30	0.5	0.13	0.19	0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
3:45	0.5	0.13	0.19	0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
4:00	0.6	0.16	0.19	0.04	0.123	0.188	168.86	0.00	0.00	0.00	0.00	0.00	168.86	0.00	0.00	0.00	0.00	168.86	0.19
4:15	0.6	0.16	0.19	0.04	0.123	0.188	168.86	0.00	0.00	0.00	0.00	0.00	168.86	0.00	0.00	0.00	0.00	168.86	0.19
4:30	0.7	0.19	0.19	0.04	0.144	0.219	197.00	0.00	0.00	0.00	0.00	0.00	197.00	0.00	0.00	0.00	0.00	197.00	0.22
4:45	0.7	0.19	0.18	0.04	0.144	0.219	197.00	0.00	0.00	0.00	0.00	0.00	197.00	0.00	0.00	0.00	0.00	197.00	0.22
5:00	0.8	0.22	0.18	0.05	0.164	0.250	225.14	0.00	0.00	0.00	0.00	0.00	225.14	0.00	0.00	0.00	0.00	225.14	0.25
5:15	0.6	0.16	0.18	0.04	0.123	0.188	168.86	0.00	0.00	0.00	0.00	0.00	168.86	0.00	0.00	0.00	0.00	168.86	0.19
5:30	0.7	0.19	0.18	0.04	0.144	0.219	197.00	0.00	0.00	0.00	0.00	0.00	197.00	0.00	0.00	0.00	0.00	197.00	0.22
5:45	0.8	0.22	0.17	0.05	0.164	0.250	225.14	0.00	0.00	0.00	0.00	0.00	225.14	0.00	0.00	0.00	0.00	225.14	0.25
6:00	0.8	0.22	0.17	0.05	0.164	0.250	225.14	0.00	0.00	0.00	0.00	0.00	225.14	0.00	0.00	0.00	0.00	225.14	0.25
6:15	0.9	0.24	0.17	0.06	0.185	0.281	253.29	0.00	0.00	0.00	0.00	0.00	253.29	0.00	0.00	0.00	0.00	253.29	0.28
6:30	0.9	0.24	0.17	0.06	0.185	0.281	253.29	0.00	0.00	0.00	0.00	0.00	253.29	0.00	0.00	0.00	0.00	253.29	0.28
6:45	1.0	0.27	0.16	0.06	0.205	0.313	281.43	0.00	0.00	0.00	0.00	0.00	281.43	0.00	0.00	0.00	0.00	281.43	0.31
7:00	1.0	0.27	0.16	0.06	0.205	0.313	281.43	0.00	0.00	0.00	0.00	0.00	281.43	0.00	0.00	0.00	0.00	281.43	0.31
7:15	1.0	0.27	0.16	0.06	0.205	0.313	281.43	0.00	0.00	0.00	0.00	0.00	281.43	0.00	0.00	0.00	0.00	281.43	0.31
7:30	1.1	0.30	0.16	0.07	0.226	0.344	309.57	0.00	0.00	0.00	0.00	0.00	309.57	0.00	0.00	0.00	0.00	309.57	0.34
7:45	1.2	0.32	0.16	0.08	0.246	0.375	337.71	0.00	0.00	0.00	0.00	0.00	337.71	0.00	0.00	0.00	0.00	337.71	0.38
8:00	1.3	0.35	0.15	0.08	0.267	0.407	365.86	0.00	0.00	0.00	0.00	0.00	365.86	0.00	0.00	0.00	0.00	365.86	0.41
8:15	1.5	0.40	0.15	0.10	0.308	0.469	422.14	0.00	0.00	0.00	0.00	0.00	422.14	0.00	0.00	0.00	0.00	422.14	0.47
8:30	1.5	0.40	0.15	0.10	0.308	0.469	422.14	0.00	0.00	0.00	0.00	0.00	422.14	0.00	0.00	0.00	0.00	422.14	0.47
8:45	1.6	0.43	0.15	0.10	0.328	0.500	450.29	0.00	0.00	0.00	0.00	0.00	450.29	0.00	0.00	0.00	0.00	450.29	0.50
9:00	1.7	0.46	0.15	0.11	0.349	0.532	478.43	0.00	0.00	0.00	0.00	0.00	478.43	0.00	0.00	0.00	0.00	478.43	0.53
9:15	1.9	0.51	0.14	0.12	0.390	0.594	534.71	0.00	0.00	0.00	0.00	0.00	534.71	0.00	0.00	0.00	0.00	534.71	0.59
9:30	2.0	0.54	0.14	0.13	0.410	0.625	562.86	0.00	0.00	0.00	0.00	0.00	562.86	0.00	0.00	0.00	0.00	562.86	0.63
9:45	2.1	0.57	0.14	0.13	0.431	0.657	591.00	0.00	0.00	0.00	0.00	0.00	591.00	0.00	0.00	0.00	0.00	591.00	0.66
10:00	2.2	0.59	0.14	N/A	0.455	0.694	624.39	0.00	0.00	0.00	0.00	0.00	624.39	0.00	0.00	0.00	0.00	624.39	0.69
10:15	1.5	0.40	0.13	0.10	0.308	0.469	422.14	0.00	0.00	0.00	0.00	0.00	422.14	0.00	0.00	0.00	0.00	422.14	0.47
10:30	1.5	0.40	0.13	0.10	0.308	0.469	422.14	0.00	0.00	0.00	0.00	0.00	422.14	0.00	0.00	0.00	0.00	422.14	0.47
10:45	2.0	0.54	0.13	0.13	0.410	0.625	562.86	0.00	0.00	0.00	0.00	0.00	562.86	0.00	0.00	0.00	0.00	562.86	0.63
11:00	2.0	0.54	0.13	0.13	0.410	0.625	562.86	0.00	0.00	0.00	0.00	0.00	562.86	0.00	0.00	0.00	0.00	562.86	0.63
11:15	1.9	0.51	0.13	0.12	0.390	0.594	534.71	0.00	0.00	0.00	0.00	0.00	534.71	0.00	0.00	0.00	0.00	534.71	0.59
11:30	1.9	0.51	0.13	0.12	0.390	0.594	534.71	0.00	0.00	0.00	0.00	0.00	534.71	0.00	0.00	0.00	0.00	534.71	0.59
11:45	1.7	0.46	0.12	0.11	0.349	0.532	478.43	0.00	0.00	0.00	0.00	0.00	478.43	0.00	0.00	0.00	0.00	478.43	0.53
12:00	1.8	0.48	0.12	0.12	0.369	0.563	506.57	0.00	0.00	0.00	0.00	0.00	506.57	0.00	0.00	0.00	0.00	506.57	0.56
12:15	2.5	0.67	0.12	N/A	0.553	0.843	758.58	0.00	0.00	0.00	0.00	0.00	758.58	0.00	0.00	0.00	0.00	758.58	0.84

12:30	2.6	0.70	0.12	N/A		0.582	0.887	797.96	0.00	0.00	0.00	0.00	0.00	797.96	0.00	0.00	0.00	0.00	797.96	0.89
12:45	2.8	0.75	0.12	N/A		0.638	0.971	874.22	0.00	0.00	0.00	0.00	0.00	874.22	0.00	0.00	0.00	0.00	874.22	0.97
13:00	2.9	0.78	0.11	N/A		0.666	1.015	913.54	0.00	0.00	0.00	0.00	0.00	913.54	0.00	0.00	0.00	0.00	913.54	1.02
13:15	3.4	0.92	0.11	N/A		0.803	1.223	1100.48	0.00	0.00	0.00	0.00	0.00	1100.48	0.00	0.00	0.00	0.00	1100.48	1.22
13:30	3.4	0.92	0.11	N/A		0.804	**1.225**	1102.83	0.00	0.00	0.00	0.00	0.00	1102.83	0.00	0.00	0.00	0.00	1102.83	1.23
13:45	2.3	0.62	0.11	N/A		0.510	0.777	699.09	0.00	0.00	0.00	0.00	0.00	699.09	0.00	0.00	0.00	0.00	699.09	0.78
14:00	2.3	0.62	0.11	N/A		0.511	0.779	701.38	0.00	0.00	0.00	0.00	0.00	701.38	0.00	0.00	0.00	0.00	701.38	0.78
14:15	2.7	0.73	0.11	N/A		0.621	0.946	851.28	0.00	0.00	0.00	0.00	0.00	851.28	0.00	0.00	0.00	0.00	851.28	0.95
14:30	2.6	0.70	0.10	N/A		0.596	0.907	816.59	0.00	0.00	0.00	0.00	0.00	816.59	0.00	0.00	0.00	0.00	816.59	0.91
14:45	2.6	0.70	0.10	N/A		0.597	0.910	818.78	0.00	0.00	0.00	0.00	0.00	818.78	0.00	0.00	0.00	0.00	818.78	0.91
15:00	2.5	0.67	0.10	N/A		0.572	0.871	784.02	0.00	0.00	0.00	0.00	0.00	784.02	0.00	0.00	0.00	0.00	784.02	0.87
15:15	2.4	0.65	0.10	N/A		0.546	0.832	749.23	0.00	0.00	0.00	0.00	0.00	749.23	0.00	0.00	0.00	0.00	749.23	0.83
15:30	2.3	0.62	0.10	N/A		0.521	0.794	714.41	0.00	0.00	0.00	0.00	0.00	714.41	0.00	0.00	0.00	0.00	714.41	0.79
15:45	1.9	0.51	0.10	N/A		0.415	0.632	568.82	0.00	0.00	0.00	0.00	0.00	568.82	0.00	0.00	0.00	0.00	568.82	0.63
16:00	1.9	0.51	0.10	N/A		0.416	0.634	570.84	0.00	0.00	0.00	0.00	0.00	570.84	0.00	0.00	0.00	0.00	570.84	0.63
16:15	0.4	0.11	0.09		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
16:30	0.4	0.11	0.09		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
16:45	0.3	0.08	0.09		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
17:00	0.3	0.08	0.09		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
17:15	0.5	0.13	0.09		0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
17:30	0.5	0.13	0.09		0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
17:45	0.5	0.13	0.09		0.03	0.103	0.156	140.71	0.00	0.00	0.00	0.00	0.00	140.71	0.00	0.00	0.00	0.00	140.71	0.16
18:00	0.4	0.11	0.08		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
18:15	0.4	0.11	0.08		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
18:30	0.4	0.11	0.08		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
18:45	0.3	0.08	0.08		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
19:00	0.2	0.05	0.08		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
19:15	0.3	0.08	0.08		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
19:30	0.4	0.11	0.08		0.03	0.082	0.125	112.57	0.00	0.00	0.00	0.00	0.00	112.57	0.00	0.00	0.00	0.00	112.57	0.13
19:45	0.3	0.08	0.08		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
20:00	0.2	0.05	0.08		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
20:15	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
20:30	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
20:45	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
21:00	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
21:15	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
21:30	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
21:45	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
22:00	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
22:15	0.3	0.08	0.07		0.02	0.062	0.094	84.43	0.00	0.00	0.00	0.00	0.00	84.43	0.00	0.00	0.00	0.00	84.43	0.09
22:30	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
22:45	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
23:00	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
23:15	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
23:30	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
23:45	0.2	0.05	0.07		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
24:00	0.2	0.05	0.06		0.01	0.041	0.063	56.29	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	0.00	0.00	56.29	0.06
					Total volume (CF)			**29403.43**									**Total Overflow (CF)**		**29403.43**	

Appendix G – Hydraulic Calculations

Pre-Dev Runoff Volume

	2	5	10	100
1	595.92	1189.43	3243.60	8227.38
3	582.85	1001.87	2778.79	7414.30
6	822.24	1191.35	3109.48	7731.16
24	1524.81	1985.54	3556.73	10394.72

Post-Dev Runoff Volume

	2	5	10	100
1	2572.22	3577.06	4841.82	9818.29
3	4166.97	5379.37	6760.63	12093.98
6	6026.59	7611.52	9290.73	15779.45
24	11625.13	15137.76	18120.03	29403.43

BMP Storage Volume

DMA 1	0.00	cf
DMA 2	301.60	cf
DMA 3	338.40	cf
DMA 4	2914.56	cf
DMA 5	182.22	cf

BMP Volume *3736.778* cf

Runoff Volume Increase

	2	5	10	100
1	*1976.30*	*2387.63*	*1598.22*	*1590.91*
3	*3584.12*	*4377.50*	*3981.84*	*4679.68*
6	*5204.35*	*6420.17*	*6181.25*	*8048.29*
24	*10100.32*	*13152.22*	*14563.30*	**19008.71**

Detention Volume Required

15271.9 **cf**

PRINSCO WATER MANAGEMENT SOLUTIONS

*Ensure correct unit type is selected

HydroStor™

PROJECT DESCRIPTION

Project Name: Harb-Beaumont Date: ___/___/___ City/State: ___/___ Phone #: ___

Engineer: MTH2 Engineering, Inc Contractor: ___ Designed By: MLA Prinsco Rep: ___

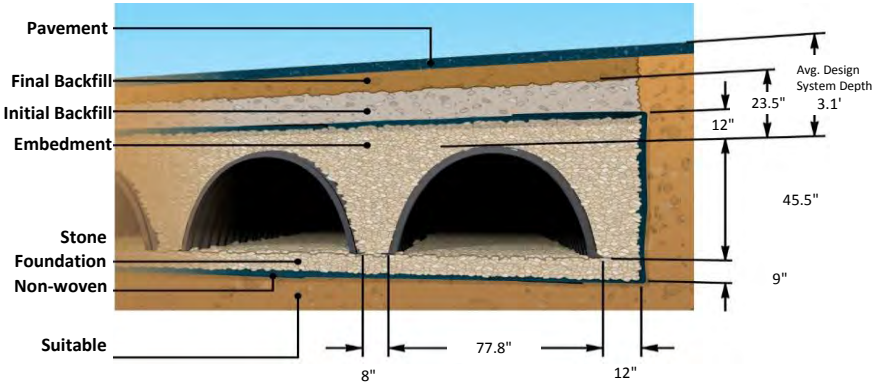
DESIGN CRITERIA - BASED ON STORAGE VOLUME

