APPENDIX I

STORM WATER QUALITY MANAGEMENT PLAN

Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

All Peoples Church

PTS 636444

[Insert Drawing Number (if applicable) and Internal Order Number (if applicable)]

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:

William G. Mack

2/17/2021

William Gregg Mack, RCE 73620
Provide Wet Signature and Stamp Above Line

PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA

Prepared For:

All Peoples Church

5577 University Avenue

San Diego, CA 92105

[Insert Applicant Phone Number]

Prepared By:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

Pasco Laret Suiter & Associates
1911 San Diego Ave. Suite 100
San Diego, CA 92102
(858) 259-8212

Date:
February 11, 2020

Approved by: City of San Diego   Date

The City of SAN DIEGO

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Project Name: All Peoples Church

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- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
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Acronyms

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

Certification Page

Project Name:
Permit Application

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and 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 the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature

73620 | 12/31/2022

PE# | Expiration Date

William Gregg Mack

Print Name

Pasco Laret Suiter & Associates

Company

2021-2-11

Date

REGISTERED PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA

Engineer's Stamp

Project Name: All Peoples Church

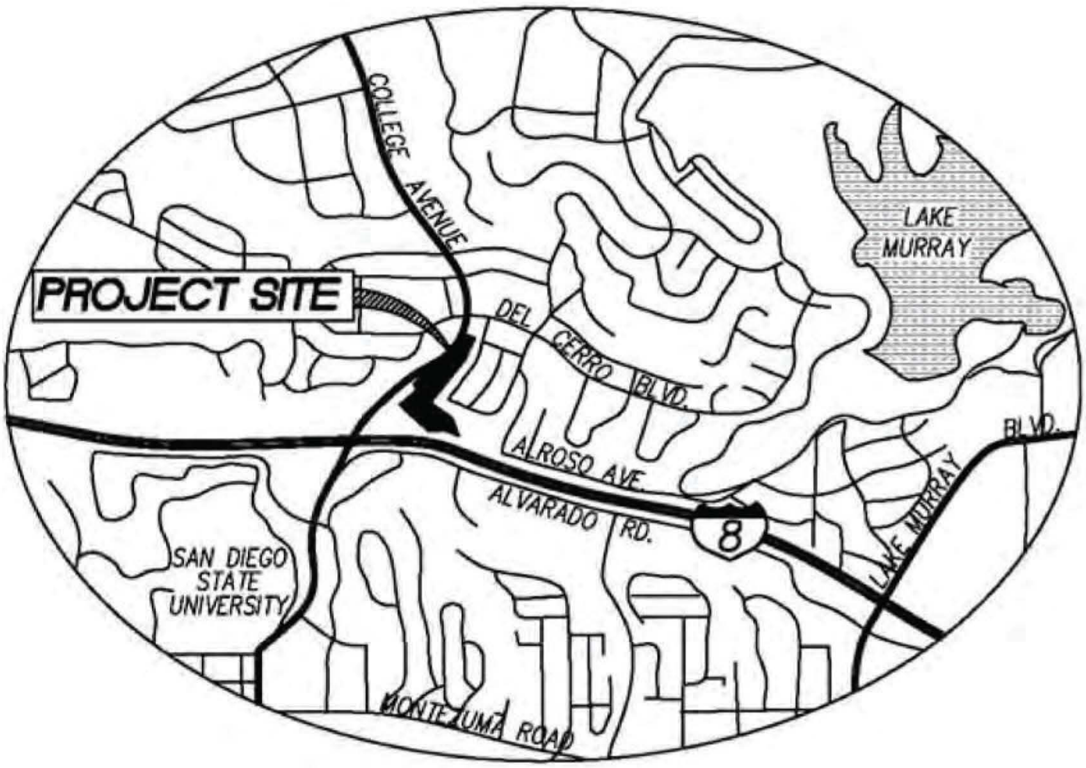
Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	2020-8-25	☑ Preliminary Design/Planning/CEQA ☐ Final Design	**Initial Submittal**
2	2021-2-11	☑ Preliminary Design/Planning/CEQA ☐ Final Design	2nd Submittal Per City Cycle Issues
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Vicinity Map

Project Name: All Peoples Church
Permit Application PTS 636444



City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
November 2018

Project Address: College Ave, San Diego,CA (APN 463-010-10)	Project Number:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1] , which is administered by the State Regional Water Quality Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and/or contact with storm water?

   ☐ Yes; WPCP required, skip questions 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

   ☐ Yes; WPCP required, skip question 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☒ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

Clear Page 1

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed.

2. ☐ **High Priority**
   a. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and not located in the ASBS watershed.
   b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects that are not located in an ASBS watershed or designated as a High priority site.
   b. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and not located in an ASBS watershed.
   c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos watershed management area.

4. ☒ **Low Priority**
   a. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.
Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

Clear Page 2

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒ Yes ☐ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☒ No
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface.	☐ Yes ☒ No
4.	**New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.	☐ Yes ☒ No
5.	**New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☐ Yes ☒ No
6.	**New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☐ Yes ☒ No

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7.	**New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☐ Yes ☒ No
8.	**New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☒ No
9.	**New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10.	**Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1.	The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.**	☐
2.	The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3.	The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4.	The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management	☒

Guido Knudson	Design Engineer-Civil
Name of Owner or Agent *(Please Print)*	Title
[signature]	03/19/2019
Signature	Date

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Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: All Peoples Church		
Permit Application Number: PTS 636444		Date:2021-2-8
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop.** Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: All Peoples Church

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (<u>not required if prior lawful approval does not apply</u>):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☐ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply: There are no CCSYA areas on site or upstream of the site.		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody. Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

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Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	All Peoples Church
Project Address	Northeast corner of Interstate 8 and College Avenue, San Diego, CA 92120
Assessor's Parcel Number(s) (APN(s))	463-010-10-00
Permit Application Number	PTS 636444
Project Watershed	Select One: ☐ San Dieguito River ☐ Penasquitos ☐ Mission Bay ☑ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	Mission San Diego 907.11
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	5.99 Acres (260, 924 Square Feet)
Area to be disturbed by the project (Project Footprint)	5.99 Acres (260,924 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	2.46 Acres (107,187 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	3.53 Acres (153,737 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	+41 %

Project Name: All Peoples Church

Form I-3B Page 2 of 11
Description of Existing Site Condition and Drainage Patterns
Current Status of the Site (select all that apply): ☐Existing development ☐Previously graded but not built out ☐Agricultural or other non-impervious use ☑Vacant, undeveloped/natural Description / Additional Information:
Existing Land Cover Includes (select all that apply): ☑Vegetative Cover ☐Non-Vegetated Pervious Areas ☐Impervious Areas Description / Additional Information:
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐NRCS Type A ☐NRCS Type B ☑NRCS Type C ☑NRCS Type D
Approximate Depth to Groundwater: ☐Groundwater Depth < 5 feet ☐5 feet < Groundwater Depth < 10 feet ☑10 feet < Groundwater Depth < 20 feet ☐Groundwater Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☑Watercourses ☐Seeps ☐Springs ☐Wetlands ☐None Description / Additional Information:

Form I-3B Page 3 of 11
Description of Existing Site Topography and Drainage
How is storm water runoff conveyed from the site? At a minimum, this description should answer: 1. Whether existing drainage conveyance is natural or urban; 2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site; 3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels; 4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.
Descriptions/Additional Information
There are three locations where offsite run-on enters the project site: 1. An existing 36-inch reinforced concrete pipe (RCP) discharges storm water onto the project site at the northern boundary of the property. Runoff is conveyed in a southerly direction through the project site in an earthern drainage channel prior to discharging to an existing 48-inch RCP which conveys flow under the Interstate 8 offramp. The offsite drainage area to the existing 36-inch RCP is 28.8 acres. The 100-year storm event peak flow rate (Q100) at this location is 60.04 cubic feet per second (cfs). 2. An existing 18-inch RCP discharges storm water onto the project site at the eastern boundary of the project site. Runoff flows westerly, confluences with the earthen drainage channel and continues in a southerly direction. The offiste drainage area to the existing 18-inch RCP is 21.5 acres. The 100-year storm event peak flow rate (Q100) at this location is 40.5 cubic feet per second (cfs). 3. An existing 30-inch RCP discharges storm water onto the project site at the southwestern boundary of the project site. Runoff flows southeasterly and confluences with the earthen drainage channel which at this location begins flowing southeasterly prior to discharging to the existing 48-inch RCP which continues under the I-8 offramp. The offsite drainage area to the existing 30-inch RCP is 4.2 acres. The 100-year storm event peak flow rate (Q100) at this location is 11.32 cubic feet per second (cfs). The total drainage area to the existing 48-inch RCP that conveys flow under the I-8 offramp is 64 acres. Q100 at this location is 118.26 cfs.

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: The project proposes to construct 1 church building, two private driveway entrances, drive aisles, paver parking, associated public and private utilities, and 4 biofiltration basins that will provide storm water quality treatment and hydromodification manangement for onsite runoff. A 36-inch RCP mainline storm drain is proposed to connect to the existing 36-inch RCP at the northern boundary and convey offsite storm water southerly through the project site. An 18-inch RCP is proposed to connect to the existing 18-inch RCP at the eastern boundary of the site and convey offsite storm water westerly before confluencing with the proposed mainline 48-inch RCP. Onsite storm water runoff will drain to 4 biofiltration basins for water quality treatment and hydromodification manangment prior to discharging to the mainline storm drain.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Church, parking garage, driveways/roadways, and associated hardscape.
List/describe proposed pervious features of the project (e.g., landscape areas): Landscape areas, shade trees, biofiltration basins and pervious pavement
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The site currently sits well below the adjacent College Avenue and Interstate 8 offramp to College Avenue and has relatively steep topography from one end to the other. In order to create a buildable PAD area and have reasonable road grades, the lower end of the site needs to be raised using proposed walls.

Project Name: All Peoples Church

Form I-3B Page 5 of 11
Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)? ☑ Yes ☐ No If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations. Description / Additional Information: The site currently has 3 existing public stormdrains that outlet onto the site and then flow overland. The proposed project is going to add additional underground pipe to route two of these outlets further down the site, closer to POC-1. All new parking, garage and road surfacing will be collected via storm drain inlet structures and piped to different bioretention basins throughout the site for water quality treatment and hydromodification controls. The church structure itself will have the roof drains directed to Bioretention Basin #4. Concrete brow ditches will be used to convey off-site drainage, drainage along the property line and self-mitigating landscape areas. These ditches will be end at Type-F Catch Basins and routed amongst the main stormdrain line and routed to the south to POC-1. With the exception of DMA-4, the entire offsite and onsite drainage ends up in a 48" Public stormdrain that runs along Caltran R/W before it exits at a headwall into an engineered earthen channel (per SDD-109). This flows adjacent to the proposed retaining wall (adjacent to the proposed Church) before outletting at rip-rap and confluencing with the treated runoff from DMA-4 before flowing according to it's existing drainage path to the existing 48" Caltrans stomdrain (with headwall). This is approximately where POC-1 is located and where the runoff is picked up and routed South beneath Interstate-8. Note: All offsite runoff that enters the property is being addressed using proposed underground (public) stormdrain infrastructure and private concrete brow ditches to convey the offsite runoff to POC-1.

Form I-3B Page 6 of 11
Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply): ☑Onsite storm drain inlets ☐Interior floor drains and elevator shaft sump pumps ☑Interior parking garages ☐Need for future indoor & structural pest control ☑Landscape/outdoor pesticide use ☐Pools, spas, ponds, decorative fountains, and other water features ☐Food service ☐Refuse areas ☐Industrial processes ☐Outdoor storage of equipment or materials ☐Vehicle and equipment cleaning ☐Vehicle/equipment repair and maintenance ☐Fuel dispensing areas ☐Loading docks ☐Fire sprinkler test water ☐Miscellaneous drain or wash water ☑Plazas, sidewalks, and parking lots Description/Additional Information:

Project Name: All Peoples Church

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) Site runoff discharges on the southwest corner of the site into an existing 48" concrete headwall that carries storm water under Interstate 8 and into Alvarado Creek. From Alvarado Creek, storm water flows and merges into San Diego River (Lower) which then flows into Famosa Slough and Channel. Storm water ultimately flows into the Pacific Ocean Shoreline, San Diego HU, at Stub Jetty, south of the San Diego River outlet, near Cape May Avenue.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations AGR, AQUA, BIOL, COLD, COMM, IND, MAR, MIGR, MUN, NAV, RARE, REC1, REC2, SHELL, SPWN, WARM, WILD
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations None
Provide distance from project outfall location to impaired or sensitive receiving waters 500 feet to Alvarado Creek
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands N/A

Project Name: All Peoples Church

Form I-3B Page 8 of 11

Identification of Receiving Water Pollutants of Concern

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body (Refer to Appendix K)	Pollutant(s)/Stressor(s) (Refer to Appendix K)	TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)
Alvarado Creek	Nitrogen	TMDL
Alvarado Creek	Selenium	TMDL
Famosa Slough and Channel	Eutrophic	TMDL
Pacific Ocean Shoreline, San Diego HU	Trash	TMDL
San Diego River (Lower)	Benthic Community Effects	TMDL
San Diego River (Lower)	Cadmium	TMDL
San Diego River (Lower)	Nitrogen	TMDL
San Diego River (Lower)	Oxygen, Dissolved	TMDL
San Diego River (Lower)	Phosphorus	TMDL
San Diego River (Lower)	Total Dissolved Solids	TMDL

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☑	☐
Nutrients	☐	☑	☐
Heavy Metals	☑	☐	☐
Organic Compounds	☑	☐	☐
Trash & Debris	☐	☑	☐
Oxygen Demanding Substances	☐	☐	☑
Oil & Grease	☐	☑	☐
Bacteria & Viruses	☑	☐	☐
Pesticides	☐	☑	☐

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*
This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

No CCSYA exist in the project footprint or upstream area. Please see CCSYA exhibit.

Form I-3B Page 10 of 11
Flow Control for Post-Project Runoff*   ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.   There is 1 POC for the project. POC1 is located at the south edge of the project site. The downstream receiving channel is Alvarado Creek.
Has a geomorphic assessment been performed for the receiving channel(s)?   ☑No, the low flow threshold is $0.1Q_2$ (default low flow threshold)   ☐Yes, the result is the low flow threshold is $0.1Q_2$ ☐Yes, the result is the low flow threshold is $0.3Q_2$ ☐Yes, the result is the low flow threshold is $0.5Q_2$ If a geomorphic assessment has been performed, provide title, date, and preparer:
Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Project Name: All Peoples Church

Source Control BMP Checklist for PDPs			Form I-4B
Source Control BMPs			
All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.4 not implemented:			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☑ Yes	☐ No	☐ N/A
Interior parking garages	☑ Yes	☐ No	☐ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Project Name: All Peoples Church

Site Design BMP Checklist for PDPs	Form I-5B		
Site Design BMPs			
All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided. A site map with implemented site design BMPs must be included at the end of this checklist.			
Site Design Requirement	**Applied?**		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.1 not implemented: The project site is located on a natural drainage channel which will be filled in to construct building pad, parking garage, and road; however the proposed condition honors the existing drainage patterns and utilizes biofiltration basins to mitigate for hydromodification management and the 100-year storm event peak flows.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☑ Yes	☐ No	☐ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.2 not implemented:			

Project Name: All Peoples Church

Form I-5B Page 2 of 4			
Site Design Requirement	Applied?		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☐ No	☑ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☑ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

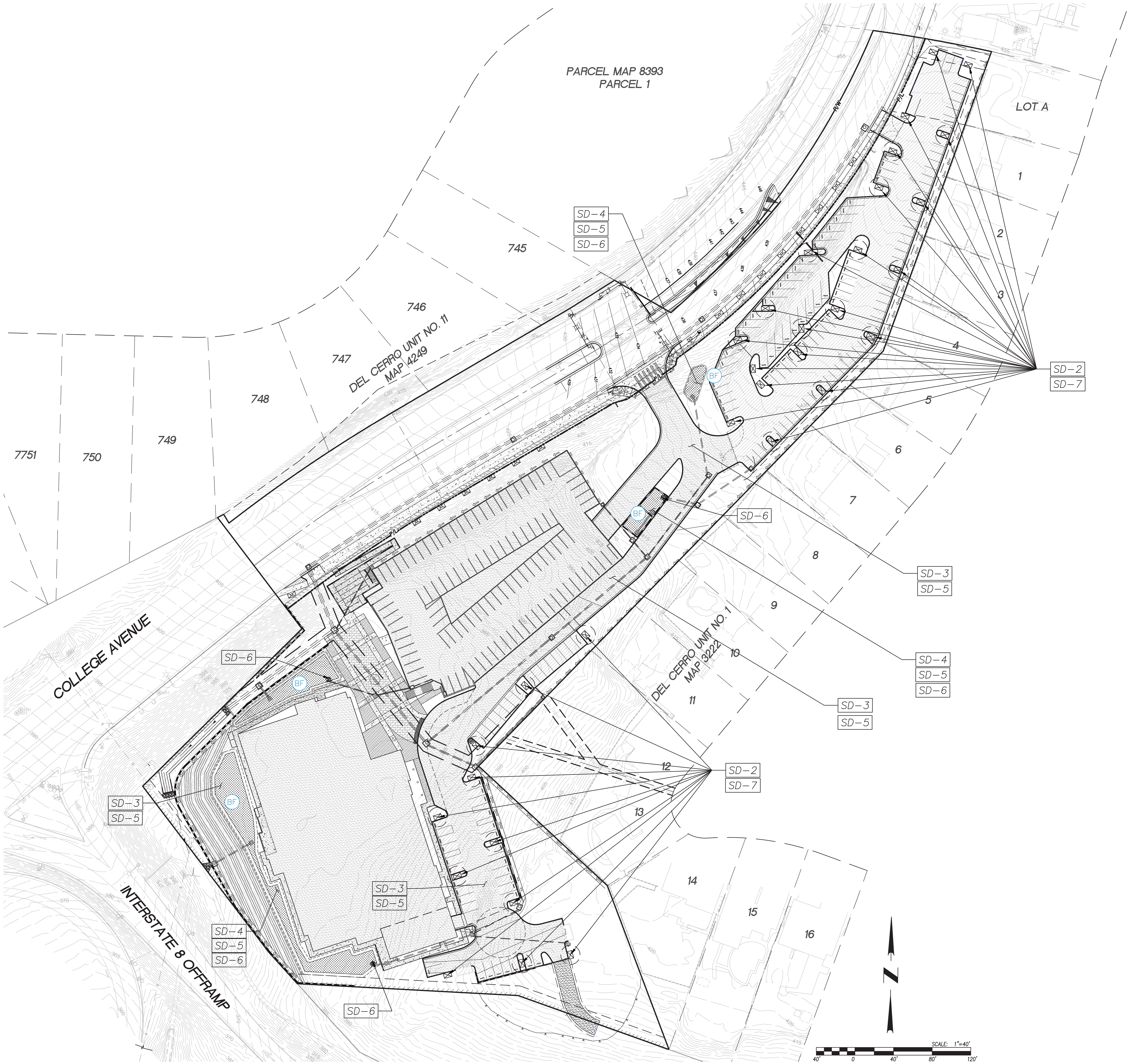
Project Name: All Peoples Church

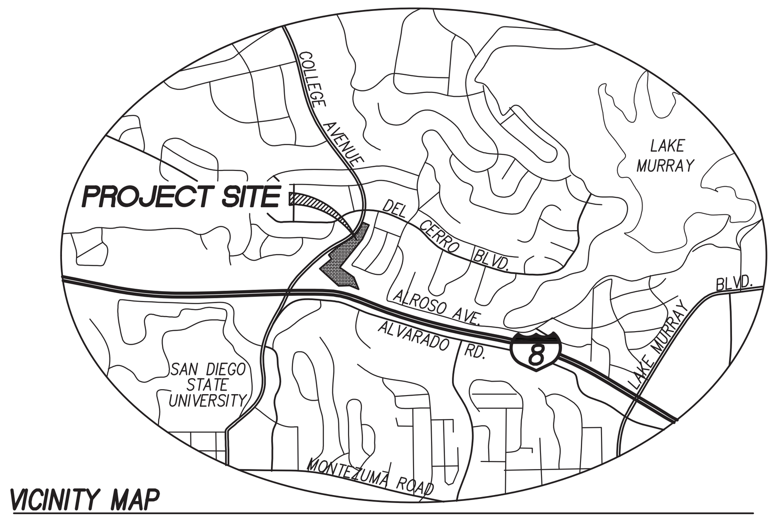
Form I-5B Page 3 of 4			
Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☑ Yes	☐ No	☐ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☑ Yes	☐ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvest and Use Precipitation is not feasible to implement per Form I-7.			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: All Peoples Church

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:
SEE MAP ON NEXT PAGE

SWQMP SITE DESIGN MAP





VICINITY MAP

NOT TO SCALE

LEGEND

RIGHT-OF-WAY	R/W
DEDICATED PROPERTY LINE	P/L
LIMIT OF GRADING	
DRAINAGE DIRECTION	
RIP RAP ENERGY DISSIPATER	
PERMEABLE PAVEMENT	
IMPERVIOUS AREA (ROOF AND CONCRETE)	
BIOFILTRATION BASIN (BF-1)	BF

SITE DESIGN BMPS IMPLEMENTED

SD-2	CONSERVE NATURAL AREAS, SOILS, AND VEGETATION (4.3.2)
SD-3	MINIMIZE IMPERVIOUS AREA (4.3.3)
SD-4	MINIMIZE SOIL COMPACTION (4.3.4)
SD-5	IMPERVIOUS AREA DISPERSION (4.3.5)
SD-6	RUNOFF COLLECTION (4.3.6)
SD-7	LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES (4.3.7)

SITE DESIGN BMP NOTES

THE FOLLOWING SITE DESIGN ELEMENTS WERE IMPLEMENTED TO MEET THE REQUIREMENTS LAID OUT IN SECTION 4.3 OF THE STORMWATER STANDARDS MANUAL:

4.3.2: THIS PROJECT PROPOSES TO CONSERVE NATURAL AREAS, SOILS, AND VEGETATION BY PLANTING ADDITIONAL NATIVE OR DROUGHT TOLERANT TREES AND SHRUBS, AS WELL AS REPLACING THE TOPSOIL IN AREAS OF DISTURBANCE.

4.3.3: THE PROJECT PROPOSES TO MINIMIZE IMPERVIOUS AREA BY USING PERMEABLE PAVERS IN THE PRIVATE DRIVEWAYS AND SURFACE PARKING AREAS, AS WELL AS KEEPING THE DRIVE AISLES TO THE MINIMUM WIDTH NECESSARY.

4.3.4: ALL PROPOSED LANDSCAPE AND BIOFILTRATION AREAS MINIMIZE SOIL COMPACTION IN ORDER TO ALLOW MORE STORMWATER RUNOFF TO PERMEATE INTO THE SOIL AND SLOW DOWN THE FLOW.

4.3.5: THIS PROJECT SUCCESSFULLY DISPERSES ALL IMPERVIOUS AREAS THROUGH LANDSCAPING, BIOFILTRATION/STORMWATER TREATMENT, OR PERMEABLE PAVERS PRIOR TO DRAINING TO THE PUBLIC STORM SYSTEM.

4.3.6: THE PROJECT PROPOSED RUNOFF COLLECTION BY TREATING SITE RUNOFF IN PERMANENT POST-CONSTRUCTION BMPS PRIOR TO RELEASING FLOW OFFSITE. ALL RUNOFF FROM THE PROPOSED CHURCH IS COLLECTED IN ROOF DOWNSPOUTS AND DISCHARGES INTO THE BIOCLEAN MWS TREATMENT DEVICE AND THEN AN UNDERGROUND VAULT.

4.3.7: ALL PROPOSED LANDSCAPE ARES WILL BE PLANTED WITH NATIVE OR DROUGHT TOLERANT SPECIES.

SITE DESIGN MAP

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

Summary of PDP Structural BMPs	Form I-6
PDP Structural BMPs	
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual). Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).	
Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. The type of structural BMP chosen for the project was based on the flow charts presented in Figures 5-1 and 5-2 of the City of San Diego Storm Water Standards Manual. Using Form I-7 (Worksheet B.3-1) to gauge the feasibility of implementing capture and use techniques for the project site, it was determined that Harvest and Use BMPs are considered infeasible. After determining Harvest and Use BMPs are infeasible, the infiltration feasibility analysis per Form I-8 resulted in a No Infiltration condition. The project site is divided into five (5) DMAs, with DMAs 1-4 treated for water quality and hydromodification. DMA-5 is self-mitigating. The project is proposing the use of permeable pavement as Site Design BMPs per BMP Design Fact Sheet SD-D. The permanent structural BMP selection was Biofiltration (BF-1) for DMA-1 to DMA-4 (Continue on page 2 as necessary.)	

Form I-6 Page 2 of 8

(Continued from page 1)

Project Name: All Peoples Church

Form I-6 Page 1 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 2 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):
472 SF bioretention basin serves to meet water quality and hydromodification requirements. It includes an 18" by 18" overflow riser, with a 0.2188" orifice for hydromodification. It treats the western half of the limited-use parking area that utilizes permeable pavement throughout. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 3 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 4 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-2
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):
858 SF walled-in, tiered bioretention basin serves to meet water quality and hydromodification requirements. It includes an 18" by 18" overflow riser, with a 0.2969" orifice for hydromodification. It treats the eastern half of the northern limited-use parking area that utilizes permeable pavement almost entirely throughout, with some concrete in there. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 5 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-3	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 6 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): 1725 SF standard bioretention basin serves to meet water quality and hydromodification requirements. It includes an 24" by 24" overflow riser, with a 3/4" orifice for hydromodification. It treats the parking garage, concrete downgrade approach to upper deck of garage, plaza area, concrete ADA switchback ramp and associated landscape and hardscape adjacent to the plaza. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 7 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-4	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☑ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 8 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):
4252 SF standard bioretention basin serves to meet water quality and hydromodification requirements. It includes an 24" by 24" overflow riser, with a 3/4" orifice for hydromodification. It treats the entirety of the Church, the fire access road and turnaourd, permeable parking spots, graded slopes, concrete downgrade approach to lower deck of garage, and associated landscape and hardscape adjacent to the Church building. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

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Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

Project Name: All Peoples Church

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography and impervious areas
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☑ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☑ Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)

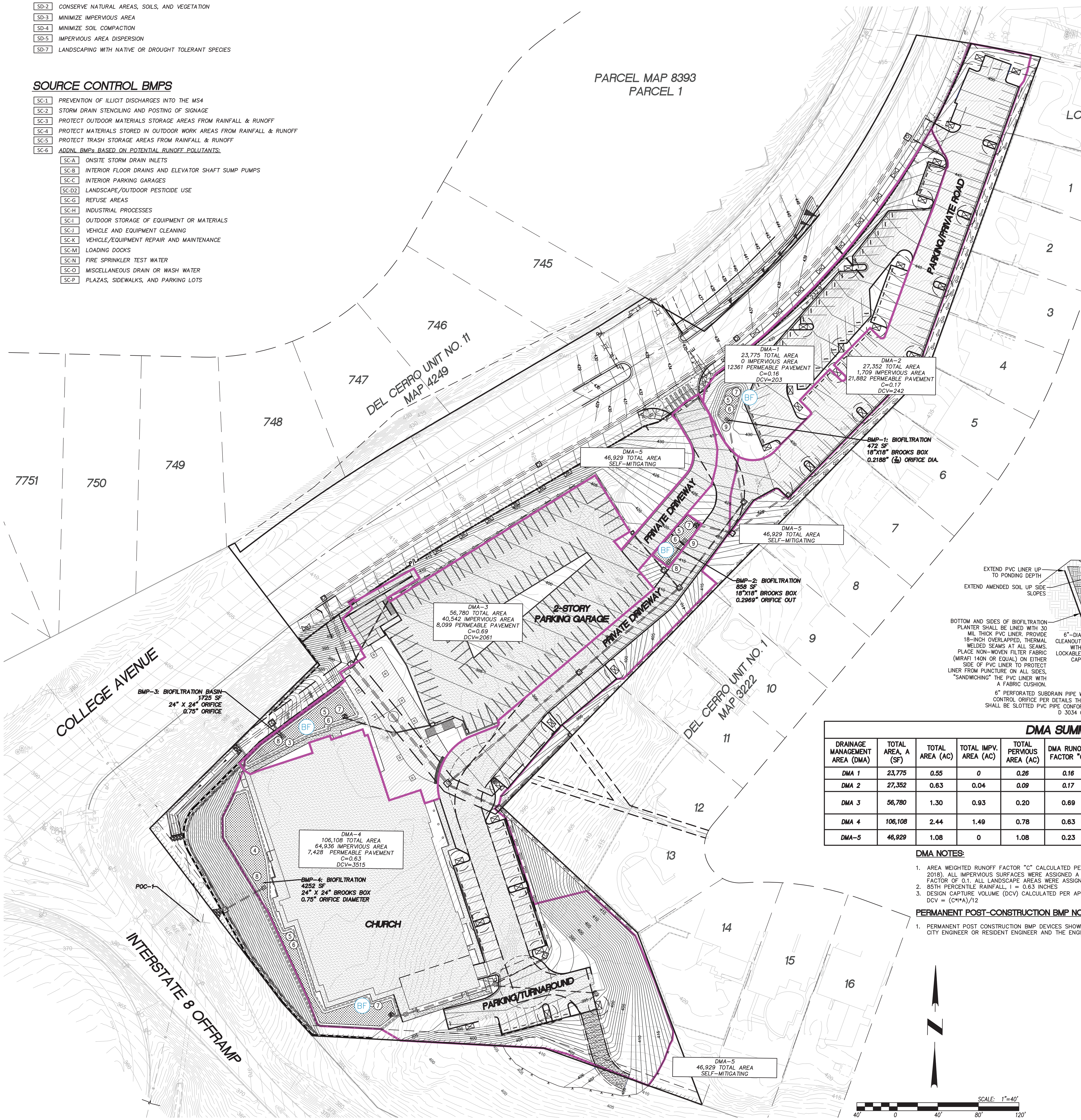
ONSITE WATER QUALITY AND HMP EXHIBIT

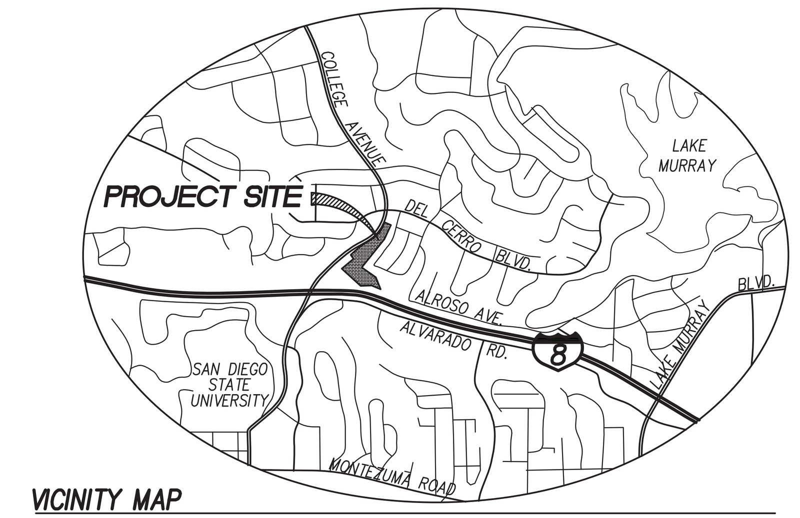
SITE DESIGN BMPS

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDRAULIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

SOURCE CONTROL BMPS

- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- SC-2 STORM DRAIN STENCILING AND POSTING OF SIGNAGE
- SC-3 PROTECT OUTDOOR MATERIALS STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS FROM RAINFALL & RUNOFF
- SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-6 ADDNL BMPs BASED ON POTENTIAL RUNOFF POLLUTANTS:
  - SC-A ONSITE STORM DRAIN INLETS
  - SC-B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
  - SC-C INTERIOR PARKING GARAGES
  - SC-D2 LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-G REFUSE AREAS
  - SC-H INDUSTRIAL PROCESSES
  - SC-I OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
  - SC-J VEHICLE AND EQUIPMENT CLEANING
  - SC-K VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
  - SC-M LOADING DOCKS
  - SC-N FIRE SPRINKLER TEST WATER
  - SC-O MISCELLANEOUS DRAIN OR WASH WATER
  - SC-P PLAZAS, SIDEWALKS, AND PARKING LOTS





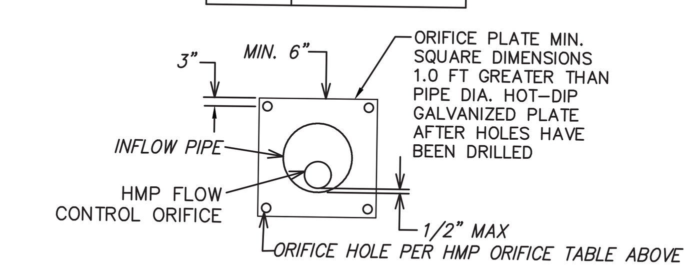
VICINITY MAP

NOT TO SCALE

LEGEND

- RIGHT-OF-WAY — R/W
- PROPERTY LINE — P/L
- DMA BOUNDARY
- LIMIT OF GRADING
- DRAINAGE DIRECTION
- RIP RAP ENERGY DISSIPATER
- PERMEABLE PAVEMENT
- IMPERVIOUS AREA (ROOF AND CONCRETE)
- BIOFILTRATION BASIN (BF-1) BF

HMP ORIFICE TABLE	
BMP	ORIFICE SIZE
1	0.2188"
2	0.2969"
3	0.75"
4	0.75"

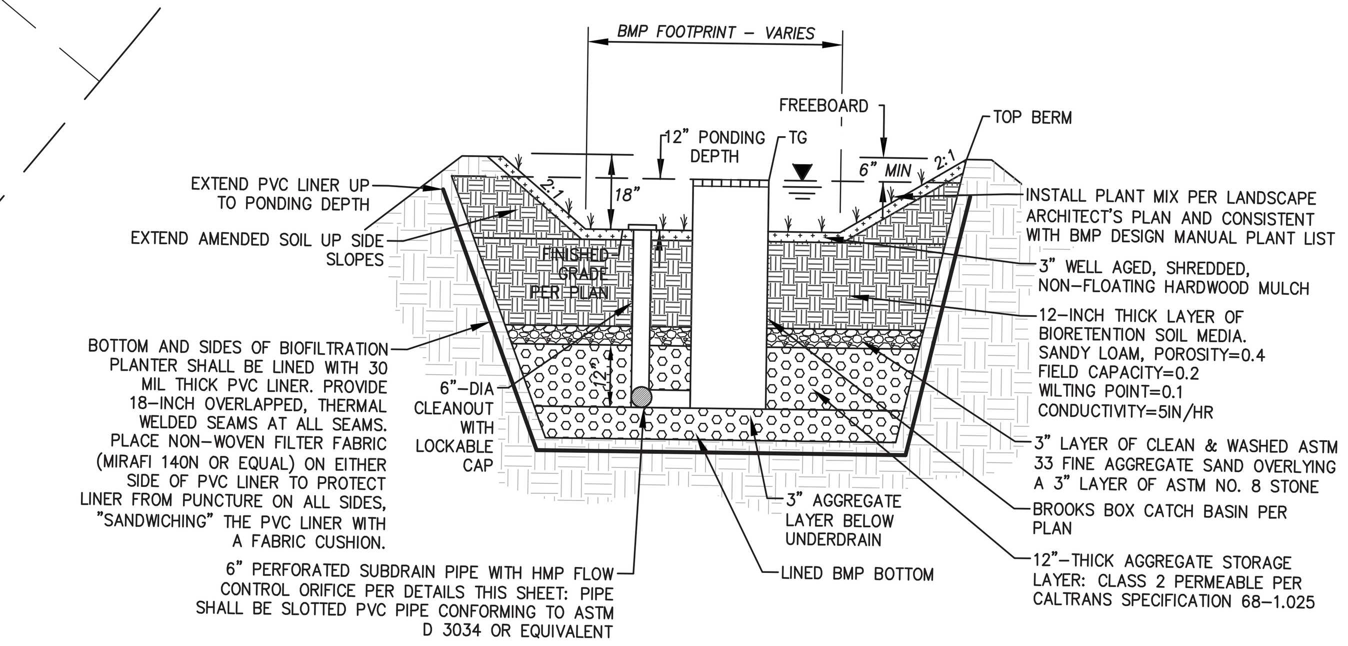


FLOW CONTROL ORIFICE PLATE DETAIL

NOT TO SCALE

CONSTRUCTION NOTES

1. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-1 PER DETAIL THIS SHEET
2. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-2 PER DETAIL THIS SHEET
3. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-3 PER DETAIL THIS SHEET
4. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-4 PER DETAIL THIS SHEET
5. 6" CLEANOUT WITH LOCKABLE CAP
6. PERFORATED 6" PVC UNDERDRAIN PIPE (ASTM D 3034 OR EQUIVALENT)
7. No. 2 BACKING RIP-RAP ENERGY DISSIPATER
8. 24" X 24" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.
9. 18" X 18" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.



DMA SUMMARY

DRAINAGE MANAGEMENT AREA (DMA)	TOTAL AREA, A (SF)	TOTAL AREA (AC)	TOTAL IMPV. AREA (AC)	TOTAL PERVIOUS AREA (AC)	DMA RUNOFF FACTOR "C"	DCV (CU-FT)	DMA TYPE	STRUCTURAL BMP TYPE	STRUCT. BMP NAME
DMA 1	23,775	0.55	0	0.26	0.16	203	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-1
DMA 2	27,352	0.63	0.04	0.09	0.17	242	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-2
DMA 3	56,780	1.30	0.93	0.20	0.69	2061	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-3
DMA 4	106,108	2.44	1.49	0.78	0.63	3515	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-4
DMA-5	46,929	1.08	0	1.08	0.23	0	SELF-MITIGATING	SELF-MITIGATING	N/A

DMA NOTES:

1. AREA WEIGHTED RUNOFF FACTOR "C" CALCULATED PER APPENDIX B.1.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). ALL IMPERVIOUS SURFACES WERE ASSIGNED A RUNOFF FACTOR OF 0.90. ALL PERMEABLE PAVEMENT WAS ASSIGNED A RUNOFF FACTOR OF 0.1. ALL LANDSCAPE AREAS WERE ASSIGNED A RUNOFF FACTOR OF 0.23, CONSISTENT WITH TYPE C SOILS.
2. 85TH PERCENTILE RAINFALL, I = 0.63 INCHES
3. DESIGN CAPTURE VOLUME (DCV) CALCULATED PER APPENDIX B.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). DCV = (C*I*A)/12

PERMANENT POST-CONSTRUCTION BMP NOTES:

1. PERMANENT POST CONSTRUCTION BMP DEVICES SHOWN ON PLAN SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY ENGINEER OR RESIDENT ENGINEER AND THE ENGINEER OF WORK.

PROJECT CHARACTERISTICS

TOTAL PROJECT OWNERSHIP: 5.99 ACRES

TOTAL DISTURBED AREA: 5.92 ACRES

TOTAL PROPOSED IMPERVIOUS AREA: 107,187 SF= 2.46 ACRES

TOTAL PERMEABLE PAVEMENT: 49,621 SF=1.14 ACRES

TOTAL PROPOSED LANDSCAPE AREA: 101,059 SF = 2.32 ACRES

EXISTING HYDROLOGIC FEATURES: N/A

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE C

GROUNDWATER INFORMATION

GROUNDWATER WAS NO ENCOUNTERED DURING GEOTECHNICAL TESTING PER GEOTECHNICAL INVESTIGATION, "UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION AND DESIGN RECOMMENDATIONS, PROPOSED CHURCH FACILITY, APN 463-010-1000, SAN DIEGO, CALIFORNIA 90212" BY ADVANCED GEOTECHNICAL SOLUTIONS, INC DATED JANUARY 20, 2020.

CCYSAs

THE PROJECT IS ENTIRELY EXEMPT/NOT SUBJECT TO RPO REQUIREMENTS WITHOUT UTILIZATION OF RPO EXEMPTIONS AS THERE ARE NO AREAS ONSITE OR UPSTREAM TO PROTECT; THEREFORE THE PROJECT EFFECTIVELY AVOIDS AND BYPASSES SOURCES OF MAPPED CCYSAS PER APPROACHED OUTLINED IN APPENDIX H.2 AND H.3 AS NONE WERE IDENTIFIED.

REFER TO WMAA MAP INCLUDED IN THE "PRIORITY DVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR THE ALL PEOPLES CHURCH"

PROPOSED CONDITION
DMA & HMP EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

BMP Sizing and DCV Summary Table

BMP Location	BMP Description	Total Area (sq-ft)	% Impervious	% Pervious	% Permeable Pavement	C Weighted Runoff Factor	DCV Req'd (Cu-ft)	Minimum 3% Treatment Area (sq-ft)	BMP Area Provided (sq-ft)	DCV Provided (Cu-Ft)			Modular Wetland Flow Design (cfs)
DMA-1	BIOFILTRATION PLANTER #1	23775.00	0%	48%	52%	0.16	202.7	116	472.0	660.8			
DMA-2	BIOFILTRATION PLANTER #2	27352.00	6%	14%	80%	0.17	241.9	138	858.0	1201.2			
DMA-3	BIOFILTRATION PLANTER #3	56780.00	71%	15%	14%	0.69	2061.1	1178	1725.0	2415.0			
DMA-4	BIOFILTRATION PLANTER #4	106108.00	61%	32%	7%	0.63	3514.7	2008	4252.0	5952.8			
DMA-5	SELF-TREATING	46929.00	0%	100%	0%	0.23	566.7	NA	0.0	0.0			
TOTAL DMA AREA:		260944	41%	28%	31%	0.47	6587.01	3440.19	7307.00	10229.8			
TOTAL BMP AREA:		7307.00											

NOTE: Weighted runoff factor based on percent of impervious, pervious, and paver area in each respective DMA

Runoff Factor (Table B.1.1 City of SD SW Manual)

Impervious	0.90	
Landscape	0.23	C Soils
Permeable Pavers	0.10	

P85th Parameters

Intensity:	0.20	in/hr
Precip:	0.63	in

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

B.1.2 Offline BMPs

Diversion flow rates for offline BMPs shall be sized to convey the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inches of rainfall per hour, for each hour of every storm event. The following hydrologic method (Equation B.1-3) shall be used to calculate the diversion flow rate for off-line BMPs:

Equation B.1-1: Hydrologic Method

$$Q = C \times i \times A$$

where:

Q = Diversion flow rate in cubic feet per second

C = Runoff factor, area weighted estimate using Table B.1

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) within the project footprint.

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and Equation B.1-2.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x = Runoff factor for area X

A_x = Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs - Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.
[2]Surface shall be designed in accordance with SD-F (Amended soils) fact sheet in Appendix E

Drawdown Time for Biofiltration BMP-1

Outlet Q:	0.0026 cfs	0.234 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	472.0 sq-ft		
BMP Percolation Rate:	0.05 cfs		
Basin Volume:	661 cu-ft		
DCV/Average Q:	258125 secs		**71.70 Hours**

Drawdown Time for Biofiltration BMP-2

Outlet Q:	0.0048 cfs	0.241 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	858.0 sq-ft		
BMP Percolation Rate:	0.099 cfs		
Basin Volume:	1201 cu-ft		
DCV/Average Q:	251297 secs		**69.80 Hours**

Drawdown Time for Biofiltration BMP-3

Outlet Q:	0.0294 cfs	0.737 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	1725.0 sq-ft		
BMP Percolation Rate:	0.20 cfs		
Basin Volume:	2415 cu-ft		
DCV/Average Q:	82059 secs		**22.79 Hours**

Drawdown Time for Biofiltration BMP-4

Outlet Q:	0.0294 cfs	0.299 in/hr
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec

ALL PEOPLES CHURCH
J-2936
2/9/2021

BMP Area:	4252.0 sq-ft	
BMP Percolation Rate:	0.49 cfs	
Basin Volume:	5953 cu-ft	
DCV/Average Q:	202270 secs	**56.19 Hours**


San Diego County
85th Percentile Isopluvials
85th Percentile Rainfall in Inches
Freeway
Highway
Major Road
Street
Municipal Boundary
Water Body
Note:
The 85th percentile is a 24-hour rainfall total.
It represents a value such that 85% of the
observed 24-hour rainfall totals will be less
than that value.
PROJECT LOCATION
PROJECT LOCATION
SAN DIEGO BAY
0 1 2 3 4 Miles
LUEG GIS
Land Use & Environment Group
Geographic Information Service
SanGIS

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5)
(Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

To use this tool applicants must navigate to the appropriate worksheet tab and populate the orange cells with project specific information, all other cells are locked for editing and will be automatically calculated.

In this tool each tab is independent of other tabs.

After completion of the calculations, the applicant must print a pdf of the tab for each BMP and attach it to the PDP SWQMP.

Disclaimer:

The applicant assumes responsibility for the selection and application of this tool and should verify all of the assumptions and computed results for reasonableness and accuracy. The City will not be held liable for any errors or other negative impacts associated with the use of this tool. In the event that the City performs updates to this tool, applicants that have not established reliance on previous versions of this tool via discretionary approval may be required to utilize the latest version of the tool.

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.16	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	300	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	68	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	150	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	79	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	114	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	114	sq. ft.
23	Provided BMP Footprint	472	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.16	
3	85^{th} percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	48	cu. ft.

The City of SAN DIEGO		Project Name	All Peoples Church				
		BMP ID	1				
Volume Retention for No Infiltration Condition					**Worksheet B.5-6**		
1	Area draining to the biofiltration BMP					23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.16	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					3804	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					114	sq. ft.
5	Biofiltration BMP Footprint					472	sq. ft.
Landscape Area (must be identified on DS-3247)							
	Identification		**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					472	sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					4.14	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					48	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-151.7556348	cu. ft.
Site Design BMP							
	Identification	**Site Design Type**				**Credit**	
16	**1**						cu. ft.
	2						cu. ft.
	3						cu. ft.
	4						cu. ft.
	5						cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met				

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5)
(Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

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In this tool each tab is independent of other tabs.

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Disclaimer:

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The City of SAN DIEGO

	Project Name	All Peoples Church
	BMP ID	2

Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.17	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	244	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	366	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	83	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	183	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	96	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	139	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	139	sq. ft.
23	Provided BMP Footprint	876	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	2	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.17	
3	85^{th} percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	244	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	59	cu. ft.

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5)
(Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

To use this tool applicants must navigate to the appropriate worksheet tab and populate the orange cells with project specific information, all other cells are locked for editing and will be automatically calculated.

In this tool each tab is independent of other tabs.

After completion of the calculations, the applicant must print a pdf of the tab for each BMP and attach it to the PDP SWQMP.

Disclaimer:

The applicant assumes responsibility for the selection and application of this tool and should verify all of the assumptions and computed results for reasonableness and accuracy. The City will not be held liable for any errors or other negative impacts associated with the use of this tool. In the event that the City performs updates to this tool, applicants that have not established reliance on previous versions of this tool via discretionary approval may be required to utilize the latest version of the tool.

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	3	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2057	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	3085	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	701	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	1543	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	812	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	1175	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	1175	sq. ft.
23	Provided BMP Footprint	1725	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85^{th} percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2057	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	498	cu. ft.

The City of SAN DIEGO

Project Name	All Peoples Church
BMP ID	2

Volume Retention for No Infiltration Condition — **Worksheet B.5-6**

1	Area draining to the biofiltration BMP	27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.17	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	4650	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	139	sq. ft.
5	Biofiltration BMP Footprint	876	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.			
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	876	sq. ft.			

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	6.28	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	59	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-311.9224268	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

The City of SAN DIEGO

	Project Name	All Peoples Church
	BMP ID	3

Volume Retention for No Infiltration Condition						**Worksheet B.5-6**
1	Area draining to the biofiltration BMP				56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				39178	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]				1175	sq. ft.
5	Biofiltration BMP Footprint				1,725	sq. ft.
Landscape Area (must be identified on DS-3247)						
	Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				1725	sq. ft.
Volume Retention Performance Standard						
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]				1.47	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]				498	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]				-233.9467446	cu. ft.
Site Design BMP						
	Identification	**Site Design Type**			**Credit**	
16	**1**					cu. ft.
	2					cu. ft.
	3					cu. ft.
	4					cu. ft.
	5					cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.				0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met				

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5)
(Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

To use this tool applicants must navigate to the appropriate worksheet tab and populate the orange cells with project specific information, all other cells are locked for editing and will be automatically calculated.

In this tool each tab is independent of other tabs.

After completion of the calculations, the applicant must print a pdf of the tab for each BMP and attach it to the PDP SWQMP.

Disclaimer:

The applicant assumes responsibility for the selection and application of this tool and should verify all of the assumptions and computed results for reasonableness and accuracy. The City will not be held liable for any errors or other negative impacts associated with the use of this tool. In the event that the City performs updates to this tool, applicants that have not established reliance on previous versions of this tool via discretionary approval may be required to utilize the latest version of the tool.

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	4	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	3510	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	5264	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	1196	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	2632	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	1385	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	2005	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	2005	sq. ft.
23	Provided BMP Footprint	4252	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	85^{th} percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	3510	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	849	cu. ft.

The City of SAN DIEGO	Project Name	All Peoples Church
	BMP ID	4

Volume Retention for No Infiltration Condition — **Worksheet B.5-6**

1	Area draining to the biofiltration BMP	106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	66848	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	2005	sq. ft.
5	Biofiltration BMP Footprint	4,252	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	4252	sq. ft.

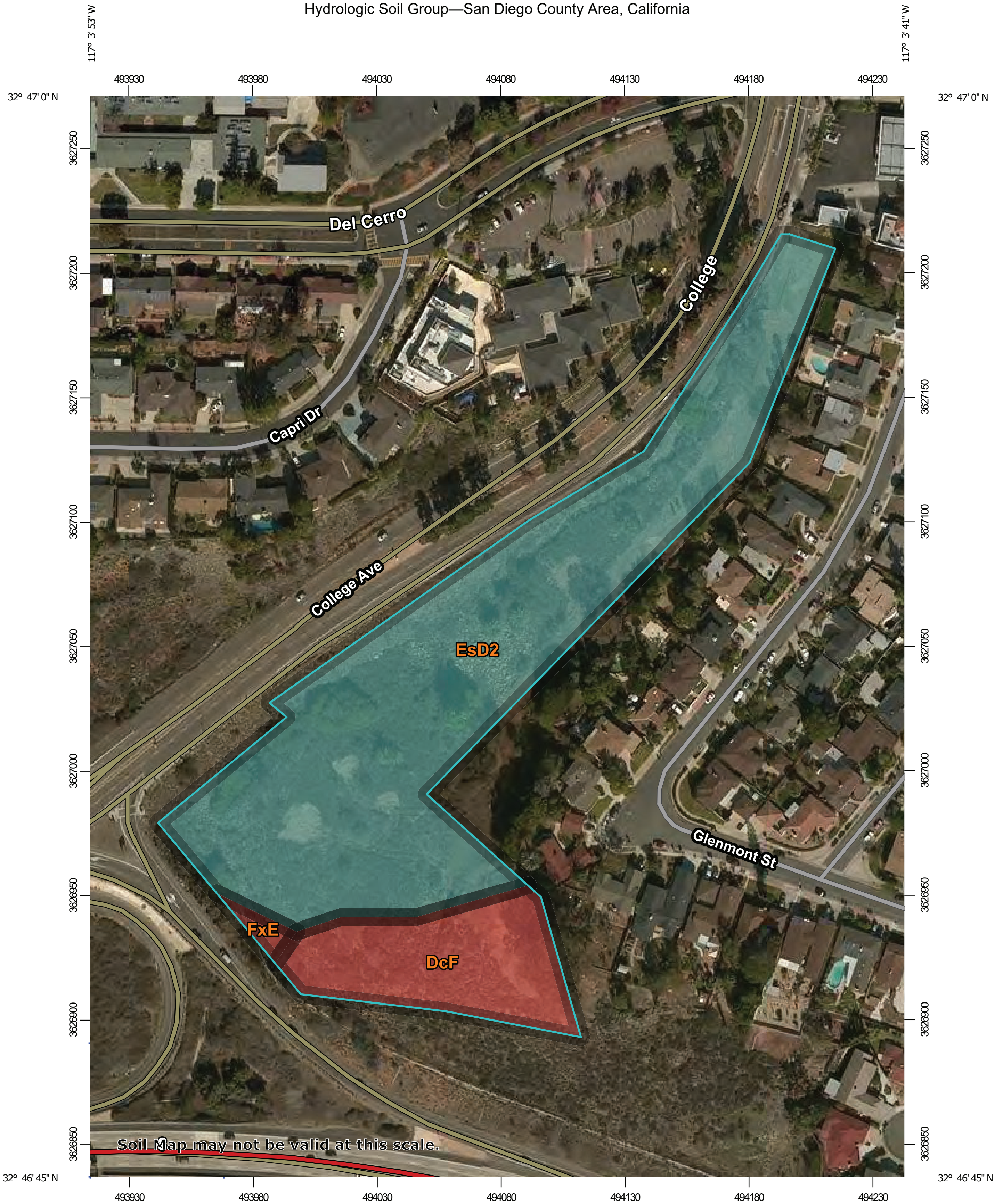
Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	2.12	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	849	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-951.22087	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

Harvest and Use Feasibility Checklist		Worksheet B.3-1 : Form I-7
1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season? ☐ Toilet and urinal flushing ☐ Landscape irrigation ☑ Other: NO		
2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2. [Provide a summary of calculations here]		
3. Calculate the DCV using worksheet B-2.1. DCV = 5,405.7 (cubic feet) [Provide a summary of calculations here] SUM OF DMAS 1-5 = 202.7 + 170.0 + 1927.4 + 2448.7 + 656.9		
3a. Is the 36-hour demand greater than or equal to the DCV? ☐ Yes / ☑ No ⇨ ⇩	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV? ☐ Yes / ☑ No ⇨ ⇩	3c. Is the 36-hour demand less than 0.25DCV? ☑ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.
Is harvest and use feasible based on further evaluation? ☐ Yes, refer to Appendix E to select and size harvest and use BMPs. ☑ No, select alternate BMPs.		



Map Scale: 1:2,120 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 13, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DcF	Diablo-Urban land complex, 15 to 50 percent slopes	D	1.1	18.4%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	4.9	80.5%
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	0.1	1.1%
Totals for Area of Interest			**6.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, CA 92029
Telephone: (619) 867-0487

All Peoples Church
c/o Hamann Companies
1000 Pioneer Way
El Cajon, CA 92020

November 30, 2020
P/W 1805-05
Report No. 1805-05-B-5

Attention: **Mr. Greg Hamann**

Subject: **Infiltration Feasibility Condition Letter for Stormwater BMPs, All Peoples Church, APN 463-01-010-00, San Diego, California 92120**

References: Attached

Gentlemen:

In accordance with your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Infiltration Feasibility Condition Letter supporting a no infiltration condition for four (4) BMP Basins within the All Peoples Church Project located in the City of San Diego, California. This letter has been prepared in accordance with the guidance presented in Appendix C, Section C.1.1 – Infiltration Feasibility Condition Letter of the City of San Diego BMP Design Manual October 2018 Edition.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is currently vacant, supporting a light growth of seasonal grasses, shrubs, and small trees. Access to the site is via College Avenue. Topography on site generally slopes down toward the southwest. Approximate elevations onsite range from 356 msl at the southwest corner to 450 msl at the northerly limits of the site. There are existing slopes up to approximately 25 feet high along the westerly/northwesterly property boundary that ascend to College Avenue. At the southwesterly corner of the site, there are existing slopes descending to a minor drainage.

Based on review of the 40-scale Preliminary Grading Plan, it is our understanding that the subject site will be graded to support a nearly 37,000 square foot church structure, associated paved parking areas, a two-level parking garage, four (4) bioretention basins, retaining walls and slopes. It is anticipated the church structure will be a concrete and/or steel frame structure, two to three stories in height and supported by a shallow slab on grade foundation system. The two-level parking garage is anticipated to be concrete and supported by a shallow slab on grade foundation system.

Existing onsite utilities include three water lines (12 inch, 42 inch, and 48 inch) in the northerly portion of the site and a storm drain outlet in the northwesterly portion of the site. At this time, AGS is unaware of specific septic system(s) or water well(s) that may exist on the property. If encountered, septic systems and water wells must be abandoned/mitigated in accordance with the specifications of the County of San Diego.

PREVIOUS GRADING

As part of our preliminary investigations several historic aerial photos and topographic maps of the project area were reviewed by representatives of AGS. Based on our review and subsurface explorations, it was determined that the site was previously graded to its current configuration. This grading was likely accomplished in multiple phases. The first phase of grading appears to have occurred in the late 1950's to early 1960's in relation to the construction of the residential development superjacent to the east, College Avenue to the west and Interstate 8 (previously Highway 80) and associated College Avenue off ramp to the south and southwest. Pre-development photos show a moderate sized drainage trending southwest through the approximate central portion of the site. Minor modifications to this drainage course occurred during the first phase of grading activity at the site. Subsequently, a second phase of grading appears to have occurred in the mid- to late-1960's. During this phase, the drainage appears to have been filled and a level pad constructed in the southwest portion of the site with graded slopes descending the west and southwest. Based on our previous subsurface explorations and review of historic photos and topographic maps, fills on the order of 20 to 30 feet deep were placed in the southwesterly portion of the site. The fill materials placed during this second phase of grading may have been derived from the residential development to the southeast (Del Cerro Court).

STORM WATER MANAGEMENT DISCUSSION

We understand storm water management devices are being proposed in accordance with the 2018 City of San Diego Storm Water Standards Manual. If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Presented below is a discussion for each item requested in Appendix C.1.1 of the 2018 City of San Diego Storm Water Standards.

- *The phase of the project in which the geotechnical engineer first analyzed the site for infiltration feasibility.*

  The site was first analyzed for infiltration feasibility in the planning phase.

- *Results of previous geotechnical analysis conducted in the project area, if any.*

  AGS prepared a Preliminary Geotechnical Investigation for the previously proposed residential development at the site in 2015 (AGS 2015), which involved excavating, logging, and sampling of ten (10) tracked excavator tests pits extending to a maximum depth of 27 feet below existing grade. Existing fill soils up to 22 feet in thickness were encountered during site exploration. Based on our review of historic topographic maps and aerial photos, it is anticipated that fill soil up to approximately 30 feet in thickness exists onsite. In addition, an Infiltration Feasibility Study, which involved excavating and testing four (4) 12-inch diameter borehole percolation test holes, was prepared in May 2016 (AGS, 2016a) and recommended a 'No Infiltration' condition due to the depth of pre-existing fill soils, the steeply sloping (>25%) nature of the site, and negligible permeability of the underlying bedrock units.

- *The development status of the site prior to the project application (i.e., new development with raw ungraded land, or redevelopment with existing graded conditions).*

  The property has been previously graded. Existing site improvements include multiple underground utilities.

- *The history of design discussions for the project footprint, resulting in the final design determination.*

  It is our understanding that the design team began evaluating site development in 2014 and AGS began providing geotechnical consulting services in 2014 as well. Originally, the site was planned for a 26-lot single-family residential development. Subsequent to issuance of the Infiltration Feasibility Study, there were several meetings with the design team and City of San Diego review staff. The City of San Diego review staff concluded that partial/passive infiltration must be allowed regardless of the scope and cost of the mitigations. In December 2016, AGS prepared a response to review comments and an updated Worksheet C.4-1 (AGS 2016b) indicating a partial infiltration condition with mitigation. The proposed mitigations included deep removals and replacement with highly permeable imported/manufactured materials up to 30 feet deep to act as a conduit to a more suitable infiltration surface, lining the sides of the basins with impermeable membranes, and deepened foundation systems. In 2018, the City of San Diego BMP Design Manual was updated and provided clarification of the lower bound infiltration rate and what mitigations are considered reasonable and unreasonable. The mitigations proposed in December 2016 were now considered unreasonable and the site would be considered to have a 'No Infiltration' condition; however, the project site was sold to the current owner in 2018.

  In 2018 plans changed from a single-family residential development to its currently proposed church facility. AGS began by updating the previous studies to address the new plans beginning with a Preliminary Geotechnical Investigation (AGS 2018) and an Updated Preliminary Geotechnical Investigation (AGS 2020a) which were desktop studies utilizing previous subsurface investigations.

- *Full/partial infiltration BMP standard setbacks to underground utilities, structures, retaining walls, fill slopes, and natural slopes applicable to the DMA that prevent full/partial infiltration.*

  Steep (>25 percent) existing fill slopes up to 20 feet in height flank the westerly side of the site. After development, graded fill slopes will be present in close proximity to the proposed southwesterly BMP in addition to deep fills present. Due to the top of slope and proposed church structure constraints, establishing a BMP set back from top of slope is not feasible.

  A storm drain is proposed downgradient of the southerly basin where it is anticipated that stormwater allowed to infiltrate will likely flow along the bedrock/fill contact, flow into the storm drain trench, and pipe along the proposed storm drain line potentially leading to settlement and distress above.

- *Physical impairments (i.e., fire road egress, public safety considerations, etc.) that prevent full/partial infiltration.*

  Physical impairments are not anticipated to prevent full/partial infiltration.

➢ *The consideration of site design alternatives to achieve partial/full infiltration within the DMA.*

Due to the existing sloping topography of the site descending down gradient to deep fills, negligible infiltration capacity within the bedrock/formational materials, and structural or steep (>25%) sloping terrain constraints AGS considered that there were no locations on the property which would support full or partial infiltration.

It may be possible to import or manufacture select permeable soils to be utilized beneath the basin as a 'conduit' to the native infiltration surface at depth; however, this option is highly cost prohibitive and not considered a reasonable mitigation in accordance with the current BMP Design Manual.

➢ *The extent site design BMPs requirements were included in the overall design.*

The following narrative is from the Civil Engineer (Pasco, Laret, Suiter & Associates) regarding storm water BMP design:

> The development consists of construction of one church building, one two-story parking garage, parking and drive aisles, associated hardscape, and a permeable pavement plaza area with four biofiltration basins to meet water quality and hydromodification requirements. In general, runoff from the project will be directed via sheet flow, gutter flow, stormdrain structures and underground PVC drainage pipes into the proposed biofiltration basins. After stormwater is treated and mitigated it will ultimately be conveyed to the POC at the southern edge of the project site and follow existing drainage patterns into the existing 48" public stormdrain in Caltrans ROW, where it flows under Interstate-8 to the south.
>
> In general, the site's runoff will be conveyed to the biofiltration basins, where it will be treated and flow-restricted, before entering the MS4 where it is received by the headwall and 48" public stormdrain in Caltrans ROW. The proposed biofiltration basins are designed according to the Storm Water Standards BMP Design Manual Section 5.5 and in Appendix B.5.1 (for standard biofiltration BMP sizing) and Appendix F. Appendix G.2.4 was used in combination with site specific continuous simulation modeling (EPA SWMM) to meet hydromodification management requirements.
>
> The proposed development is divided into four basins: 1, 2, 3 and 4. Each basin connects to the public stormdrain via pipe connection underground or is released at-grade to the existing drainage pathways before ultimately being conveyed to the single POC at the headwall and 48" underground stormdrain in Caltrans ROW, adjacent to the southern edge of the project site.
>
> Basin 1 collects and treats runoff from the permeable parking and landscape areas on the western side of the northerly parking area. Storm water sheet flows across the parking area, into the gutter, and is conveyed to the basin via curb openings; Basin 2 collects and treats the runoff from the easterly side of the northerly parking area, the drive aisle, and associated landscape. Stormwater sheet flows across the drive aisle and parking spaces before becoming gutter flow, where it is picked up by a curb inlet and piped over to the biofiltration basin; Basin 3 captures and treats runoff from the parking garage, main drive aisle, associated landscape, permeable plaza area, and miscellaneous hardscape via overland sheet flow, Type-I inlets, area drains, and is piped over to the biofiltration basin; Basin 4 captures the southern portion of the main drive aisle, associated parking, graded slopes, church structure, and associated hardscape

before sheet flowing or being underground piped to the biofiltration basin adjacent to the Church structure.

The four bioretention basins were sized to meet the requirements for water quality treatment and hydromodification flow-control before they enter the existing point-of-compliance (POC) at the 48" underground drainage pipe in Caltrans ROW, adjacent to the southern boundary of the site. The drainage then flows beneath Interstate 8 to the south.

- *Conclusion or recommendation from the geotechnical engineer regarding the DMA's infiltration condition.*

  The hazards associated with infiltrating stormwater in the proposed BMP's as currently planned cannot be reasonably mitigated and should be avoided. Based on the presence of deep existing fill soils, the potential for slope instability, and potential soil volumetric change as discussed in sections above, AGS recommends a no infiltration condition for the proposed BMP's.

- *An Exhibit for all applicable DMA's that clearly labels:*

  AGS prepared an Infiltration Feasibility Exhibit attached herewith as Plate 1. The Exhibit shows the existing and proposed grades, proposed development, depths of existing artificial fill designated as "afu", and proposed BMP's distances to slopes, underground utilities, structures, and retaining walls.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

Prepared by:

SHANE P. SMITH
Staff Engineer

Reviewed by:

ANDRES BERNAL, Sr. Geotechnical Engineer
PE 62366, GE 2715, Reg. Exp. 9-30-21

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-21

Distribution: (5) Addressee

Attachments: References
Plate 1 – Infiltration Feasibility Exhibit

REFERENCES

Advanced Geotechnical Solutions, Inc. (2015). "Preliminary Geotechnical Investigation, Del Cerro Residential Development, College Avenue and Interstate 8, San Diego, California," dated July 20, 2015, Report No. 1411-02-B-4.

---. (2016a). "Geotechnical Addendum, Infiltration Testing for Proposed Storm Water BMP Basins, Proposed Del Cerro Single-Family Residential Development, City of San Diego, California," dated May 21, 2016, Report No. 1411-02-B-6.

---. (2016b). "Geotechnical Addendum, Response to Cycle 13 Review Comments, LDR-Geology, Del Cerro Residential Development, College Avenue and Interstate 8, City of San Diego, California," dated December 21, 2016, Report No. 1411-02-B-7.

---. (2018). "Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-01-010-00, San Diego, California 902120," dated November 20, 2018, Report No. 1805-05-B-2.

---. (2020a). "Updated Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-01-010-00, San Diego, California 902120," dated January 7, 2020, Report No. 1805-05-B-3.

---. (2020b). "Geotechnical Addendum and Response to Cycle 2 LDR-Geology Review Comments, All Peoples Church, Northeast of College Avenue and Interstate 8, San Diego, California," dated January 20, 2020, Report No. 1805-05-B-4.

California Building Standards Commission, 2019, California Building Code, Title 24, Part 2, Volumes 1 and 2.

City of San Diego, 2018, Transportation & Storm Water, Storm Water Standard – BMP Design Manual, October 2018 Edition.

Kennedy, M.P., and Tan, S.S., 2008, Geologic Map of the San Diego 30' x 60' Quadrangle, California Regional Geologic Map Series, Scale = 1:100,000, Map No. 3, Sheet 1 of 2.

State of California Water Boards, September 23, 2016, http://geotracker.waterboards.ca.gov/

Pasco, Laret, Suiter, & Associates, 2020, Preliminary Grading Plan, Site Development Permit No. 92338, Planned Development Permit No. 92339, And Easement Vacation No. 92340 All Peoples Church, 40-Scale, original date April 22, 2019, plot revised March 17, 2020.

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 92338, PLANNED DEVELOPMENT PERMIT NO. 92339, EASEMENT VACATION NO. 92340, AND TENTATIVE MAP NO. _______

ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

TOPOGRAPHY:

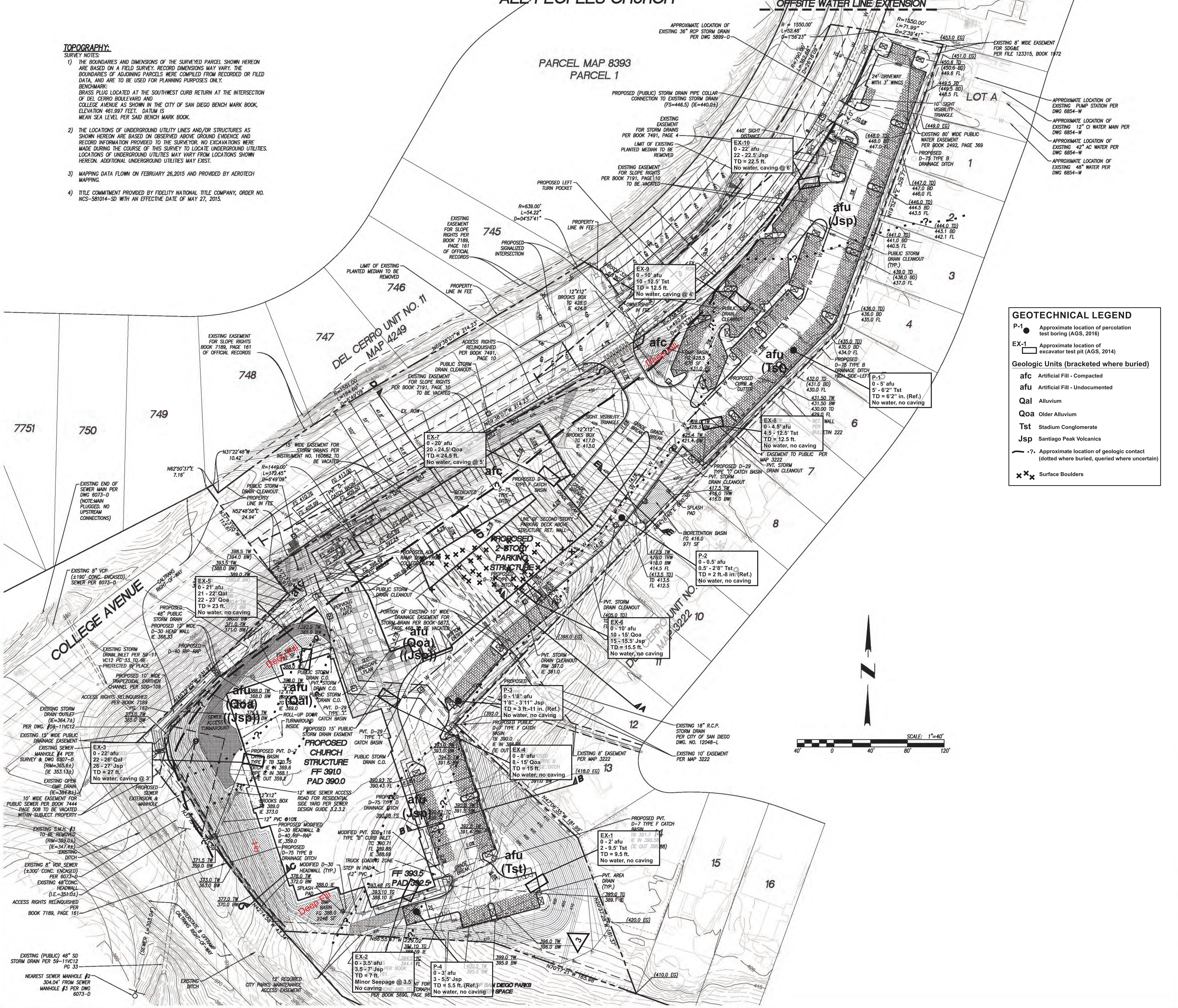
SURVEY NOTES:

1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK. ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.

2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.

3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.

4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



LEGEND

- BOUNDARY LINE
- ADJACENT PROPERTY LINE
- EASEMENT LINE
- RIGHT OF WAY
- EXISTING STREET CENTERLINE
- EXISTING IMPROVEMENTS
- EXISTING CONTOUR — 139
- EXISTING CURB & GUTTER
- EXISTING SEWER MAIN
- EXISTING STORM DRAIN MAIN
- EXISTING CURB INLET
- EXISTING WATER MAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING STRUCTURE
- EXISTING VEGETATION
- PROPOSED IMPROVEMENTS
- PROPOSED ROAD CENTERLINE
- LIMIT OF WORK LINE
- CURB AND GUTTER
- 24' RESIDENTIAL DRIVEWAY
- PROPOSED CONTOURS — 146
- PROPOSED SPOT ELEVATION — FS=145.0
- RETAINING WALL
- SDRSD D-75 BROW DITCH
- BIORETENTION BASIN
- STORM DRAIN HEADWALL
- STORM DRAIN CLEANOUT
- AREA DRAIN
- STORM DRAIN INLET
- TYPE F CATCH BASIN
- RIP RAP ENERGY DISSIPATOR PER SDD-104
- PVC STORM DRAIN (SIZE VARIES)
- WATER SERVICE — W
- TRAFFIC SIGNAL
- PARKING GARAGE WALL
- CUT/FILL SLOPE
- PERMEABLE PAVERS
- PROPOSED RIP-RAP
- TREE PER LANDSCAPE PLANS

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2020
DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 635444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY GRADING PLAN

SHEET NUMBER: C 2.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020 11. ______
2. ______ 12. ______

PLATE 1
Infiltration Feasibility Exhibit

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-5	Nov. 2020

3-17-2020 PLSA 2936

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Attachment 2
Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: All Peoples Church

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

☑ Underlying hydrologic soil group

☑ Approximate depth to groundwater

☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)

☑ Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas

☑ Existing topography

☑ Existing and proposed site drainage network and connections to drainage offsite

☑ Proposed grading

☑ Proposed impervious features

☑ Proposed design features and surface treatments used to minimize imperviousness

☑ Point(s) of Compliance (POC) for Hydromodification Management

Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)

☑ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).