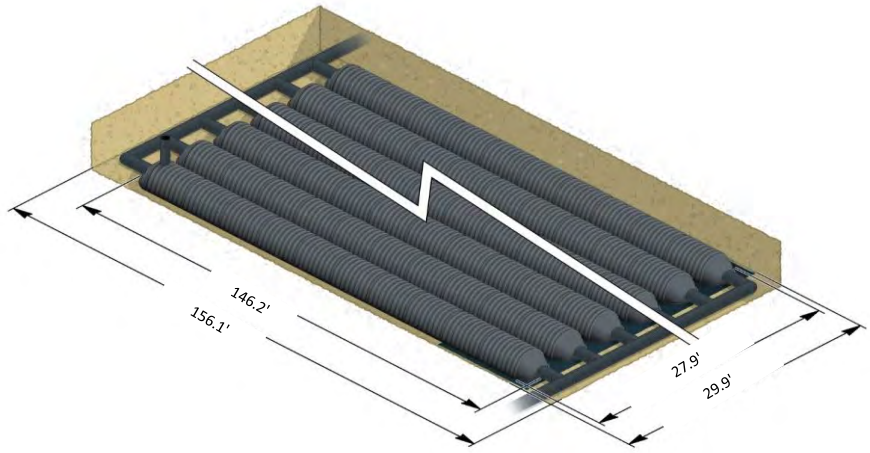
Chamber Size: HS180 Constraint on System Dimensions: Width Number of Manifolds: 2 Manifold Diameter: 24 (in) Include Manifold Volume?: Yes *Units: Standard

Target Storage Volume	15272 (cf)	Constraint Limit	35 (ft)	Stone Porosity	40 %	Bottom of Stone Elevation	2584.86 (ft)	Max. Pavement Elevation	2593 (ft)
Min. Pavement Elevation	2592.02 (ft)								
Additional Stone Above Chamber*	0 (in)	Additional Stone Below Chamber*	0 (in)	Additional Stone Side of Chamber*	0 (in)	Additional Stone Between Chambers*	0 (in)		

* Minimum recommended values are already included in calculations

SYSTEM LAYOUT





NOTES ON COVER ABOVE CHAMBER:

Min. Burial Depth: 23.5"

Max. Burial Depth: 8'

SYSTEM STORAGE & QUANTITIES

System Layout: 1 rows of 20 chambers & 3 rows of 19 chambers

System Footprint	Stone Storage	Manifold Storage	Chamber Storage	Total System Storage
4521 (sf)	6415 (cf)	169 (cf)	8867 (cf)	15451 (cf)

Number of Chambers	Number of End Caps	Required Stone (For Embedment Backfill)	Non-Woven Geotextile (Includes 20% Overlap)	Woven Geotextile - Scour	Woven Geotextile - Sediment Row
77	8	594 (cy)	1493 (sy)	78 (sy)	247 (sy)

ASSISTANCE: For assistance with design, drawings or pricing please have your completed system design aid ready, and contact your Prinsco sales representative

Peak Flowrate per DMA and Inlet Sizing

Shortcut Unit Hydrograph Peak Flowrate:

5.98 cfs 100-yr, 1-hr

Total Site Area: *65819.04* sf *1.511* Ac.

							Peak		**Inlet Size**
DMA 1	*1696.67*	sf	*2.58%*				*0.154*	cfs	Self Retaining
DMA 2	*5068.80*	sf	*7.70%*				*0.461*	cfs	18"x18" DI
DMA 3	*5246.26*	sf	*7.97%*				*0.477*	cfs	18"x18" DI
DMA 4	*51198.29*	sf	*77.79%*				*4.652*	cfs	24"x24" DI
DMA 5	*2609.02*	sf	*3.96%*				*0.237*	cfs	Self Retaining
			100.00%						

Jensen 18"x18" Drop Inlet, assumes 2" ponding above top of grate.

Drop Inlet Flow Calculator

Leave either Area, Flow, or Head blank for calculation of that quantity.

Input Data:			Results:		
Design flow =		cfs	**Design flow =**	2.98	cfs
Design head =	0.17	ft	**Design head =**	0.17	ft
Inlet net area =	2.25	sq. ft.	**Inlet area req'd =**	2.25	sq. ft.
Orifice coefficient =	0.6				

Orifice Coefficient:

Openings with square edges: 0.6
Openings with round edges: 0.8

Jensen 24"x24" Drop Inlet, assumes 2" ponding above top of grate.

Drop Inlet Flow Calculator

Leave either Area, Flow, or Head blank for calculation of that quantity.

Input Data:			Results:		
Design flow =		cfs	**Design flow =**	5.29	cfs
Design head =	0.17	ft	**Design head =**	0.17	ft
Inlet net area =	4	sq. ft.	**Inlet area req'd =**	4	sq. ft.
Orifice coefficient =	0.6				

Orifice Coefficient:

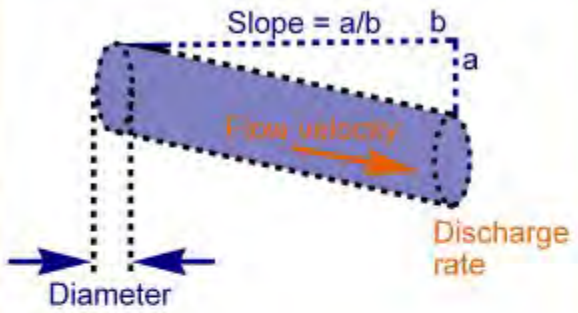
Openings with square edges: 0.6
Openings with round edges: 0.8

Gravity-fed pipe flow

Hazen-Williams formula for a full pipe.

Search

Engineering index
Civil Engineering index



the calc

The gravitational flow form of the Hazen-Williams equation is calculated to provide water velocity and discharge rate that can be achieved through a pipe with provided proportions.

Pipe diameter:	6	inches
Roughness coefficient:	140	
Pipe length (b):	1	feet
Drop (a):	0.005	feet
Velocity:	2.84739	feet/second
Discharge rate	0.559010	cu ft/s
Pipe slope:	0.00500000	

Calculate!

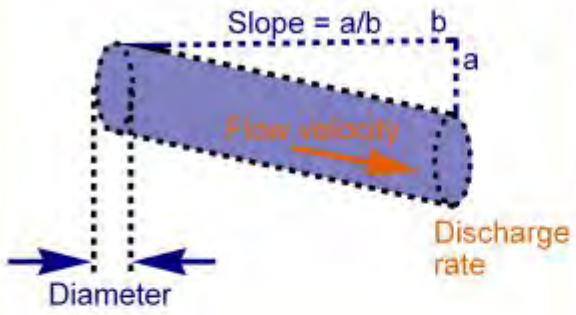
Add ⊕

notes

This calc is mainly for pipes full with water at ambient temperature and under turbulent flow.
If you know the slope rather than the pipe length and drop, then enter "1" in "Length" and enter the slope in "Drop". If the cunduit is not a full circular pipe, but you know the hydraulic radius, then enter (Rh×4) in "Diameter".
Typical values of the roughness (friction loss) coefficient include: 100 (concrete, cast iron); 120 (steel); 140 (cement); 150 (copper, plastics).

Gravity-fed pipe flow

Hazen-Williams formula for a full pipe.



the calc

The gravitational flow form of the Hazen-Williams equation is calculated to provide water velocity and discharge rate that can be achieved through a pipe with provided proportions.

Pipe diameter:	8	inches
Roughness coefficient:	140	
Pipe length (b):	1	feet
Drop (a):	0.005	feet
Velocity:	3.41318	feet/second
Discharge rate	1.19127	cu ft/s
Pipe slope:	0.00500000	

Calculate!

Add ⊕

notes

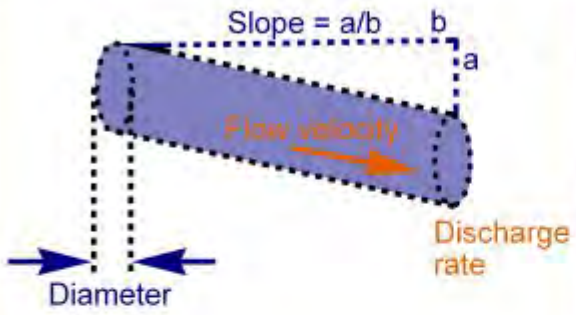
This calc is mainly for pipes full with water at ambient temperature and under turbulent flow.
If you know the slope rather than the pipe length and drop, then enter "1" in "Length" and enter the slope in "Drop". If the cunduit is not a full circular pipe, but you know the hydraulic radius, then enter (Rh×4) in "Diameter".
Typical values of the roughness (friction loss) coefficient include: 100 (concrete, cast iron); 120 (steel); 140 (cement); 150 (copper, plastics).

Gravity-fed pipe flow

Hazen-Williams formula for a full pipe.

Search

Engineering index
Civil Engineering index



the calc

The gravitational flow form of the Hazen-Williams equation is calculated to provide water velocity and discharge rate that can be achieved through a pipe with provided proportions.

Pipe diameter:	15	inches
Roughness coefficient:	140	
Pipe length (b):	1	feet
Drop (a):	0.005	feet
Velocity:	5.07165	feet/second
Discharge rate	6.22303	cu ft/s
Pipe slope:	0.00500000	

Calculate!

Add ⊕

notes

This calc is mainly for pipes full with water at ambient temperature and under turbulent flow.
If you know the slope rather than the pipe length and drop, then enter "1" in "Length" and enter the slope in "Drop". If the cunduit is not a full circular pipe, but you know the hydraulic radius, then enter (Rh×4) in "Diameter".
Typical values of the roughness (friction loss) coefficient include: 100 (concrete, cast iron); 120 (steel); 140 (cement); 150 (copper, plastics).

Orifice Flow Calculations

Mathematically, the orifice flow equation gives the mass flow rate, or discharge Q through an orifice, given the area of the orifice A, and can be written as:

$$Q = C_d * A * \sqrt{(2 * g * H)}$$

where, C_d is coefficient of discharge, g is acceleration due to gravity in m/s^2, and H being the mean center line (distance between the water level and the center of the orifice).
The coefficient of discharge, C_d is a function of various parameters such as the diameter of orifice d, acceleration due to gravity, hydraulic depth, and the kinematic viscosity of the fluid v. Mathematically, it can be expressed as:

$$C_d \propto (d * \sqrt{(g * H)} / v)$$

C_d is approximately 0.60 per Table 4-6 in Handbook of Hydraulics by Brater and King.

A round orifice, 1.125" in diameter provides a maximum flow rate of 0.064 CFS under a maximum centerline head of 45" per the below calculation:

Diameter of orifice (d)	1.125	in
Area of orifice (A)	0.994	in^2
Coefficient of discharge (Cd)	0.6	
Center line head (H)	45	in
Gravitational constant (g)	32.185	ft/s^2
Discharge (Q)	0.06435	ft^3/s

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ A. **On-site storm drain inlets**	☑ **Locations of inlets.**	☑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☑ **Maintain and periodically repaint or replace inlet markings.** ☑ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☑ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☑ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
☐ B. **Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ C. **Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ D1. **Need for future indoor & structural pest control**		☐ **Note building design features that discourage entry of pests.**	☐ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☑ D2. **Landscape/ Outdoor Pesticide Use**	☐ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☑ **Show self-retaining landscape areas, if any.** ☐ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☐ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ☐ **Consider using pest-resistant plants, especially adjacent to hardscape.** ☑ **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☑ **Maintain landscaping using minimum or no pesticides.** ☑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☑ **Provide IPM information to new owners, lessees and operators.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☐ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☐ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. **Food service**	☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☐ **Describe the location and features of the designated cleaning area.** ☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☑ G. **Refuse areas**	☐ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☐ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☐ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** **www.cchealth.org/groups/hazmat/**	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **The property owner shall dry sweep the fueling area routinely.** ❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. **Loading Docks**	❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		❑ **Move loaded and unloaded items indoors as soon as possible.** ❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ N. **Fire Sprinkler Test Water**		☑ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	☑ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ☐ **Boiler drain lines** ☐ **Condensate drain lines** ☑ **Rooftop equipment** ☑ **Drainage sumps** ☑ **Roofing, gutters, and trim.** ☐ **Other sources**		☐ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ☐ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ☑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ☑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ☐ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ P. **Plazas, sidewalks, and parking lots.**			☑ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

This Operations and Maintenance Plan (OMP) describes the designated responsible party for implementation of this plan and the project's Water Quality Management Plan (WQMP), including: operation and maintenance of all the structural Best Management Practices (BMPs), conducting training and educational programs, detailed inspection and maintenance requirements for all BMPs, manufacturer's maintenance requirements, permits, and any other necessary activities.

1. Project Information:
   A portion of Parcel A, and Parcel B of Lot Line Adjustment xxx
   Site Size: 65,819 SF (1.511 AC)

2. The Responsible Party for implementation of this OMP and the WQMP is:

   High Sand, Inc.
   655 Highland Springs Avenue
   Beaumont, CA, 92223

   Contact Person: Ali Harb
   Phone: (909) 214-3333
   24-Hour Emergency Number: (909) 214-3333
   Email: ali123harb@gmail.com

3. Record Keeping:

   The Responsible Party shall retain OMP records for at least 5 years.