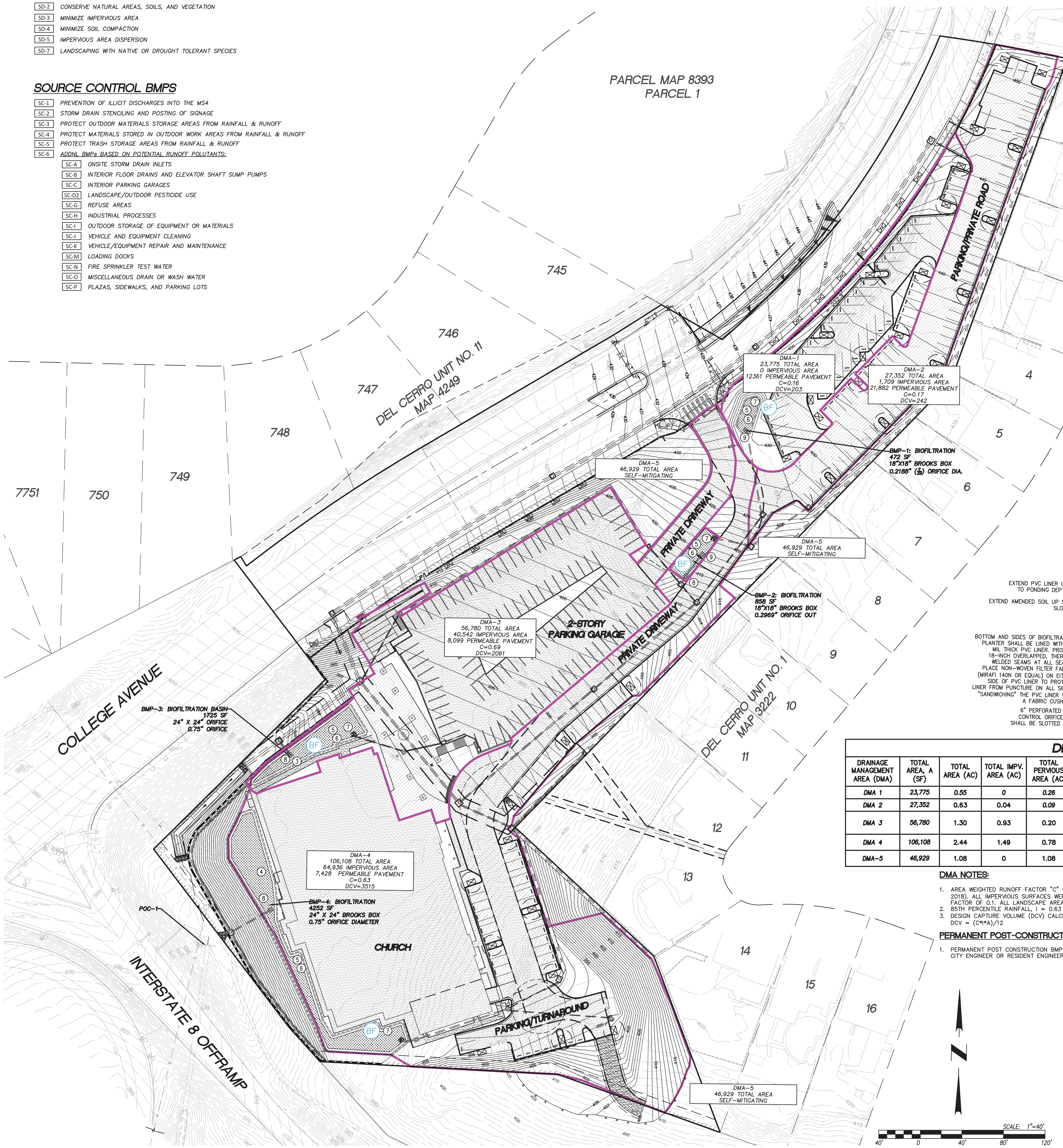
ONSITE WATER QUALITY AND HMP EXHIBIT

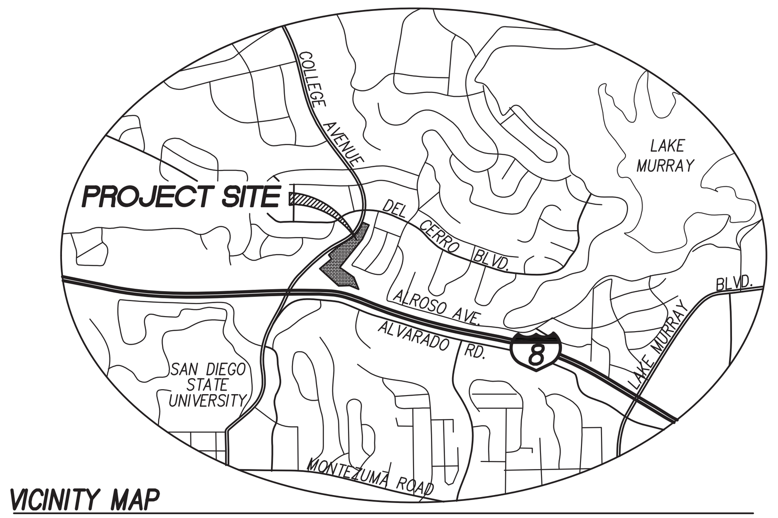
SITE DESIGN BMPS

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDRAULIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

SOURCE CONTROL BMPS

- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- SC-2 STORM DRAIN STENCILING AND POSTING OF SIGNAGE
- SC-3 PROTECT OUTDOOR MATERIALS STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS FROM RAINFALL & RUNOFF
- SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-6 ADDNL BMPs BASED ON POTENTIAL RUNOFF POLUTANTS:
  - SC-A ONSITE STORM DRAIN INLETS
  - SC-B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
  - SC-C INTERIOR PARKING GARAGES
  - SC-D2 LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-G REFUSE AREAS
  - SC-H INDUSTRIAL PROCESSES
  - SC-I OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
  - SC-J VEHICLE AND EQUIPMENT CLEANING
  - SC-K VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
  - SC-M LOADING DOCKS
  - SC-N FIRE SPRINKLER TEST WATER
  - SC-O MISCELLANEOUS DRAIN OR WASH WATER
  - SC-P PLAZAS, SIDEWALKS, AND PARKING LOTS





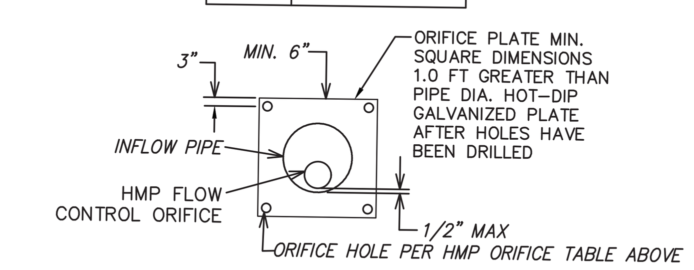
VICINITY MAP

NOT TO SCALE

LEGEND

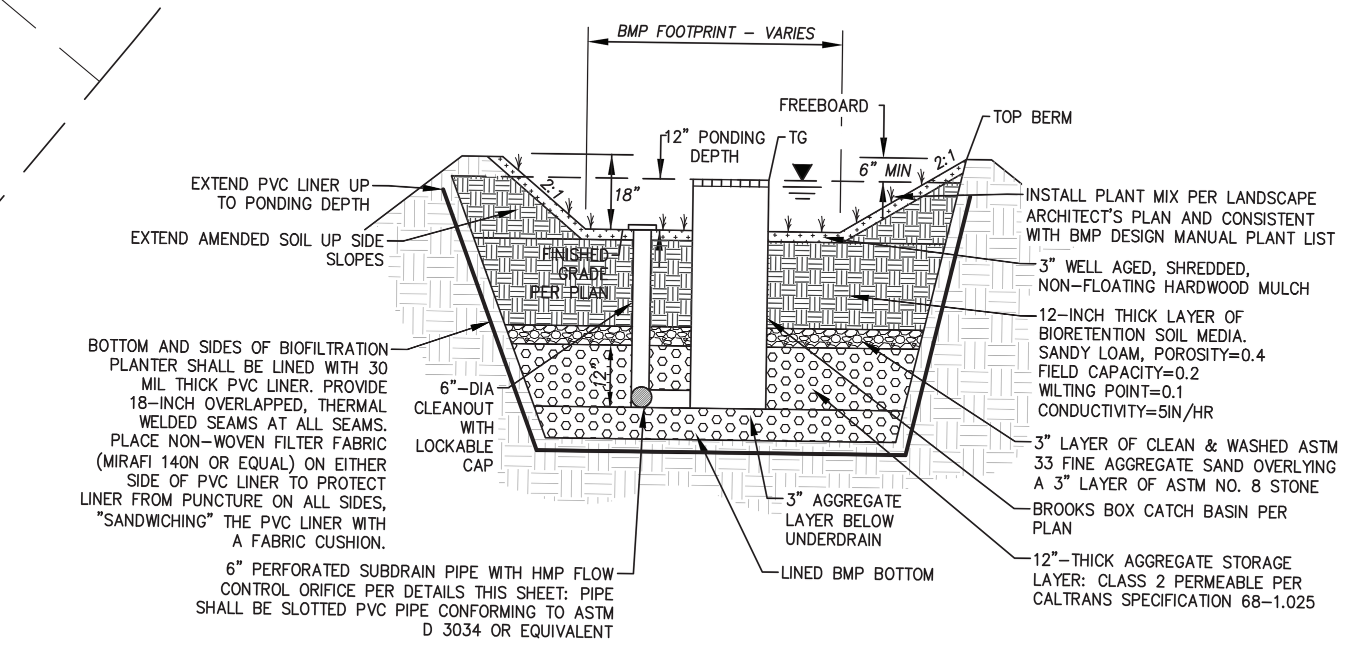
RIGHT-OF-WAY	R/W
PROPERTY LINE	P/L
DMA BOUNDARY	
LIMIT OF GRADING	
DRAINAGE DIRECTION	
RIP RAP ENERGY DISSIPATER	
PERMEABLE PAVEMENT	
IMPERVIOUS AREA (ROOF AND CONCRETE)	
BIOFILTRATION BASIN (BF-1)	BF

HMP ORIFICE TABLE	
BMP	ORIFICE SIZE
1	0.2188"
2	0.2969"
3	0.75"
4	0.75"



FLOW CONTROL ORIFICE PLATE DETAIL

NOT TO SCALE



DMA SUMMARY

DRAINAGE MANAGEMENT AREA (DMA)	TOTAL AREA, A (SF)	TOTAL AREA (AC)	TOTAL IMPV. AREA (AC)	TOTAL PERVIOUS AREA (AC)	DMA RUNOFF FACTOR "C"	DCV (CU-FT)	DMA TYPE	STRUCTURAL BMP TYPE	STRUCT. BMP NAME
DMA 1	23,775	0.55	0	0.26	0.16	203	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-1
DMA 2	27,352	0.63	0.04	0.09	0.17	242	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-2
DMA 3	56,780	1.30	0.93	0.20	0.69	2061	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-3
DMA 4	106,108	2.44	1.49	0.78	0.63	3515	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-4
DMA-5	46,929	1.08	0	1.08	0.23	0	SELF-MITIGATING	SELF-MITIGATING	N/A

DMA NOTES:

1. AREA WEIGHTED RUNOFF FACTOR "C" CALCULATED PER APPENDIX B.1.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). ALL IMPERVIOUS SURFACES WERE ASSIGNED A RUNOFF FACTOR OF 0.90. ALL PERMEABLE PAVEMENT WAS ASSIGNED A RUNOFF FACTOR OF 0.1. ALL LANDSCAPE AREAS WERE ASSIGNED A RUNOFF FACTOR OF 0.23, CONSISTENT WITH TYPE C SOILS.
2. 85TH PERCENTILE RAINFALL, I = 0.63 INCHES
3. DESIGN CAPTURE VOLUME (DCV) CALCULATED PER APPENDIX B.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). DCV = (C*I*A)/12

PERMANENT POST-CONSTRUCTION BMP NOTES:

1. PERMANENT POST CONSTRUCTION BMP DEVICES SHOWN ON PLAN SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY ENGINEER OR RESIDENT ENGINEER AND THE ENGINEER OF WORK.

CONSTRUCTION NOTES

1. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-1 PER DETAIL THIS SHEET
2. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-2 PER DETAIL THIS SHEET
3. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-3 PER DETAIL THIS SHEET
4. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-4 PER DETAIL THIS SHEET
5. 6" CLEANOUT WITH LOCKABLE CAP
6. PERFORATED 6" PVC UNDERDRAIN PIPE (ASTM D 3034 OR EQUIVALENT)
7. No. 2 BACKING RIP-RAP ENERGY DISSIPATER
8. 24" X 24" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.
9. 18" X 18" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.

PROJECT CHARACTERISTICS

TOTAL PROJECT OWNERSHIP: 5.99 ACRES

TOTAL DISTURBED AREA: 5.92 ACRES

TOTAL PROPOSED IMPERVIOUS AREA: 107,187 SF= 2.46 ACRES

TOTAL PERMEABLE PAVEMENT: 49,621 SF=1.14 ACRES

TOTAL PROPOSED LANDSCAPE AREA: 101,059 SF = 2.32 ACRES

EXISTING HYDROLOGIC FEATURES: N/A

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE C

GROUNDWATER INFORMATION

GROUNDWATER WAS NO ENCOUNTERED DURING GEOTECHNICAL TESTING PER GEOTECHNICAL INVESTIGATION, "UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION AND DESIGN RECOMMENDATIONS, PROPOSED CHURCH FACILITY, APN 463-010-1000, SAN DIEGO, CALIFORNIA 90212" BY ADVANCED GEOTECHNICAL SOLUTIONS, INC DATED JANUARY 20, 2020.

CCYSAs

THE PROJECT IS ENTIRELY EXEMPT/NOT SUBJECT TO RPO REQUIREMENTS WITHOUT UTILIZATION OF RPO EXEMPTIONS AS THERE ARE NO AREAS ONSITE OR UPSTREAM TO PROTECT; THEREFORE THE PROJECT EFFECTIVELY AVOIDS AND BYPASSES SOURCES OF MAPPED CCYSAS PER APPROACHED OUTLINED IN APPENDIX H.2 AND H.3 AS NONE WERE IDENTIFIED.

REFER TO WMAA MAP INCLUDED IN THE "PRIORITY DVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR THE ALL PEOPLES CHURCH"

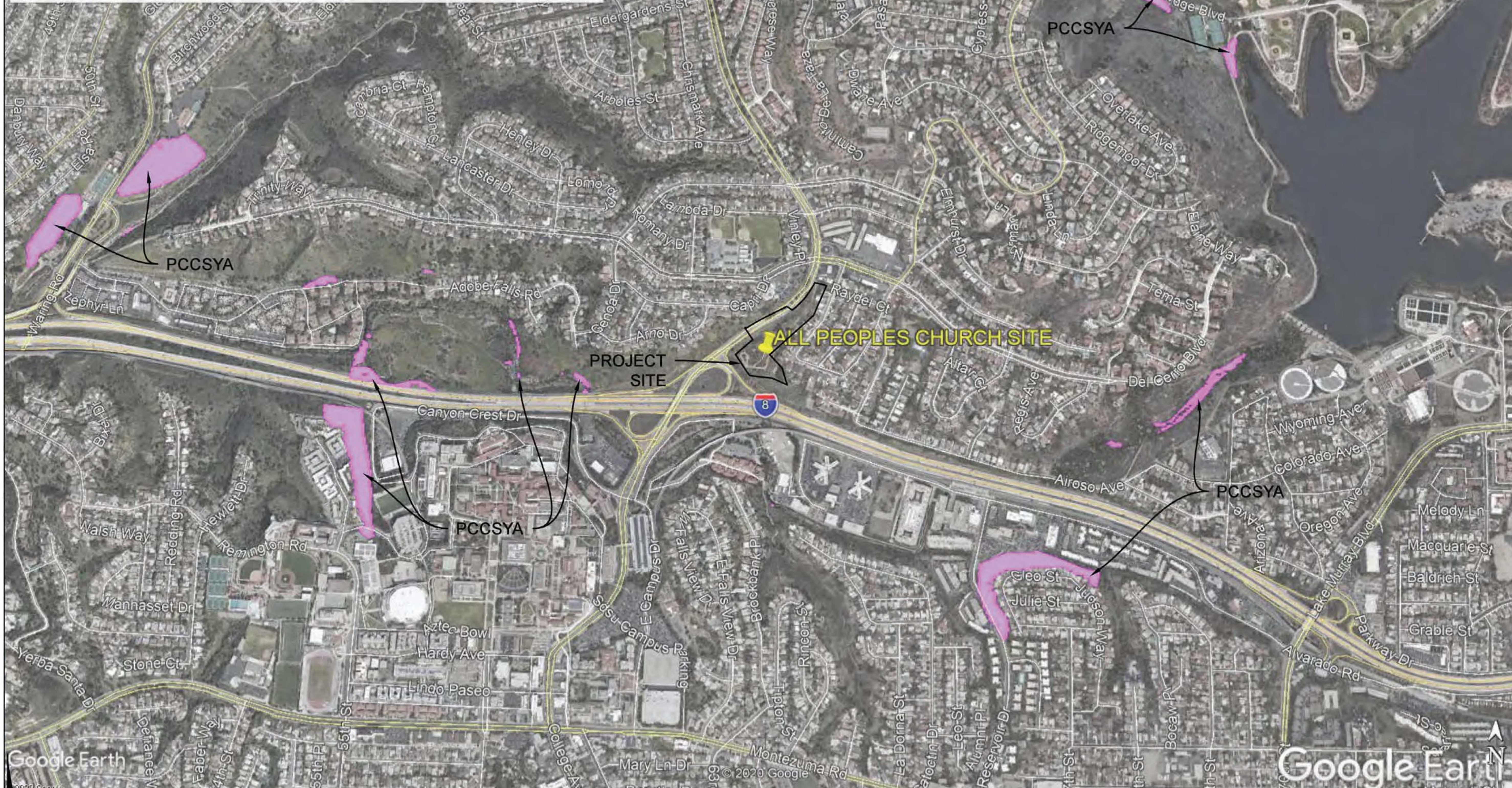
PROPOSED CONDITION DMA & HMP EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

POTENTIAL CRITICAL COARSE SEDIMENT YEILD AREAS MAP

PROJECT SITE DOES NOT CONTAIN CRITICAL COARSE SEDIMENT YEILD AREAS



ALL PEOPLES CHURCH

LOCATED NORTHEAST CORNER OF I-8 & COLLEGE AVE
SAN DIEGO, CA 92120
SCALE: NTS
PREPARED: 8/25/2020

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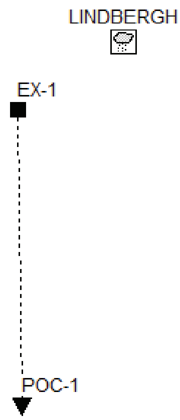
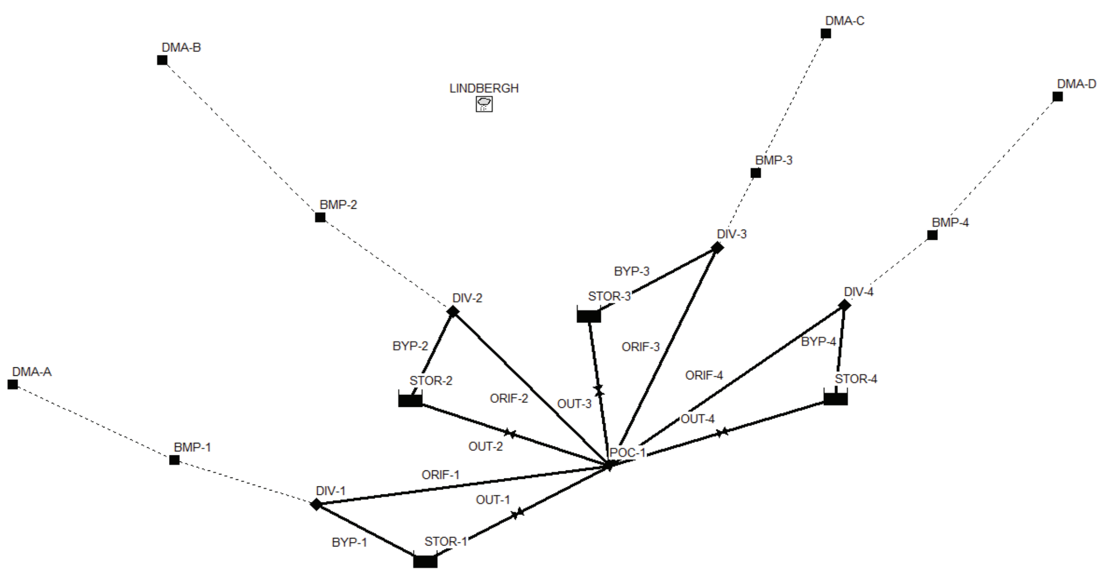
ALL PEOPLES CHURCH
J-2936
2/9/2021

SWMM MODEL SCHEMATICS FOR ALL PEOPLES CHURCH

PRE-PROJECT MODEL



POST-PROJECT MODEL



J:\ACTIVE JOBS\2936 ALL PEOPLE'S CHURCH\CIVIL\REPORTS\SWQMP\SWMM\RESULTS\2936_SWMM_Schematics.xlsx

SWMM Input Parameters

SWMM PRE-DEV INPUT PARAMETERS FOR POC-1

DMA	Tributary Area, A (ac)	Tributary Area, A (sf)	Overland Flow Length, L	Overland Flow Width, W=A/L	% Slope, S_o	Imp. Area (sf)	% Imperv	N-Imperv	N-Perv	Suction Head	Conductivity	Initial Deficit	Total Inflow	Separation Time
EX-1	**4.913108**	**214,015**	**1248**	**171**	**8.2**	**0.0**	**0.0%**	**0.012**	**0.100**	**6.0**	**0.100**	**0.31**	**0.00983**	**24**

SWMM POST-DEV INPUT PARAMETERS FOR POC-1

DMA	Tributary Area, A (ac)	Tributary Area, A (sf)	Overland Flow Length, L	Overland Flow Width, W=A/L	% Slope, S_o	Imp. Area (sf)	% Imperv	N-Imperv	N-Perv	Suction Head	Conductivity	Initial Deficit	Total Inflow	Separation Time
DMA-A	0.534963	23,303	389.5	60	5.3	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
BMP-1	0.010835	472	37.8	12	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-B	0.608219	26,494	602.9	44	5.9	1,709	6.5%	0.012	0.10	6.0	0.07500	0.31		
BMP-2	0.019697	858	52	16	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-C	1.263889	55,055	549.3	100	8.4	40,543	73.6%	0.012	0.10	6.0	0.07500	0.31		
BMP-3	0.039601	1,725	62.3	28	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-D	2.338292	101,856	783.9	130	5.6	64,943	63.8%	0.012	0.10	6.0	0.07500	0.31		
BMP-4	0.097612	4,252	210	20	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
TOTAL	**4.913108**	**214,015**	**335.9625**	**637**	**3.2**	**107,195**	**50.1%**	**0.012**	**0.10**	**6.0**	**0.07500**	**0.31**	**0.00983**	**24**

```
ALL PEOPLES CHURCH
J-2936
PRE-DEVELOPMENT CONDITION

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           10/17/1948
START_TIME           08:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    08:00:00
END_DATE             12/31/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   .11    0.16   .18    .21    .21    .2     .16    .12
  0.08   0.06
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00     1.0      TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
EX-1             LINDBERGH        POC-1            4.913108 0        171      8.2
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
EX-1             0.012      0.1        0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
EX-1             6          0.1        0.31

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Node 1075
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "J:\Active Jobs\3417 The
Grove\CIVIL\REPORTS\SWQMP\SWMM\ELECTRONIC FILES\Rainfall_data\lindbergh.txt"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
```

```
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            1100.000           3500.000

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX-1             1066.897           5940.023

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1908.881           6482.122
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

ALL PEOPLES CHURCH
J-2936
PRE-DEVELOPMENT CONDITION


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ 10/17/1948 08:00:00
Ending Date .............. 12/31/2005 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       230.851       563.840
Evaporation Loss .........         2.020         4.935
Infiltration Loss ........       220.084       537.543
Surface Runoff ...........         9.591        23.425
Final Storage ............         0.000         0.000
Continuity Error (%) .....        -0.366


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         9.591         3.125
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
```

```
External Inflow ..........        0.000         0.000
External Outflow .........        9.591         3.125
Flooding Loss ............        0.000         0.000
Evaporation Loss .........        0.000         0.000
Exfiltration Loss ........        0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume ......        0.000         0.000
Continuity Error (%) .....        0.000


***************************
Analysis begun on:  Thu Feb  4 13:29:58 2021
Analysis ended on:  Thu Feb  4 13:30:31 2021
Total elapsed time: 00:00:33
```

```
ALL PEOPLES CHURCH
J-2936
POST-DEVELOPMENT CONDITION

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           10/17/1948
START_TIME           08:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    08:00:00
END_DATE             12/31/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   .11    0.16   .18    .21    .21    .2     .16    .12
  0.08   0.06
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00     1.0      TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
DMA-A            LINDBERGH        BMP-1            .534963  0        60       5.3
  0
BMP-1            LINDBERGH        DIV-1            0.010835 0        12       .1
  0
DMA-B            LINDBERGH        BMP-2            .608219  6.5      44       5.9
  0
DMA-C            LINDBERGH        BMP-3            1.263889 73.6     100      8.4
  0
DMA-D            LINDBERGH        BMP-4            2.338292 63.8     130      5.6
  0
BMP-2            LINDBERGH        DIV-2            .019697  0        16       .1
  0
BMP-3            LINDBERGH        DIV-3            0.039601 0        28       .1
  0
BMP-4            LINDBERGH        DIV-4            0.097612 0        20       0.1
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
DMA-A            0.012      .1         0.05       0.1        25         OUTLET
BMP-1            0.012      .1         0.05       0.1        25         OUTLET
DMA-B            .012       .1         0.05       .1         25         OUTLET
DMA-C            .012       .1         0.05       .1         25         OUTLET
DMA-D            .012       .1         0.05       .1         25         OUTLET
BMP-2            .012       .1         0.05       .1         25         OUTLET
BMP-3            .012       .1         0.05       .1         25         OUTLET
BMP-4            .012       .1         0.05       .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-A            6          .075       .31
BMP-1            6          .075       .31
DMA-B            6          .075       .31
DMA-C            6          .075       .31
DMA-D            6          .075       .31
BMP-2            6          .075       .31
```

```
BMP-3            6          .075       .31
BMP-4            6          .075       .3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BMP1             BC
BMP1             SURFACE    14.47      0.0        0          0          5
BMP1             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP1             STORAGE    18         0.67       0.0        0
BMP1             DRAIN      .0338      0.5        3          6          0          0


BMP2             BC
BMP2             SURFACE    12         0.0        0          0          5
BMP2             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP2             STORAGE    18         0.67       0          0
BMP2             DRAIN      .0348      0.5        6          6          0          0


BMP3             BC
BMP3             SURFACE    13.9       0.0        0          0          5
BMP3             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP3             STORAGE    18         .67        0          0
BMP3             DRAIN      .1064      0.5        3          6          0          0


BMP4             BC
BMP4             SURFACE    13.9       0.0        0          0          5
BMP4             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP4             STORAGE    18         0.67       0          0
BMP4             DRAIN      .0432      0.5        3          6          0          0


[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp
 ToPerv     RptFile                  DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ----------
---------- ---------- ------------------------ ---------------- ----------
BMP-1            BMP1             1       471.97     0          0          100
 0          *                        *                100
BMP-2            BMP2             1       858.00     0          0          100
 0          *                        *                100
BMP-3            BMP3             1       1725.02    0          0          100
 0          *                        *                100
BMP-4            BMP4             1       4251.98    0          0          100
```

```
 0         *                        *                 100

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Node 1075
POC-1            0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV-1            0          BYP-1            CUTOFF     0.00251    0          0
    0          0
DIV-2            0          BYP-2            CUTOFF     0.00478    0          0
    0          0
DIV-3            0          BYP-3            CUTOFF     0.02943    0          0
    0          0
DIV-4            0          BYP-4            CUTOFF     0.02943    0          0
    0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
   N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ----------
-------------------------- -------- --------          -------- --------
STOR-1           0        0.5        0          TABULAR    STOR-1
   0        0
STOR-2           0        0.5        0          TABULAR    STOR-2
   0        0
STOR-3           0        0.5        0          TABULAR    STOR-3
   0        0
STOR-4           0        0.5        0          TABULAR    STOR-4
   0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
BYP-1            DIV-1            STOR-1           10         0.01       0
0          0          0
ORIF-1           DIV-1            POC-1            10         0.01       0
0          0          0
BYP-2            DIV-2            STOR-2           10         0.01       0
0          0          0
ORIF-2           DIV-2            POC-1            10         0.01       0
0          0          0
BYP-3            DIV-3            STOR-3           10         0.01       0
0          0          0
ORIF-3           DIV-3            POC-1            10         0.01       0
```

```
0          0          0
BYP-4            DIV-4            STOR-4           10         0.01       0
0          0          0
ORIF-4           DIV-4            POC-1            10         0.01       0
0          0          0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------
---------------- ---------- --------
OUT-1            STOR-1           POC-1            0          TABULAR/DEPTH   OUT-1
                     NO
OUT-2            STOR-2           POC-1            0          TABULAR/DEPTH   OUT-2
                     NO
OUT-3            STOR-3           POC-1            0          TABULAR/DEPTH   OUT-3
                     NO
OUT-4            STOR-4           POC-1            0          TABULAR/DEPTH   OUT-4
                     NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
BYP-1            CIRCULAR     1                0          0          0          1

ORIF-1           DUMMY        0                0          0          0          1

BYP-2            CIRCULAR     1                0          0          0          1

ORIF-2           DUMMY        0                0          0          0          1

BYP-3            CIRCULAR     1                0          0          0          1

ORIF-3           CIRCULAR     1                0          0          0          1

BYP-4            CIRCULAR     1                0          0          0          1

ORIF-4           CIRCULAR     1                0          0          0          1


[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
OUT-1            Rating     0.000      0.602
OUT-1                       0.083      1.074
OUT-1                       0.167      1.916
OUT-1                       0.250      2.998
OUT-1                       0.333      4.275
```

```
OUT-1                        0.417      5.719
OUT-1                        0.500      7.313
;
;Qtotal from Top of Riser to Top of Berm
OUT-2            Rating      0.000      1.204
OUT-2                        0.083      1.700
OUT-2                        0.167      2.566
OUT-2                        0.250      3.671
OUT-2                        0.333      4.970
OUT-2                        0.417      6.435
OUT-2                        0.500      8.050
;
;Qtotal Outlet Structure Discharge- Top Riser to TB
OUT-3            Rating      0.000      1.505
OUT-3                        0.083      2.163
OUT-3                        .167       3.313
OUT-3                        .250       4.782
OUT-3                        0.333      6.510
OUT-3                        0.417      8.461
OUT-3                        0.500      10.611
;
;Qtotal from Riser to TB
OUT-4            Rating      0.000      6.019
OUT-4                        .083       6.861
OUT-4                        .167       8.188
OUT-4                        .25        9.829
OUT-4                        .333       11.723
OUT-4                        .417       13.834
OUT-4                        .5         16.140
;
;GRATE TO TOP OF BERM
STOR-1           Storage     0.000      668
STOR-1                       0.083      685
STOR-1                       0.167      702
STOR-1                       0.25       719
STOR-1                       0.333      736
STOR-1                       0.417      753
STOR-1                       0.5        770
;
;TOP OF GRATE TO TOP OF BERM
STOR-2           Storage     0.000      858
STOR-2                       .083       858
STOR-2                       0.167      858
STOR-2                       0.250      858
STOR-2                       0.333      858
STOR-2                       0.417      858
STOR-2                       0.500      858
;
;TOP OF GRATE TO TOP OF BERM
STOR-3           Storage     0.000      2265
```

```
STOR-3                        0.083      2310
STOR-3                        .167       2355
STOR-3                        .250       2400
STOR-3                        .333       2445
STOR-3                        .417       2490
STOR-3                        .500       2535
;
;TG TO TB
STOR-4           Storage      0.000      5591
STOR-4                        0.083      5703
STOR-4                        .167       5815
STOR-4                        .250       5927
STOR-4                        0.333      6039
STOR-4                        0.417      6151
STOR-4                        0.500      6263

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "J:\Active Jobs\3417 The
Grove\CIVIL\REPORTS\SWQMP\SWMM\ELECTRONIC FILES\Rainfall_data\lindbergh.txt"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            3443.449           1802.912
DIV-1            -178.777           1303.345
DIV-2            1505.190           3806.228
DIV-3            4769.319           4636.678
DIV-4            6337.947           3886.967
STOR-1           1159.170           565.167
STOR-2           974.625            2652.826
STOR-3           3177.624           3748.558
STOR-4           6222.607           2675.894

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-A            -3927.336          2860.438
BMP-1            -1931.949          1880.046
DMA-B            -2081.892          7070.358
DMA-C            6107.266           7416.378
DMA-D            8967.705           6597.463
BMP-2            -132.641           5028.835
BMP-3            5242.215           5605.536
BMP-4            7422.145           4798.155

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1908.881           6482.122
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
  --------------------------------------------------------------

  ALL PEOPLES CHURCH
  J-2936
  POST-DEVELOPMENT CONDITION

  WARNING 04: minimum elevation drop used for Conduit BYP-1
  WARNING 04: minimum elevation drop used for Conduit ORIF-1
  WARNING 04: minimum elevation drop used for Conduit BYP-2
  WARNING 04: minimum elevation drop used for Conduit ORIF-2
  WARNING 04: minimum elevation drop used for Conduit BYP-3
  WARNING 04: minimum elevation drop used for Conduit ORIF-3
  WARNING 04: minimum elevation drop used for Conduit BYP-4
  WARNING 04: minimum elevation drop used for Conduit ORIF-4

  *********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  *********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... GREEN_AMPT
  Flow Routing Method ...... KINWAVE
  Starting Date ............ 10/17/1948 08:00:00
  Ending Date .............. 12/31/2005 23:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 01:00:00
  Wet Time Step ............ 00:15:00
  Dry Time Step ............ 04:00:00
  Routing Time Step ........ 60.00 sec


  **************************        Volume         Depth
  Runoff Quantity Continuity     acre-feet        inches
  **************************     ---------       -------
  Initial LID Storage ......         0.025         0.061
  Total Precipitation ......       230.851       563.840
  Evaporation Loss .........        37.117        90.657
  Infiltration Loss ........        98.720       241.118
  Surface Runoff ...........         7.680        18.757
```

```
  LID Drainage .............        88.864       217.045
  Final Storage ............         0.056         0.137
  Continuity Error (%) .....        -0.676


  **************************        Volume        Volume
  Flow Routing Continuity        acre-feet      10^6 gal
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......        96.543        31.460
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........        96.170        31.338
  Flooding Loss ............         0.827         0.269
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.000
  Continuity Error (%) .....        -0.469


  ********************************
  Highest Flow Instability Indexes
  ********************************
  All links are stable.


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :    60.00 sec
  Average Time Step           :    60.00 sec
  Maximum Time Step           :    60.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00


  ***************************
  Analysis begun on:  Tue Feb  9 12:36:03 2021
  Analysis ended on:  Tue Feb  9 12:37:25 2021
  Total elapsed time: 00:01:22
```

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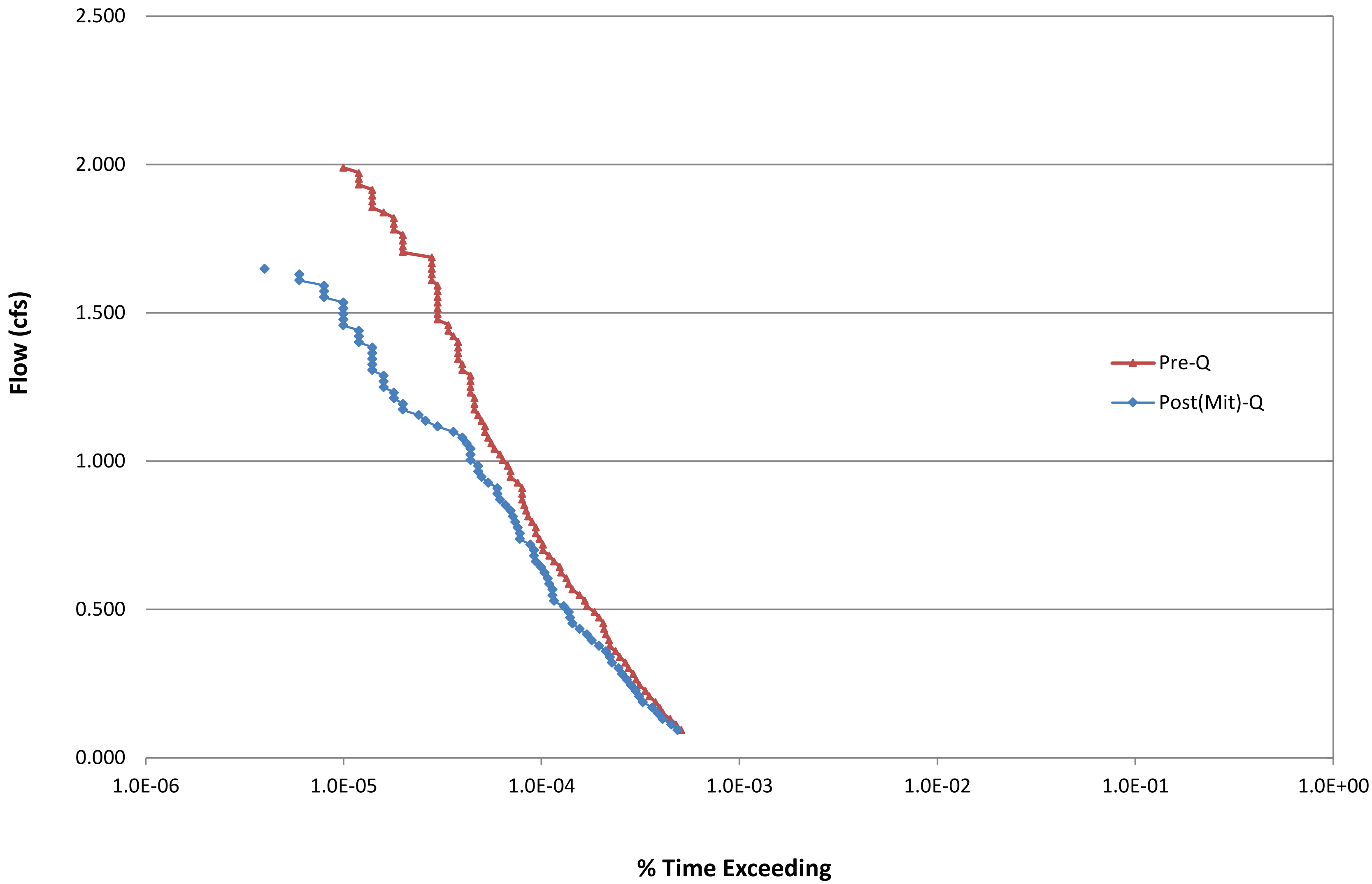
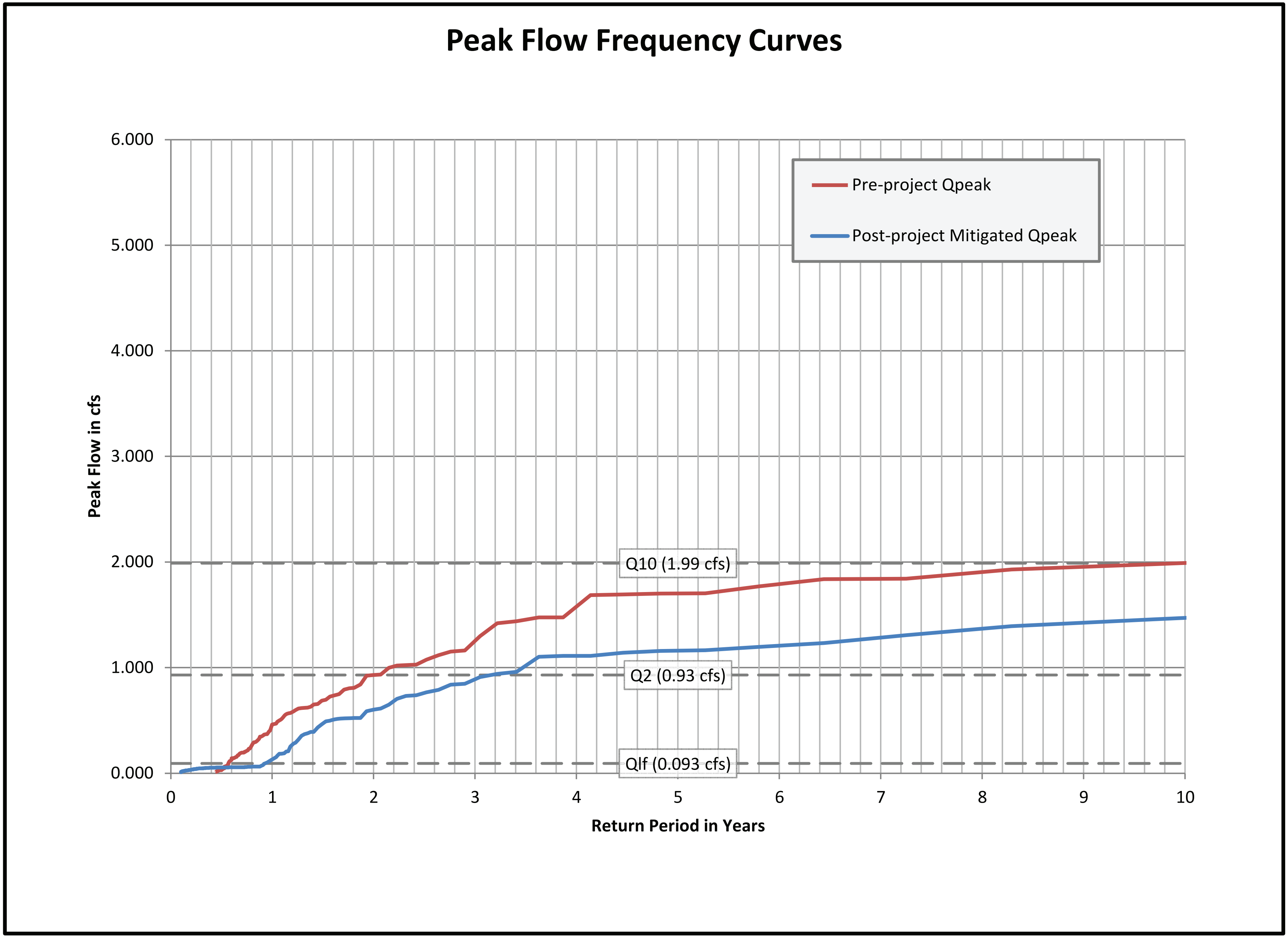
Peak Flow Frequency Summary

Return Period	Pre-project Q (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1*Q2	0.093	0.060
2-year	0.930	0.601
3-year	1.253	0.889
4-year	1.578	1.110
5-year	1.702	1.160
6-year	1.790	1.207
7-year	1.840	1.283
8-year	1.905	1.368
9-year	1.954	1.424
10-year	1.990	1.470

Flow Duration Curve [Pre vs. Post (Mitigated)]





Peak Flow Frequency Curves
Pre-project Qpeak
Post-project Mitigated Qpeak
Q10 (1.99 cfs)
Q2 (0.93 cfs)
Qlf (0.093 cfs)
Peak Flow in cfs
6.000
5.000
4.000
3.000
2.000
1.000
0.000
0
1
2
3
4
5
6
7
8
9
10
Return Period in Years

BMP Sizing and DCV Summary Table

BMP Location	BMP Description	Total Area (sq-ft)	% Impervious	% Pervious	% Permeable Pavement	C Weighted Runoff Factor	DCV Req'd (Cu-ft)	Minimum 3% Treatment Area (sq-ft)	BMP Area Provided (sq-ft)	DCV Provided (Cu-Ft)			Modular Wetland Flow Design (cfs)
DMA-1	BIOFILTRATION PLANTER #1	23775.00	0%	48%	52%	0.16	202.7	116	472.0	660.8			
DMA-2	BIOFILTRATION PLANTER #2	27352.00	6%	14%	80%	0.17	241.9	138	858.0	1201.2			
DMA-3	BIOFILTRATION PLANTER #3	56780.00	71%	15%	14%	0.69	2061.1	1178	1725.0	2415.0			
DMA-4	BIOFILTRATION PLANTER #4	106108.00	61%	32%	7%	0.63	3514.7	2008	4252.0	5952.8			
DMA-5	SELF-TREATING	46929.00	0%	100%	0%	0.23	566.7	NA	0.0	0.0			
TOTAL DMA AREA:		260944	41%	28%	31%	0.47	6587.01	3440.19	7307.00	10229.8			
TOTAL BMP AREA:		7307.00											

NOTE: Weighted runoff factor based on percent of impervious, pervious, and paver area in each respective DMA

Runoff Factor (Table B.1.1 City of SD SW Manual)

Impervious	0.90	
Landscape	0.23	C Soils
Permeable Pavers	0.10	

P85th Parameters

Intensity:	0.20	in/hr
Precip:	0.63	in

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

B.1.2 Offline BMPs

Diversion flow rates for offline BMPs shall be sized to convey the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inches of rainfall per hour, for each hour of every storm event. The following hydrologic method (Equation B.1-3) shall be used to calculate the diversion flow rate for off-line BMPs:

Equation B.1-1: Hydrologic Method

$$Q = C \times i \times A$$

where:

Q = Diversion flow rate in cubic feet per second

C = Runoff factor, area weighted estimate using Table B.1

i = Rainfall intensity of 0.2 in/hr.

A = Tributary area (acres) within the project footprint.

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and Equation B.1-2.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x = Runoff factor for area X

A_x = Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.

[2]Surface shall be designed in accordance with SD-F (Amended soils) fact sheet in Appendix E

Drawdown Time for Biofiltration BMP-1

Outlet Q:	0.0026 cfs	0.234 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	472.0 sq-ft		
BMP Percolation Rate:	0.05 cfs		
Basin Volume:	661 cu-ft		
DCV/Average Q:	258125 secs		71.70 Hours

Drawdown Time for Biofiltration BMP-2

Outlet Q:	0.0048 cfs	0.241 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	858.0 sq-ft		
BMP Percolation Rate:	0.099 cfs		
Basin Volume:	1201 cu-ft		
DCV/Average Q:	251297 secs		69.80 Hours

Drawdown Time for Biofiltration BMP-3

Outlet Q:	0.0294 cfs	0.737 in/hr	
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec	
BMP Area:	1725.0 sq-ft		
BMP Percolation Rate:	0.20 cfs		
Basin Volume:	2415 cu-ft		
DCV/Average Q:	82059 secs		22.79 Hours

Drawdown Time for Biofiltration BMP-4

Outlet Q:	0.0294 cfs	0.299 in/hr
BMP Percolation Rate:	5 in/hr	0.0001 ft/sec

BMP Area:	4252.0 sq-ft	
BMP Percolation Rate:	0.49 cfs	
Basin Volume:	5953 cu-ft	
DCV/Average Q:	202270 secs	**56.19 Hours**

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BMP-1

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0	ft
		48	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.2188	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.003	cfs
Ponding Depth Surface Area	A_{PD}	668	ft^2
Bioretention Surface Area	$A_{S,} A_G$	473	ft^2
	$A_{S,} A_G$	0.0109	ac
Flow Rate (per unit area)	q	0.229	in/hr
Effective Ponding Depth	PD_{eff}	**14.47**	in
Drain Coefficient	C	**0.0331**	--

Cutoff Flow	Q_{cutoff}	**0.00251**	cfs

Outlet Structure for Discharge of BMP-1

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir	
No. of orif:	1			Invert:	0.50 ft
Invert:	0 ft			L:	6.0 ft
Slot height	0.25 ft			C_w:	3.1
Slot width	0.5 ft				
A	0.125	0.125			
C_o:	0.60				

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.037	0.000	0.037	
0.667	0.167	0.105	0.000	0.105	
0.750	0.250	0.194	0.000	0.194	
0.833	0.333	0.549	0.000	0.549	
0.917	0.417	0.576	0.000	0.576	
1.000	0.500	0.602	0.000	0.602	RISER STRUCTURE
1.083	0.583	0.626	0.447	1.074	
1.167	0.667	0.650	1.266	1.916	
1.250	0.750	0.673	2.325	2.998	
1.333	0.833	0.695	3.580	4.275	
1.417	0.917	0.716	5.003	5.719	
1.500	1.000	0.737	6.576	7.313	
1.583	1.083	0.757	8.287	9.044	
1.667	1.167	0.777	10.125	10.902	
1.750	1.250	0.796	12.081	12.877	
1.833	1.333	0.815	14.149	14.964	
1.917	1.417	0.833	16.324	17.157	
2.000	1.500	0.851	18.600	19.451	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-1

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	473	0
0.083	488	40
0.167	504	83
0.250	519	128
0.333	535	176
0.417	551	226
0.500	567	280
0.583	584	336
0.667	600	395
0.750	617	456
0.833	634	521
0.917	651	589
1.000	668	660
1.083	685	733
1.167	702	809
1.250	719	888
1.333	736	970
1.417	753	1055
1.500	770	1142

Stage-Storage-Discharge of BMP-1

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0064	0.000
0.083	0.0077	0.037
0.167	0.0091	0.105
0.250	0.0105	0.194
0.333	0.0120	0.549
0.417	0.0135	0.576
0.500	0.0151	0.602
0.583	0.0168	1.074
0.667	0.0186	1.916
0.750	0.0204	2.998
0.833	0.0223	4.275
0.917	0.0242	5.719
1.000	0.0262	7.313

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BMP-2

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0	ft
		48	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.2969	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.005	cfs
Ponding Depth Surface Area	A_{PD}	858	ft^2
Bioretention Surface Area	$A_{S,} A_G$	858	ft^2
	$A_{S,} A_G$	0.0197	ac
Flow Rate (per unit area)	q	0.233	in/hr
Effective Ponding Depth	PD_{eff}	**12.00**	in
Drain Coefficient	C	**0.0336**	--

Cutoff Flow	Q_{cutoff}	**0.00462**	cfs

Outlet Structure for Discharge of BMP-2

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir		
No. of orif:	1			Invert:	0.50	ft
Invert:	0	ft		L:	6.0	ft
Slot height	0.25	ft		C_w:	3.1	
Slot width	1	ft				
A	0.250		0.25			
C_o:	0.60					

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.075	0.000	0.075	
0.667	0.167	0.211	0.000	0.211	
0.750	0.250	0.388	0.000	0.388	
0.833	0.333	1.099	0.000	1.099	
0.917	0.417	1.152	0.000	1.152	
1.000	0.500	1.204	0.000	1.204	RISER STRUCTURE
1.083	0.583	1.253	0.447	1.700	
1.167	0.667	1.300	1.266	2.566	
1.250	0.750	1.346	2.325	3.671	
1.333	0.833	1.390	3.580	4.970	
1.417	0.917	1.433	5.003	6.435	
1.500	1.000	1.474	6.576	8.050	
1.583	1.083	1.515	8.287	9.802	
1.667	1.167	1.554	10.125	11.679	
1.750	1.250	1.592	12.081	13.673	
1.833	1.333	1.630	14.149	15.779	
1.917	1.417	1.667	16.324	17.991	
2.000	1.500	1.702	18.600	20.302	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	858	0
0.083	858	72
0.167	858	143
0.250	858	215
0.333	858	286
0.417	858	358
0.500	858	429
0.583	858	501
0.667	858	572
0.750	858	644
0.833	858	715
0.917	858	787
1.000	858	858
1.083	858	930
1.167	858	1001
1.250	858	1073
1.333	858	1144
1.417	858	1216
1.500	858	1287

Stage-Storage-Discharge of BMP-2

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0098	0.000
0.083	0.0115	0.075
0.167	0.0131	0.211
0.250	0.0148	0.388
0.333	0.0164	1.099
0.417	0.0181	1.152
0.500	0.0197	1.204
0.583	0.0213	1.700
0.667	0.0230	2.566
0.750	0.0246	3.671
0.833	0.0263	4.970
0.917	0.0279	6.435
1.000	0.0295	8.050

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BMP-3

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0	ft
		48	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.75	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.029	cfs
Ponding Depth Surface Area	A_{PD}	2271	ft^2
Bioretention Surface Area	$A_{S,} A_G$	1725	ft^2
	$A_{S,} A_G$	0.0396	ac
Flow Rate (per unit area)	q	0.737	in/hr
Effective Ponding Depth	PD_{eff}	**13.90**	0
Drain Coefficient	C	**0.1064**	--

Cutoff Flow	Q_{cutoff}	**0.02943**	cfs

Outlet Structure for Discharge of BMP-3

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir		
No. of orif:	1			Invert:	0.50	ft
Invert:	0	ft		L:	8.0	ft
Slot height	0.25	ft		C_w:	3.1	
Slot width	1.25	ft				
A	0.313		0.3125			
C_o:	0.60					

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.093	0.000	0.093	
0.667	0.167	0.264	0.000	0.264	
0.750	0.250	0.484	0.000	0.484	
0.833	0.333	1.374	0.000	1.374	
0.917	0.417	1.441	0.000	1.441	
1.000	0.500	1.505	0.000	1.505	RISER STRUCTURE
1.083	0.583	1.566	0.597	2.163	
1.167	0.667	1.625	1.687	3.313	
1.250	0.750	1.682	3.100	4.782	
1.333	0.833	1.737	4.773	6.510	
1.417	0.917	1.791	6.670	8.461	
1.500	1.000	1.843	8.768	10.611	
1.583	1.083	1.893	11.049	12.942	
1.667	1.167	1.943	13.499	15.442	
1.750	1.250	1.991	16.108	18.099	
1.833	1.333	2.037	18.866	20.903	
1.917	1.417	2.083	21.766	23.849	
2.000	1.500	2.128	24.800	26.928	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	1725	0
0.083	1770	146
0.167	1815	299
0.250	1860	459
0.333	1905	628
0.417	1950	803
0.500	1995	986
0.583	2040	1177
0.667	2085	1375
0.750	2130	1581
0.833	2175	1794
0.917	2220	2014
1.000	2265	2243
1.083	2310	2478
1.167	2355	2721
1.250	2400	2972
1.333	2445	3230
1.417	2490	3496
1.500	2535	3769

Stage-Storage-Discharge of BMP-3

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0226	0.000
0.083	0.0270	0.093
0.167	0.0316	0.264
0.250	0.0363	0.484
0.333	0.0412	1.374
0.417	0.0462	1.441
0.500	0.0515	1.505
0.583	0.0569	2.163
0.667	0.0625	3.313
0.750	0.0682	4.782
0.833	0.0742	6.510
0.917	0.0802	8.461
1.000	0.0865	10.611

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BMP-4

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0	ft
		48	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.75	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.029	cfs
Ponding Depth Surface Area	A_{PD}	5597	ft^2
Bioretention Surface Area	$A_{S,} A_G$	4252	ft^2
	$A_{S,} A_G$	0.0976	ac
Flow Rate (per unit area)	q	0.299	in/hr
Effective Ponding Depth	PD_{eff}	**13.90**	0
Drain Coefficient	C	**0.0432**	--

Cutoff Flow	Q_{cutoff}	**0.02943**	cfs

Outline Structure for Discharge of BMP-4

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir		
No. of orif:	4			Invert:	0.50	ft
Invert:	0	ft		L:	8.0	ft
Slot height	0.25	ft		C_w:	3.1	
Slot width	1.25	ft				
A	0.313		0.3125			
C_o:	0.60					

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.373	0.000	0.373	
0.667	0.167	1.055	0.000	1.055	
0.750	0.250	1.938	0.000	1.938	
0.833	0.333	5.494	0.000	5.494	
0.917	0.417	5.762	0.000	5.762	
1.000	0.500	6.019	0.000	6.019	RISER STRUCTURE
1.083	0.583	6.264	0.597	6.861	
1.167	0.667	6.501	1.687	8.188	
1.250	0.750	6.729	3.100	9.829	
1.333	0.833	6.950	4.773	11.723	
1.417	0.917	7.164	6.670	13.834	
1.500	1.000	7.371	8.768	16.140	
1.583	1.083	7.573	11.049	18.622	
1.667	1.167	7.770	13.499	21.270	
1.750	1.250	7.962	16.108	24.070	
1.833	1.333	8.149	18.866	27.015	
1.917	1.417	8.333	21.766	30.098	
2.000	1.500	8.512	24.800	33.312	

Note:

1. Weir equation, $Q=C_w L_e (h)^{3/2}$
2. Orifice equation, $Q=C_o A_e (2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-4

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	4252	0
0.083	4363	359
0.167	4472	736
0.250	4586	1132
0.333	4698	1547
0.417	4810	1981
0.500	4921	2433
0.583	5032.714286	2903
0.667	5144.392857	3392
0.750	5256.071429	3900
0.833	5367.75	4427
0.917	5479.428571	4972
1.000	5591	5535
1.083	5703	6118
1.167	5815	6719
1.250	5927	7339
1.333	6039	7977
1.417	6151	8635
1.500	6263	9311

Stage-Storage-Discharge of BMP-4

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0558	0.000
0.083	0.0666	0.373
0.167	0.0779	1.055
0.250	0.0895	1.938
0.333	0.1016	5.494
0.417	0.1141	5.762
0.500	0.1271	6.019
0.583	0.1404	6.861
0.667	0.1542	8.188
0.750	0.1685	9.829
0.833	0.1831	11.723
0.917	0.1982	13.834
1.000	0.2137	16.140

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Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.093	cfs
Q10 (Pre):	1.990	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.01897	cfs
Total Hourly Data:	501471	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.093	255	5.09E-04	244	4.87E-04	96%	Pass
1	0.112	240	4.79E-04	227	4.53E-04	95%	Pass
2	0.131	224	4.47E-04	205	4.09E-04	92%	Pass
3	0.150	206	4.11E-04	194	3.87E-04	94%	Pass
4	0.169	198	3.95E-04	182	3.63E-04	92%	Pass
5	0.188	189	3.77E-04	163	3.25E-04	86%	Pass
6	0.207	176	3.51E-04	156	3.11E-04	89%	Pass
7	0.226	168	3.35E-04	150	2.99E-04	89%	Pass
8	0.245	157	3.13E-04	142	2.83E-04	90%	Pass
9	0.264	151	3.01E-04	135	2.69E-04	89%	Pass
10	0.283	146	2.91E-04	128	2.55E-04	88%	Pass
11	0.302	138	2.75E-04	123	2.45E-04	89%	Pass
12	0.321	133	2.65E-04	114	2.27E-04	86%	Pass
13	0.340	125	2.49E-04	111	2.21E-04	89%	Pass
14	0.359	119	2.37E-04	106	2.11E-04	89%	Pass
15	0.377	111	2.21E-04	98	1.95E-04	88%	Pass
16	0.396	110	2.19E-04	90	1.79E-04	82%	Pass
17	0.415	106	2.11E-04	85	1.70E-04	80%	Pass
18	0.434	104	2.07E-04	78	1.56E-04	75%	Pass
19	0.453	103	2.05E-04	72	1.44E-04	70%	Pass
20	0.472	98	1.95E-04	70	1.40E-04	71%	Pass
21	0.491	93	1.85E-04	69	1.38E-04	74%	Pass
22	0.510	85	1.70E-04	65	1.30E-04	76%	Pass
23	0.529	83	1.66E-04	58	1.16E-04	70%	Pass
24	0.548	78	1.56E-04	57	1.14E-04	73%	Pass
25	0.567	72	1.44E-04	57	1.14E-04	79%	Pass
26	0.586	69	1.38E-04	55	1.10E-04	80%	Pass
27	0.605	67	1.34E-04	54	1.08E-04	81%	Pass
28	0.624	63	1.26E-04	52	1.04E-04	83%	Pass
29	0.643	62	1.24E-04	50	9.97E-05	81%	Pass
30	0.662	58	1.16E-04	47	9.37E-05	81%	Pass
31	0.681	55	1.10E-04	46	9.17E-05	84%	Pass
32	0.700	51	1.02E-04	46	9.17E-05	90%	Pass
33	0.719	51	1.02E-04	44	8.77E-05	86%	Pass
34	0.738	49	9.77E-05	39	7.78E-05	80%	Pass
35	0.757	47	9.37E-05	39	7.78E-05	83%	Pass
36	0.776	47	9.37E-05	38	7.58E-05	81%	Pass
37	0.795	45	8.97E-05	37	7.38E-05	82%	Pass
38	0.814	43	8.57E-05	36	7.18E-05	84%	Pass
39	0.833	42	8.38E-05	35	6.98E-05	83%	Pass
40	0.852	41	8.18E-05	33	6.58E-05	80%	Pass
41	0.871	40	7.98E-05	31	6.18E-05	78%	Pass

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Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
42	0.890	40	7.98E-05	30	5.98E-05	75%	Pass
43	0.909	40	7.98E-05	30	5.98E-05	75%	Pass
44	0.928	38	7.58E-05	27	5.38E-05	71%	Pass
45	0.946	35	6.98E-05	25	4.99E-05	71%	Pass
46	0.965	35	6.98E-05	24	4.79E-05	69%	Pass
47	0.984	34	6.78E-05	24	4.79E-05	71%	Pass
48	1.003	32	6.38E-05	22	4.39E-05	69%	Pass
49	1.022	31	6.18E-05	22	4.39E-05	71%	Pass
50	1.041	29	5.78E-05	22	4.39E-05	76%	Pass
51	1.060	28	5.58E-05	21	4.19E-05	75%	Pass
52	1.079	27	5.38E-05	20	3.99E-05	74%	Pass
53	1.098	26	5.18E-05	18	3.59E-05	69%	Pass
54	1.117	26	5.18E-05	15	2.99E-05	58%	Pass
55	1.136	25	4.99E-05	13	2.59E-05	52%	Pass
56	1.155	24	4.79E-05	12	2.39E-05	50%	Pass
57	1.174	23	4.59E-05	10	1.99E-05	43%	Pass
58	1.193	23	4.59E-05	10	1.99E-05	43%	Pass
59	1.212	23	4.59E-05	9	1.79E-05	39%	Pass
60	1.231	22	4.39E-05	9	1.79E-05	41%	Pass
61	1.250	22	4.39E-05	8	1.60E-05	36%	Pass
62	1.269	22	4.39E-05	8	1.60E-05	36%	Pass
63	1.288	22	4.39E-05	8	1.60E-05	36%	Pass
64	1.307	20	3.99E-05	7	1.40E-05	35%	Pass
65	1.326	20	3.99E-05	7	1.40E-05	35%	Pass
66	1.345	19	3.79E-05	7	1.40E-05	37%	Pass
67	1.364	19	3.79E-05	7	1.40E-05	37%	Pass
68	1.383	19	3.79E-05	7	1.40E-05	37%	Pass
69	1.402	19	3.79E-05	6	1.20E-05	32%	Pass
70	1.421	18	3.59E-05	6	1.20E-05	33%	Pass
71	1.440	17	3.39E-05	6	1.20E-05	35%	Pass
72	1.459	17	3.39E-05	5	9.97E-06	29%	Pass
73	1.478	15	2.99E-05	5	9.97E-06	33%	Pass
74	1.497	15	2.99E-05	5	9.97E-06	33%	Pass
75	1.515	15	2.99E-05	5	9.97E-06	33%	Pass
76	1.534	15	2.99E-05	5	9.97E-06	33%	Pass
77	1.553	15	2.99E-05	4	7.98E-06	27%	Pass
78	1.572	15	2.99E-05	4	7.98E-06	27%	Pass
79	1.591	15	2.99E-05	4	7.98E-06	27%	Pass
80	1.610	14	2.79E-05	3	5.98E-06	21%	Pass
81	1.629	14	2.79E-05	3	5.98E-06	21%	Pass
82	1.648	14	2.79E-05	2	3.99E-06	14%	Pass
83	1.667	14	2.79E-05	0	0.00E+00	0%	Pass
84	1.686	14	2.79E-05	0	0.00E+00	0%	Pass
85	1.705	10	1.99E-05	0	0.00E+00	0%	Pass
86	1.724	10	1.99E-05	0	0.00E+00	0%	Pass
87	1.743	10	1.99E-05	0	0.00E+00	0%	Pass
88	1.762	10	1.99E-05	0	0.00E+00	0%	Pass
89	1.781	9	1.79E-05	0	0.00E+00	0%	Pass

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Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
90	1.800	9	1.79E-05	0	0.00E+00	0%	Pass
91	1.819	9	1.79E-05	0	0.00E+00	0%	Pass
92	1.838	8	1.60E-05	0	0.00E+00	0%	Pass
93	1.857	7	1.40E-05	0	0.00E+00	0%	Pass
94	1.876	7	1.40E-05	0	0.00E+00	0%	Pass
95	1.895	7	1.40E-05	0	0.00E+00	0%	Pass
96	1.914	7	1.40E-05	0	0.00E+00	0%	Pass
97	1.933	6	1.20E-05	0	0.00E+00	0%	Pass
98	1.952	6	1.20E-05	0	0.00E+00	0%	Pass
99	1.971	6	1.20E-05	0	0.00E+00	0%	Pass
100	1.990	5	9.97E-06	0	0.00E+00	0%	Pass

TOTAL WORK:

EROSION POTENTIAL (EP):

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)**	☐ Included ☐ Not applicable

**OMITTED FOR DISCRETIONARY. WILL BE INCLUDED WITH FUTURE MINISTERIAL SUBMITTAL.

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: All Peoples Church

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☑ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☑ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☑ Details and specifications for construction of structural BMP(s)
- ☑ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☑ How to access the structural BMP(s) to inspect and perform maintenance
- ☑ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☑ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☑ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☑ Recommended equipment to perform maintenance
- ☑ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☑ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☑ All BMPs must be fully dimensioned on the plans
- ☑ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

SITE PLAN

SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH

BASIS OF BEARINGS:
THE BASIS OF BEARING FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM 1983 (CCS83), ZONE 6, 2011.00 EPOCH, AND IS DETERMINED BY G.P.S. MEASUREMENTS TAKEN ON FEBRUARY 24, 2015 AND ESTABLISHED FROM CONTINUOUSLY OPERATING REFERENCE STATIONS P472 AND P473 DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) AND/OR NATIONAL GEODETIC SURVEY (NGS), RESPECTIVELY. BEARING N 39°42'24" W

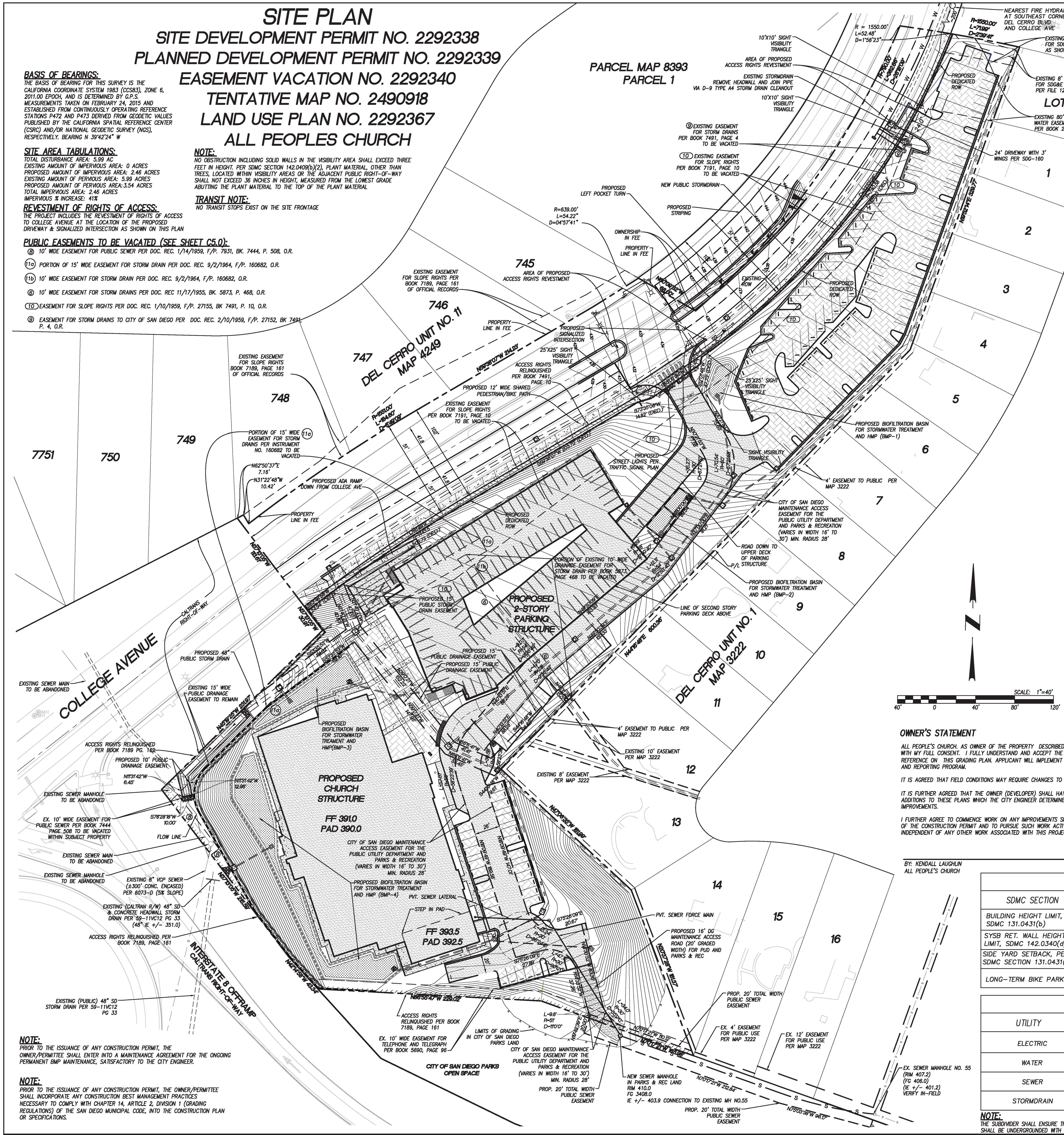
SITE AREA TABULATIONS:
TOTAL DISTURBANCE AREA: 5.99 AC
EXISTING AMOUNT OF IMPERVIOUS AREA: 0 ACRES
PROPOSED AMOUNT OF IMPERVIOUS AREA: 2.46 ACRES
EXISTING AMOUNT OF PERVIOUS AREA: 5.99 ACRES
PROPOSED AMOUNT OF PERVIOUS AREA: 3.54 ACRES
TOTAL IMPERVIOUS AREA: 2.46 ACRES
IMPERVIOUS % INCREASE: 41%

REVESTMENT OF RIGHTS OF ACCESS:
THE PROJECT INCLUDES THE REVESTMENT OF RIGHTS OF ACCESS TO COLLEGE AVENUE AT THE LOCATION OF THE PROPOSED DRIVEWAY & SIGNALIZED INTERSECTION AS SHOWN ON THIS PLAN

NOTE:
NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED THREE FEET IN HEIGHT. PER SDMC SECTION 142.0409(b)(2), PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT-OF-WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLANT MATERIAL

TRANSIT NOTE:
NO TRANSIT STOPS EXIST ON THE SITE FRONTAGE

PUBLIC EASEMENTS TO BE VACATED (SEE SHEET C5.0):
8 10' WIDE EASEMENT FOR PUBLIC SEWER PER DOC. REC. 1/14/1959, F/P. 7931, BK. 7444, P. 508, O.R.
11a PORTION OF 15' WIDE EASEMENT FOR STORM DRAIN PER DOC. REC. 9/2/1964, F/P. 160682, O.R.
11b 10' WIDE EASEMENT FOR STORM DRAIN PER DOC. REC. 9/2/1964, F/P. 160682, O.R.
6 10' WIDE EASEMENT FOR STORM DRAINS PER DOC. REC 11/17/1955, BK. 5873, P. 468, O.R.
10 EASEMENT FOR SLOPE RIGHTS PER DOC. REC. 1/10/1959, F/P. 27155, BK 7491, P. 10, O.R.
9 EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, F/P. 27152, BK 7491, P. 4, O.R.



NOTE:
PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.

NOTE:
PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLAN OR SPECIFICATIONS.

NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

PARCEL NOTE:
THIS IS A MAP OF A PARCEL AS DEFINED IN SECTION 8700-8704 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT.

GRADING QUANTITIES

AMOUNT OF CUT:	16,500 CUBIC YARDS
MAXIMUM DEPTH OF CUT OUTSIDE OF BUILDING:	25.5' FEET
MAXIMUM DEPTH OF CUT UNDER THE BUILDING:	7.5 FEET
AMOUNT OF FILL:	39,000 CUBIC YARDS
MAXIMUM DEPTH OF FILL OUTSIDE OF BUILDING:	28' FEET
MAXIMUM DEPTH OF FILL UNDER THE BUILDING:	10 FEET

NET IMPORT: 22,500 CUBIC YARDS

LEGEND
PROPERTY LINE
DEDICATED RIGHT-OF-WAY
RIGHT OF WAY
EXISTING LOT LINE
STREET CENTERLINE
EXISTING EASEMENT
PROPOSED EASEMENT
LIMITS OF ACCESS RELINQUISHMENT
PROPOSED BUILDING FOOTPRINT
PROPOSED BMP
PROPOSED STORMDRAIN
EXISTING STORMDRAIN LINE
PROPOSED TRAFFIC SIGNAL
PROPOSED PERMEABLE PAVEMENT
PROPOSED HARDSCAPE
CUT/FILL SLOPE
PROPOSED D-75 BROW DITCH => => => =>

SCALE: 1"=40'
40' 0 40' 80' 120'

OWNER'S STATEMENT

ALL PEOPLE'S CHURCH. AS OWNER OF THE PROPERTY DESCRIBED HEREIN ACKNOWLEDGE THESE PLANS HAVE BEEN PREPARED AT MY DIRECTION WITH MY FULL CONSENT. I FULLY UNDERSTAND AND ACCEPT THE TERMS AND CONDITIONS CONTAINED HEREIN AND AS ATTACHED BY REFERENCE ON THIS GRADING PLAN. APPLICANT WILL IMPLEMENT THE SPECIFIC HISTORICAL RESOURCES (ARCHAEOLOGY) MITIGATION, MONITORING AND REPORTING PROGRAM.