   All training and educational activities, and BMP operation and maintenance shall be documented to verify compliance with this OMP Plan. A BMP Inspection and Maintenance Log, and a Training Log are included with this document.

   The WQMP Verification Form shall be completed on an annual basis and retained as part of this document.

4. Vector Control

   Standing water, which exists for longer than 72 hours may contribute to mosquito breeding areas. BMPs shall be inspected for standing water on a regular basis. Standing water may indicate that the BMPs are not functioning properly and proper action to remedy the situation shall be taken in a timely manner. Elimination of standing water and managing garbage, lawn clippings, and pet droppings, can help decrease the presence of mosquitoes and flies in the area. The County Vector Control District may be contacted for more information and support.

5. Inspections

   The local jurisdiction may conduct a site inspection to evaluate compliance with the project specific WQMP. The Responsible Party should keep this document, including the logs and the applicable WQMP, accessible on the project premises at all times and made available to the local jurisdiction inspector when requested as proof of maintenance.

6. Operation and Maintenance Requirements

Reference the WQMP Site Plan included with this OMP for delineation and designation of pervious and impervious areas, locations and type of Stormwater BMPs, and locations of self-retaining areas addressed by LID principles that do not require specialized maintenance beyond that of typical landscape maintenance.

Reference the drain inlet insert filter manufacturer's service and maintenance guides in Appendix 9.

The below listed fact sheets provide detailed information regarding operation and maintenance requirements for various features and activities expected. These fact sheets are included in Appendix 10 Educational Materials.

Non-Stormwater Management
SC-10 Non-Stormwater Discharges
SC-11 Spill Prevention, Control and Cleanup
Material and Waste Management
SC-30 Outdoor Loading/Unloading
SC-32 Outdoor Equipment Operations
SC-34 Waste Handling and Disposal
SC-35 Safer Alternative Products
Building and Grounds Management
SC-41 Building & Grounds Maintenance
SC-42 Building Repair and Construction
SC-43 Parking/Storage Area Maintenance
SC-44 Drainage System Maintenance

Appendix 10 also contains the following information pamphlets:

After the Storm
Stormwater Pollution for Automotive Maintenance and Car Care
Stormwater Pollution for Outdoor Cleaning Activities and Professional Mobile Service Providers
Only Rain Down the Storm Drain

The following chart provides additional operation and maintenance guidelines.

BMP	Inspection/Maintenance Required	Minimum Frequency of Activities	Responsible Party
Education for Property Owners, Tenants and Occupants	Educational materials are provided in Appendix 10 of the WQMP. Provide literature and instructions pertaining to environmental awareness to all employees, tenants and occupants. Keep log of persons receiving educational materials.	Once yearly and for new employees, tenants and occupants	Owner
Employee Training	Educate all employees on environmental awareness. Instruct on proper use of chemicals and clean-up procedures. Keep logs of employees and training dates.	Once yearly prior to storm season	Owner
Activity Restrictions	Any activity that may affect surrounding areas or downstream receiving waters such as car washing or leaving trash bin lids open is prohibited. Keep areas free of debris.	Trash areas shall be checked before and after a storm event	Owner
Irrigation	Inspect for siltation or debris washing out of planters. Sweep silt to planters and check amount of irrigation used and for properly functioning irrigation. Check irrigation system for leaks and over spray, provide maintenance as required.	Monthly	Owner
Landscape, self-retaining, and self-treating areas	Check for landscape to be in healthy condition. Replace dead or barren areas with plants consistent with the approved landscape plans, remove trash and debris, ensure areas are depressed as required per the WQMP Site Plan.	Monthly	Owner
Common Area Landscape Management	Hire contractor familiar with Riverside County guidelines for use of fertilizers and pesticides. Maintain all landscape equipment in proper working order.	Monthly	Owner

Common Area Litter Control	Inspect trash enclosure area and bins for spill contamination and debris. Inspect site for debris. Keep areas free of debris.	Monthly	Owner
Parking Lot Sweeping	Sweep by hand or machine sweeper, parking and drive areas. No hosing down of area with water is allowed. Properly dispose of debris offsite. Keep a log of sweeping activities.	Bi-monthly from October 15th thru April 15th and before a storm event	Owner
Storm Drain System and Drain Inlets	Inspect drain inlets and clean out debris and obstructions from inside inlet. Ensure inlet grate is properly installed. Maintain insert filter per manufacturer's service and maintenance guides. Keep a log of inspection activities.	Inspect bi-monthly from October 15th thru April 15th and before a storm event. Replace insert filter per manufacturer's replacement guidelines	Owner
Prinsco Hydrostor HS180 Chamber System	Per manufacturer's Retention/Detention Inspection and Maintenance Guideline included in Appendix 9.	Bi-monthly from October 15th thru April 15th, and before and after a storm event	Owner
Bio-Retention BMP Inspection	Maintain adjacent landscape and remove landscape debris from the infiltration basin area. Remove trash and debris from infiltration basin area.	Monthly and before a storm event	Owner
Bio-Retention BMP Maintenance	Check for water ponding. If basin does not drain, excavate an additional 2-4 inches of soil. May be required every 5 to 10 years.	3 days after storm event	Owner

BMP Operation and Maintenance Log

Highland Springs Remodel and Development

Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown on WQMP Site Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Training and Educational Log

Highland Springs Remodel and Development

Date of Training/Educational Activity: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

Topic of Training/Educational Activity: _____

_____

Name of Participant	Signature of Participant

For newsletter or mailer educational activities, please include the following information:

- Date of mailing
- Number distributed
- Method of distribution
- Topics addressed

If a newsletter article was distributed, please include a copy of it.

Water Quality Management Plan Verification Survey

Highland Springs Remodel and Development

Responsible Party: _____

Contact Phone: _____ Contact Email: _____

1. **Have your contractors (landscape, maintenance, etc.) been educated regarding the applicable requirements to prevent pollution as outlined in the WQMP?**

   ☐ Yes ☐ No

   Name of Landscape/Maintenance Contractor: _____

   Method of education (contract language, Copy of O&M, educational brochures, etc.):

   _____

2. **Have the storm drains and inlets been inspected and maintained, at a minimum, annually prior to Oct 1?**

   ☐ Yes ☐ No

   Date of Last Inspection/Maintenance: _____

   Maintenance conducted by: _____

3. **Have you observed any runoff from the irrigation system?**

   ☐ Yes ☐ No If yes, how was the problem resolved?

   _____

4. **What type of Integrated Pest Management (IPM) practices are used on site?**

   _____

5. **Are native and/or drought tolerant plants established and considered for any new landscaping**?

   ☐ Yes ☐ No

6. **Have the storm drain stencils been inspected annually for legibility prior to Oct. 1?**

   ☐ Yes ☐ No

   Total number of stencils on site: _____
   How many inlets required re-stenciling / date of restenciling? _____ / _____

7. **Have education materials been distributed to the residents/tenants/contractors within the past year?**

   ☐ Yes ☐ No

   Topic / Date of Distribution: _____/_____

   Method of Distribution: newsletter, billing insert, etc.: _____

8. **Is street sweeping conducted weekly?**

   ☐ Yes ☐ No Contractor: _____

9. **Are trash areas in common area inspected daily?**

   ☐ Yes ☐ No

10. **Have any vector concerns been observed (standing water, mosquito larvae, etc.).**

    ☐ Yes ☐ No

11. **Have the treatment BMPs been inspected and maintained per Manufacturer instructions? (attach invoices and inspection/maintenance forms).**

    ☐ Yes ☐ No

12. **Have there been any issues with operation and maintenance of the treatment BMPs units?**

    _____

I certify the above information is correct and the BMPs for this project have been implemented and operated and maintained in accordance with the Operation and Maintenance (O&M) Plan on site.

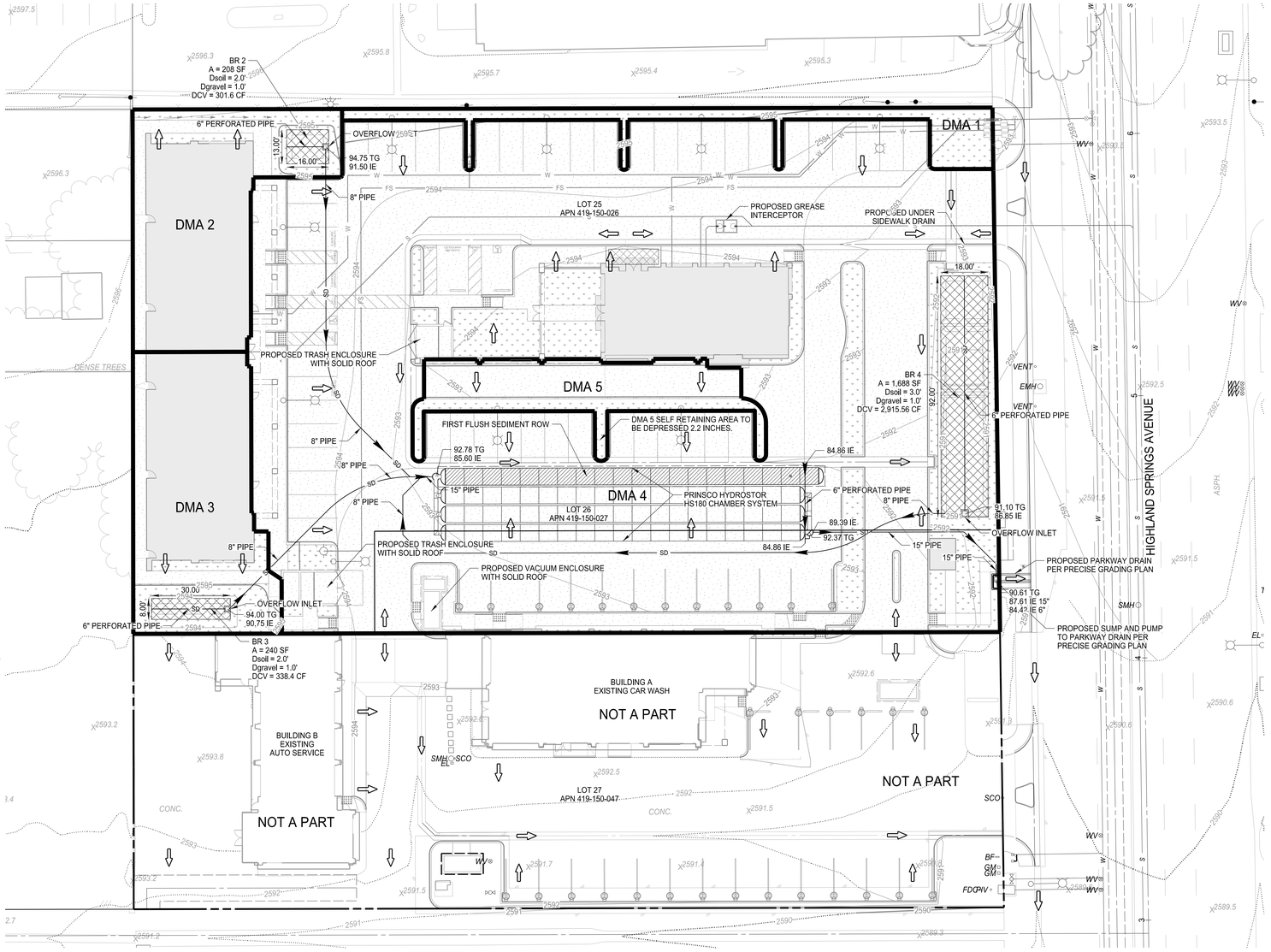
_____
Print Name of Responsible Party

_____ _____
Signature Date

IN THE CITY OF BEAUMONT, CALIFORNIA

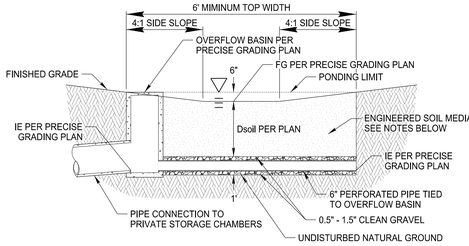
WQMP SITE PLAN

HIGHLAND SPRINGS REMODEL AND DEVELOPMENT
HIGH SAND, INC.



NOTES

1. LANDSCAPE AREAS TO BE DEPRESSED BELOW ADJACENT HARDSCAPE OR TOP OF CURB A MINIMUM OF 1" UNLESS OTHERWISE NOTED.
2. THE EXISTING DEVELOPED SITE WITHIN LOT 27 (APN 419-150-047) IS NOT A PART. THE REDEVELOPMENT PROPOSED WITHIN LOT 27 DOES NOT MEET THE MINIMUM THRESHOLDS LISTED PER TABLE 1-1 "PRIORITY DEVELOPMENT CATEGORIES" IN THE SANTA ANA REGION WATER QUALITY MANAGEMENT PLAN TECHNICAL GUIDANCE DOCUMENT, AND DOES NO RUN-ON TO THE PROPOSED PROJECT.



NOTES:

1. ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL AND 15% ORGANIC COMPONENTS BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT.
2. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL MEETING THE RANGES BELOW:

70%-80%	SAND
15%-20%	SILT
5%-10%	CLAY

3. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT THE NITROGEN DOES NOT LEACH FROM THE MEDIA.