IT IS AGREED THAT FIELD CONDITIONS MAY REQUIRE CHANGES TO THESE PLANS.

IT IS FURTHER AGREED THAT THE OWNER (DEVELOPER) SHALL HAVE A REGISTERED CIVIL ENGINEER MAKE SUCH CHANGES, ALTERATIONS OR ADDITIONS TO THESE PLANS WHICH THE CITY ENGINEER DETERMINES ARE NECESSARY AND DESIRABLE FOR THE PROPER COMPLETION OF THE IMPROVEMENTS.

I FURTHER AGREE TO COMMENCE WORK ON ANY IMPROVEMENTS SHOWN ON THESE PLANS WITHIN EXISTING CITY RIGHT-OF-WAY WITHIN 60 DAYS OF THE CONSTRUCTION PERMIT AND TO PURSUE SUCH WORK ACTIVELY ON EVERY NORMAL WORKING DAY UNTIL COMPLETED, IRRESPECTIVE AND INDEPENDENT OF ANY OTHER WORK ASSOCIATED WITH THIS PROJECT OR UNDER MY CONTROL.

BY: KENDALL LAUGHLIN
ALL PEOPLE'S CHURCH
DATE:

DEVIATIONS TABLE

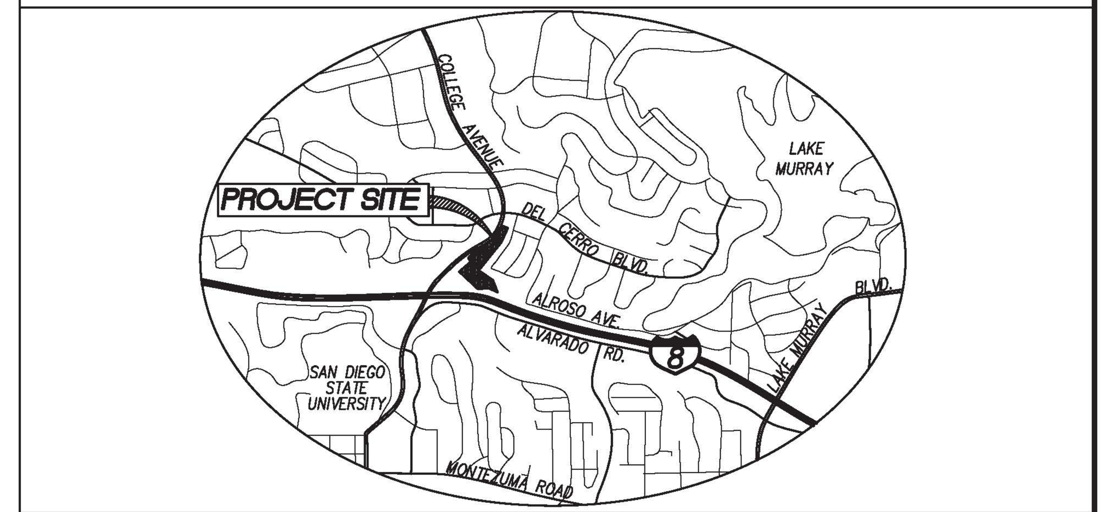
SDMC SECTION	REQUIRED	PROPOSED
BUILDING HEIGHT LIMIT, PER SDMC 131.0431(b)	30 FEET	53 FEET
SYSB RET. WALL HEIGHT LIMIT, SDMC 142.0340(d)(1)	6 FEET	20 FEET
SIDE YARD SETBACK, PER SDMC SECTION 131.0431(b)	84 FEET, 2 INCHES	14 FEET
LONG-TERM BIKE PARKING	16	2

UTILITY TABLE

UTILITY	EXISTING	PROPOSED
ELECTRIC	N/A	UNDERGROUND
WATER	N/A	UNDERGROUND
SEWER	UNDERGROUND	UNDERGROUND
STORMDRAIN	UNDERGROUND/ SURFACE FLOW	UNDERGROUND

NOTE:
THE SUBDIVIDER SHALL ENSURE THAT ALL ONSITE UTILITIES SERVING THE SUBDIVISION SHALL BE UNDERGROUNDED WITH THE APPROPRIATE PERMITS.

VICINITY MAP



DEVELOPMENT SUMMARY
THE PROJECT CONSISTS OF THE DEVELOPMENT OF SIX-ACRE UNDEVELOPED SITE SITUATED NORTH OF INTERSTATE 8 AND EAST OF COLLEGE AVENUE IN THE NAVAJO COMMUNITY PLAN AREA.
- A 54,476 SF SANCTUARY/MULTIPURPOSE BUILDING TO ACCOMMODATE 900 SEATS (APPROXIMATELY 587 FIXED SEATS AND 3690 S.F. OF NON-FIXED SEATING) WITH SUNDAY SCHOOL, CLASSROOMS, OFFICES AND A MULTIPURPOSE ROOM/GYM.
- A 71,000 SF TWO LEVEL PARKING GARAGE WITH 203 SPACES
- SURFACE PARKING FOR 153 SPACES
- SITE UTILITIES AND LANDSCAPING
- OFFSITE IMPROVEMENTS TO COLLEGE AVENUE TO CREATE A MEDIAN BREAK AND A SIGNALIZED INTERSECTION FOR THE MAIN DRIVEWAY
- ON-SITE WATER QUALITY BASINS TO TREAT STORM WATER RUNOFF AND SEWER AND STORM WATER CONNECTIONS TO EXISTING CITY FACILITIES.
- PROPOSED DEVIATIONS TO EXCEED THE BUILDING HEIGHT LIMITS FROM 30' TO 53', TO REDUCE SIDE YARD SETBACKS FROM 84.17' TO 14', TO REDUCE LONG-TERM BIKE PARKING FROM 16 TO 2, SIDE-YARD SETBACK WALL HEIGHT TO EXCEED HEIGHT LIMITS FROM 6' TO 20'
- REQUIRED APPROVALS; THE PROJECT WOULD REQUIRE CITY APPROVAL OF A COMMUNITY PLAN AMENDMENT TO MODIFY THE NAVAJO COMMUNITY PLAN, A PLANNED DEVELOPMENT PERMIT, A SITE DEVELOPMENT PERMIT, A TENTATIVE MAP AND VARIOUS EASEMENT VACATIONS & REVESTMENT OF ACCESS RIGHTS ON COLLEGE AVENUE (PROCESS 5).

SITE DESCRIPTION
APN: 463-010-10-00 SITE AREA: 5.99 ACRES
ABBREVIATED LEGAL DESCRIPTION:
PORTION OF LOT 67 OF RANCHO MISSION OF SAN DIEGO, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS DESCRIBED IN GRANT DEED RECORDED NOVEMBER 3, 1975 AS DOCUMENT 75-306249, O.R.

SURVEY NOTES:
1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.
2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.
3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.
4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.

LAMBERT COORDINATES: NAD27 224-1750 CCS83 COORDINATES: NAD83 1864-6311

PROJECT INFORMATION
TOTAL PROJECT OWNERSHIP: 5.99 ACRES
TOTAL GRADED AREA: 5.60 ACRES
PERCENT OF SITE TO BE GRADED: 93%
TYPE OF CONSTRUCTION: TYPE III-B
EXISTING USE: VACANT LAND
PROPOSED USE: RELIGIOUS ASSEMBLY
NUMBER OF EXISTING LOTS: 1
NUMBER OF PROPOSED LOTS: 1

EXISTING ZONE: RS-1-7
COMMUNITY PLAN: NAVAJO COMMUNITY PLAN AREA
OCCUPANCY TYPE: SINGLE FAMILY RESIDENTIAL
GEOLOGIC HAZARD CATEGORY: 52

GROSS SITE AREA: 260,944 SF
FLOOR AREA MAXIMUM: 45% (117,416 SF)
FLOOR AREA RATIO: 42% (108,654 SF)
SANCTUARY-1ST FLOOR 37,357 SF
SANCTUARY-2ND FLOOR 14,802 SF
SANCTUARY-PHANTOM FLOOR 22,555 SF
PARKING- 1ST FLOOR 33,940 SF
COVERAGE MAX ALLOWED: 50% (130,462 SF)
COVERAGE PROPOSED: 28% (72,822 SF)
SANCTUARY-1ST FLOOR 37,357 SF
PARKING-1ST FLOOR 35,465 SF

PARKING REQUIRED: 319 SPACES
PARKING PROVIDED: 356 AUTOMOBILE SPACES
319 STANDARD SPACES
2 VAN ACCESSIBLE SPACES
6 ACCESSIBLE SPACES
29 CLEAN AIR VEHICLE SPACES
21 FUTURE EV CHARGING STATIONS
(37 CARPOOL SPACES INCLUDED IN COUNT ABOVE)
7 MOTORCYCLE SPACES
17 SHORT-TERM BICYCLE SPACES
2 LONG-TERM BICYCLE STORAGE

LANDSCAPE AREA: 153,757 SF

MONTGOMERY FIELD AIRPORT LAND USE COMPATIBILITY OVERLAY ZONE
AIRPORT INFLUENCE AREA (REVIEW AREA 2)
PARKING IMPACT OVERLAY ZONE (CAMPUS)

SHEET INDEX

CIVIL (7)

C 1.0	SITE PLAN
C 2.0	PRELIMINARY GRADING PLAN
C 3.0	PRELIMINARY UTILITY PLAN
C 4.0	SECTIONS AND DETAILS
C 5.0	EXISTING CONDITIONS EXHIBIT
C 6.0	OFFSITE IMPROVEMENTS
C 7.0	TRAFFIC SIGNAL INSTALLATION PLAN

ARCHITECTURAL (19)

A.1	TITLE
A.2	SITE PLAN
A.2a	SETBACK SITE PLAN
A.2b	FIRE ACCESS PLAN
A.3	COLORED SITE PLAN
A.3b	ENLARGED COLORED SITE
A.4	FIRST FLOOR
A.5	SECOND FLOOR
A.5b	AREA SCHEDULE
A.6	STADIUM SEATING
A.7	ELEVATIONS
A.8	ELEVATIONS
A.9	SECTIONS
A.10	ROOF
A.11	PARKING GARAGE GROUND LEVEL
A.12	PARKING GARAGE SECOND LEVEL
A.13	PARKING GARAGE ELEVATIONS
A.14	CARPORT
A.15	SITE SECTIONS

LANDSCAPE (6)
L-1 TO L-6 LANDSCAPE DEVELOPMENT PLAN

PUBLIC SERVICES

GAS AND ELECTRIC:	SDG&E
TELEPHONE:	AT&T
CABLE TELEVISION:	COX COMMUNICATIONS
SEWER AND WATER:	CITY OF SAN DIEGO
DRAINAGE SYSTEM:	CITY OF SAN DIEGO
FIRE DEPARTMENT:	CITY OF SAN DIEGO
SCHOOL DISTRICT:	SAN DIEGO UNIFIED SCHOOL DISTRICT

PROJECT TEAM

OWNER/DEVELOPER:
ALL PEOPLES CHURCH
5577 UNIVERSITY AVENUE
SAN DIEGO, CA 92105

ARCHITECT:
KENNETH D SMITH ARCHITECT &ASSOCIATES
500 FESLER STREET, SUITE 102
EL CAJON, CALIFORNIA 92020
T: (619) 444-2182

LANDSCAPE ARCHITECT:
AHLES LANDSCAPE ARCHITECTURE
2410 MANCHESTER AVENYE
RANCHO SANTA FE, CA 92091
T: (858) 756-8693

CIVIL ENGINEER/SURVEY:
PASCO LARET SUITER AND ASSOCIATES
535 N HWY 101, SUITE A
SOLANA BEACH, CALIFORNIA 92075
T: (858) 259-8212 FAX: (858) 259-4812

TRAFFIC ENGINEER:
LOS ENGINEERING, INC.
11622 EL CAMINO REAL, SUITE 100
SAN DIEGO, CA 92130
T: (619) 890-1253
LANDSCAPE ARCHITECT:

GEOTECHNICAL:
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 CORPORATE DR, SUITE B
ESCONDIDO, CA 92029
T: (619) 850-3980

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2022
DATE

PROJECT NAME: ALL PEOPLES CHURCH
PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8
SAN DIEGO, CALIFORNIA 92120
PROJECT TRACKING SYSTEM NUMBER: 636444
INTERNAL ORDER NUMBER: PENDING
SHEET TITLE: SITE PLAN
SHEET NUMBER: C 1.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020
2. 08-28-2020
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PLSA 2936

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 2292338 ,PLANNED DEVELOPMENT PERMIT NO. 2292339, EASEMENT VACATION NO. 2292340, TENTATIVE MAP NO. 2490918

LAND USE PLAN NO. 2292367

ALL PEOPLES CHURCH

TOPOGRAPHY:

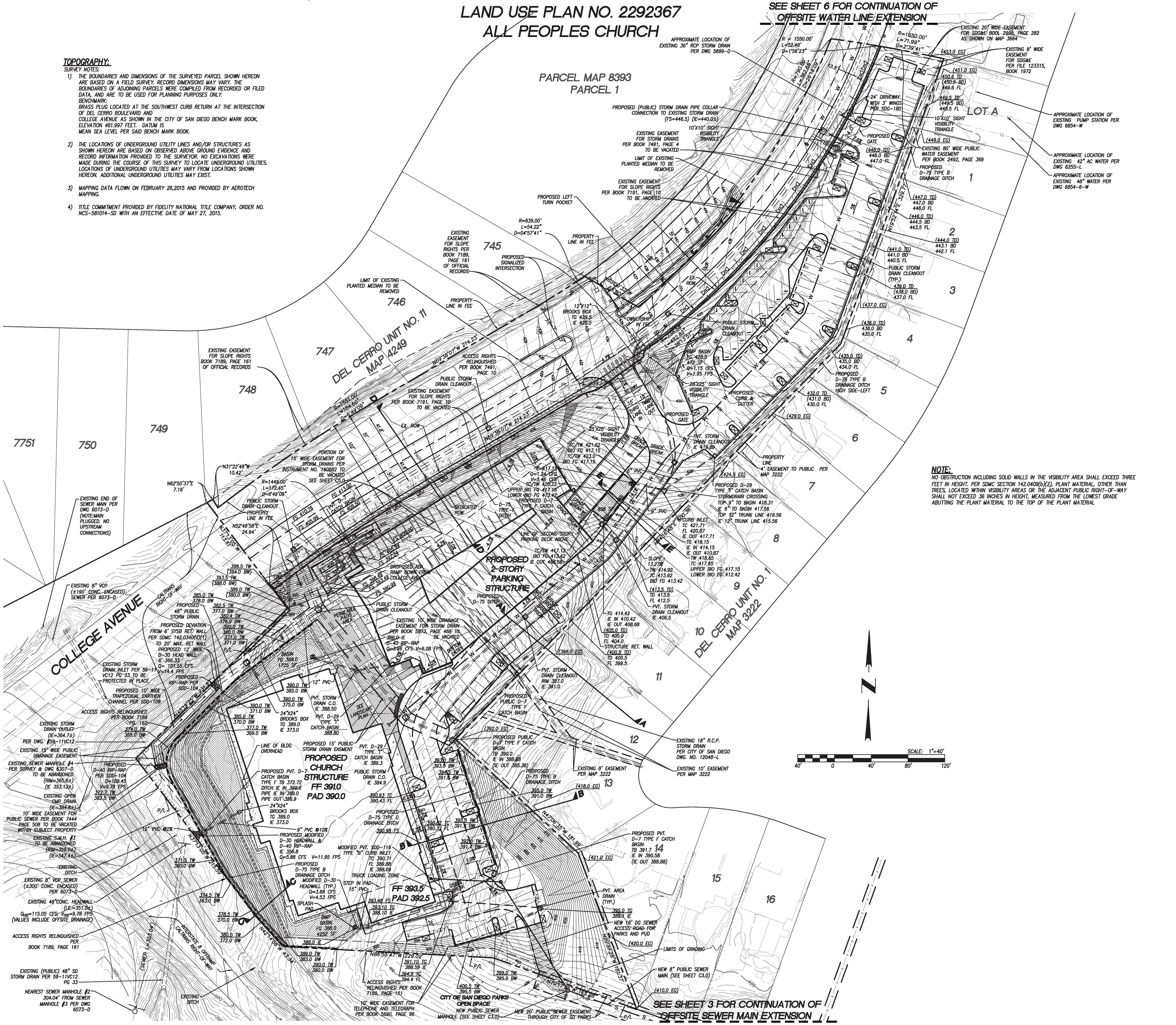
SURVEY NOTES:

1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND
COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS
MEAN SEA LEVEL PER SAID BENCH MARK BOOK.

2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.

3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.

4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



NOTE:
NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED THREE FEET IN HEIGHT. PER SDMC SECTION 142.0409(b)(2), PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT-OF-WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLANT MATERIAL

LEGEND

BOUNDARY LINE
ADJACENT PROPERTY LINE
EASEMENT LINE
RIGHT OF WAY
EXISTING STREET CENTERLINE

EXISTING IMPROVEMENTS
EXISTING CONTOUR — 139
EXISTING CURB & GUTTER
EXISTING SEWER MAIN
EXISTING STORM DRAIN MAIN
EXISTING CURB INLET
EXISTING WATER MAIN
EXISTING WATER VALVE
EXISTING FIRE HYDRANT
EXISTING STREET LIGHT
EXISTING STRUCTURE
EXISTING VEGETATION

PROPOSED IMPROVEMENTS
PROPOSED ROAD CENTERLINE
LIMIT OF WORK LINE
CURB AND GUTTER
24' RESIDENTIAL DRIVEWAY
PROPOSED CONTOURS — 146
PROPOSED SPOT ELEVATION — FS=145.0
RETAINING WALL
SDRSD D-75 BROW DITCH
BIORETENTION BASIN
STORM DRAIN HEADWALL
STORM DRAIN CLEANOUT
AREA DRAIN
STORM DRAIN INLET
TYPE F CATCH BASIN
RIP RAP ENERGY DISSIPATOR PER SDD-104
PVC STORM DRAIN (SIZE VARIES)
WATER SERVICE
TRAFFIC SIGNAL
PARKING GARAGE WALL
CUT/FILL SLOPE
PERMEABLE PAVERS
PROPOSED RIP-RAP
TREE PER LANDSCAPE PLANS

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
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REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2022
DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY GRADING PLAN

SHEET NUMBER: C 2.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:

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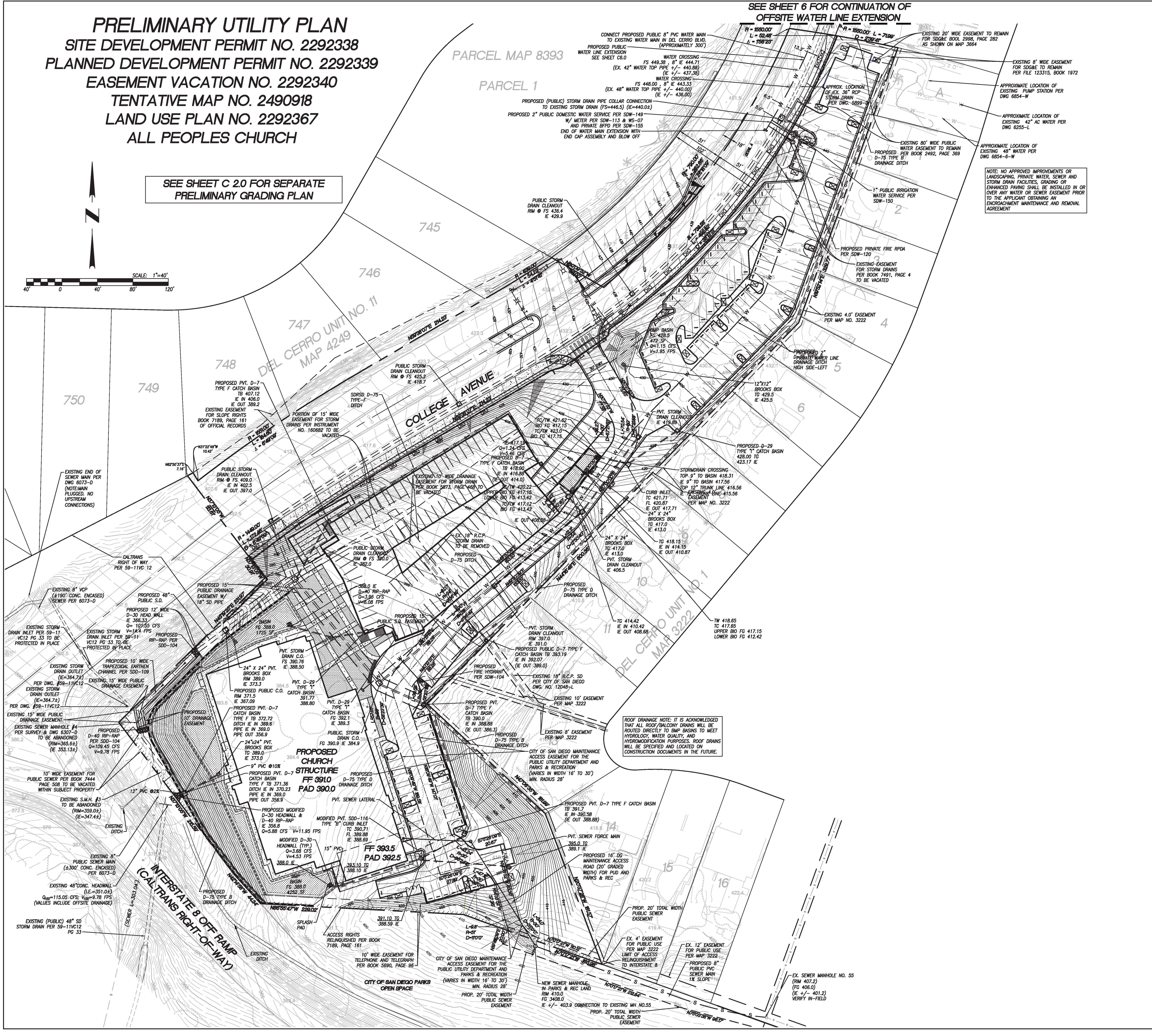
PLSA 2936

PRELIMINARY UTILITY PLAN
SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH

SEE SHEET C 2.0 FOR SEPARATE PRELIMINARY GRADING PLAN

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION



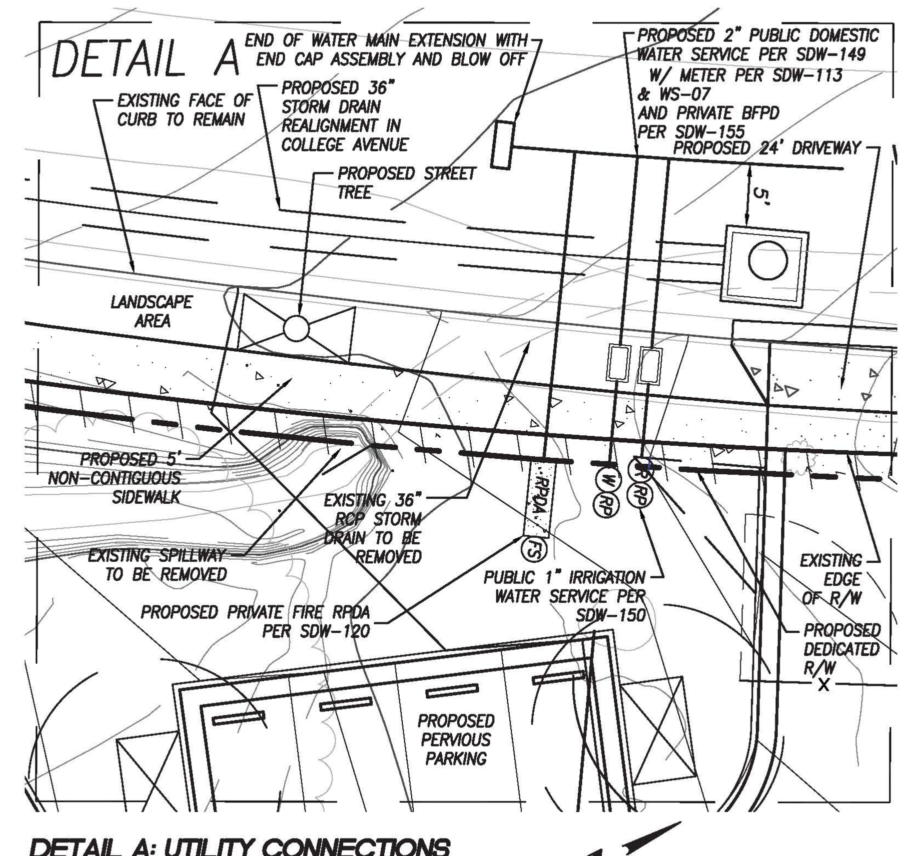
LEGEND

EXISTING IMPROVEMENTS

- BOUNDARY LINE
- EXISTING CONTOURS
- EXISTING CURB AND GUTTER
- EXISTING STREET CENTERLINE
- EXISTING SEWER MAIN
- EXISTING STORM DRAIN MAIN
- EXISTING CURB INLET
- EXISTING WATER MAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING VEGETATION

PROPOSED IMPROVEMENTS

- SITE BOUNDARY
- ROW
- PUBLIC RIGHT-OF-WAY CENTERLINE
- CURB AND GUTTER
- RESIDENTIAL DRIVEWAY (WIDTH VARIES)
- PROPOSED CONTOURS
- PROPOSED SPOT ELEVATION
- RETAINING WALL
- TYPE "B" BROW DITCH
- STORM DRAIN HEADWALL
- STORM DRAIN (SIZE PER PLAN)
- STORM DRAIN CLEANOUT
- 2" PUBLIC WATER SERVICE & METER W/ PRIVATE BFPD
- 8" PVC WATER MAIN (PUBLIC)
- 8" FIRE SERVICE WITH RPDA (PUBLIC)
- 1" IRRIGATION SERVICE (PUBLIC)
- RIP RAP ENERGY DISSIPATOR PER SDD-104
- PROPOSED PERMEABLE PAVEMENT PARKING
- TREE PER LANDSCAPE PLANS
- PROPOSED SEWER ACCESS



DETAIL A: UTILITY CONNECTIONS
SCALE: 1"=10'

PREPARED BY:

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CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
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REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2022

PROJECT NAME: ALL PEOPLES CHURCH	DRAWN BY: GJK
	CHECKED BY: W. MACK
PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120	ORIGINAL DATE: 04-22-2019
PROJECT TRACKING SYSTEM NUMBER: 636444	REVISIONS:
INTERNAL ORDER NUMBER: PENDING	
SHEET TITLE: PRELIMINARY UTILITY PLAN	
SHEET NUMBER: C 3.0 OF 7	

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SECTIONS AND DETAILS

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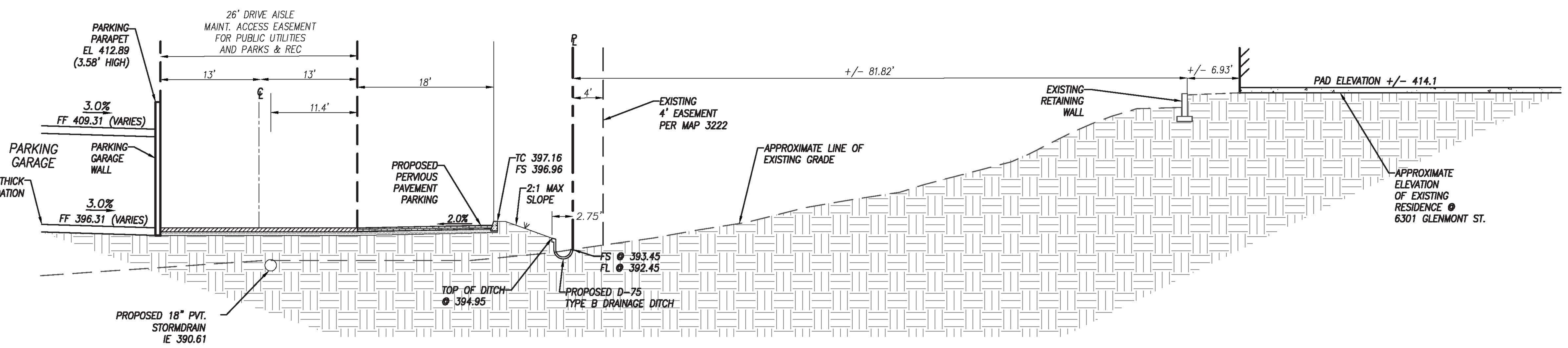
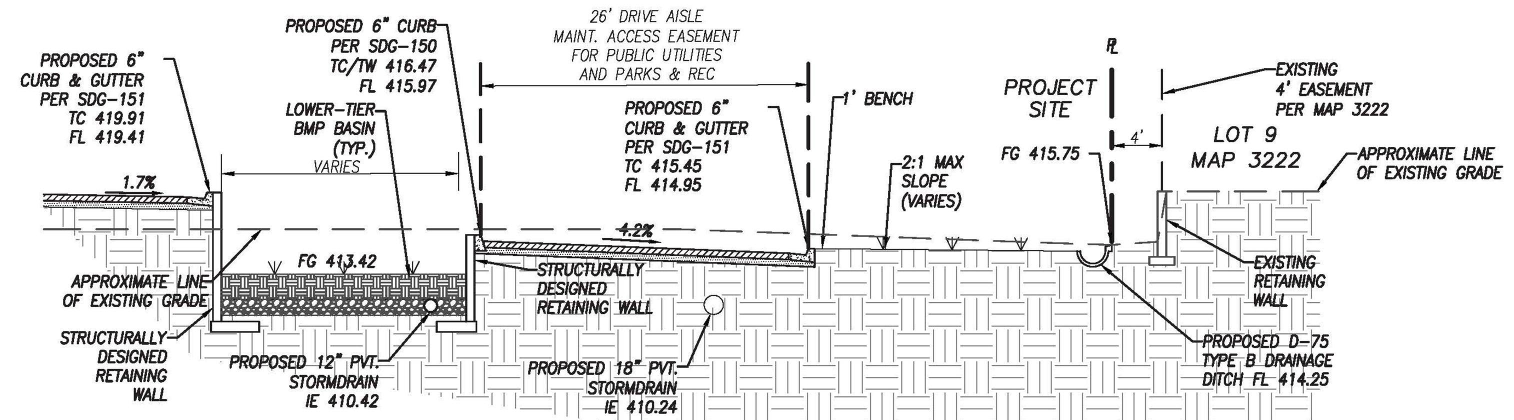
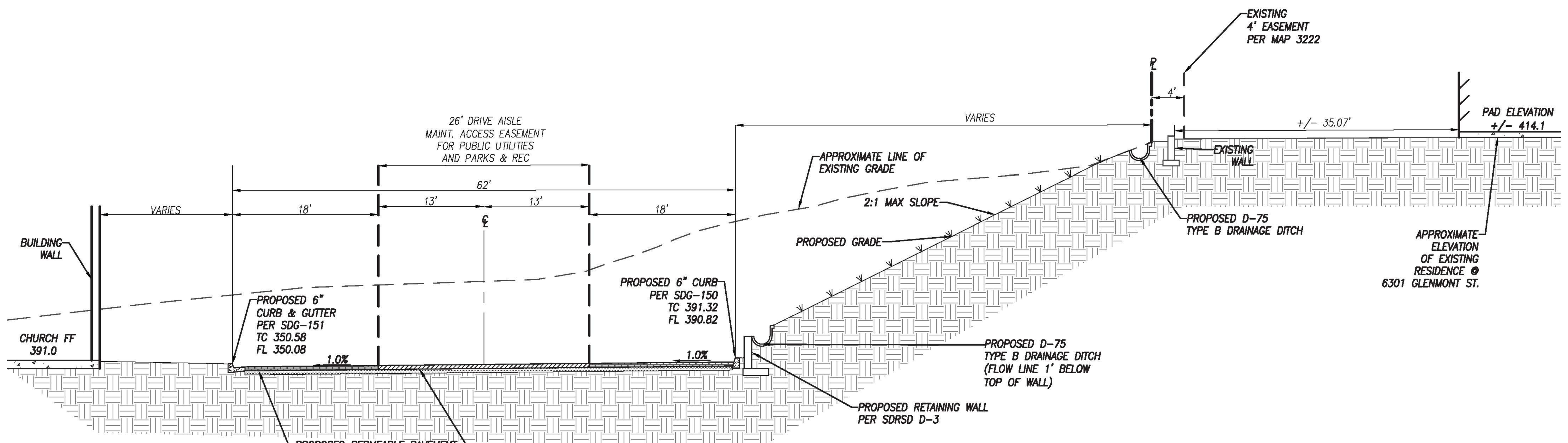
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH



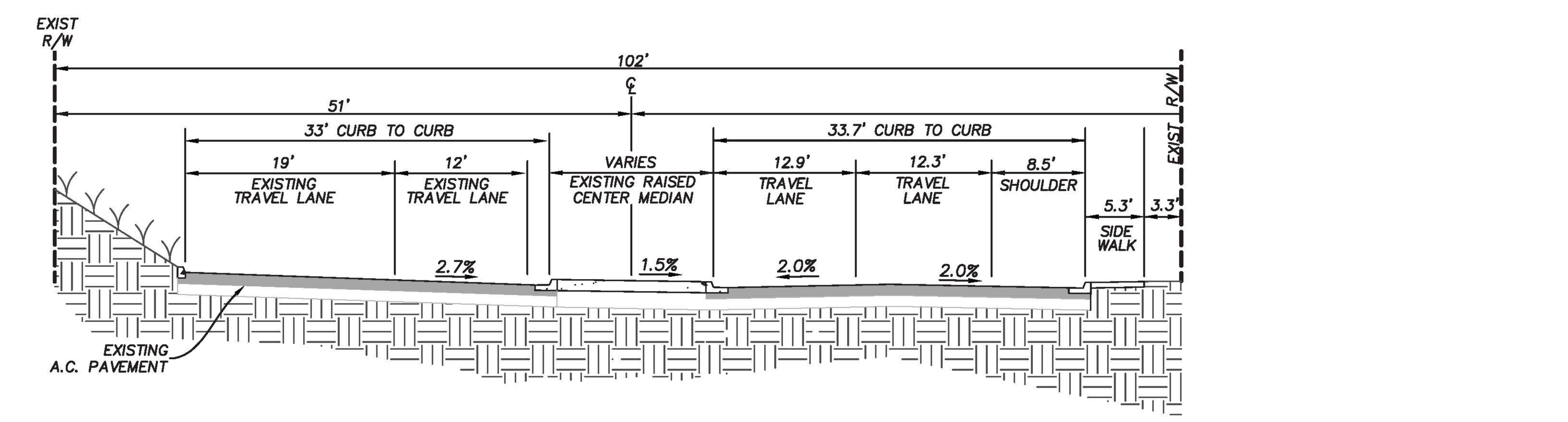
SECTION A-A: THROUGH TO 5608 MARNE AVE
NOT TO SCALE



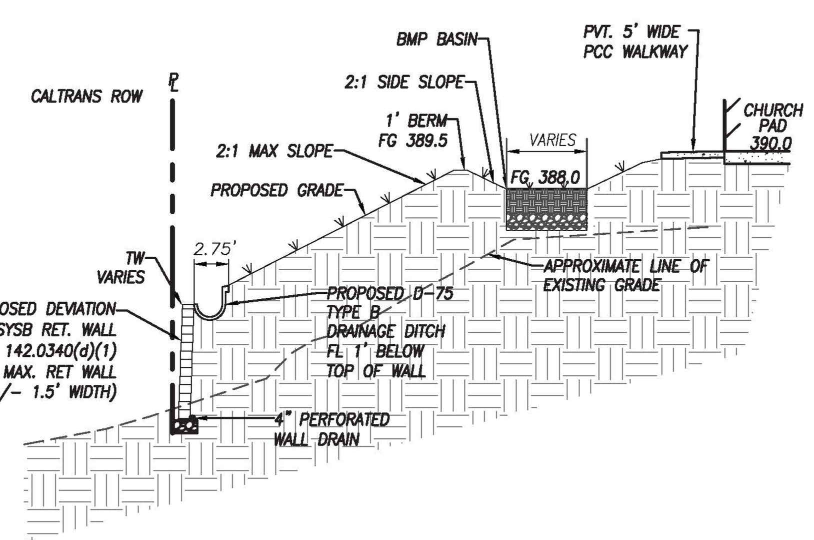
SECTION E-E: EASTERLY BOUNDARY BASIN
NOT TO SCALE



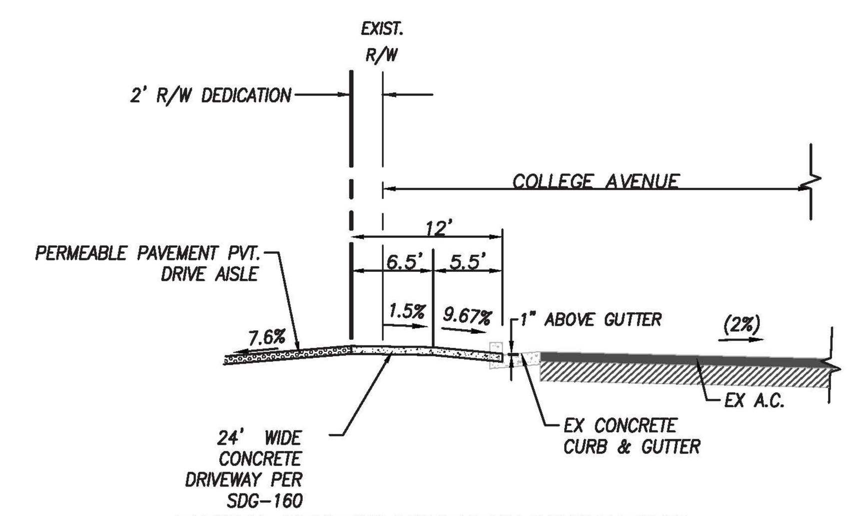
SECTION B-B: THROUGH TO 6301 GLENMONT STREET
NOT TO SCALE



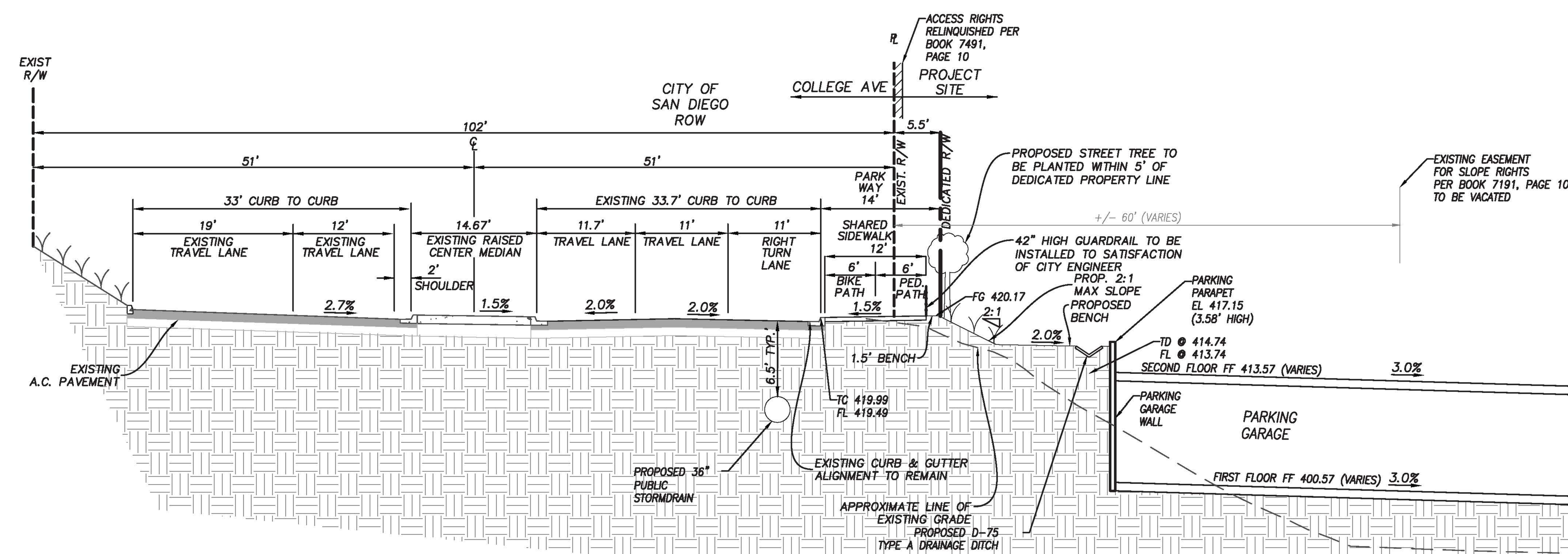
TYPICAL SECTION: COLLEGE AVENUE
NOT TO SCALE



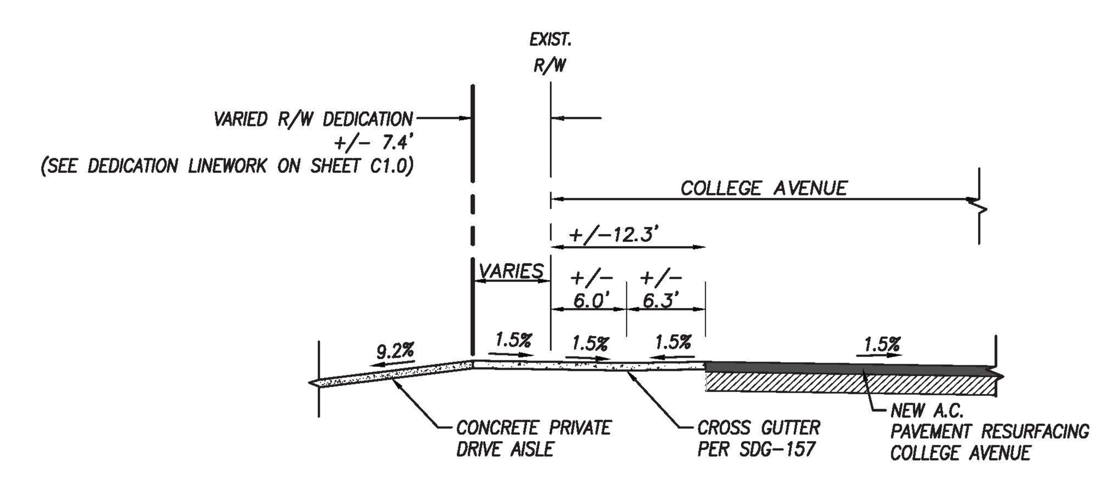
SECTION C-C: SOUTHWEST-CALTRANS ROW
NOT TO SCALE



TYPICAL SECTION: NORTHERN 24' DRIVEWAY
NOT TO SCALE



SECTION D-D: WEST FROM COLLEGE AVENUE
NOT TO SCALE



TYPICAL SECTION: 30' SIGNALIZED INTERSECTION
NOT TO SCALE

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 EXPIRATION: 12/31/2022 DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8 SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: SECTIONS & DETAILS

SHEET NUMBER: C 4.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:

1. 03-17-2020	11.
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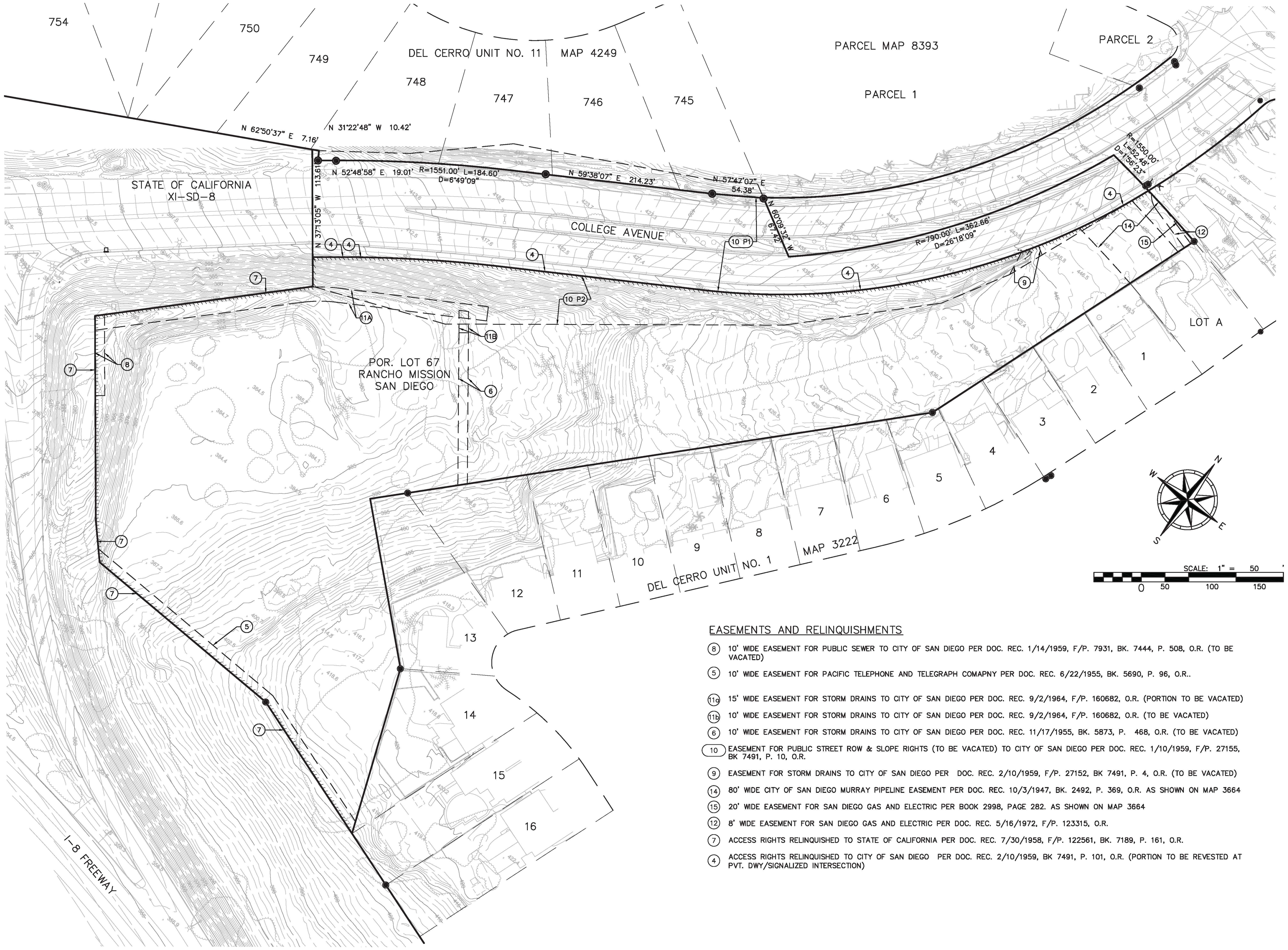
PLSA 2936

EXISTING CONDITIONS EXHIBIT
SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH



EASEMENTS AND RELINQUISHMENTS

- (8) 10' WIDE EASEMENT FOR PUBLIC SEWER TO CITY OF SAN DIEGO PER DOC. REC. 1/14/1959, F/P. 7931, BK. 7444, P. 508, O.R. (TO BE VACATED)
- (5) 10' WIDE EASEMENT FOR PACIFIC TELEPHONE AND TELEGRAPH COMAPNY PER DOC. REC. 6/22/1955, BK. 5690, P. 96, O.R..
- (11a) 15' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 9/2/1964, F/P. 160682, O.R. (PORTION TO BE VACATED)
- (11b) 10' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 9/2/1964, F/P. 160682, O.R. (TO BE VACATED)
- (6) 10' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 11/17/1955, BK. 5873, P. 468, O.R. (TO BE VACATED)
- (10) EASEMENT FOR PUBLIC STREET ROW & SLOPE RIGHTS (TO BE VACATED) TO CITY OF SAN DIEGO PER DOC. REC. 1/10/1959, F/P. 27155, BK 7491, P. 10, O.R.
- (9) EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, F/P. 27152, BK 7491, P. 4, O.R. (TO BE VACATED)
- (14) 80' WIDE CITY OF SAN DIEGO MURRAY PIPELINE EASEMENT PER DOC. REC. 10/3/1947, BK. 2492, P. 369, O.R. AS SHOWN ON MAP 3664
- (15) 20' WIDE EASEMENT FOR SAN DIEGO GAS AND ELECTRIC PER BOOK 2998, PAGE 282. AS SHOWN ON MAP 3664
- (12) 8' WIDE EASEMENT FOR SAN DIEGO GAS AND ELECTRIC PER DOC. REC. 5/16/1972, F/P. 123315, O.R.
- (7) ACCESS RIGHTS RELINQUISHED TO STATE OF CALIFORNIA PER DOC. REC. 7/30/1958, F/P. 122561, BK. 7189, P. 161, O.R.
- (4) ACCESS RIGHTS RELINQUISHED TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, BK 7491, P. 101, O.R. (PORTION TO BE REVESTED AT PVT. DWY/SIGNALIZED INTERSECTION)

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT ON MARCH 16, 2015.

Gary D Mellom

GARY D. MELLOM, PLS 8537 12-31-2022

PROFESSIONAL LAND SURVEYOR
GARY D. MELLOM
LS 8537
STATE OF CALIFORNIA

PROJECT INFORMATION

CLIENT: ALL PEOPLE'S CHURCH
ADDRESS: COLLEGE AVE AND I-8 FREEWAY, SAN DIEGO, CA
APN: 463-010-10

ABBREVIATED LEGAL DESCRIPTION

PORTION OF LOT 67 OF RANCHO MISSION OF SAN DIEGO, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS DESCRIBED IN GRANT DEED RECORDED NOVEMBER 3, 1975 AS DOCUMENT NO. 75-306249, O.R.

SURVEY NOTES

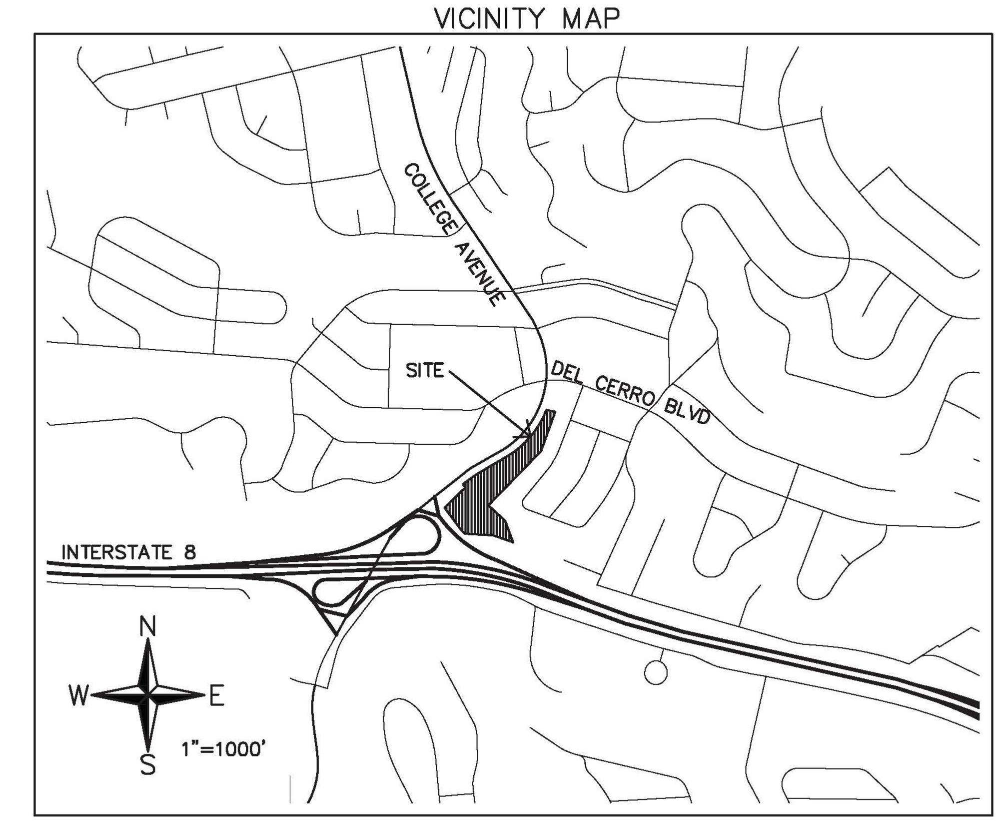
1. THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL(S) SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY. BENCHMARK:

   BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.
2. THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.
3. MAPPING DATA FLOWN ON FEBRUARY 26, 2015 AND PROVIDED BY AEROTECH MAPPING.
4. TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 996-23035459-PPI WITH AN EFFECTIVE DATE OF AUGUST 19, 2013.

LEGEND

FOUND MONUMENT	PEDESTRIAN SIGNAL
PROPERTY LINE	POST- MISC
RIGHT-OF-WAY LINE	2980.5 SPOT ELEVATION
CENTER LINE	BRIDGE SIGNS
ADJOINING PROPERTY LINE	FIRE HYDRANT
EXISTING EASEMENT	METER / UTILITY
X X FENCE LINE	MH MANHOLE
WALL	STREET LIGHT
INDEX CONTOUR LINE	LIGHT POLE
INTERMEDIATE CONTOUR LINE	SIGNS
VEGETATION LINE	GATE
ACCESS RIGHTS RELENQUISHED	TRAFFIC SIGNAL
SWIMMING POOL	VALVE
PALM TREE	BUILDING ROOFLINE
SINGLE TREE	

VICINITY MAP



PREPARED BY:

PASCO LARET SUITER
& ASSOCIATES
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REGISTERED PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2022

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8
SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: EXISTING CONDITIONS EXHIBIT

SHEET NUMBER: C 5.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
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OFFSITE IMPROVEMENTS
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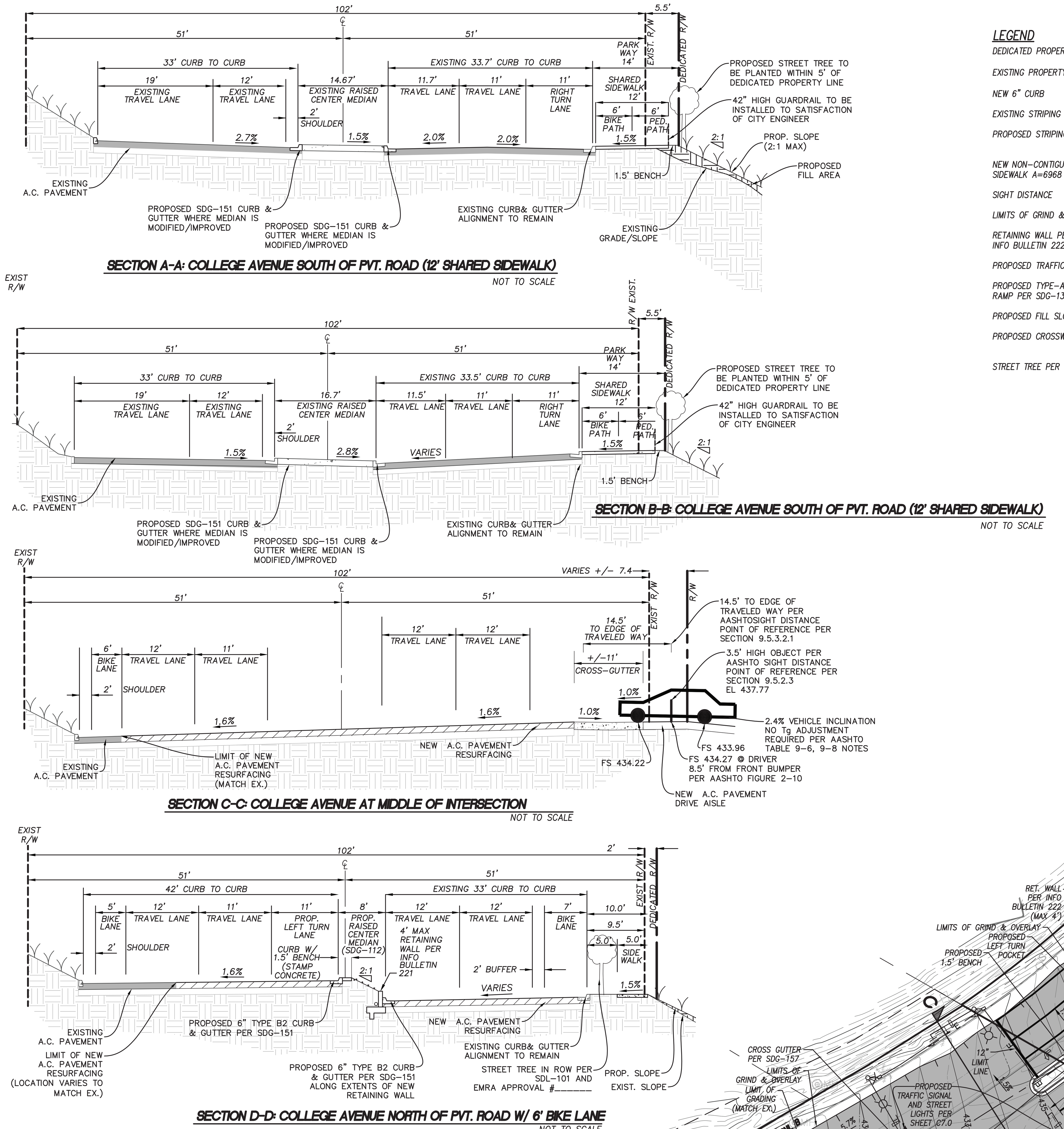
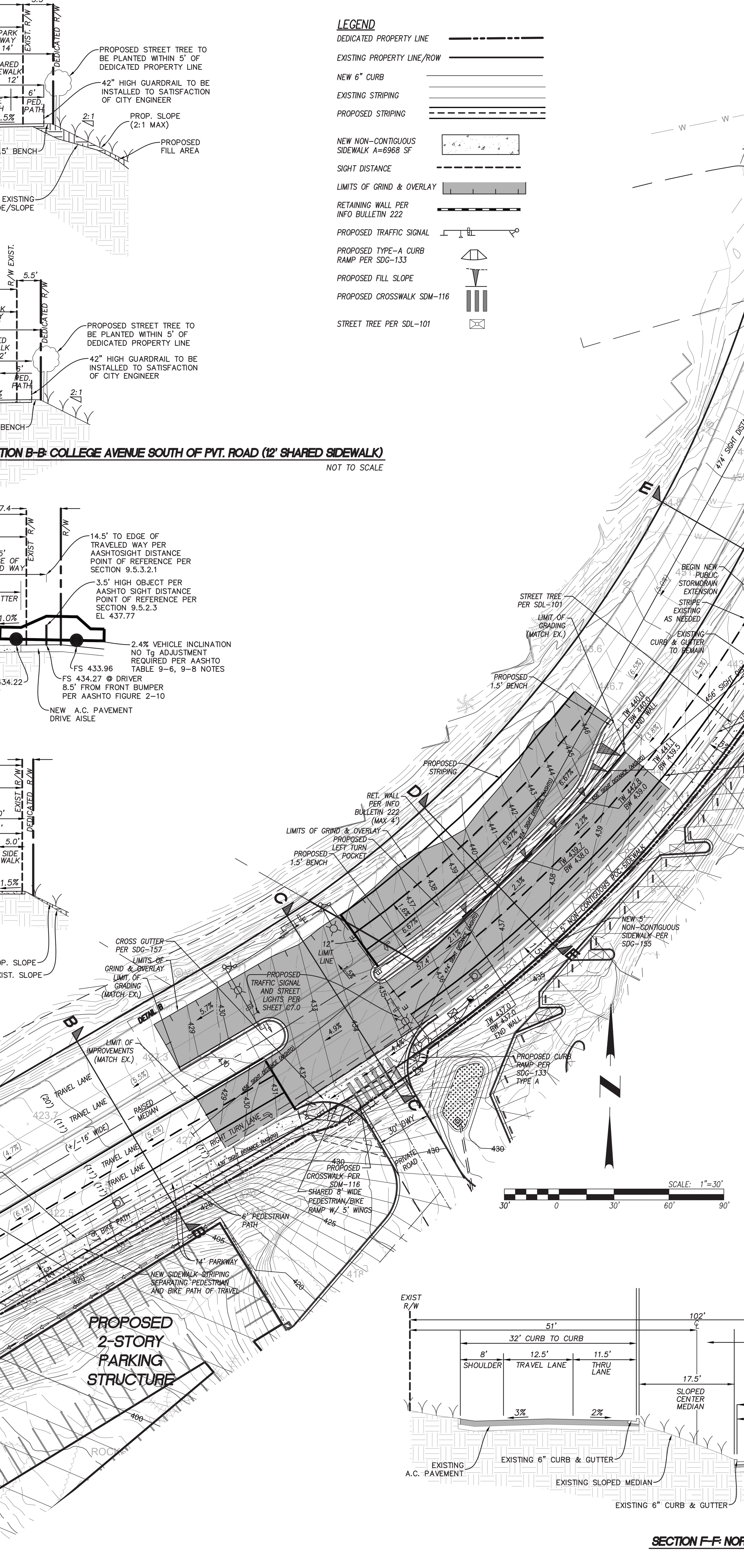
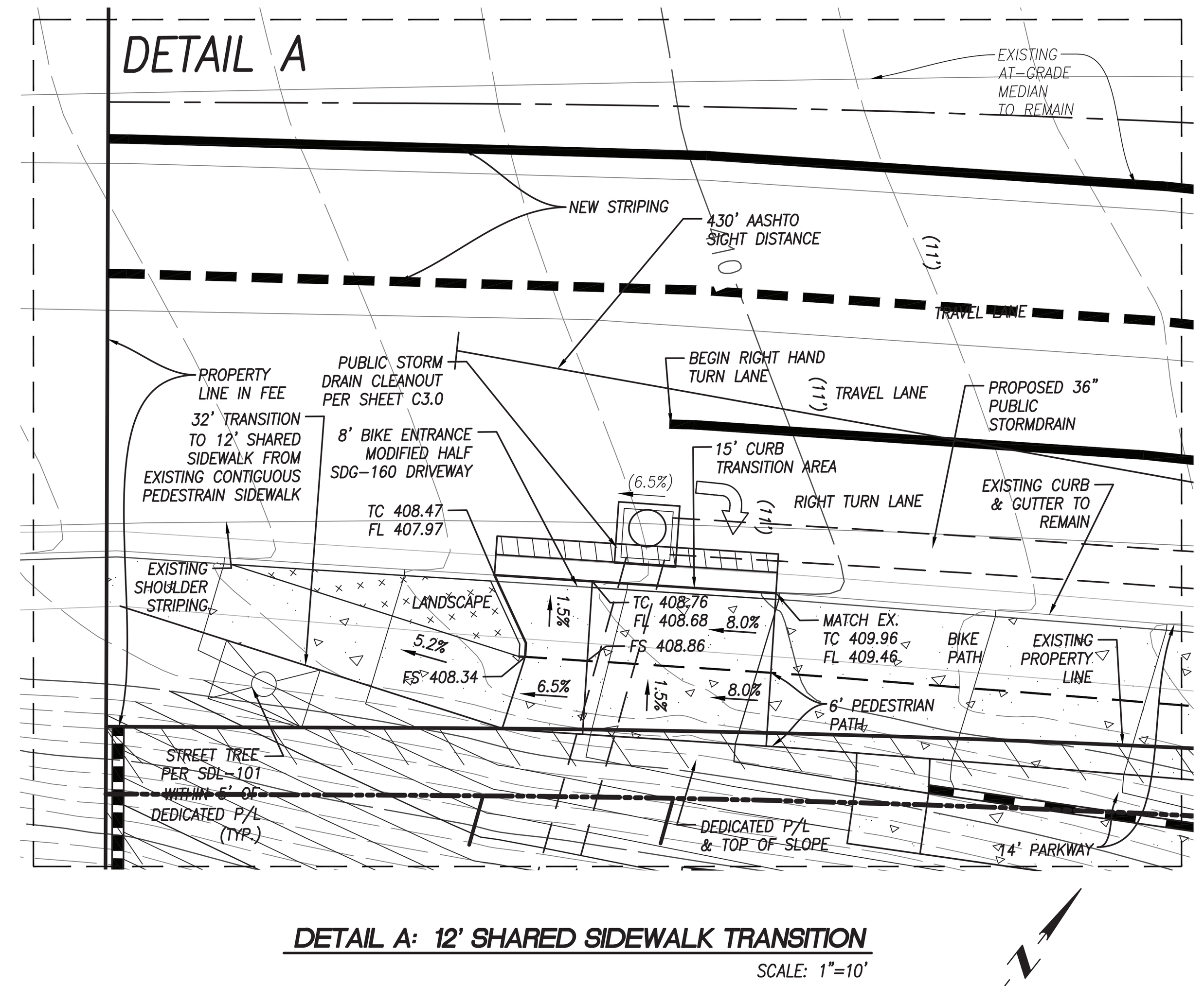
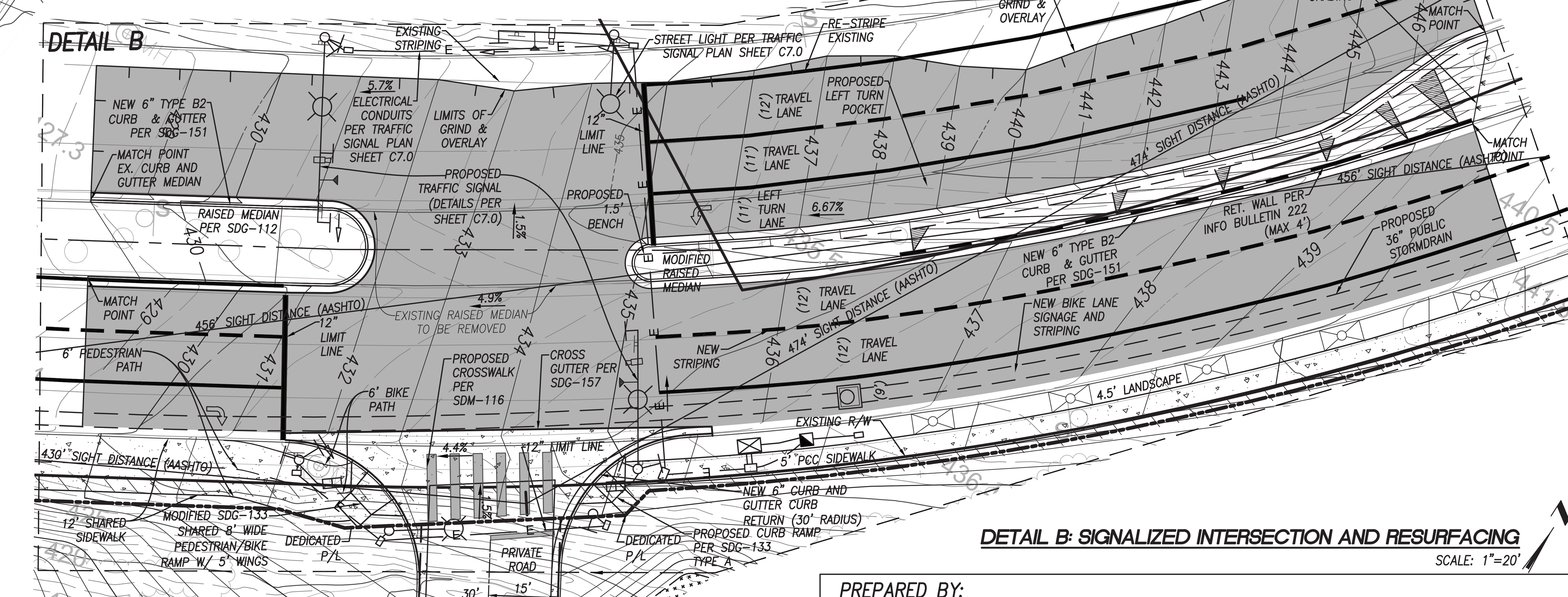
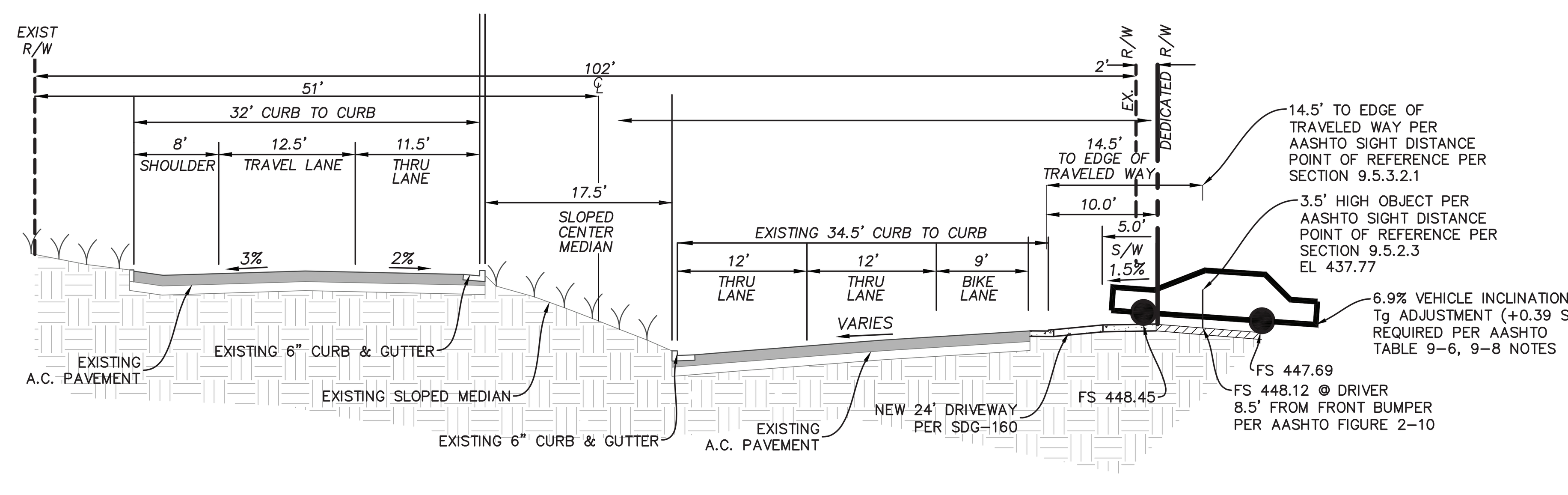
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH











PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER · WILLIAM GREGG MACK · No. 73620 · CIVIL · STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2022

PROJECT NAME: ALL PEOPLES CHURCH	DRAWN BY: GJK
PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120	CHECKED BY: W. MACK
PROJECT TRACKING SYSTEM NUMBER: 636444	ORIGINAL DATE: 04-22-2019
INTERNAL ORDER NUMBER: PENDING	REVISIONS: 1. 03-17-2020 2. 08-28-2020 3. 2-12-2020 4. – 20.
SHEET TITLE:	
SHEET NUMBER: C 6.0 OF 7	

PLSA 2936

TRAFFIC SIGNAL INSTALLATION PLAN
SITE DEVELOPMENT PERMIT NO. 92338
PLANNED DEVELOPMENT PERMIT NO. 92339
EASEMENT VACATION NO. 92340
TENTATIVE MAP NO.________
ALL PEOPLES CHURCH

TRAFFIC SIGNAL GENERAL NOTES *

1. PULL BOXES SHALL BE NO. 6 AND CONDUIT 3" UNLESS NOTED OTHERWISE.
2. LOCATIONS OF ALL UNDERGROUND UTILITIES ARE APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND VERIFY THE EXACT LOCATIONS AND CONDITIONS ON THE JOB SITE.
3. THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN A TRAFFIC CONTROL PLAN PERMIT FROM THE CITY OF SAN DIEGO DEVELOPMENT SERVICES DEPARTMENT PERMIT CENTER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO START OF WORK.
4. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3" CONDUIT INSTALLED TO THE ADJACENT NO. 6 PULL BOX. THE CONTROLLER FOUNDATION SHALL HAVE A SPARE 3" CONDUIT INSTALLED TO THE ADJACENT NO. 6 PULL BOX FOR FUTURE USE AS SHOWN ON CONDUIT SCHEDULE. (NEEDS TO BE ADDED AS A NOTE AT THE BOTTOM OF THE CONDUIT SCHEDULE)
   A. ALL CONDUIT CROSSINGS SHALL INCLUDE A MINIMUM OF TWO (2) 3" CONDUITS.
5. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKINGS, PARKING REMOVAL AND TRAFFIC SIGNING (EXCEPT "G" SERIES STREET NAME SIGNS) AS SHOWN ON THESE PLANS.
   A. THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN THE APPROVAL OF CITY RESIDENT TRAFFIC ENGINEER (ETS DIVISION) OF THE LOOP LOCATIONS PRIOR TO CUTTING, AS WELL AS, PRIOR TO ANY INSTALLATION AND/OR REMOVAL OF STRIPING, PAVEMENT MARKING, PARKING REMOVAL AND SIGN LOCATIONS.
   B. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL UNNECESSARY AND CONFLICTING STRIPING AND PAVEMENT MARKINGS.
   C. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL PAVEMENT MARK-OUTS.
6. THE TRAFFIC SIGNAL CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE (3) WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN-ON.
7. CONTRACTOR SHALL PROVIDE ALL CABLING AND CONDUCTORS NECESSARY TO PERFORM ALL FUNCTIONS SHOWN ON THESE PLANS.
8. ALL POLES, CONDUIT, PULL BOXES, STRIPING AND LOOP DETECTOR LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE DETERMINED BY FIELD CONDITIONS AT THE TIME ON CONSTRUCTION AND AS DIRECTED BY THE CITY OF SAN DIEGO.
9. ROUTING AND LOCATIONS OF UNDERGROUND ELECTRICAL SYSTEM IS DIAGRAMMATIC AND SUBJECT TO APPROVAL OF THE CITY ELECTRICAL ENGINEER. UNDERGROUND ELECTRICAL LINES AND SUBSURFACE STRUCTURES MAY BE RELOCATED IF NECESSARY TO CLEAR OTHER EXISTING UNDERGROUND FACILITIES.
10. ALL TREES AND SHRUBS SHALL BE TRIMMED OR REMOVED AS DETERMINED BY THE CITY RESIDENT ENGINEER AS REQUIRED TO MAINTAIN SIGNAL HEAD VISIBILITY AND SIGHT DISTANCE.
11. ALL VEHICLE HEADS SHALL BE 12" L.E.D. WITH AN INCANDESCENT LOOK AND BACKPLATES.
12. ALL VEHICLE DETECTOR LOOPS SHALL BE TYPE "E" AS SHOWN ON THIS PLAN.
    A. DETECTOR LOOPS SHALL BE 6' DIAMETER WITH 10' SPACING AND POSITIONED IN CENTER OF LANE UNLESS OTHERWISE SHOWN.
    B. FRONT DETECTOR LOOPS SHALL BE TYPE "E" MODIFIED LOOPS PER SDE – 104.
    C. ALL LOOP LAYOUTS SHALL INCLUDE LAYOUT OF HOMERUN LINES, WHICH MUST BE APPROVED PRIOR TO INSTALLATION.
    D. BICYCLE DETECTOR LOOPS SHALL BE TYPE Q.
13. PEDESTRIAN SIGNAL INDICATIONS AND PUSH BUTTONS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNAL INDICATIONS SHALL BE 16"X18" L.E.D. COUNTDOWN TIMER WITH AN INCANDESCENT LOOK. PEDESTRIAN PUSH BUTTONS SHALL BE 2" PER ADA REQ.
14. ALL CROSSWALKS SHALL BE CONTINENTAL TYPE PER SDM-116.
15. PEDESTRIAN PUSH BUTTON HOUSING COLOR SHALL MATCH COLOR NO. 33538 OF FED-STD-595 WHEN PEDESTRIAN PUSH BUTTONS ARE PLACED ON A TRAFFIC SIGNAL POLE.
16. PEDESTRIAN PUSH BUTTON LOCATIONS SHALL FOLLOW THE CA MUTCD STANDARDS AND THE THE ADA REQUIREMENTS.