BIO-RETENTION FACILITY

DMA SURFACE TYPE AREA SUMMARY

DMA 1		
	Landscape (Self-treating)	1696.67 SF
		1696.67 SF Total
DMA 2		
	Concrete or Asphalt	815.36 SF
	Roofs	3214.33 SF
	Landscape	1039.10 SF
		5068.80 SF Total
DMA 3		
	Concrete or Asphalt	806.28 SF
	Roofs	3214.17 SF
	Landscape	1225.82 SF
		5246.26 SF Total
DMA 4		
	Concrete or Asphalt	42040.11 SF
	Roofs	2970.73 SF
	Landscape	6187.45 SF
		51198.29 SF Total
DMA 5		
	Concrete or Asphalt (Drains to self-retaining)	1581.96 SF
	Landscape (Self-retaining)	1027.06 SF
		2609.02 SF Total

LEGEND

- INDICATES PC CONCRETE PAVEMENT
- INDICATES BUILDING ROOF
- INDICATES LANDSCAPE
- INDICATES BIO-RETENTION FACILITY
- INDICATES DMA BOUNDARY
- INDICATES STORM DRAIN PIPE
- INDICATES FLOW DIRECTION
- INDICATES OVERFLOW INLET

SCALE: 1" = 20'

20 0 20 40

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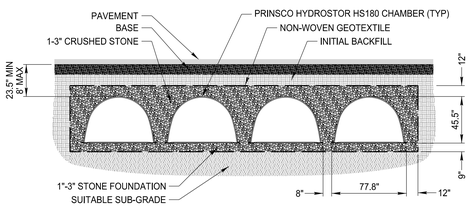
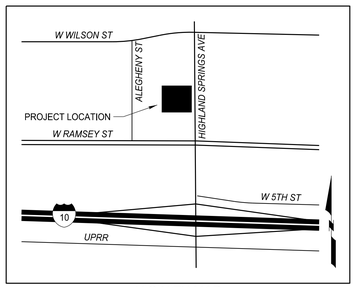
www.mth2engineering.com
civil • water resources • storm water
urban design and planning



PRINSCO HYDROSTOR HS180 CHAMBER SYSTEM



VICINITY MAP
NOT TO SCALE

BMP GEO-LOCATIONS

DMA/ID	BMP DESCRIPTION	LATITUDE	LONGITUDE	DCV REQUIRED	DCV PROVIDED
DMA 1/LANDSCAPE	SELF-TREATING	33°55'52.05" N	116°56'51.65" W	---	---
DMA 2/BR-2	BIORETENTION FACILITY	33°55'52.05" N	116°56'52.65" W	259.0 CF	301.6 CF
DMA 3/BR-3	BIO-RETETNION FACILITY	33°55'50.25" N	116°56'53.10" W	259.9 CF	338.4 CF
DMA 4/BR-4	BIO-RETENTION FACILITY	33°55'51.05" N	116°56'50.00" W	2851.5 CF	2914.6 CF
DMA 5/LANDSCAPE	SELF-RETAINING	33°55'51.00" N	116°56'51.45" W	---	---

Introduction

Prinsco's underground retention/detention systems provide a solution to effectively manage and store stormwater runoff utilizing a series of pipes and fittings. As the stormwater moves through the retention/detention systems, sediment and debris will tend to settle out of the water and collect within the system. This will require the system to be regularly inspected and cleaned in order for the system to perform as originally designed. Designing a system that is conducive to regular maintenance will allow the system to function efficiently and extend the service life.

System Accessories

A good maintenance program is just as important as proper design and installation. There are several components that can be incorporated into a system and can be used exclusively or in tandem to allow for ease of maintenance.

Risers – Risers are placed within a retention/detention system to provide manned access to key parts of the systems. Risers are typically 24" diameter or larger and are located on the laterals adjacent to the manifolds.

Cleanouts – Cleanouts are typically placed on the manifolds. Common sizes for cleanouts are 6- or 8-in diameter pipe. Cleanouts provide an access point for vacuum or water-jetting hoses used to clean the retention/detention system.

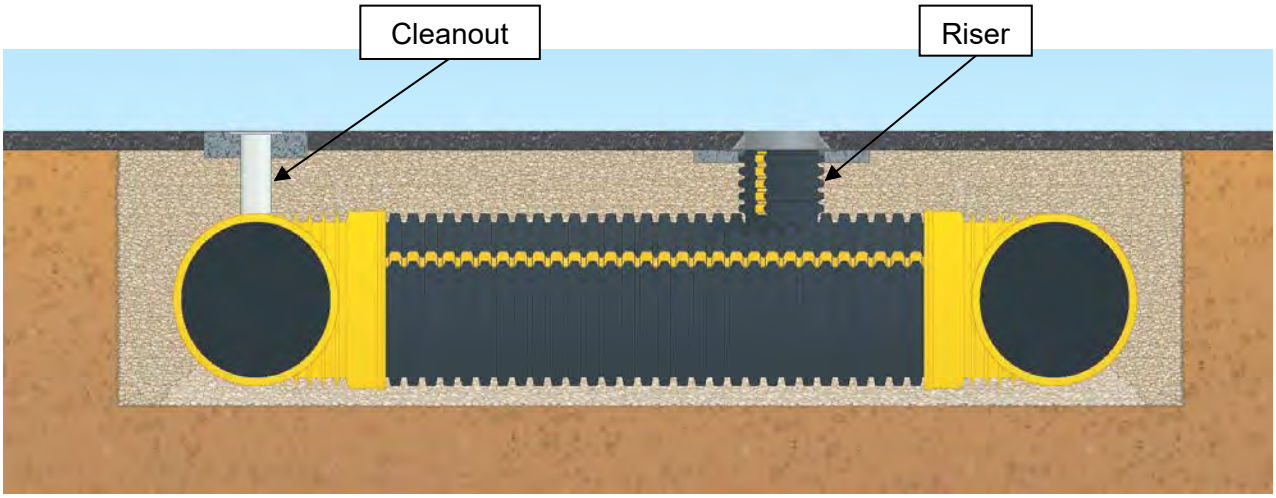


Figure 1: Riser and Cleanout Locations

Pre-Treatment Device - The use of a pre-treatment unit is recommended for all retention or detention systems. A pre-treatment unit is designed to capture a majority of the sediment and debris before it is able to enter the retention/detention system. This will reduce the maintenance and cleaning requirements of the systems and reduce pollutants from reaching nearby waterways. Prinsco's Stormwater Quality Unit (SWQU) is designed to remove debris collected in runoff including trash, sediment, oils and other suspended solids as shown in Figure 2. Prinsco's SWQU is a cost-effective alternative to other units and removes 80 percent of total suspended solids, oil and grease.

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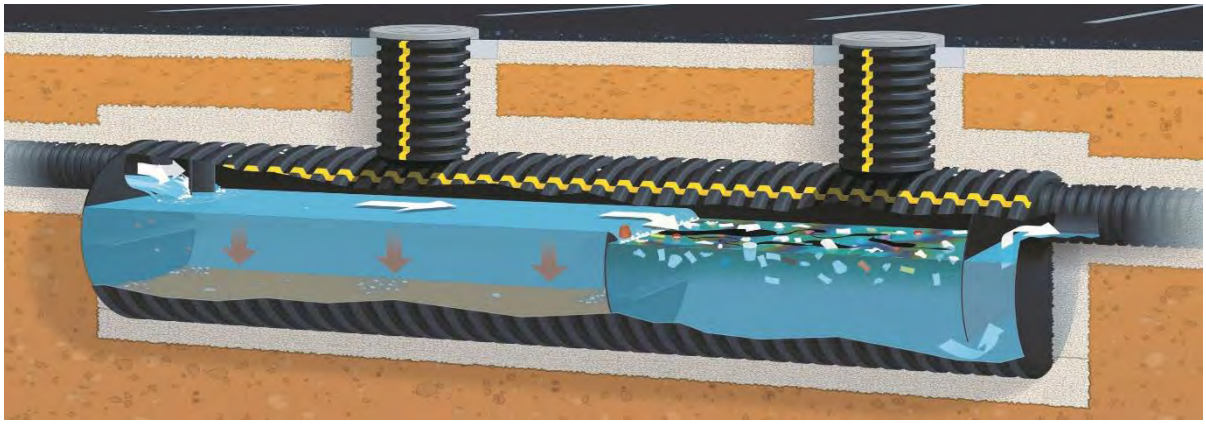

Figure 2: Prinsco's Stormwater Quality Unit

Retention/Detention System Maintenance

Maintaining a clean and obstruction-free retention/detention system is essential to ensuring the system performs as designed. Buildup of debris can obstruct flow through the laterals or block the entranceway of the outlet pipe in a retention or detention system that may result in ineffective. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

Initial System Inspection

An initial inspection should be performed before the retention/detention system is put into operation. It is best to create an Inspection and Maintenance Log Sheet at this time. A sample of an Inspection and Maintenance Log Sheet can be found at the end of this technical note. Included with the log sheet should be a layout of the system with the invert elevations at the risers and cleanout locations, prior to sediment accumulation. Initial measurements can be taken with a stadia rod or other measurement techniques. These measurements will allow for inspection measurements to being taken from outside of the system, eliminating the need for manned entrance.

Inspection Frequency

Inspection frequency will vary based on the system design and requirements. A system inspection schedule should be developed for each individual system, with the industry standard being a minimum of once per year. After the inspection schedule is established for the system, it should be tracked on the Inspection and Maintenance Log Sheet.

Due to construction activities, more frequent inspections should be performed during the first year of operation. Construction sediment and debris loading can be minimized if the Stormwater Pollution Prevention Plan (SWPPP) plan for the construction site is followed. After the first year of operation the rate at which the retention or detention system collects soil/pollutants will be heavily dependent on the site activities. During winter months, in geographical areas where sand is applied to road surface, systems may see increased sediment loading. Other increased loading areas are present with vehicle or equipment wash-down areas.

During inspections, elevations of sediment height should be taken from each riser and cleanout. These elevations should be recorded on the Inspection and Maintenance Log Sheet to determine sediment high based on initial invert depth. Also during the inspection, personnel should be looking for blockages to inlet or outlet stubs. Inspection of the pre-treatment unit upstream of the system should always be inspected at this same time. Refer to the manufacturer's recommendations for inspecting and maintaining the pre-treatment unit.

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Maintenance Frequency

Cleaning frequency will vary for each. It is at the sole discretion of the inspector to determine if or when the system requires cleaning. The following are recommendations of when the system should be cleaned:

- If the system is experiencing an unusual amount of silt and soil build up
- When the outlet stub becomes blocked or flow is impeded with sediment or debris
- If the system does not drain to the lowest pipe elevation during dry conditions
- If the system reaches a sediment height between 10 and 20 percent of the pipe diameter, the inspector should consider cleaning

If the system reaches a sediment height greater than 20 percent of the pipe diameter, the system should be clean at the soonest opportunity.

System Cleaning

There are typically two ways that a system is cleaned. The first, and most common method is done by using a high-pressure water jet and a vacuum truck. The high-pressure nozzle with rear facing jets is attached to a hose and drug downstream, washing sediment and debris downstream with it. The vacuum truck would then be located on the downstream end and remove the sediment and debris with its vacuum hose. It should be noted that multiple passes of the water jet may be needed to clean the run, dependent on the amount of soil loading. The second method used is a manual method that is very labor intensive. This method should only be used with larger diameter retention or detention systems. Care needs to be taken to insure damage to the inside liner of the pipe does not occur when removing sediment and debris. Strategically placed risers and cleanouts will make this process as easy as possible.

Figure 3: Vacuum Truck Removing Sediment and Debris

Before the system is cleaned, the following considerations should be made:

- The system will be much easier to clean when there is little to no flow into the system and the system does not have any standing water. For this reason, system cleaning should be scheduled around dry weather.
- Before cleaning begins, all outlet stubs should be blocked off. If this is not done, sediment loading could back up or plug downstream pipelines adding to cleaning expenses. This is also done to prevent any of the debris or pollutants from washing into downstream waterways.
- When beginning the cleaning process all upstream pipelines and pre-treatment units should be cleaned prior to starting on the retention or detention system.
- When cleaning the retention or detention system, it is best to start at the highest elevation of the system and work towards the lowest elevation.
- Stationing the vacuum truck above the downstream manifold and jetting the debris from the laterals to the downstream manifold, provides an effective capture point for the vacuum line.

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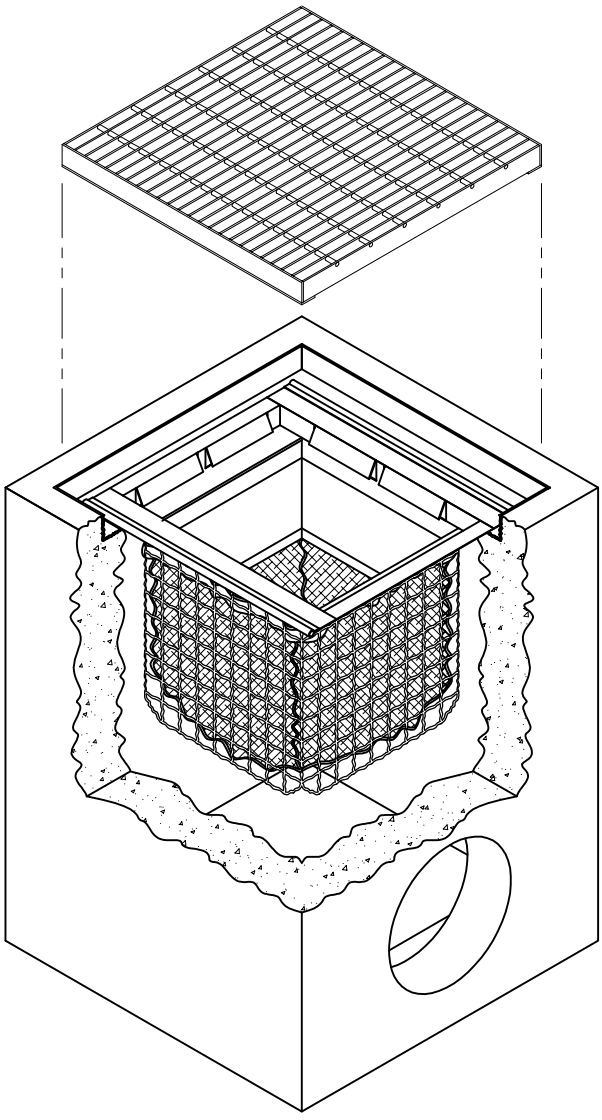
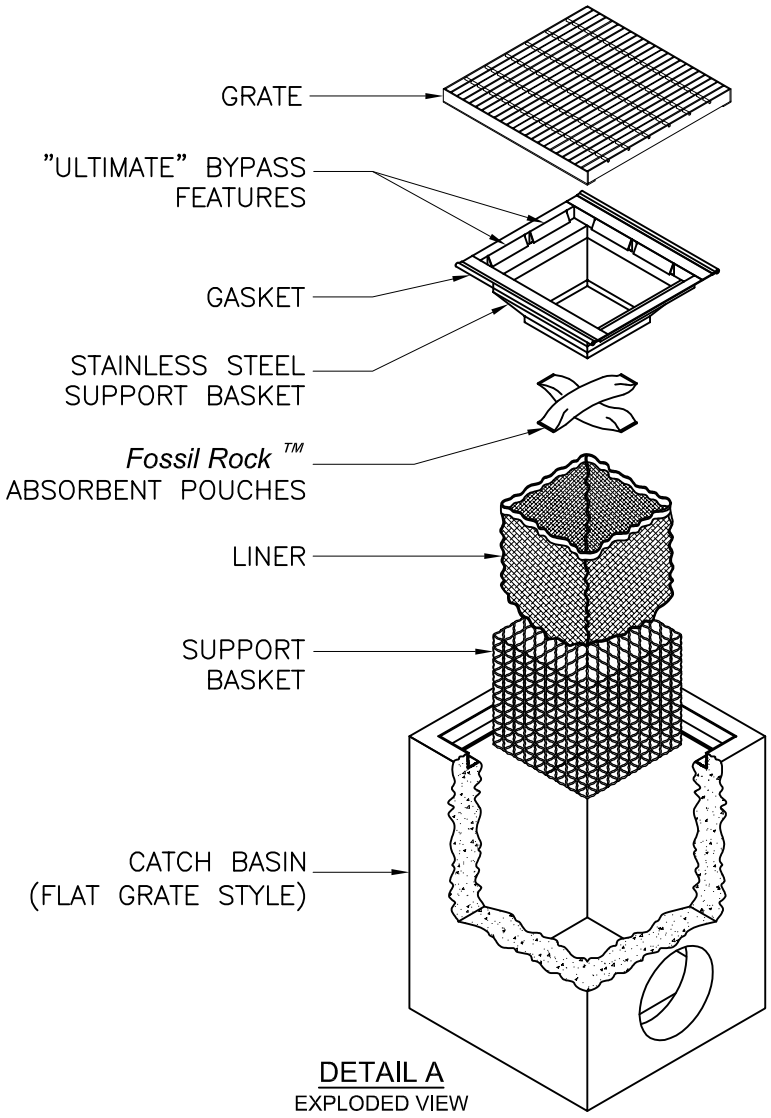
FGP-0001



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®

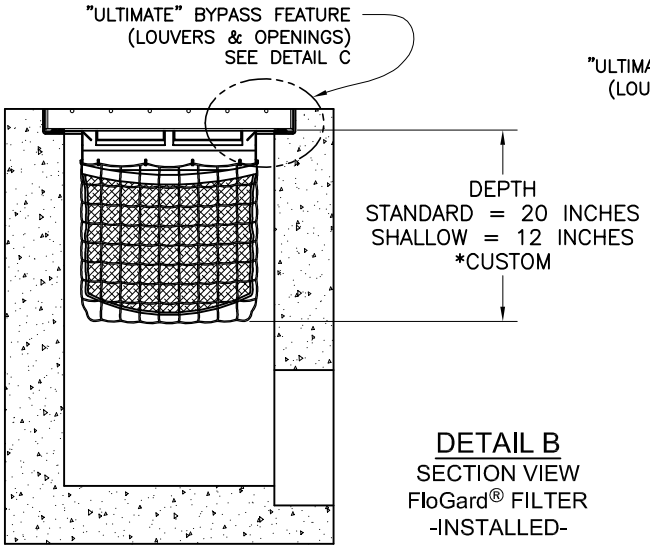
Catch Basin Insert Filter

Grated Inlet Style

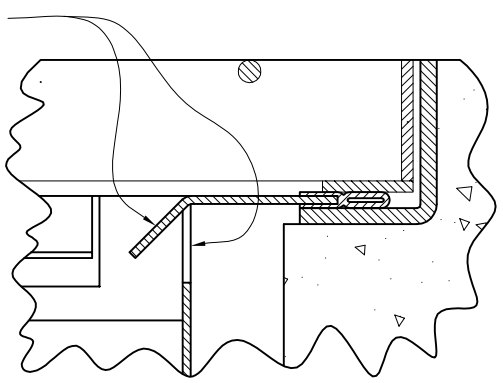
Oldcastle® Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

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

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

Inspection and Maintenance Guide

DRAINAGE PROTECTION SYSTEMS
DPS
A division of
Oldcastle Infrastructure

Water

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus® Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed FloGard+Plus Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (wash racks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing FloGard+Plus catch basin inserts).
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc., shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary, and the pouch tethers re-attached to the liner's D-ring.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium will be replaced with new material. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of storm drain filters, catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined-space trained and certified. Call us at (888) 950-8826 for further information and assistance.

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

OUR MARKETS

BUILDING STRUCTURES

COMMUNICATIONS

WATER

ENERGY

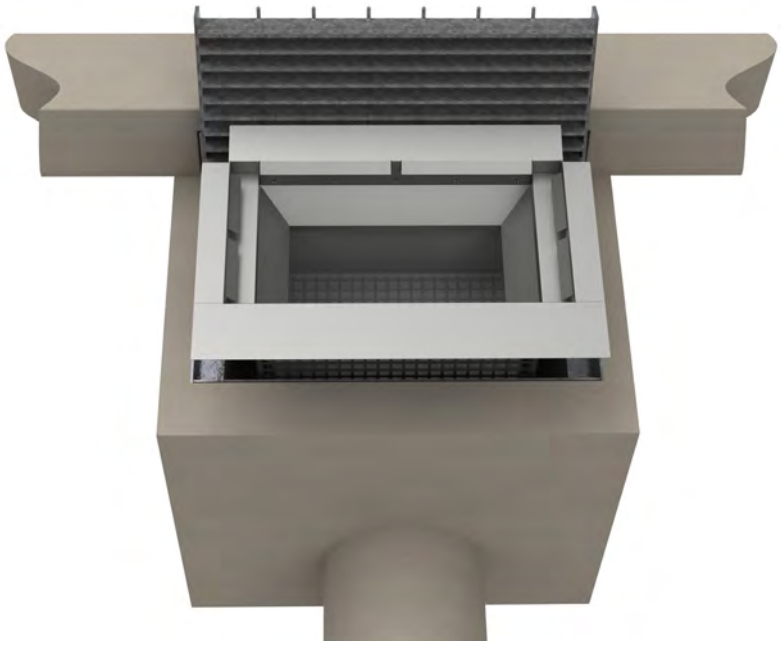
TRANSPORTATION

Oldcastle Precast®

FLOGARD +PLUS®

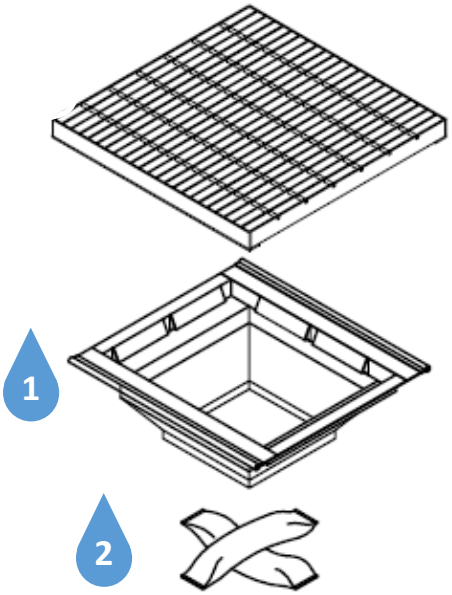
Replacement & Repair

Instruction Manual



Stormwater

FloGard Plus Replacement and Repair



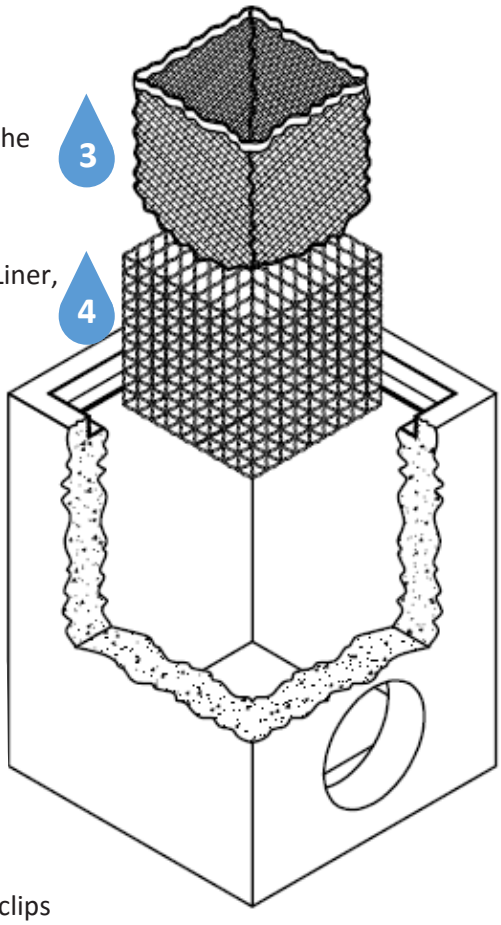
Parts of the FloGard Plus Inlet Filter-

1. FloGard Stainless Steel Support Frame
2. Fossil Rock Absorbent Pouches
3. Liner
4. GeoGrid Support Basket & Cable

* Grate and Basin NOT INCLUDED

Disassembly:

1. Clear FloGard of any existing debris by hand or vacuum.
2. Unclip and remove the Fossil Rock pouches from the inside Liner.
3. Lift the FloGard from the catch basin.
4. Using a slotted screw driver, carefully pry open the metal tabs holding the GeoGrid and Cable in place. Separate the GeoGrid and Liner from the FloGard frame.
5. Unclip the Liner from the inside of the GeoGrid. If you are reusing the Liner, rinse thoroughly with water and inspect for tears. (If torn, mend with stainless steel wire or replace the Liner).
6. Rinse and inspect the GeoGrid Basket and the reinforcing cable. (If torn, mend with stainless steel wire or replace the GeoGrid).
7. Rinse and inspect the Stainless Steel FloGard frame.



Reassembly:

1. Fully expand the GeoGrid Basket and orient to the FloGard frame. Hook cable and GeoGrid to the FloGard frame metal tabs and close the tabs using slotted screwdriver. Move around the FloGard until all tabs are closed and GeoGrid is secured to the Frame.
2. Expand and orient the Liner, locating the clips at each corner and side. Push the Liner through the center of the FloGard frame and secure the clips to the GeoGrid Basket close to the top support cable. Push the Liner to expand inside of the basket.
3. Clip new Fossil Rock Rubberizer pouches to the inside of the Liner.
4. Lower FloGard back into the basin, replace grate.

FLOGARD +PLUS®

OUR MARKETS

BUILDING STRUCTURES

COMMUNICATIONS

WATER

ENERGY

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Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Non-Stormwater Discharges SC-10

Description

Non-stormwater discharges (NSWDs) are flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain if local regulations allow. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include: potable water sources, fire hydrant flushing, air conditioner condensate, landscape irrigation drainage and landscape watering, emergency firefighting, etc. as discussed in Section 2.

However there are certain non-stormwater discharges that pose an environmental concern. These discharges may originate from illegal dumping of industrial material or wastes and illegal connections such as internal floor drains, appliances, industrial processes, sinks, and toilets that are illegally connected to the nearby storm drainage system through on-site drainage and piping. These unauthorized discharges (examples of which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains.

Non-stormwater discharges will need to be addressed through a combination of detection and elimination. The ultimate goal is to effectively eliminate unauthorized non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

pollutants on streets and into the storm drain system and downstream water bodies.

Approach

Initially the Discharger must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is the elimination of unauthorized non-stormwater discharges. See other BMP Fact Sheets for activity-specific pollution prevention procedures.

General Pollution Prevention Protocols

- Implement waste management controls described in SC-34 Waste Handling and Disposal.
- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" or similar stenciled or demarcated next to them to warn against ignorant or unintentional dumping of pollutants into the storm drainage system.
- Manage and control sources of water such as hose bibs, faucets, wash racks, irrigation heads, etc. Identify hoses and faucets in the SWPPP, and post signage for appropriate use.

Non-Stormwater Discharge Investigation Protocols

Identifying the sources of non-stormwater discharges requires the Discharger to conduct an investigation of the facility at regular intervals. There are several categories of non-stormwater discharges:

- Visible, easily identifiable discharges, typically generated as surface runoff, such as uncontained surface runoff from vehicle or equipment washing; and
- Non-visible, (e.g., subsurface) discharges into the site drainage system through a variety of pathways that are not obvious.