POLE SCHEDULE *

NO.	STANDARD TYPE	STANDARD HGT	STANDARD SIG. M.A.	STANDARD LUM. M.A.	LUMINARE LED	PLACEMENT A	PLACEMENT B	SIGNAL MOUNTING VEHICLE	SIGNAL MOUNTING VEHICLE	PEDESTRIAN SIGNAL	PEDESTRIAN APS PPB	QUAD	REMARKS
A	15 TS	30'	-	15'	ZI4	-	-	-	-	-	Ø2	8	
B	1A	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	-	-	4
C	26-4-100	30'	40'	15'	ZI4	-	4'	2-MAS	SV-2-T	–	-	-	ALL PEOPLE'S CHURCH
D	26-3-100	30'	25'	15'	ZI4	-	4'	MAS	SV-2-T	-	-	-	COLLEGE AVE.
E	19-4-100	30'	30'	15'	ZI4	-	-	MAS	SV-2-T	SP-1-T	-	-	ALL PEOPLE'S CHURCH 4
F'	1A	10'	–	–	–	-	-	–	TV-1-T	–	Ø2	8	

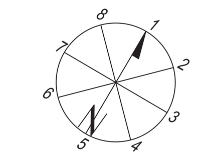
ALL VEHICLE HEADS SHALL BE 12" WITH BACKPLATES AND GLASS LENSES. ANCHOR BOLT NUT COVERS SHALL BE PROVIDED.

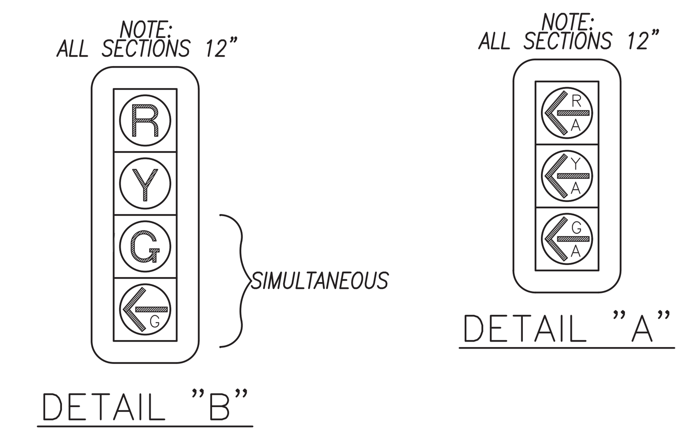
1. PED PUSH BUTTONS SHALL BE 2-WIRE ACCESSIBLE PEDESTRIAN SIGNALS (APS) PER CITY SPECIFICATIONS.

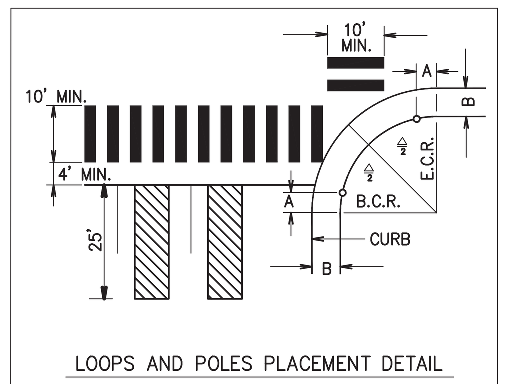
LEGEND

– VIDEO DETECTION CAMERA

– VIDEO DETECTION ZONE (SIZE AND LOCATION TO BE DETERMINED IN FIELD)





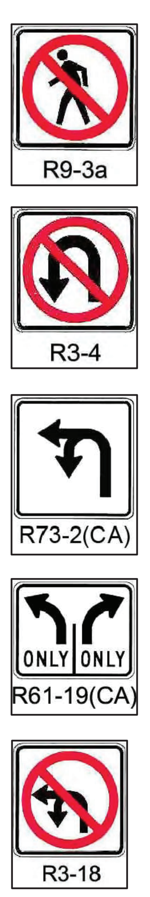


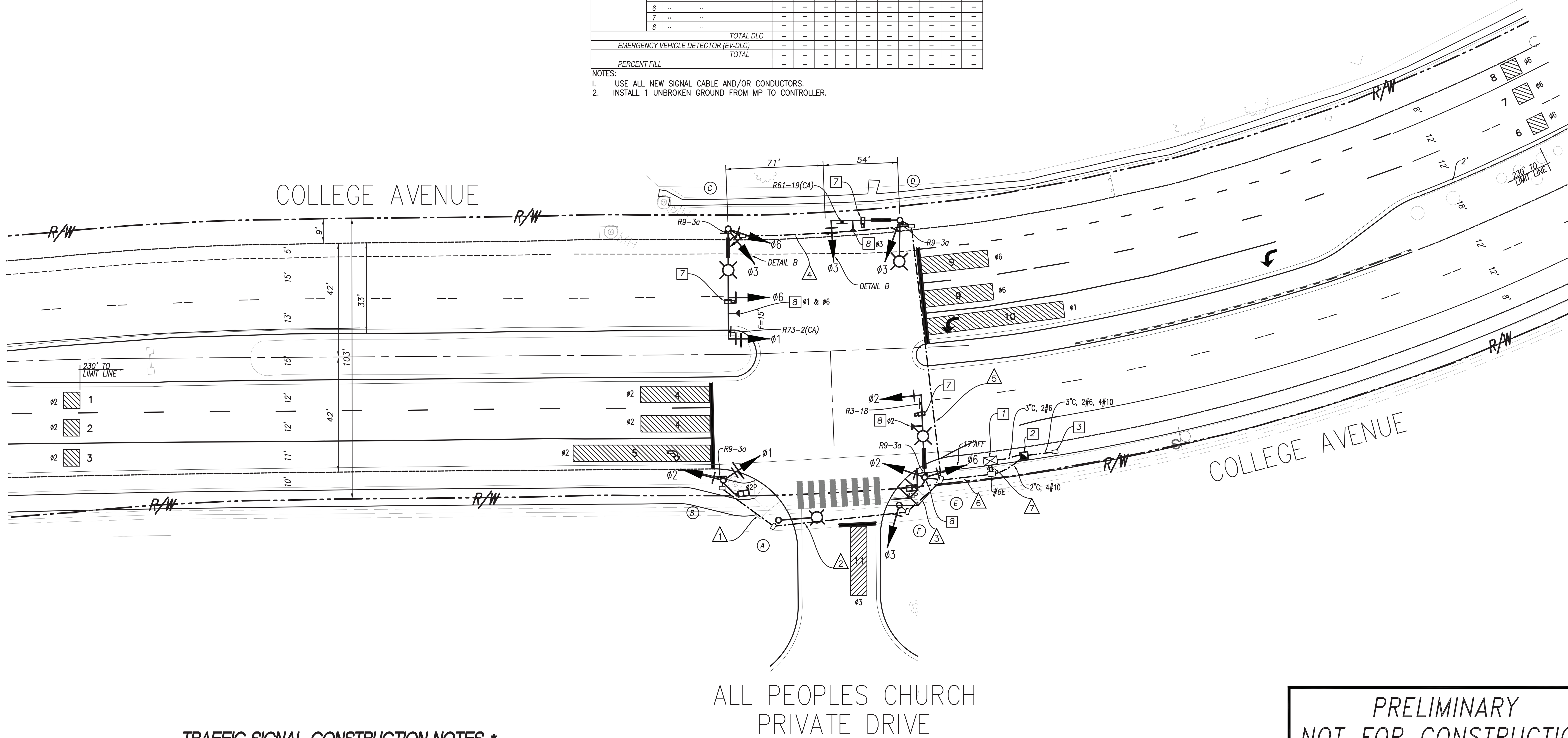
CONDUCTOR TABLE *

AWG SIZE OR CABLE TYPE	PHASE	POLE OR CIRCUIT	3" ⚠1	3" ⚠2	3" ⚠3	3" ⚠4	3" ⚠5	3" ⚠6	3" ⚠7	3" ⚠8	3" ⚠9	2-3" ⚠10
CONDUCTORS PPB 3 / 12 CONDUCTORS		POLE - A	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		POLE - B	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		POLE - C	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		POLE - D	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		POLE - E	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		POLE - F	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
		-	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
			–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
			–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
TOTAL CABLES	3 CONDUCTOR/12 CONDUCTOR		–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–	–/–
NO 6		SIGNAL SERVICE	–	–	–	–	–	–	–	–	–	–
NO 8		GROUND	–	–	–	–	–	–	–	–	–	–
NO 10		LIGHTING	–	–	–	–	–	–	–	–	–	–
6 PAIR NO.22		INTERCONNECT CABLE	–	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	1	LOOP DETECTOR	–	–	–	–	–	–	–	–	–	–
	2	" "	–	–	–	–	–	–	–	–	–	–
	3	" "	–	–	–	–	–	–	–	–	–	–
	4	" "	–	–	–	–	–	–	–	–	–	–
	5	" "	–	–	–	–	–	–	–	–	–	–
	6	" "	–	–	–	–	–	–	–	–	–	–
	7	" "	–	–	–	–	–	–	–	–	–	–
	8	" "	–	–	–	–	–	–	–	–	–	–
TOTAL DLC			–	–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE DETECTOR (EV-DLC)			–	–	–	–	–	–	–	–	–	–
TOTAL			–	–	–	–	–	–	–	–	–	–
PERCENT FILL			–	–	–	–	–	–	–	–	–	–

NOTES:
1. USE ALL NEW SIGNAL CABLE AND/OR CONDUCTORS.
2. INSTALL 1 UNBROKEN GROUND FROM MP TO CONTROLLER.

SIGN LEGEND





DETECTOR ASSIGNMENT *

DETECTOR	PHASE	SLOT	FIELD TERMINAL
PPB	2P	I12U	T8-4 & COM 6
EVA	2	J12U	T9-4 & COM 6
EVC	1+6	J12L	T9-5 & COM 6
EVD	8	J14U	T9-8 & COM 9
FLASH SENSE		I14U	T8-10 & COM 12
STOP TIMING		I14L	T8-11 & COM 12
RR1 FLASH		J14U	T9-10 & COM 12
RR2 LTD OPE		J14L	T9-11 & COM 12

THE LOCATIONS OF EXISTING UTILITY INSTALLATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE. THERE MAY BE OTHER UNDERGROUND UTILITY INSTALLATIONS WITHIN THE PROJECT AREA THAT ARE NOT SHOWN.

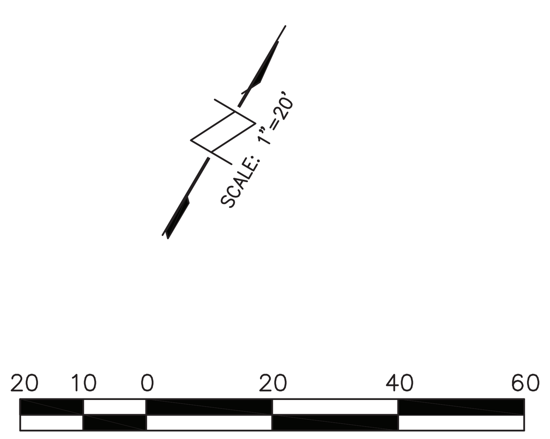
TRAMES SOLUTIONS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES, LIABILITY OR COSTS RESULTING FROM CHANGES OR ALTERATIONS MADE TO THIS PLAN WITHOUT THE EXPRESSED WRITTEN CONSENT OF TRAMES SOLUTIONS, INC.

ENGINEERING PERMIT NO:______________

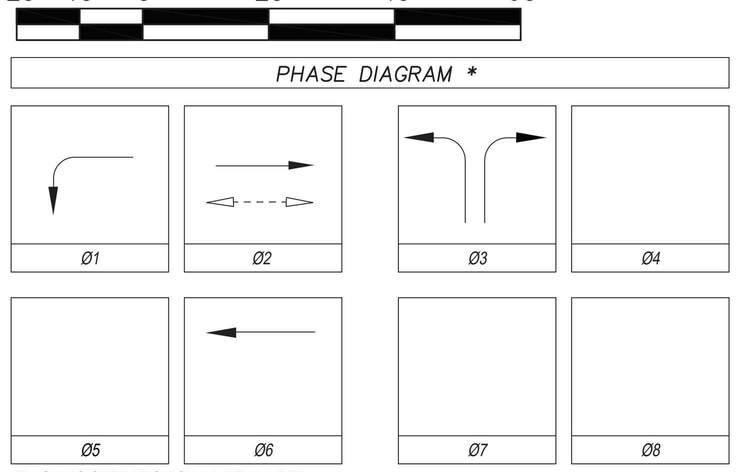
DISCRETIONARY PERMIT NO:______________

TRAFFIC SIGNAL CONSTRUCTION NOTES *

1. FURNISH AND INSTALL 2770 CONTROLLER IN A TYPE 332 CABINET, EQUIPPED WITH ONE MODEL 412C SYSTEM MEMORY MODULE, ONE MODEL 404 MODEM FOR 8-PHASE CAPABILITY AND CITY APPROVED BATTERY BACKUP.
2. FURNISH AND INSTALL TYPE III SERVICE PEDESTAL AND CABINET WITH 50A-1P CIRCUIT BREAKER AND 30A-1P BREAKER FOR STREET LIGHTS.
3. CONTRACTOR TO VERIFY SERVICE REQUIREMENTS WITH SDG&E.
4. FURNISH AND INSTALL COUNTDOWN PEDESTRIAN SIGNAL HEADS PER CITY OF SAN DIEGO REQUIREMENTS.
5. FURNISH AND INSTALL CCTV CAMERA ON POLE G WITH ALL APPURTENANT EQUIPMENT, CONTRACTOR SHALL SUPPLY ALL NECESSARY HARDWARE PER CITY REQUIREMENTS.
6. INSTALL #6 PULL BOX. NO SPLICING IN HANDHOLE.
7. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON TELSPAR WITH ALL EQUIPMENT, CONTRACTOR SHALL SUPPLY ALL NECESSARY HARDWARE PER CITY REQUIREMENTS.
8. FURNISH AND INSTALL 522B1-DIRECTIONAL DUAL CHANNEL EVPE DETECTOR PER CITY OF SAN DIEGO REQUIREMENTS.



PHASE DIAGRAM *



FLASHING OPERATION SHALL BE ALL RED.

The City of SAN DIEGO

DEVELOPMENT SERVICES DEPARTMENT

PRELIMINARY
NOT FOR CONSTRUCTION

STREET DATA TABLE

STREET NAME	CLASSIFICATION	SPEED (MPH)	ADT (VEHICLES)	R/W (FT)
COLLEGE AVENUE	4 LANE MAJOR	40	????	102
PRIVATE DRIVE	2 LANE LOCAL	25	????	0

PREPARED BY:

TRAMES SOLUTIONS INC.
4225 OCEANSIDE BLVD, #354 H
OCEANSIDE, CA 92056
TEL: 760-291-1400
TRAFFIC DESIGN • TRAFFIC IMPACT ANALYSIS • TRANSPORTATION PLANNING

REGISTERED PROFESSIONAL ENGINEER SOROUSH KHADEM No. 72472 CIVIL STATE OF CALIFORNIA

SOROUSH KHADEM R.C.E. 72472 DATE
EXPIRATION: 6/30/2020

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: TRAFFIC SIGNAL INSTALLATION PLAN

SHEET NUMBER: ______ OF 7

DRAWN BY: BEW

CHECKED BY: .

ORIGINAL DATE: 3-17-20

REVISIONS:

1. 03-17-2020	11. ______
2. ______	12. ______
3. ______	13. ______
4. ______	14. ______
5. ______	15. ______
6. ______	16. ______
7. ______	17. ______
8. ______	18. ______
9. ______	19. ______
10. ______	20. ______

Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

PRELIMINARY DRAINAGE STUDY

All People's Church

PTS#: 636444 _

APN: 463-010-10-00
Northeast Corner of Interstate 8 and College Avenue
San Diego, California 92120

Prepared By:

William Gregg Mack, P.E. RCE 73620 EXP: 12-31-22
Pasco Laret Suiter & Associates, Inc.
535 N. Highway 101, Suite A
Solana Beach, CA 92075

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

Prepared for:
All Peoples Church
5577 University Avenue
San Diego, CA 92105

February 8, 2020

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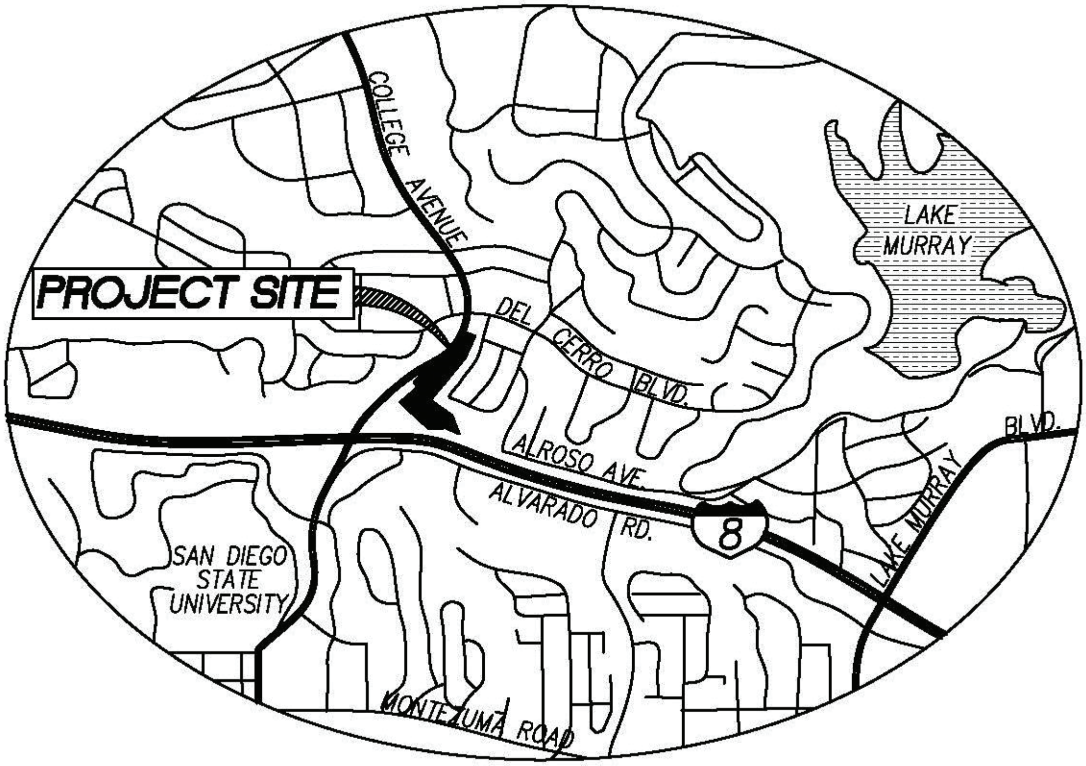

Figure 1 Vicinity Map

1. INTRODUCTION

1.1 Project Description

The All Peoples Church project is a church and associated parking garage located on a vacant 5.99 acre parcel at the northeast corner of Interstate 8 and College Avenue in the City of San Diego, California, and is currently undeveloped in its existing condition. The APN for the project site is 463-010-10-00. The subject property is a corner parcel within the City of San Diego and is bordered to the west by College Avenue, to the south by Interstate 8, to the east by Single-Family Residential Homes, and to the north by a Chevron Gas Station. All of the surrounding area has been developed and is mainly comprised of Single-Family Residential and Commercial land uses. The FEMA Map shows that the subject property is not located in an existing floodplain.

The project is designed in accordance with the January 2017 Edition of the Drainage Design Manual, the 2018 San Diego Storm Water Standards Manual and complies with the Regional Water Quality Control Board Region 9 MS4 Permit, Order No. R9-2015-0100. The project does not propose work adjacent regulated waters therefore 401 and 404 permits are not applicable. There are no negative impacts to any adjacent properties.

1.2 Existing Conditions

The project site is currently vacant, undeveloped land in the existing condition. There are three locations where offsite run-on enters the project site. An existing 36-inch reinforced concrete pipe (RCP) public storm drain main enters the project site at the northern boundary of the property. Runoff is conveyed in a southerly direction through the project site in an earthen drainage channel prior to discharging to an existing 48-inch RCP which conveys flow under the Interstate 8 off-ramp. An existing 18-inch RCP discharges storm water onto the project site at the eastern boundary of the project site. Runoff flows westerly, confluences with the earthen drainage channel and continues in a southerly direction. An existing 30-inch RCP discharges storm water onto the project site at the southwestern boundary of the project site. Runoff flows southeasterly and confluences with the earthen drainage channel which at this location begins flowing southeasterly prior to discharging to the existing Caltrans 48-inch RCP which continues under the I-8 off-ramp.

All of the existing onsite storm water that is generated by the project site flows toward the existing 48-inch storm drain near the southwest corner of the project site.

Refer to the Existing Hydrology Exhibit in Appendix 2 for further information regarding the drainage patterns of the project site and adjacent properties.

1.3 Proposed Conditions

The project proposes to fill in a portion the existing drainage channel to create 1 building PAD for a church, a 2-story parking garage, a private drive with two access driveways from College Avenue, permeable pavement parking and drive aisles, public and private utilities and associated improvements, with 4 biofiltration basins that will provide storm water mitigation of the 100-year storm event peak flow rate.

A 36-inch public offsite storm drain main is proposed to connect to the existing 36-inch RCP stormdrain, that discharges into the site at the northern portion of the lot currently, but that will be rerouted down College Avenue. This main 36-inch trunk line in College Avenue will transition to a public 48" RCP line after it turns on-site near the Caltrans ROW. Additionally, an 18-inch public storm drain is proposed along the eastern property line to re-route a portion of the existing 18-inch RCP stormdrain (per the City of San Diego) and convey offsite storm runoff from the existing 18-inch RCP to the existing 48-inch public storm drain outlet, via a connection to the proposed 48-inch public stormdrain trunk line, mentioned above. Approximately 4.91 acres of the developed site will drain to the 4 proposed biofiltration basins located throughout the project site, to detain and mitigate the 100-year storm event post-development. The 4 biofiltration basins will provide mitigation of the 100-year storm event peak flow rate prior to discharging on-site before the stormwater moves further downstream to the existing off-site Caltrans 48-inch public storm drain system at the south end of the project site. The remaining 1.08 acres of slopes and self-mitigated areas will follow natural drainage paths or be conveyed via concrete brow ditches to the ultimate discharge site at the south end of the project site as well.

The new 48-inch public RCP will capture and convey off-site storm runoff that is discharged onto the project site in the existing condition, as well as transport treated water from the new proposed development (via private drainage structures and pipe networks) to Biofiltration Basins 1-3 into an engineered earthen channel per SDD-109 that will run along the existing drainage route (adjacent to the proposed wall) at the southwest corner of the site, before it discharges and picks up the treated stormwater of Biofiltration Basin 4, and follows natural overland drainage pathways and is picked up via the existing stormdrain in Caltrans ROW that flows beneath Interstate 8. All on-site and off-site runoff will have an ultimate discharge point at the off-site 48-inch RCP Caltrans stormdrain that goes under the I-8 offramp to College Avenue, which matches the existing condition.

Refer to the Proposed Hydrology Exhibit in Appendix 2 for further information regarding the drainage patterns of the project site and adjacent properties.

2. METHODOLOGY

The proposed project has been analyzed to determine the peak runoff flow for 100 year, 6 hour rainfall event using the Rational Method per the City of San Diego Drainage Design Manual (Section 1-102.3). The Runoff Coefficient, C, for the existing and proposed conditions were selected using Table 2 of page 82 of the City of San Diego Drainage Design Manual, Revised C Method. The time of concentration for all existing and proposed drainage areas were calculated using the minimum TC of 5 min which yields an intensity of 4.4 inches per hour.

The proposed LID best management practices have been sized and located such that all runoff will be directed to landscape planters or through pervious areas where feasible before ultimately discharging to the downstream storm drain system.

2.1 Rational Method

As mentioned above, runoff from the project site was calculated for the 100-year storm events. Runoff was calculated using the Rational Method which is given by the following equation:
Q = C x I x A

Where:
Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient (Determined from Table A-1, P.A-3 in the City of San Diego Drainage Design Manual)
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres, (ac)
Rational Method calculations were performed using the City of San Diego Drainage Design Manual (Section 1-102.3)

2.2 Runoff Coefficient

The runoff coefficients for the hydrologic analysis were calculated using Table A-1 from the City of San Diego Drainage Design Manual January 2017. A natural/rural land coefficient of 0.45 was used. A coefficient of 0.85 has still been used per Table A-1 of the Drainage Design Manual.

Runoff Coefficient:
Pervious C = 0.45
Commercial C = 0.85

Table 2.1 below summarizes the onsite percent impervious and runoff coefficient, "C", in the existing and proposed condition.

Table 3.2 – Summary of Onsite Impervious Area

	Total Impervious Area (ac)	Total Pervious Area (ac)	Total Project Area (ac)	Percent Impervious (%)	Percent Permeable Pavement (%)	Runoff Coefficient "C"
Existing	0.00	5.99	5.99	0%	0%	0.45
Proposed	2.46	3.53	5.99	41%	19%	0.50

Weighted runoff coefficients were calculated where appropriate and are calculated as shown on the Post-Hydrology Exhibit in Appendix 2.

2.3 Rainfall Intensity

Rainfall intensity was determined using the Rainfall Intensity Duration Frequency Curves from page 83 of the City of San Diego Drainage Design Manual (April, 1984). Based on a 5 min time of concentration, an intensity of 4.4 inches per hour is used.

2.4 Tributary Areas

Drainage basins are delineated in the Post-Project Hydrology Exhibit in Appendix 2 and graphically portray the tributary area for each drainage basin.

3. HYDROLOGIC RESULTS

3.1 Existing and Proposed Peak Flow Rate Comparison

Table 3.1 below summarizes the overall (offsite and onsite) existing and proposed hydrologic results at the outfall of the project site, Node 160. Detailed AES computer output is provided in the Appendix 2.

Table 3.1 – Summary of the Overall 100-Year Storm Event Peak Flow Rates

Overall		Existing Condition			Proposed Condition (Unmitigated)			Proposed Condition (Mitigated)		
Basin	Node	Total Drainage Area Offsite and Onsite	Q100 (cfs)	Tc (min)	Total Drainage Area Offsite and Onsite (ac)	Q100 (cfs)	Tc (min)	Total Drainage Area Offsite and Onsite (ac)	Q100 (cfs)	Tc (min)
	160	64.4	118.26	13.07	64.4	116.62	13.06	64.4	115.05	13.06
			V100 (fps)			V100 (fps)			V100 (fps)	
			13.92			9.86			9.78	

For the proposed unmitigated and mitigated condition, AES models were created to analyze only the onsite and offsite proposed drainage areas that end at the same POC (the Caltrans headwall and 48" RCP line that flows beneath Interstate-8). The onsite proposed unmitigated condition consists of analysis of the proposed project drainage characteristics without considering the detention provided by the 4 biofiltration basins. The onsite proposed unmitigated results were then input into the overall AES model to create the overall unmitigated proposed condition. Combined onsite and offsite unmitigated condition AES output is located in Appendix 1.

For the onsite proposed mitigated condition, the effects of the detention provided by the 4 biofiltration basins was included in the analysis. Because the proposed condition has a peak flow Q100 that is less than the existing condition Q100, the site meets the hydrology requirements without even taking into account the mitigated condition. However, the mitigated Q is even lower once the routing of the basins is taken into account. The longer routing of the proposed condition, in conjunction with utilizing permeable pavement, leads to a proposed condition with a similar time of concentration and a lower overall peak flow. Therefore, the site has brought the proposed condition to a peak flow beneath that of the existing condition, thus meeting required drainage standards for the 100-year storm.

3.2 Existing Downstream System

In the existing and proposed condition, storm water runoff from the project site flows to an existing Caltrans 48-inch RCP which continues under the I-8 off-ramp. Please see Appendix 3 for the pre-developed and post-developed headwall calculations for the Caltrans receiving headwall off-site.

The headwall calculation results are as follows:
Existing Condition: Pre-AES 118.26 CFS – Headwall Height 6.13’ (EL 357.09)
Post-Mitigated: Post-Mitigated AES 115.05 CFS – Headwall Height 5.95’ (EL 356.91)

The headwater level lowers in the developed condition and does not reach the bottom of wall elevation of FG 357 (the lowest FG for the entire wall length), thus the headwater will not impact the retaining wall (15’+ distance away).

In addition, the headwall height (Post-Mitigated) divided by the diameter of receiving pipe should be less than 1.5 for the 100-year design flows (to avoid pressurizing the pipe and ensuring the flow can adequately enter the pipe). Per calculation below, this works.

HW/D= 5.95’/ 4’=1.4875 < 1.5

The proposed biofiltration basins will provide mitigation for increased runoff and detain the 100-year storm event peak flow rate back below to the existing condition. Therefore, the proposed project has no adverse impacts to the existing downstream system.

4. CONCLUSION

This report presents the drainage analysis for the proposed All Peoples Church project located at the northeast corner of Interstate 8 and College Avenue in the City of San Diego. The project consists of the construction of 1 church, 1 two-story parking garage, a private drive and associated permeable parking area, public and private utilities and associated improvements, and 4 biofiltration basins which will provide mitigation of the 100-year storm event peak flow. As a result of the detention provided by the 4 proposed biofiltration basins and the vault, the proposed All Peoples Church project mitigates the 100-year storm event peak flow rate back below the existing condition. The proposed storm drain mainline is sized to sufficiently convey the onsite and offsite 100-year storm event peak flow rate in the post development condition. There are no negative impacts to any adjacent properties.

Appendix 1
Pre and Post Hydrology Calculations

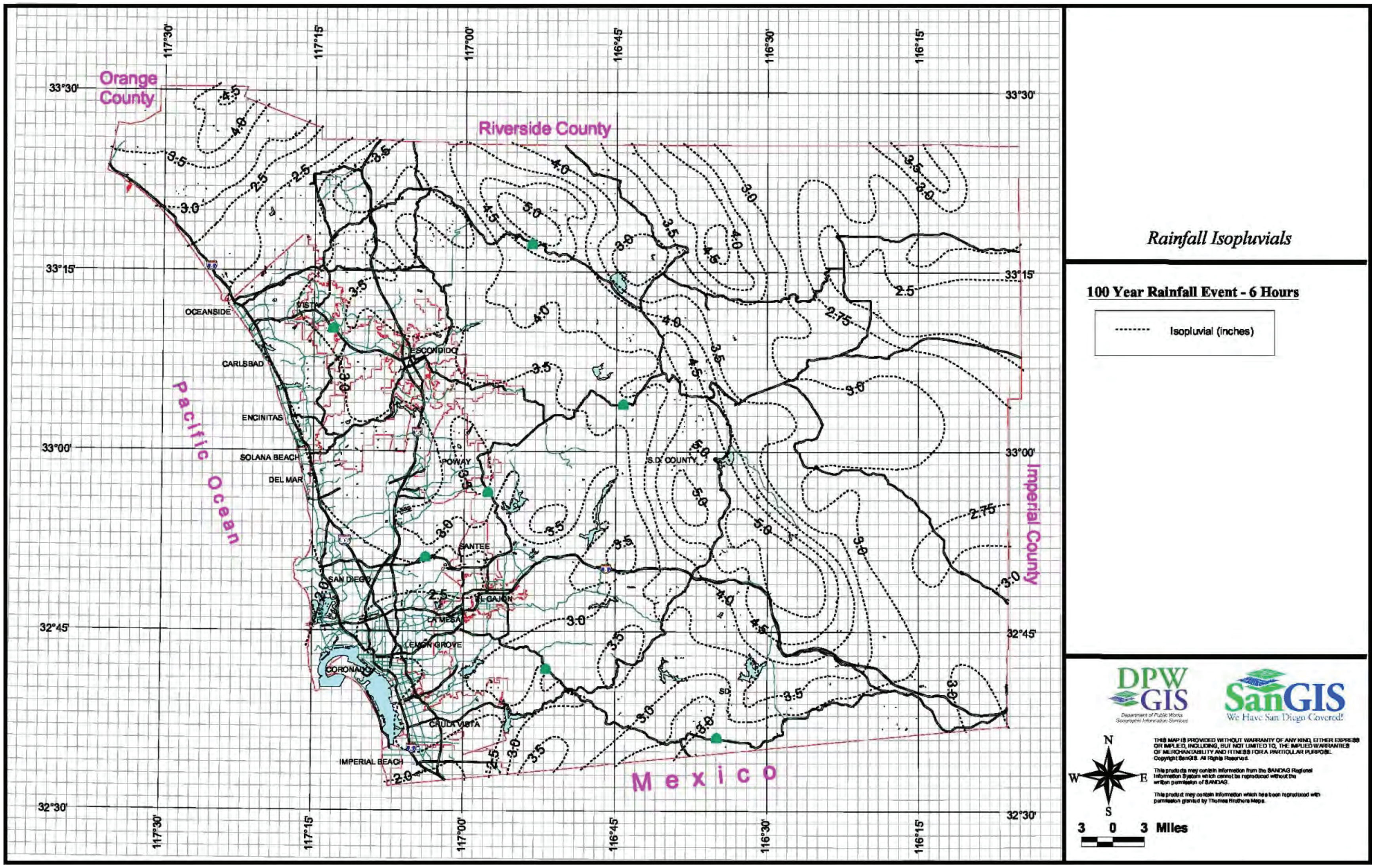

Figure B-2. 100-Year 6-Hour Isopluvials.


117° 3' 53" W
117° 3' 41" W
493930
493980
494030
494080
494130
494180
494230
32° 46' 59" N
32° 46' 45" N
3627240
3627190
3627140
3627090
3627040
3626990
3626940
3626890
3626840
Del Cerro
College
Capri Dr
College Ave
Marne Ave
Glenmont St
EsD2
FxE
DcF
Soil Map may not be valid at this scale.
Map Scale: 1:2,050 if printed on A portrait (8.5" x 11") sheet.
Meters
0 30 60 120 180
Feet
0 50 100 200 300
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 22, 2018—Aug 31, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DcF	Diablo-Urban land complex, 15 to 50 percent slopes	D	1.5	21.8%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	5.1	76.4%
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	0.1	1.8%
Totals for Area of Interest			**6.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ALL PEOPLES CHURCH
J-2936
2/9/2021

100 YR ON-SITE PRE-PROJECT HYDROLOGY

Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious		Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	Existing Site	5.99	260944	0	0%	100%		0.45	11.96	24464

100 YR ON-SITE POST-PROJECT HYDROLOGY

BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	%Permeable Pavement	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
Basin-1	WESTERLY UPPER PARKING TO BASIN #1	0.55	**23775.00**	**0.00**	0%	100%	52%	0.50	1.21	2477
Basin-2	EASTERLY UPPER PARKING TO BASIN#2	0.63	**27352.00**	**1709.00**	6%	94%	80%	0.50	1.39	2849
Basin-3	ROAD, PARKING GARAGE, AND PLAZA AREA TO MWS#3	1.30	**56780.00**	**40542.00**	71%	29%	14%	0.75	4.34	8872
Basin-4	CHURCH, ROAD TO BASIN #4	2.44	**106108.00**	**64936.00**	61%	39%	7%	0.65	7.02	14369
Basin-5	SELF-RETAINING	1.08	**46929.00**	**0.00**	0%	100%	0%	0.45	2.15	4400
Totals:		**5.99**	**260944**	**107187**	**41%**	**38%**	**31%**	**0.50**	**16.12**	**32966**

Note:
1

100 Yr Storm at 5 Min TC		
Intensity:	4.40	in/hr
Precip:	2.50	in

Runoff Coefficient	
Impervious	0.85
Permeable Pavement	0.45
Existing C Coefficient	0.45

Runoff Detention Calculations:	
Pre-project Volume (cu-ft)	24464
Post-Project Volume (cu-ft)	32966
BMP Volume (cu-ft)	10230
Net volume retained (cu-ft)	**1727**
Post-Project Vol (adjusted)	**22736**

Results: 22736cf < 24464cf
Therefore, detention requirements are met.