The approach to detecting and eliminating non-stormwater discharges will vary considerably, as discussed below:

Visible and identifiable discharges

- Conduct routine inspections of the facilities and of each major activity area and identify visible evidence of unauthorized non-stormwater discharges. This may include:
  - ✓ Visual observations of actual discharges occurring;

- ✓ Evidence of surface staining, discoloring etc. that indicates that discharges have occurred;
- ✓ Pools of water in low lying areas when a rain event has not occurred; and
- ✓ Discussions with operations personnel to understand practices that may lead to unauthorized discharges.

- □ If evidence of non-stormwater discharges is discovered:
  - ✓ Document the location and circumstances using Worksheets 5 and 6 (Section 2 of the manual), including digital photos;
  - ✓ Identify and implement any quick remedy or corrective action (e.g., moving uncovered containers inside or to a proper location); and
  - ✓ Develop a plan to eliminate the discharge. Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge.
- □ Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge. Make sure the facility SWPPP is up-to-date and includes applicable BMPs to address the non-stormwater discharge.

Other Illegal Discharges (Non visible)

Illicit Connections

- □ Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- □ Isolate problem areas and plug illicit discharge points.
- □ Locate and evaluate discharges to the storm drain system.
- □ Visual Inspection and Inventory:
  - ✓ Inventory and inspect each discharge point during dry weather.
  - ✓ Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system.
  - ✓ Non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- □ A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.

- Inspect the path of loading/unloading area drain inlets and floor drains in older buildings.

- Never assume storm drains are connected to the sanitary sewer system.

Monitoring for investigation/detection of illegal discharges

- If a suspected illegal or unknown discharge is detected, monitoring of the discharge may help identify the content and/or suggest the source. This may be done with a field screening analysis, flow meter measurements, or by collecting a sample for laboratory analysis. Section 5 and Appendix D describe the necessary field equipment and procedures for field investigations.

- Investigative monitoring may be conducted over time. For example if, a discharge is intermittent, then monitoring might be conducted to determine the timing of the discharge to determine the source.

- Investigative monitoring may be conducted over a spatial area. For example, if a discharge is observed in a pipe, then monitoring might be conducted at accessible upstream locations in order to pinpoint the source of the discharge.

- Generally, investigative monitoring requiring collection of samples and submittal for lab analysis requires proper planning and specially trained staff.

Smoke Testing

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two piping systems. Smoke testing is generally performed at a downstream location and the smoke is forced upstream using blowers to create positive pressure. The advantage to smoke testing is that it can potentially identify multiple potential discharge sources at once.

- Smoke testing uses a harmless, non-toxic smoke cartridges developed specifically for this purpose.

- Smoke testing requires specialized equipment (e.g., cartridges, blowers) and is generally only appropriate for specially trained staff.

- A Standard Operating Procedure (SOP) for smoke testing is highly desirable. The SOP should address the following elements:

  - ✓ Proper planning and notification of nearby residents and emergency services is necessary since introducing smoke into the system may result in false alarms;

  - ✓ During dry weather, the stormwater collection system is filled with smoke and then traced back to sources;

- ✓ Temporary isolation of segments of pipe using sand bags is often needed to force the smoke into leaking pipes; and
- ✓ The appearance of smoke in a waste vent pipe, at a sewer manhole, or even the base of a toilet indicates that there may be a connection between the sanitary and storm water systems.

- Most municipal wastewater agencies will have necessary staff and equipment to conduct smoke testing and they should be contacted if cross connections with the sanitary sewer are suspected. See SC-44 Drainage System Maintenance for more information.

Dye Testing

- Dye testing is typically performed when there is a suspected specific pollutant source and location (i.e., leaking sanitary sewer) and there is evidence of dry weather flows in the stormwater collection system.
- Dye is released at a probable upstream source location, either the facility's sanitary or process wastewater system. The dye must be released with a sufficient volume of water to flush the system.
- Operators then visually examine the downstream discharge points from the stormwater collection system for the presence of the dye.
- Dye testing can be performed informally using commercially available products in order to conduct an initial investigation for fairly obvious cross-connections.
- More detailed dye testing should be performed by properly trained staff and follow SOPs. Specialized equipment such as fluorometers may be necessary to detect low concentrations of dye.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct dye testing and they should be contacted if cross connections with the sanitary sewer are suspected.

TV Inspection of Drainage System

- Closed Circuit Television (CCTV) can be employed to visually identify illicit connections to the industrial storm drainage system. Two types of CCTV systems are available: (1) a small specially designed camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, or (2) a larger remote operated video camera on treads or wheels that can be guided through storm drains to view the interior of the pipe.
- CCTV systems often include a high-pressure water jet and camera on a flexible cable. The water jet cleans debris and biofilm off the inside of pipes so the camera can take video images of the pipe condition.

- CCTV units can detect large cracks and other defects such as offsets in pipe ends caused by root intrusions or shifting substrate.
- CCTV can also be used to detect dye introduced into the sanitary sewer.
- CCTV inspections require specialized equipment and properly trained staff and are generally best left to specialized contractors or municipal public works staff.

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks may include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. These wastes can cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills);
  - ✓ An anonymous tip/reporting mechanism; and
  - ✓ Evidence of responsible parties (e.g., tagging, encampments, etc.).
- One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Spill and Leak Prevention and Response

- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.
- See SC-11 Spill Prevention Control and Cleanup.

Employee Training Program

- Training of technical staff in identifying and documenting illegal dumping incidents is required. The frequency of training must be presented in the SWPPP, and depends on site-specific industrial materials and activities.
- Consider posting a quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.
- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. Employees should be able to identify work/jobs with high potential for spills and suggest methods to reduce possibility.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.

- Conduct spill response drills annually (if no events occurred) in order to evaluate the effectiveness of the plan.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Quality Assurance and Record Keeping

Performance Evaluation

- Annually review internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.
- Develop document and data management procedures.
- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Annually document and report the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.
- Document training activities.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- Many facilities do not have accurate, up-to-date 'as-built' plans or drawings which may be necessary in order to conduct non-stormwater discharge assessments.
  - ✓ Online tools such as Google Earth™ can provide an aerial view of the facility and may be useful in understanding drainage patterns and potential sources of non-stormwater discharges
  - ✓ Local municipal jurisdictions may have useful drainage systems maps.

- Video surveillance cameras are commonly used to secure the perimeter of industrial facilities against break-ins and theft. These surveillance systems may also be useful for capturing illegal dumping activities. Minor, temporary adjustments to the field of view of existing surveillance camera systems to target known or suspected problem areas may be a cost-effective way of capturing illegal dumping activities and identifying the perpetrators.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital facility cost requirements may be minimal unless cross-connections to storm drains are detected.
- Indoor floor drains may require re-plumbing if cross-connections are detected.
- Leaky sanitary sewers will require repair or replacement which can have significant costs depending on the size and industrial activity at the facility.

Maintenance (including administrative and staffing)

- The primary effort is for staff time and depends on how aggressively a program is implemented.
- Costs for containment, and disposal of any leak or discharge is borne by the Discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Permit Requirements

The IGP authorizes certain Non-Storm Water Discharges (NSWDs) provided BMPs are included in the SWPPP and implemented to:

- Reduce or prevent the contact of authorized NSWDs with materials or equipment that are potential sources of pollutants;
- Reduce, to the extent practicable, the flow or volume of authorized NSWDs;
- Ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards (WQS); and,

- Reduce or prevent discharges of pollutants in authorized NSWDs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability."

References and Resources

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Sacramento Stormwater Management Program, *Best Management Practices for Industrial Storm Water Pollution Control*, Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

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WEF Press Alexandria, Virginia, 2009.Existing Sewer Evaluation and Rehabilitation: *WEF Manual of Practice No. FD-6 ASCE/EWRI Manuals and Reports on Engineering Practice No. 62, Third Edition.*

Spill Prevention, Control & Cleanup SC-11

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental spills. Preparation for accidental spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify hazardous material storage areas, specify material handling procedures, describe spill response procedures, and provide locations of spill clean-up equipment and materials. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills. An adequate supply of spill clean-up materials must be maintained onsite.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

Approach

General Pollution Prevention Protocols

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Establish procedures and/or controls to minimize spills and leaks. The procedures should address:
  - ✓ Description of the facility, owner and address, activities, chemicals, and quantities present;

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- ✓ Facility map of the locations of industrial materials;
- ✓ Notification and evacuation procedures;
- ✓ Cleanup instructions;
- ✓ Identification of responsible departments; and
- ✓ Identify key spill response personnel.

- ☐ Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Spill and Leak Prevention and Response

Spill Prevention

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- ☐ If illegal dumping is observed at the facility:
  - ✓ Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - ✓ Landscaping and beautification efforts may also discourage illegal dumping.
  - ✓ Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- ☐ Store and contain liquid materials in such a manner that if the container is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- ☐ If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

Preventative Maintenance

- ☐ Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.

- ☐ Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

- ☐ Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

- ☐ Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- ☐ Label all containers according to their contents (e.g., solvent, gasoline).

- ☐ Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).

- ☐ Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).

- ☐ Identify key spill response personnel.

Spill Response

- ☐ Clean up leaks and spills immediately.

- ☐ Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).

- ☐ On paved surfaces, clean up spills with as little water as possible.

  - ✓ Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills.

  - ✓ If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

  - ✓ If possible use physical methods for the cleanup of dry chemicals (e.g., brooms, shovels, sweepers, or vacuums).

- ☐ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

- ☐ Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

- ☐ For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board or local authority as location regulations dictate.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to 911 for dispatch and clean-up assistance when needed. Do not contact fire agencies directly.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills);
  - ✓ Clean-up procedures; and
  - ✓ Responsible parties.

Employee Training Program

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - ✓ The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur; and
  - ✓ Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- Develop spill prevention and control plan, provide and document training, conduct inspections of material storage areas, and supply spill kits.
- Extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident;
- Weather conditions;
- Duration of the spill/leak/discharge;

- Cause of the spill/leak/discharge;
- Response procedures implemented;
- Persons notified; and
- Environmental problems associated with the spill/leak/discharge.

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- Date and time the inspection was performed;
- Name of the inspector;
- Items inspected;
- Problems noted;
- Corrective action required; and
- Date corrective action was taken.

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems;
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- External corrosion and structural failure;
- Spills and overfills due to operator error; and
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.

- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use absorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:

  Cover fueling area if possible.

  Use a perimeter drain or slope pavement inward with drainage to a sump.

  Pave fueling area with concrete rather than asphalt.

- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use absorbent materials on small spills and general cleaning rather than hosing down the area. Remove the absorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities.

The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department).
- Develop procedures to prevent/mitigate spills to storm drain systems.
- Identify responsible departments.

- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- Address spills at municipal facilities, as well as public areas.
- Provide training concerning spill prevention, response and cleanup to all appropriate personnel.

References and Resources

California's Nonpoint Source Program Plan. http://www.swrcb.ca.gov/nps/index.html.

Clark County Storm Water Pollution Control Manual. Available online at: http://www.co.clark.wa.us/pubworks/bmpman.pdf.

King County Storm Water Pollution Control Manual. Available online at: http://dnr.metrokc.gov/wlr/dss/spcm.htm.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp.org.

The Stormwater Managers Resource Center. http://www.stormwatercenter.net/.

Outdoor Loading / Unloading SC-30

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by wind, stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of material to rainfall whenever possible.
- Prevent stormwater run-on.
- Check equipment regularly for leaks.

Good Housekeeping

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains inlets in the area.
- Grade and/or berm the loading/unloading area with drainage to sump; regularly remove materials accumulated in sump.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date or have an emergency spill cleanup plan readily available, as applicable.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees.
- Ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Material Handling and Waste Management

- Spot clean leaks and drips routinely to prevent runoff of spillage.
- Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.

- Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the storm drain or sanitary sewer.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
  - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
  - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
  - ✓ Install a roof over the waste receptacle area.
  - ✓ Install a low containment berm around the waste receptacle area.
  - ✓ Use and maintain drip pans under waste receptacles.
- Post "no littering" signs.
- Perform work area clean-up and dry sweep after daily operations.

Employee Training Program

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document activities performed, quantities of materials removed, and improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.
- Keep accurate logs of daily clean-up operations.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
  - ✓ Designate specific areas for outdoor loading and unloading.
  - ✓ Require employees to understand and follow spill and leak prevention BMPs.
- It may not be possible to conduct transfers only during dry weather.
  - ✓ Limit materials and equipment rainfall exposure to all extents practicable.
  - ✓ Require employees to understand and follow spill and leak prevention BMPs.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

Many facilities will already have indoor or covered areas where loading/unloading takes place and will require no additional capital expenditures.

If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.

Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.

- Conduct regular inspections and make repairs and improvements as necessary.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

Loading and Unloading of Liquids

- Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer,

treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - ✓ The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - ✓ The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.
  - ✓ The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.
- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
  - ✓ Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.
  - ✓ Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations.* Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

New Jersey Department of Environmental Protection, 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315*. Available online at: http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf.

Sacramento Stormwater Management Program, *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: *Best Management Practices.* Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/.

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, and solid waste treatment and disposal are examples of process operations that can lead to contamination of stormwater runoff. The targeted constituents will vary for each site depending on the operation being performed.

Approach

Implement source control BMPs to limit exposure of outdoor equipment to direct precipitation and stormwater run-on. Refer to SC-22 Vehicle and Equipment Repair for additional information.

General Pollution Prevention Protocols

- ☐ Perform the activity during dry periods whenever possible.
- ☐ Install secondary containment measures where leaks and spills may occur.
- ☐ Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.
- ☐ Connect process equipment area to public sanitary sewer or facility wastewater treatment system when possible. Some jurisdictions require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Good Housekeeping

- ☐ Manage materials and waste properly (see Material Handling and Waste Management) to reduce adverse impacts on stormwater quality.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Cover the work area with a permanent roof if possible.
- Use drop cloths for sanding and painting operations.
- Use a vacuum for fine particle clean-up in pavement cracks and crevices.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention).
- "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Use roll down or permanent walls when windy/breezy to prevent wind transport of particulates/pollutants.

Preventative Maintenance

- Design outdoor equipment areas to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to sump.
- Dry clean the work area regularly. Do not wash outdoor equipment with water if there is a direct connection to the storm drain.
- Pave area with concrete rather than asphalt.
- Inspect outdoor equipment regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.
- Inspect and clean, if necessary, storm drain inlets and catch basins within the outdoor equipment area before October 1 each year.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.

Material Handling and Waste Management

- Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drain or sewer connections.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
  - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
  - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
  - ✓ Install a roof over the waste receptacle area.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees on proper equipment operation and maintenance procedures.
- Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Ensure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for outdoor equipment, types and quantities of materials removed and disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- Providing cover over outdoor equipment may be impractical or cost-prohibitive.
  - ✓ Operate outdoor equipment only during periods of dry weather.
- Regular operations and time limitations may require outdoor activities during wet weather.
  - ✓ Designate specific areas for outdoor activities.
  - ✓ Allow time for work area clean-up after each shift.
  - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
  - ✓ Design and install secondary containment and good housekeeping BMPs for outdoor equipment area.
- Storage sheds often must meet building and fire code requirements.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities will already have indoor covered areas where vehicle and equipment repairs take place and will require no additional capital expenditures.
- If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.
- Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

References and Resources

Minnesota Pollution Control Agency. *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations.* Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

New Jersey Department of Environmental Protection, 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315*. Available online at: http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Oregon Department of Environmental Quality, *Industrial Stormwater Best Management Practices Manual- BMP 26 Fueling and Liquid Loading/Unloading Operations*, February 2013. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control.* Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: Best Management Practices. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Waste Handling & Disposal SC-34

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Accomplish reduction in the amount of waste generated using the following source controls:
  - ✓ Production planning and sequencing;
  - ✓ Process or equipment modification;
  - ✓ Raw material substitution or elimination;
  - ✓ Loss prevention and housekeeping;
  - ✓ Waste segregation and separation; and
  - ✓ Close loop recycling.
- ☐ Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- ☐ Recycle materials whenever possible.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs	Covered
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Use the entire product before disposing of the container.
- To the extent possible, store wastes under cover or indoors after ensuring all safety concerns such as fire hazard and ventilation are addressed.
- Provide containers for each waste stream at each work station. Allow time after shift to clean area.

Good Housekeeping

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain. Clean in a designated wash area that drains to a clarifier.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- If possible, move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Preventative Maintenance

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.

- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, vacuuming, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Spill Response and Prevention Procedures

- Keep your spill prevention and plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - ✓ Vehicles equipped with baffles for liquid waste; and
  - ✓ Trucks with sealed gates and spill guards for solid waste.

Material Handling and Waste Management

Litter Control

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.

- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- Train employees and subcontractors in proper hazardous waste management.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for waste handling and disposal, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and the types of waste handled. Significant capital costs may be associated with reducing wastes by modifying processes or implementing closed-loop recycling.
- Many facilities will already have indoor covered areas where waste materials will be stored and will require no additional capital expenditures for providing cover.
- If outdoor storage of wastes is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook.* Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

New Jersey Department of Environmental Protection, 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315,* Revised. Available online at: http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf.

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Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: Best Management Practices. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL and 303(d) list pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests

Objectives
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	
Preventative Maintenance	
Spill and Leak Prevention and Response	
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	

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by methods that pose a lower risk to employees, the public, and the environment.

- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies
- Procedures
  - ✓ Standard operating procedures (SOPs);
  - ✓ Purchasing guidelines and procedures; and
  - ✓ Bid packages (services and supplies).
- Materials
  - ✓ Preferred or approved product and supplier lists;
  - ✓ Product and supplier evaluation criteria;
  - ✓ Training sessions and manuals; and
  - ✓ Fact sheets for employees.

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC-20 – SC-22) and SC-41 Building and Grounds Maintenance.

Employee Training Program

- Employees who handle potentially harmful materials should be trained in the use of safer alternatives.
- Purchasing departments should be trained on safer alternative products and encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.
- Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources provided in this fact sheet.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds"

- Alternative products may not be available, suitable, or effective in every case.

- ✓ Minimize use of hazardous/harmful products if no alternative product is available.

Regulatory Considerations

This BMP has no regulatory requirements unless local/municipal ordinance applies. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements;
- Storm water runoff sampling requirements;
- Training and licensing requirements; and
- Record keeping and reporting requirements.

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.
- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Refined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes with low VOC content are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps.

All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.

- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting. Use paper products with post-consumer recycled content and implement electric had dryers.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control, http://www.dtsc.ca.gov/PollutionPrevention/GreenTechnology/Index.cfm.

CalRecycle, http://www.calrecycle.ca.gov/Business/Regulated.htm.

City of Santa Monica Office of Sustainability and Environment, http://www.smgov.net/departments/ose/.

City of Palo Alto, http:// www.city.palo-alto.ca.us/cleanbay.

City and County of San Francisco, Department of the Environment, http://www.sfenvironment.org/toxics-health/greener-business-practices.

Green Business Program, http://www.greenbiz.ca.gov/GRlocal.html .

Product Stewardship Institute, http://www.productstewardship.us/index.cfm.

Sacramento Clean Water Business Partners. http://www.sacstormwater.org/CleanWaterBusinessPartners/CleanWaterBusinessPartners.html.

USEPA. National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges From Industrial Facilities, http://cfpub.epa.gov/npdes/stormwater/indust.cfm.

USEPA Region IX Pollution Prevention Program, http://www.epa.gov/region9/waste/p2/business.html.

Western Sustainability and Pollution Prevention Network, http://wsppn.org/.

Metals (mercury, copper)

National Electrical Manufacturers Association – Environmental Stewardship, http://www.nema.org/Policy/Environmental-Stewardship/pages/default.aspx.

Sustainable Conservation, http://www.suscon.org.

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center, http://www.birc.org.

California Department of Pesticide Regulation, http://www.cdpr.ca.gov/dprprograms.htm.

University of California Statewide IPM Program, http://www.ipm.ucdavis.edu/default.html.

Dioxins

Bay Area Dioxins Project, http://www.abag.ca.gov/bayarea/dioxin/project_materials.htm.

Building & Grounds Maintenance SC-41

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Switch to non-toxic chemicals for maintenance to the maximum extent possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Encourage proper lawn management and landscaping, including use of native vegetation.
- ☐ Encourage use of Integrated Pest Management techniques for pest control.
- ☐ Encourage proper onsite recycling of yard trimmings.
- ☐ Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.

Good Housekeeping

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils. See also SC-40, Contaminated and Erodible Areas, for more information.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and

solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Building & Grounds Maintenance SC-41

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Material Handling and Waste Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Employee Training Program

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff.

Quality Assurance and Record Keeping

- Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

Maintenance

- Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

Supplemental Information

Fire Sprinkler Line Flushing

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook.* Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

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US EPA, 1997. *Best Management Practices Handbook for Hazardous Waste Containers*. Available online at: http://www.epa.gov/region6/6en/h/handbk4.pdf.

Ventura Countywide Stormwater Management Program Clean Business Fact Sheets. Available online at: http://www.vcstormwater.org/documents/programs_business/building.pdf.

Building Repair and Construction SC-42

Description

Site modifications are common, particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and minor construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

This fact sheet is intended to be used for minor repairs and construction. If major construction is required, the guidelines in the Construction BMP Handbook should be followed.

Approach

The BMP approach is to reduce potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable.
- ☐ Avoid outdoor repairs and construction during periods of wet weather.
- ☐ Use safer alternative products to the maximum extent practicable. See also SC-35 Safer Alternative Products for more information.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	✓
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Buy recycled products to the maximum extent practicable.
- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.
- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Good Housekeeping

Repair & Remodeling

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep and vacuum the area regularly to remove sediments and small debris.
- Cover raw materials of particular concern that must be left outside, particularly during the rainy season. See also SC-33 Outdoor Storage of Raw Materials for more information.
- Use equipment and tools such as bag sanders to reduce accumulation of debris.
- Limit/prohibit work on windy days; implement roll-down walls or other measures to reduce wind transport of pollutants.
- Do not dump waste liquids down the storm drain.
- Dispose of wash water, sweepings, and sediments properly.
- Store liquid materials properly that are normally used in repair and remodeling such as paints and solvents. See also SC-31 Outdoor Liquid Container Storage for more information.
- Sweep out rain gutters or wash the gutter and trap the particles at the outlet of the downspout. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.
- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed. See also SC-44 Drainage System Maintenance for more information.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.
- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.
- Develop paint handling procedures for proper use, storage, and disposal of paints.

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100 percent effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose of the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Material Handling and Waste Management

- Post “No Littering” signs and enforce anti-litter laws.

- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.
- Make sure that hazardous waste is collected, removed, and disposed of properly. See also SC-34, Waste Handling and Disposal for more information.

Sediment and Erosion Controls

- Limit disturbance to bare soils and preserve natural vegetation whenever possible. See also EC-2, Preservation of Existing Vegetation, in the Construction BMP Handbook.
- Stabilize loose soils by re-vegetating whenever possible. See also EC-4 Hydroseeding, in the Construction BMP Handbook.
- Utilize non-vegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:
  - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
  - ✓ Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
  - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
  - ✓ Areas where vegetation will not grow adequately within the construction time frame.

  There are several non-vegetative stabilization methods and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization, in the Construction BMP Handbook.

- Utilize chemical stabilization when needed. See also EC-5 Soil Binders, in the Construction BMP Handbook.
- Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats, in the Construction BMP Handbook.
- Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC 1-3 Tracking Control, in the Construction BMP Handbook.
- Refer to the supplemental information provided below for projects that involve more extensive soil disturbance activities.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly implement the source control BMPs described above. Detailed information for Sediment and Erosion Control BMPs is provided in the Construction BMP Handbook.
- Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about pollutant source control responsibilities.
- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for building repair and construction, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more extensive requirements for larger projects that would disturb one or more acres of surface.
  - ✓ Refer to the companion "Construction Best Management Practice Handbook" which contains specific guidance and best management practices for larger-scale projects.

- Time constraints may require some outdoor repairs and construction during wet weather.
  - ✓ Require employees to understand and follow good housekeeping and spill and leak prevention BMPs.
  - ✓ Inspect sediment and erosion control BMPs daily during periods of wet weather and repair or improve BMP implementation as necessary.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
  - ✓ Minimize use of hazardous materials to the maximum extent practicable.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.
- Prices for recycled/safer alternative materials and fluids may be higher than those of conventional materials.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Limited capital investments may be required at some sites if adequate cover and containment facilities do not exist for construction materials and wastes.
- Purchase and installation of erosion and sediment controls, if needed will require additional capital investments, and this amount will vary depending on site characteristics and the types of BMPs being implemented.
- Minimize costs by maintaining existing vegetation and limiting construction operations on bare soils.

Maintenance

- The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.
- Irrigation costs may be required to establish and maintain vegetation.

Supplemental Information

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective "in-line" treatment devices. Include in the catch basin a "turn-down" elbow or similar device to trap floatables.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

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Parking Area Maintenance SC-43

Description

Parking lots can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.
- ☐ Keep accurate maintenance logs to evaluate BMP implementation.

Good Housekeeping

- ☐ Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- ☐ Post "No Littering" signs and enforce anti-litter laws.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs	Covered
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ☐ Provide an adequate number of litter receptacles.
- ☐ Clean out and cover litter receptacles frequently to prevent spillage.

Preventative Maintenance

Inspection

Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.

- ☐ Inspect cleaning equipment/sweepers for leaks on a regular basis.

Surface Cleaning

- ☐ Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- ☐ Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- ☐ Sweep all parking lots at least once before the onset of the wet season.
- ☐ Dispose of parking lot sweeping debris and dirt at a landfill.
- ☐ Follow the procedures below if water is used to clean surfaces:
  - ✓ Block the storm drain or contain runoff.
  - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
- ☐ Follow the procedures below when cleaning heavy oily deposits:
  - ✓ Clean oily spots with absorbent materials.
  - ✓ Use a screen or filter fabric over inlet, then wash surfaces.
  - ✓ Do not allow discharges to the storm drain.
  - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.
  - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- ☐ Check local ordinance for SUSMP/LID ordinance.
- ☐ Preheat, transfer or load hot bituminous material away from storm drain inlets.
- ☐ Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- ☐ Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in

place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control during sweeping to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Employee Training Program

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

Maintenance

- Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

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Drainage System Maintenance SC-44

Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the offsite conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

Approach

Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

- ☐ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

Good Housekeeping

Illicit Connections and Discharges

- ☐ Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ✓ Identify evidence of spills such as paints, discoloring, odors, etc.
- ✓ Record locations of apparent illegal discharges/illicit connections.
- ✓ Track flows back to potential discharges and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- ✓ Eliminate the discharge once the origin of flow is established.

- ☐ Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" or similar stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- ☐ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Illegal Dumping

- ☐ Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- ☐ Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills); and
  - ✓ Responsible parties.
- ☐ Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- ☐ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Preventative Maintenance

Catch Basins/Inlet Structures

- ☐ Staff should regularly inspect facilities to ensure compliance with the following:
  - ✓ Immediate repair of any deterioration threatening structural integrity.
  - ✓ Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Prioritize storm drain inlets; clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Wildlife. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Army Corps of Engineers and USFWS.

Spill Response and Prevention Procedures

- Keep your spill prevention control plan up-to-date.

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- Train employees and subcontractors in proper hazardous waste management.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - ✓ OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - ✓ OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - ✓ Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system including how wastes were cleaned up and disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Provided below are typical limitations and recommended "work-arounds" for drainage system maintenance:

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

  - ✓ Perform all maintenance onsite and do not flush accumulated material downstream to private property or riparian habitats.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, and liquid/sediment disposal.

  - ✓ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

  - ✓ Do not dump illegal materials anywhere onsite.

  - ✓ Identify illicit connections, illicit discharge, and illegal dumping.

  - ✓ Cleanup spills immediately and properly dispose of wastes.

- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.

  - ✓ Collect all materials and pollutants accumulated in drainage system and dispose of according to local regulations.

  - ✓ Install debris excluders in areas with a trash TMDL.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential .

- Developing and implementing a site specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Supplemental Information

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

Knox County Tennessee *Stormwater Management Manual* Chapter 5 Drainage System Maintenance, 2008. Available online at: http://www.knoxcounty.org/stormwater/manual/Volume%201/knoxco_swmm_v1_chap5_jan2008.pdf.

US EPA. Storm Drain System Cleaning, 2012. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=102.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

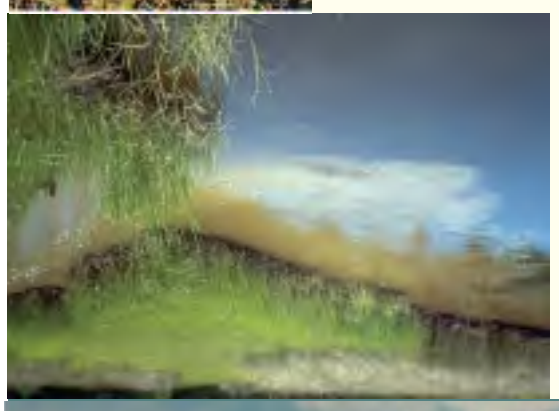
What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

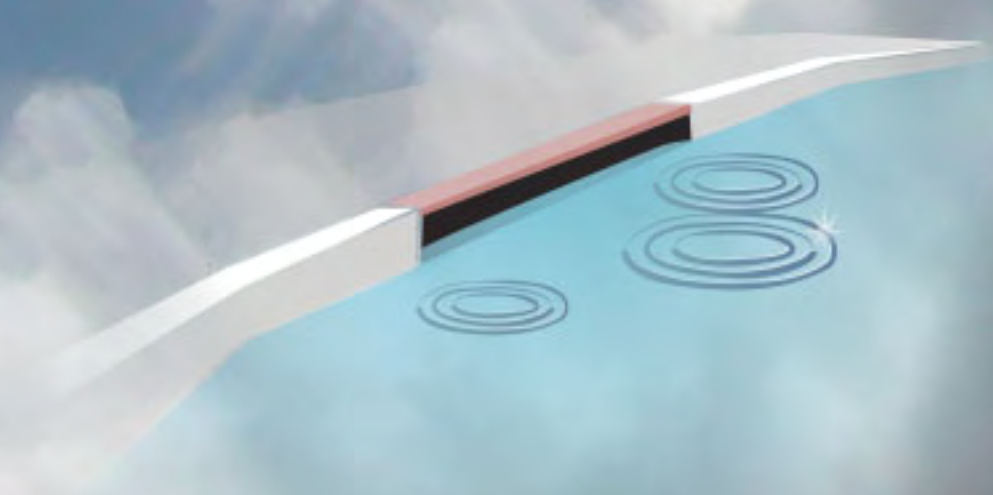
- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.



- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.

- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

After the Storm



For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

EPA 833-B-03-002

January 2003

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A Citizen's Guide to Understanding Stormwater

Stormwater Pollution Solutions

Residential

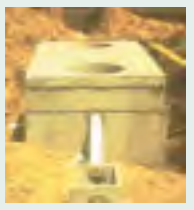
Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

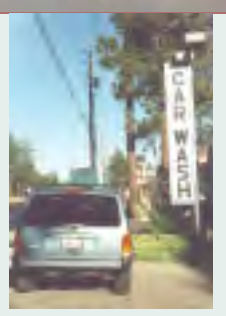
Septic systems



Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Auto care



Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

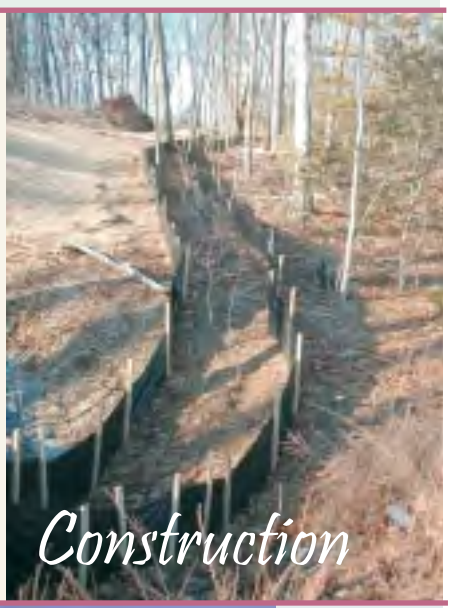
Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

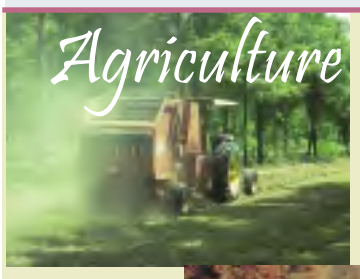
- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.



Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

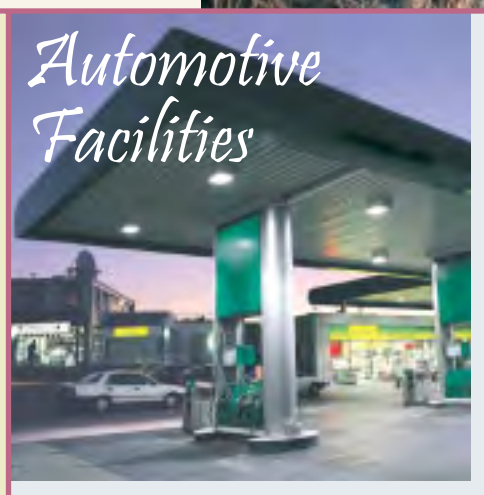
- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



Automotive Facilities

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

For Information:

To report illegal dumping or a clogged storm drain
1-800-506-2555

Hazardous Materials Disposal,
Recycling/Disposal Vendors call:
951-486-3200 or 1-800-506-2555

County Code Enforcement Offices
(unincorporated area)

Lake Elsinore/Mead Valley	951-245-3186
Jurupa Valley	951-275-8739
Moreno Valley/Banning	951-485-5840
Murrieta So. County	951-600-6140
Thousand Palms District	760-343-4150

Environmental Crimes
1-800-304-6100

Spill Response Agency
1-800-304-2226 or 951-358-5172

Recycling and Hazardous Waste Disposal
1-800-366-SAVE

For pollution prevention brochures or to obtain information on other County Environmental Services, call 1-800-506-2555

Popular links:
www.rcflood.org
www.cabmphandbooks.com
www.cfpub.epa.gov/npdes

ONLY RAIN DOWN THE STORM DRAIN
POLLUTION PREVENTION PROGRAM
1-800-506-2555

Riverside County's "Only Rain Down the Storm Drain" Pollution Prevention Program members include:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
City of Riverside
Corona
Coachella
Coachella Valley Water District
Desert Hot Springs
Hemet
Indian Wells
Indio
Lake Elsinore
La Quinta
Menifee
Murrieta
Moreno Valley
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside County
San Jacinto
Temecula
Wildomar

Stormwater Pollution

What you should know for...

Automotive Maintenance and Car Care

Best Management Practices (BMPS) for:

- Auto Body Shops
- Auto Repair Shops
- Car Dealerships
- Gas Stations
- Fleet Service Operations

Stormwater Pollution...What You Should Know

Riverside County has three major river systems, or watersheds, that are important to our communities and the environment. Improper automotive maintenance, storage and washing activities can cause pollution that endangers the health of these rivers.

Pollutants that can collect on the ground from automotive repair, storage and washing areas such as antifreeze, oil, grease, gas, lubricants, soaps and dirt can be washed into the street by rain, over-irrigation or wash water runoff. Once these pollutants are in the streets they can be carried to these rivers by the storm drain system. Unlike the sewer system, the storm drain system carries water (and pollution) to our rivers without treatment. Pollution from storm drains is a form of storm water pollution.

A common storm water pollution problem associated with automotive shops and businesses is the activity of hosing down service bays without proper capture of runoff water, illegal dumping of fluids to the street or storm drain inlets and not properly storing hazardous materials. Examples of pollutants that can be mobilized by these activities include oil and grease from cars, copper and asbestos from worn break linings, zinc from tires and toxics from spilled fluids.

The Cities and County of Riverside have adopted ordinances, in accordance with state and federal law, which prohibit the discharge of pollutants into the storm drain system or local lakes, rivers or streams. This brochure provides common practices that can prevent storm water pollution and keep your shop in compliance with the law.

Best Management Practices for Auto Body & Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations

Changing Automotive Fluids

- Locate storm drains on or near your property. Do not allow material to flow to these drains.
- Collect, and separately recycle motor oil, antifreeze, transmission fluid and gear oil. Combining waste fluid prevents recycling.
- Drain brake fluid and other non-recyclables into a proper container and handle as a hazardous waste.
- Use a recyclable radiator flushing fluid and discard safely.

Only rain is allowed down the storm drain! Don't be an offender!! Violations of local ordinances are prosecuted to the fullest extent of the law.

Identify specific activities with the potential to cause spills or release pollutants such as oil, grease, fuel, etc. Post signs and train employees on how to prevent and clean up spills during activities.

YOU can prevent Stormwater Pollution following these practices...

Working on Transmissions, Engines and Miscellaneous Repairs

- Keep a drip pan or a wide low-rimmed container under vehicles to catch fluids whenever you unclip hoses, unscrew filters, or change parts, to contain unexpected leaks.
- Drain all fluids from wrecked vehicles into proper containers before disassembly or repair.
- Store batteries indoors, on an open rack.
- Return used batteries to a battery vendor.
- Contain cracked batteries to prevent hazardous spills.
- Catch metal filings in an enclosed unit or on a tarpaulin.
- Sweep filing areas to prevent washing metals into floor drains.

Cleaning Parts

- Clean parts in a self-contained unit, solvent sink, or parts washer to prevent solvents and grease from entering a storm drain.

Fueling Vehicles

- Clean-up minor spills with a dry absorbent, rather than allowing them to evaporate.
- Use a damp cloth and a damp mop to keep the area clean rather than a hose or a wet mop.

Keeping your shop or work area pollutant clean and environmentally safe

- Never hose down your work area, as pollutants could be washed into the storm drain.
- Sweep or vacuum the shop floor frequently.
- Routinely check equipment. Wipe up spills and repair leaks.
- Use large pans or an inflatable portable berm under wrecked cars.
- Avoid spills by emptying and wiping drip pans, when they are half-full.
- Keep dry absorbent materials and/or a wet/dry vacuum cleaner on hand for mid-sized spills.
- Train your employees to be familiar with hazardous spill response plans and emergency procedures.
- Immediately report hazardous material spills that have entered the street or storm drain to OES and local authorities.

Outdoor Parking and Auto Maintenance

- Use covered or controlled areas to prevent offsite spills.
- Sweep-up trash and dirt from outdoor parking and maintenance areas. Do not hose down areas. All non-stormwater discharges to the street of storm drain are prohibited.

Storing and Disposing of Waste

- Store recyclable and non-recyclable waste separately.
- Place liquid waste (hazardous or otherwise) in proper containers with secondary containment.
- Cover outdoor storage areas to prevent contact with rain water.
- Collect used parts for delivery to a scrap metal dealer.

Washing vehicles and steam cleaning equipment

- For car washing, minimize wash water used and use designated areas. Never discharge wash water to the street, gutters or storm drain.
- Be sure to keep waste water from engine parts cleaning or steam cleaning from being discharged to the street, gutter or storm drain.
- Wash vehicles and steam clean with environmentally friendly soaps and polishes.

Selecting and Controlling Inventory

- Purchase recyclable or non-toxic materials.
- Select "closed-loop" suppliers and purchase supplies in bulk.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

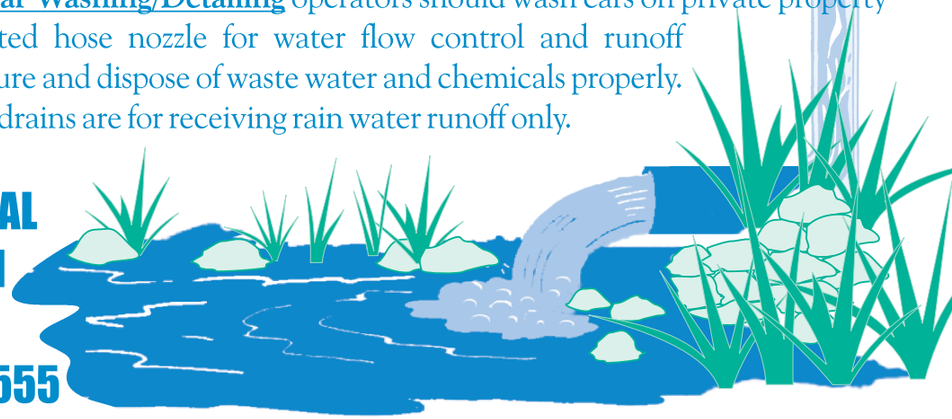
Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

...Only Rain Down ...the Storm Drain

What you should know for... Landscape and Gardening

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators

Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.

- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.
- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:
  - **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
  - **Biological Controls** - Use predatory insects to control harmful pests.
  - **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.