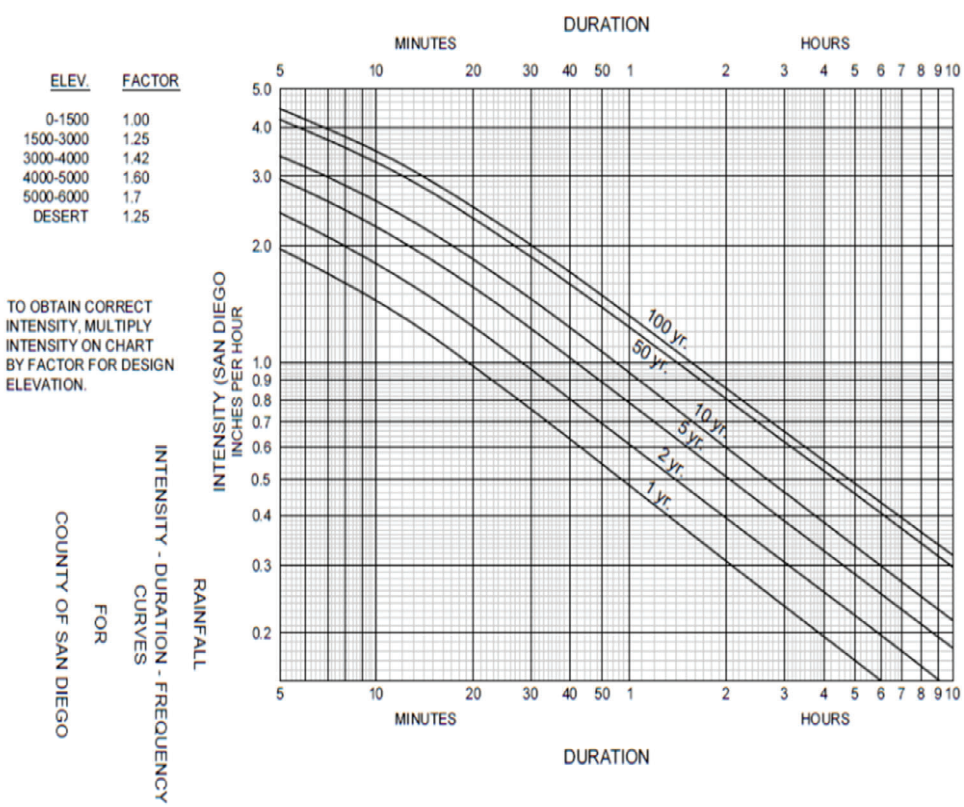

Figure A-1. Intensity-Duration-Frequency Design Chart

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A-1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

```
****************************************************************************

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                            Analysis prepared by:

                        PASCO LARET SUITER & ASSOCIATES
                          535 N. HIGHWAY 101, SUITE A
                             SOLANA BEACH, CA 92075
                                  858.259.8212

 ************************** DESCRIPTION OF STUDY **************************
* 2936 ALL PEOPLES CHURCH PRE-DEVELOPMENT CONDITION 100-YEAR               *
* FEBRUARY 2, 2021                                                         *
* C=0.45 PERVIOUS C=0.85 COMMERCIAL                                        *
 **************************************************************************

  FILE NAME: 1075EX.DAT
  TIME/DATE OF STUDY: 13:50 02/02/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===   =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   13.0      8.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
  3   15.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
  4   30.0     25.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    720.00
  DOWNSTREAM ELEVATION(FEET) =    716.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.713
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.265
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1010.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    716.00  DOWNSTREAM(FEET) =    648.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   315.00   CHANNEL SLOPE =  0.2159
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.851
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.41
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.18
  Tc(MIN.) =    7.89
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.69
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.483
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.12
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1015.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  648.00  DOWNSTREAM ELEVATION(FEET) =  616.00
  STREET LENGTH(FEET) =   415.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =    9.34
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.575
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   13.61
  TOTAL AREA(ACRES) =        7.4        PEAK FLOW RATE(CFS) =      14.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.21
  FLOW VELOCITY(FEET/SEC.) =  5.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.80
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1020.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  616.00  DOWNSTREAM ELEVATION(FEET) =  542.00
```

```
  STREET LENGTH(FEET) =   572.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.14
  STREET FLOW TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =   10.74
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.369
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.553
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    2.78
  TOTAL AREA(ACRES) =        8.9        PEAK FLOW RATE(CFS) =      16.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.59
  FLOW VELOCITY(FEET/SEC.) =  6.87   DEPTH*VELOCITY(FT*FT/SEC.) =   2.18
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =    1392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1025.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  542.00  DOWNSTREAM ELEVATION(FEET) =  464.00
  STREET LENGTH(FEET) =   938.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   16.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.07
  STREET FLOW TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =   12.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.127
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.552
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =       12.5        PEAK FLOW RATE(CFS) =      21.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  16.96
  FLOW VELOCITY(FEET/SEC.) =  7.28   DEPTH*VELOCITY(FT*FT/SEC.) =   3.24
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    2330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.94
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.58

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1035.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
  UPSTREAM ELEVATION(FEET) =    508.00
  DOWNSTREAM ELEVATION(FEET) =    502.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.358
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.332
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1040.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  502.00  DOWNSTREAM ELEVATION(FEET) =  464.00
  STREET LENGTH(FEET) =   768.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =    8.72
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.694
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.550
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =   11.99
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      12.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.52
  FLOW VELOCITY(FEET/SEC.) =  4.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE   1030.00 TO NODE   1040.00 =     866.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1025.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.90  DOWNSTREAM(FEET) =   458.90
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
```

```
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.59
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    9.02
  LONGEST FLOWPATH FROM NODE   1030.00 TO NODE   1025.00 =    1004.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.02
  RAINFALL INTENSITY(INCH/HR) =   3.64
  TOTAL STREAM AREA(ACRES) =     6.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.59

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       21.58    12.94        3.127         12.50
      2       12.59     9.02        3.635          6.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       27.65     9.02       3.635
      2       32.42    12.94       3.127

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      32.42   Tc(MIN.) =   12.94
  TOTAL AREA(ACRES) =       18.7
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    2330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1042.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   457.10  DOWNSTREAM(FEET) =   452.60
  FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.18
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
```

```
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.42
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1042.00 =    2406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1042.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.02
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =    18.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.42

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1050.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    468.00
  DOWNSTREAM ELEVATION(FEET) =    464.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.597
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1060.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  464.00  DOWNSTREAM ELEVATION(FEET) =  457.80
  STREET LENGTH(FEET) =   690.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.57
    HALFSTREET FLOOD WIDTH(FEET) =   27.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.68
  STREET FLOW TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =    6.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.109
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.781
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =   31.73
  TOTAL AREA(ACRES) =       10.1        PEAK FLOW RATE(CFS) =      32.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  39.76
  FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   2.28
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  690.0 FT WITH ELEVATION-DROP =   6.2 FT, IS   34.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1060.00
  LONGEST FLOWPATH FROM NODE   1045.00 TO NODE   1060.00 =     780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1042.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   452.00  DOWNSTREAM(FEET) =   448.30
  FLOW LENGTH(FEET) =   751.90   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.43
  PIPE TRAVEL TIME(MIN.) =   2.36    Tc(MIN.) =    8.89
  LONGEST FLOWPATH FROM NODE   1045.00 TO NODE   1042.00 =    1531.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1042.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.89
  RAINFALL INTENSITY(INCH/HR) =   3.66
  TOTAL STREAM AREA(ACRES) =    10.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        32.42    13.02        3.118         18.70
     2        32.43     8.89        3.660         10.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        60.04     8.89       3.660
     2        60.04    13.02       3.118

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      60.04   Tc(MIN.) =    8.89
  TOTAL AREA(ACRES) =       28.8
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1042.00 =    2406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1065.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   448.30  DOWNSTREAM(FEET) =   441.10
  FLOW LENGTH(FEET) =   315.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.32
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    9.26
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1065.00 =    2721.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1070.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    441.10  DOWNSTREAM(FEET) =    374.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   835.00   CHANNEL SLOPE =  0.0804
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      62.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.99
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =   10.81
  SUBAREA AREA(ACRES) =     3.50       SUBAREA RUNOFF(CFS) =    5.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.612
  TOTAL AREA(ACRES) =       32.3         PEAK FLOW RATE(CFS) =      66.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   9.12
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1070.00 =    3556.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1090.00 TO NODE   1095.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    460.00
  DOWNSTREAM ELEVATION(FEET) =    457.50
  ELEVATION DIFFERENCE(FEET) =      2.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.913
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    82.78
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE   1095.00 TO NODE   1100.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  457.50  DOWNSTREAM ELEVATION(FEET) =  419.50
  STREET LENGTH(FEET) =  1815.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.65
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.41   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.39
    SPLIT DEPTH(FEET) =    0.37   SPLIT FLOOD WIDTH(FEET) =   13.16
    SPLIT FLOW(CFS) =    5.72   SPLIT VELOCITY(FEET/SEC.) =    3.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   8.91   Tc(MIN.) =   11.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.579
  SUBAREA AREA(ACRES) =   12.50      SUBAREA RUNOFF(CFS) =   23.15
  TOTAL AREA(ACRES) =       12.9        PEAK FLOW RATE(CFS) =      24.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  4.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1100.00 =    1905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   407.50  DOWNSTREAM(FEET) =   406.00
  FLOW LENGTH(FEET) =    95.10   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.25
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.03
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1105.00 =    2000.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.03
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =    12.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.25

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1115.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    463.00
  DOWNSTREAM ELEVATION(FEET) =    461.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.793
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.00  DOWNSTREAM ELEVATION(FEET) =  417.00
  STREET LENGTH(FEET) =  1157.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.79
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.41   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.57
    SPLIT DEPTH(FEET) =    0.14   SPLIT FLOOD WIDTH(FEET) =    1.53
    SPLIT FLOW(CFS) =    0.11   SPLIT VELOCITY(FEET/SEC.) =    0.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.85
  STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =    6.01
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.208
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
  SUBAREA AREA(ACRES) =    8.50      SUBAREA RUNOFF(CFS) =   20.75
  TOTAL AREA(ACRES) =        8.6        PEAK FLOW RATE(CFS) =      21.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  4.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE   1110.00 TO NODE   1105.00 =    1257.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   4.21
  TOTAL STREAM AREA(ACRES) =     8.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.15

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       24.25    12.03        3.227        12.90
      2       21.15     6.01        4.208         8.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       33.26     6.01       4.208
      2       40.47    12.03       3.227

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      40.47   Tc(MIN.) =   12.03
  TOTAL AREA(ACRES) =       21.5
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1105.00 =    2000.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   291.60   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.47
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.24
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1120.00 =    2291.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE   1070.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    382.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.154
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.92
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =   12.69
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.579
  TOTAL AREA(ACRES) =       21.8         PEAK FLOW RATE(CFS) =      40.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   5.89
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1070.00 =    2451.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       40.47    12.69       3.154       21.80
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1070.00 =    2451.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       66.48    10.81       3.361       32.30
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1070.00 =    3556.90 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     100.95      10.81        3.361
     2     102.85      12.69        3.154

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     102.85   Tc(MIN.) =   12.69
  TOTAL AREA(ACRES) =       54.1

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0695
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.125
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     103.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.75
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   12.96
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    1.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.595
  TOTAL AREA(ACRES) =       55.4         PEAK FLOW RATE(CFS) =     103.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =  11.70
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1140.00 =    3743.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.96
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =    55.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.09

****************************************************************************
  FLOW PROCESS FROM NODE   1125.00 TO NODE   1127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
  UPSTREAM ELEVATION(FEET) =    476.00
  DOWNSTREAM ELEVATION(FEET) =    468.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.156
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
```

```
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1127.00 TO NODE   1130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    452.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.1143
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.23
  AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =    3.20
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.03
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1130.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1130.00 TO NODE   1135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    452.00  DOWNSTREAM(FEET) =    388.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   930.00   CHANNEL SLOPE =  0.0688
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.68
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =    4.99
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    8.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.517
```

```
  TOTAL AREA(ACRES) =        4.2        PEAK FLOW RATE(CFS) =      9.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =  10.53
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1135.00 =    1165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1135.00 TO NODE   1140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   361.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.08
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.55
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.08
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1140.00 =    1281.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.55

****************************************************************************
  FLOW PROCESS FROM NODE   1175.00 TO NODE   1176.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    467.00
  DOWNSTREAM ELEVATION(FEET) =    461.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.477
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1176.00 TO NODE   1140.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.00  DOWNSTREAM ELEVATION(FEET) =  393.00
  STREET LENGTH(FEET) =  1280.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 33.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.11
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   5.52   Tc(MIN.) =    8.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.21
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.62
  FLOW VELOCITY(FEET/SEC.) =  4.44   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE   1175.00 TO NODE   1140.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1176.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.00
  RAINFALL INTENSITY(INCH/HR) =   3.83
```

```
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      103.09    12.96        3.125         55.40
      2        9.55     5.08        4.384          4.20
      3        5.53     8.00        3.830          1.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       53.51     5.08       4.384
      2       77.51     8.00       3.830
      3      114.41    12.96       3.125

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     114.41   Tc(MIN.) =   12.96
  TOTAL AREA(ACRES) =       61.3
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1140.00 =    3743.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1075.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    361.00  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    97.00   CHANNEL SLOPE =  0.1031
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.112
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     114.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.92
  AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =   13.07
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.596
  TOTAL AREA(ACRES) =       61.7         PEAK FLOW RATE(CFS) =     114.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.13   FLOW VELOCITY(FEET/SEC.) =  13.92
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1075.00 =    3840.90 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1180.00 TO NODE   1075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.112
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5901
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    3.78
  TOTAL AREA(ACRES) =       64.4   TOTAL RUNOFF(CFS) =     118.26
  TC(MIN.) =   13.07
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.07
  PEAK FLOW RATE(CFS)   =     118.26
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:

                      PASCO LARET SUITER & ASSOCIATES
                        535 N. HIGHWAY 101, SUITE A
                           SOLANA BEACH, CA 92075
                                858.259.8212

 ************************** DESCRIPTION OF STUDY **************************
* 2936 ALL PEOPLES CHURCH POST HYDROLOGY 100 YEAR UNMITIGATED              *
* FEBRUARY 2, 2021                                                         *
* C=0.45 PERV C=0.85 IMPERVIOUS                                            *
 **************************************************************************

  FILE NAME: 2936P100.DAT
  TIME/DATE OF STUDY: 15:27 02/02/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===   =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1065.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.26   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =    28.80   TOTAL RUNOFF(CFS) =     60.04

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE    100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   439.90  DOWNSTREAM(FEET) =   429.90
  FLOW LENGTH(FEET) =   255.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    100.00 =     255.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.90  DOWNSTREAM(FEET) =   418.70
  FLOW LENGTH(FEET) =   226.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    120.00 =     482.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   418.70  DOWNSTREAM(FEET) =   402.50
  FLOW LENGTH(FEET) =   245.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    130.00 =     728.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.00  DOWNSTREAM(FEET) =   382.10
  FLOW LENGTH(FEET) =    66.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.99
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.465
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5802
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =       28.9   TOTAL RUNOFF(CFS) =      60.04
  TC(MIN.) =    9.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   156.70
  UPSTREAM ELEVATION(FEET) =    449.00
  DOWNSTREAM ELEVATION(FEET) =    440.30
  ELEVATION DIFFERENCE(FEET) =      8.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.962
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.30  DOWNSTREAM(FEET) =    428.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   232.80   CHANNEL SLOPE =  0.0507
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.839
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =    7.95
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     389.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.50  DOWNSTREAM(FEET) =   419.90
  FLOW LENGTH(FEET) =    80.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.10
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    510.00 =     469.60 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    520.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   419.90  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =   100.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.94
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.24
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    520.00 =     570.50 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
-----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.24
  RAINFALL INTENSITY(INCH/HR) =   3.78
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.15

*****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    453.00
  DOWNSTREAM ELEVATION(FEET) =    446.90
  ELEVATION DIFFERENCE(FEET) =      6.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.777
```

```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.16
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.252
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    446.90  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   407.80   CHANNEL SLOPE =  0.0463
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.563
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.63
  Tc(MIN.) =    9.41
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     506.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   423.20  DOWNSTREAM(FEET) =   417.70
  FLOW LENGTH(FEET) =    64.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.95
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     571.10 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.542
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.24
  TC(MIN.) =    9.51

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   417.70  DOWNSTREAM(FEET) =   417.20
  FLOW LENGTH(FEET) =    31.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.24
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =     602.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.524
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.41
  TC(MIN.) =    9.61

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    226.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.70  DOWNSTREAM(FEET) =   408.60
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.011
```

```
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    226.00 =     607.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    521.00 TO NODE    226.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.521
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4900
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.73
  TC(MIN.) =    9.62

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.50  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =    17.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.24
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.73
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.65
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.65
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.73

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.15     8.24        3.785         0.60
      2        1.73     9.65        3.517         1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.62     8.24       3.785
      2        2.80     9.65       3.517

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.80   Tc(MIN.) =    9.65
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.50  DOWNSTREAM(FEET) =   391.00
  FLOW LENGTH(FEET) =   124.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.52
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.79
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    525.00 =     750.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =   169.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.10
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.50
  UPSTREAM ELEVATION(FEET) =    452.90
  DOWNSTREAM ELEVATION(FEET) =    423.00
  ELEVATION DIFFERENCE(FEET) =     29.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.459
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.123
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    423.00  DOWNSTREAM(FEET) =    392.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   289.40   CHANNEL SLOPE =  0.1068
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   0.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.980
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =    7.21
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   7.68
```

```
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.24   RAIN INTENSITY(INCH/HOUR) =  3.20
  TOTAL AREA(ACRES) =    21.50   TOTAL RUNOFF(CFS) =     40.47

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.24
  RAINFALL INTENSITY(INCH/HR) =   3.20
  TOTAL STREAM AREA(ACRES) =    21.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         1.10     7.21        3.980          0.50
     2        40.47    12.24        3.204         21.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        24.95     7.21       3.980
     2        41.36    12.24       3.204
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      41.36   Tc(MIN.) =   12.24
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.00  DOWNSTREAM(FEET) =   386.30
  FLOW LENGTH(FEET) =    95.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.36
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =     923.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5850
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =       22.3   TOTAL RUNOFF(CFS) =      41.63
  TC(MIN.) =   12.35

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.20  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =    52.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.52
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       41.63    12.42       3.184       22.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        2.80    10.10       3.439        1.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      36.67      10.10        3.439
     2      44.22      12.42        3.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      44.22   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       23.9

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   384.80  DOWNSTREAM(FEET) =   382.20
  FLOW LENGTH(FEET) =   146.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.22
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.62
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       44.22    12.62       3.162       23.90
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       60.04     9.92       3.465       28.90
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      94.81       9.92        3.465
     2      99.01      12.62        3.162

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      99.01   Tc(MIN.) =   12.62
  TOTAL AREA(ACRES) =       52.8

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.31
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      99.01
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.66
  RAINFALL INTENSITY(INCH/HR) =   3.16
  TOTAL STREAM AREA(ACRES) =    52.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.01

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   172.20
  UPSTREAM ELEVATION(FEET) =    434.00
  DOWNSTREAM ELEVATION(FEET) =    416.30
  ELEVATION DIFFERENCE(FEET) =     17.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.924
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    416.30  DOWNSTREAM(FEET) =    392.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   254.30   CHANNEL SLOPE =  0.0924
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =    4.12
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     426.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.30  DOWNSTREAM(FEET) =   388.90
  FLOW LENGTH(FEET) =    38.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.23
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =     465.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.80  DOWNSTREAM(FEET) =   388.50
  FLOW LENGTH(FEET) =    36.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.35
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.96
  TC(MIN.) =    4.35

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =    47.80   MANNING'S N =  0.011
```

```
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    4.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     549.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    360.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    4.48

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.30  DOWNSTREAM(FEET) =   367.10
  FLOW LENGTH(FEET) =    12.50   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.39
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    4.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    145.00 =     561.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    4.49
  RAINFALL INTENSITY(INCH/HR) =   4.40
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.29
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       99.01    12.66        3.157         52.80
      2        4.29     4.49        4.400          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       39.38     4.49       4.400
      2      102.09    12.66       3.157

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     102.09   Tc(MIN.) =   12.66
  TOTAL AREA(ACRES) =       54.1
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   366.30
  FLOW LENGTH(FEET) =    42.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.14
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     102.09
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.71
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    147.00 =    1255.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.152
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5827
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =       54.5   TOTAL RUNOFF(CFS) =     102.09
  TC(MIN.) =   12.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    366.20  DOWNSTREAM(FEET) =    363.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.10   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     102.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.34
  AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   12.88
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
  TOTAL AREA(ACRES) =       54.7         PEAK FLOW RATE(CFS) =     102.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.51   FLOW VELOCITY(FEET/SEC.) =   9.32
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.88
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    54.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    102.09

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  4.38
  TOTAL AREA(ACRES) =     5.90   TOTAL RUNOFF(CFS) =     11.32

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     5.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      102.09    12.88        3.133         54.70
      2       11.32     5.08        4.385          5.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       84.27     5.08       4.385
      2      110.18    12.88       3.133

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     110.18   Tc(MIN.) =   12.88
  TOTAL AREA(ACRES) =       60.6
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    360.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    21.60   CHANNEL SLOPE =  0.1019
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     110.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.18
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.03
  Tc(MIN.) =   12.90
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.568
```

```
  TOTAL AREA(ACRES) =       60.7         PEAK FLOW RATE(CFS) =     110.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =  14.17
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    155.00 =    1370.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.80  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    90.80   CHANNEL SLOPE =  0.1079
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     110.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.86
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.15
  Tc(MIN.) =   13.06
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.567
  TOTAL AREA(ACRES) =       61.0         PEAK FLOW RATE(CFS) =     110.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.84
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   3.11
  TOTAL STREAM AREA(ACRES) =    61.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    110.18

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   193.70
  UPSTREAM ELEVATION(FEET) =    431.60
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =     23.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.760
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    407.90  DOWNSTREAM(FEET) =    389.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   483.90   CHANNEL SLOPE =  0.0372
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.60
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =    6.86
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =     677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    420.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.68
  TC(MIN.) =    6.86

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   106.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.25
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     783.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.972
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       6.97
  TC(MIN.) =    7.25

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    450.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =   369.00
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.89
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.97
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    450.00 =     823.50 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    451.00 TO NODE    450.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.964
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6362
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       7.31
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   356.90  DOWNSTREAM(FEET) =   356.80
  FLOW LENGTH(FEET) =     2.20   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.47
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.31
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    7.30
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     825.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    460.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.964
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6136
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       8.03
  TC(MIN.) =    7.30

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    351.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    20.40   CHANNEL SLOPE =  0.3922
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.954
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =    7.35
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.609
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       8.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   7.13
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    160.00 =     846.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.35
  RAINFALL INTENSITY(INCH/HR) =   3.95
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      110.18    13.06        3.114         61.00
      2        8.19     7.35        3.954          3.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       94.94     7.35       3.954
      2      116.62    13.06       3.114

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     116.62   Tc(MIN.) =   13.06
  TOTAL AREA(ACRES) =       64.4
```

```
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.06
  PEAK FLOW RATE(CFS)   =     116.62
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                            Analysis prepared by:

                        PASCO LARET SUITER & ASSOCIATES
                          535 N. HIGHWAY 101, SUITE A
                            SOLANA BEACH, CA 92075
                                 858.259.8212

 ************************** DESCRIPTION OF STUDY **************************
 * 2936 ALL PEOPLES CHURCH HYDROLOGY 100-YEAR MITIGATED                      *
 * FEBRUARY 2,2021                                                          *
 * C=0.45 PERV C=0.85 IMPERVIOUS                                            *
 **************************************************************************

  FILE NAME: 2936P100.DAT
  TIME/DATE OF STUDY: 11:11 02/03/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1065.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.26   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =    28.80   TOTAL RUNOFF(CFS) =     60.04

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE    100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   439.90  DOWNSTREAM(FEET) =   429.90
  FLOW LENGTH(FEET) =   255.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    100.00 =     255.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.90  DOWNSTREAM(FEET) =   418.70
  FLOW LENGTH(FEET) =   226.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    120.00 =     482.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   418.70  DOWNSTREAM(FEET) =   402.50
  FLOW LENGTH(FEET) =   245.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    130.00 =     728.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.00  DOWNSTREAM(FEET) =   382.10
  FLOW LENGTH(FEET) =    66.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.99
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.465
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5802
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =       28.9   TOTAL RUNOFF(CFS) =      60.04
  TC(MIN.) =    9.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   156.70
  UPSTREAM ELEVATION(FEET) =    449.00
  DOWNSTREAM ELEVATION(FEET) =    440.30
  ELEVATION DIFFERENCE(FEET) =      8.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.962
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.30  DOWNSTREAM(FEET) =    428.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   232.80   CHANNEL SLOPE =  0.0507
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.839
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =    7.95
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     389.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.95   RAIN INTENSITY(INCH/HOUR) =  3.35
  TOTAL AREA(ACRES) =     0.60   TOTAL RUNOFF(CFS) =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.50  DOWNSTREAM(FEET) =   419.90
  FLOW LENGTH(FEET) =    80.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.93
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.10
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    510.00 =     469.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   419.90  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =   100.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.34
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    520.00 =     570.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.31
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    453.00
  DOWNSTREAM ELEVATION(FEET) =    446.90
  ELEVATION DIFFERENCE(FEET) =      6.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.777
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.16
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.252
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    446.90  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   407.80   CHANNEL SLOPE =  0.0463
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.563
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.63
  Tc(MIN.) =    9.41
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     506.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   423.20  DOWNSTREAM(FEET) =   417.70
```

```
  FLOW LENGTH(FEET) =    64.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.95
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     571.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.542
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.24
  TC(MIN.) =    9.51

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   417.70  DOWNSTREAM(FEET) =   417.20
  FLOW LENGTH(FEET) =    31.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.24
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =     602.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.524
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.41
  TC(MIN.) =    9.61
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.62   RAIN INTENSITY(INCH/HOUR) =  3.27
  TOTAL AREA(ACRES) =     0.80   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    226.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.70  DOWNSTREAM(FEET) =   408.60
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.11
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.63
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    226.00 =     607.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    521.00 TO NODE    226.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.270
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4293
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.29
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.40
  TC(MIN.) =   11.63

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.50  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =    17.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.75
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.40
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   11.66
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.66
  RAINFALL INTENSITY(INCH/HR) =   3.27
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.40

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.95    11.25        3.313          0.60
      2        1.40    11.66        3.267          1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.30    11.25       3.313
      2        2.34    11.66       3.267

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.34   Tc(MIN.) =   11.66
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.50  DOWNSTREAM(FEET) =   391.00
  FLOW LENGTH(FEET) =   124.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.85
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.81
```

```
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    525.00 =     750.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =   169.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.50
  UPSTREAM ELEVATION(FEET) =    452.90
  DOWNSTREAM ELEVATION(FEET) =    423.00
  ELEVATION DIFFERENCE(FEET) =     29.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.459
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.123
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    423.00  DOWNSTREAM(FEET) =    392.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   289.40   CHANNEL SLOPE =  0.1068
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   0.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.980
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =    7.21
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   7.68
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.24   RAIN INTENSITY(INCH/HOUR) =  3.20
  TOTAL AREA(ACRES) =    21.50   TOTAL RUNOFF(CFS) =     40.47

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.24
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.20
  TOTAL STREAM AREA(ACRES) =    21.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.10     7.21        3.980         0.50
      2       40.47    12.24        3.204        21.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       24.95     7.21       3.980
      2       41.36    12.24       3.204

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      41.36   Tc(MIN.) =   12.24
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.00  DOWNSTREAM(FEET) =   386.30
  FLOW LENGTH(FEET) =    95.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.36
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =     923.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5850
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.43
```

```
  TOTAL AREA(ACRES) =       22.3   TOTAL RUNOFF(CFS) =      41.63
  TC(MIN.) =   12.35

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.20  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =    52.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.52
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       41.63    12.42       3.184       22.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        2.34    12.13       3.215        1.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      43.02      12.13        3.215
     2      43.95      12.42        3.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      43.95   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       23.9

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   384.80  DOWNSTREAM(FEET) =   382.20
  FLOW LENGTH(FEET) =   146.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.14
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.95
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.62
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       43.95    12.62       3.162       23.90
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       60.04     9.92       3.465       28.90
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      94.60       9.92        3.465
      2      98.74      12.62        3.162

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      98.74   Tc(MIN.) =   12.62
  TOTAL AREA(ACRES) =       52.8

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.29
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      98.74
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.66
  RAINFALL INTENSITY(INCH/HR) =   3.16
  TOTAL STREAM AREA(ACRES) =    52.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     98.74

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   172.20
  UPSTREAM ELEVATION(FEET) =    434.00
  DOWNSTREAM ELEVATION(FEET) =    416.30
  ELEVATION DIFFERENCE(FEET) =     17.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.924
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    416.30  DOWNSTREAM(FEET) =    392.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   254.30   CHANNEL SLOPE =  0.0924
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =    4.12
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     426.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.30  DOWNSTREAM(FEET) =   388.90
  FLOW LENGTH(FEET) =    38.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.23
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =     465.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.80  DOWNSTREAM(FEET) =   388.50
  FLOW LENGTH(FEET) =    36.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.35
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.96
  TC(MIN.) =    4.35

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =    47.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    4.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     549.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    360.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    4.48

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    360.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.48   RAIN INTENSITY(INCH/HOUR) =  4.31
  TOTAL AREA(ACRES) =     1.30   TOTAL RUNOFF(CFS) =      3.29

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.30  DOWNSTREAM(FEET) =   367.10
  FLOW LENGTH(FEET) =    12.50   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.26
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.29
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    145.00 =     561.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   4.31
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.29

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       98.74    12.66        3.157         52.80
      2        3.29     5.49        4.307          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       46.09     5.49       4.307
      2      101.15    12.66       3.157

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     101.15   Tc(MIN.) =   12.66
  TOTAL AREA(ACRES) =       54.1
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   366.30
  FLOW LENGTH(FEET) =    42.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.14
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     101.15
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.71
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    147.00 =    1255.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.152
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5774
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =       54.5   TOTAL RUNOFF(CFS) =     101.15
  TC(MIN.) =   12.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    366.20  DOWNSTREAM(FEET) =    363.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.10   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     101.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.31
  AVERAGE FLOW DEPTH(FEET) =   1.50   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   12.88
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.577
  TOTAL AREA(ACRES) =       54.7         PEAK FLOW RATE(CFS) =     101.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  1.50   FLOW VELOCITY(FEET/SEC.) =   9.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.88
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    54.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.15

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  4.38
  TOTAL AREA(ACRES) =     5.90   TOTAL RUNOFF(CFS) =     11.32

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     5.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      101.15    12.88        3.133        54.70
      2       11.32     5.08        4.385         5.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       83.60     5.08       4.385
```

```
    2      109.24    12.88       3.133

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     109.24   Tc(MIN.) =   12.88
  TOTAL AREA(ACRES) =       60.6
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    360.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    21.60   CHANNEL SLOPE =  0.1019
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     109.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.15
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.03
  Tc(MIN.) =   12.90
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  TOTAL AREA(ACRES) =       60.7         PEAK FLOW RATE(CFS) =     109.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =  14.14
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    155.00 =    1370.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.80  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    90.80   CHANNEL SLOPE =  0.1079
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     109.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.78
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.15
```

```
  Tc(MIN.) =   13.06
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  TOTAL AREA(ACRES) =       61.0         PEAK FLOW RATE(CFS) =     109.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.76
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   3.11
  TOTAL STREAM AREA(ACRES) =    61.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    109.24

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   193.70
  UPSTREAM ELEVATION(FEET) =    431.60
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =     23.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.760
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    407.90  DOWNSTREAM(FEET) =    389.90
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   483.90   CHANNEL SLOPE =  0.0372
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.60
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =    6.86
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =     677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    420.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.68
  TC(MIN.) =    6.86

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   106.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.25
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     783.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.972
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       6.97
  TC(MIN.) =    7.25

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    440.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.25   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =     2.70   TOTAL RUNOFF(CFS) =      5.57

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    450.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =   369.00
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.55
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    450.00 =     823.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    451.00 TO NODE    450.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5657
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       5.88
  TC(MIN.) =    9.29
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   356.90  DOWNSTREAM(FEET) =   356.80
  FLOW LENGTH(FEET) =     2.20   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.95
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.88
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     825.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    460.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5517
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       6.52
  TC(MIN.) =    9.30

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    20.40   CHANNEL SLOPE =  0.3922
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.574
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.48
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =    9.35
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.549
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       6.67
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   6.55
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    160.00 =     846.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.67

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      109.24    13.06        3.114        61.00
      2        6.67     9.35        3.574         3.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      101.84     9.35       3.574
      2      115.05    13.06       3.114

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     115.05   Tc(MIN.) =   13.06
  TOTAL AREA(ACRES) =       64.4
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.06
  PEAK FLOW RATE(CFS)   =     115.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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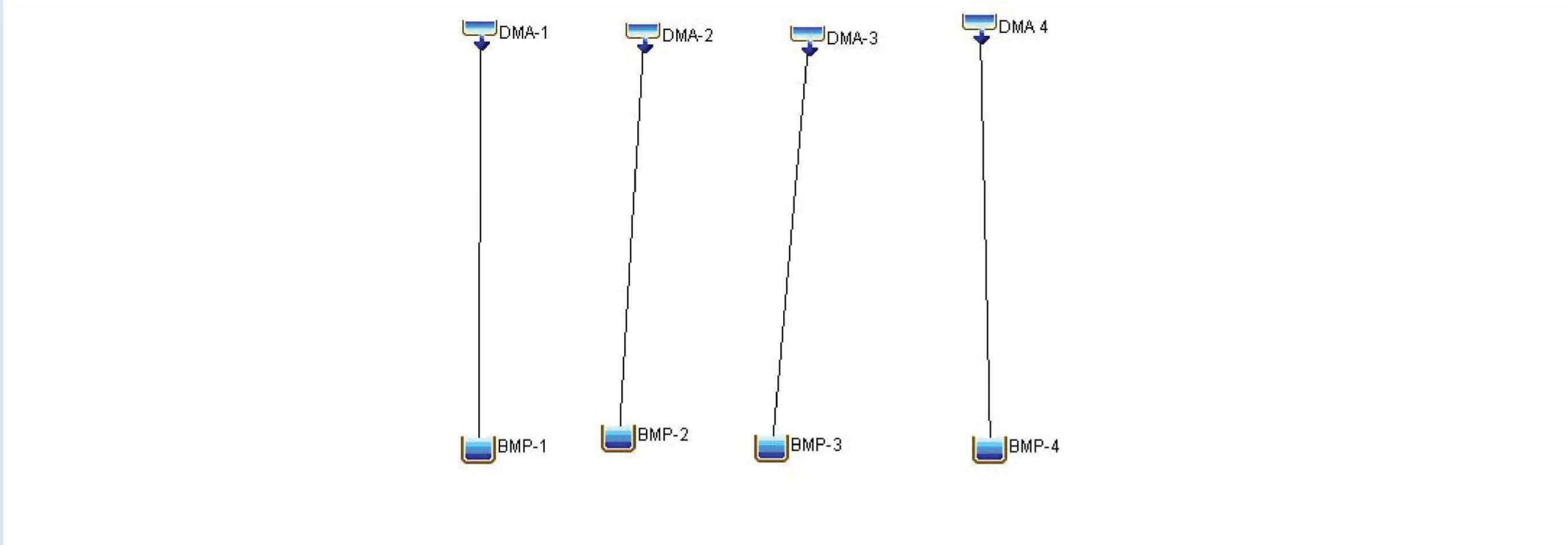
mpute Results Tools Help

--None Selected-- Run: Q100 --None Selected--

Basin Model [Post_Dev] Current Run [Q100]



Summary Results for Reservoir "BMP-1"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-1

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	1.1 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	0.9 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:13
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.5 (FT)

Summary Results for Reservoir "BMP-3"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-3

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	4.3 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:05
Peak Discharge:	3.3 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:06
Inflow Volume:	n/a	Peak Storage:	0.1 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.7 (FT)

Summary Results for Reservoir "BMP-2"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-2

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	1.4 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	1.1 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:12
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.4 (FT)

Summary Results for Reservoir "BMP-4"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-4

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	7.0 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	5.6 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:12
Inflow Volume:	n/a	Peak Storage:	0.1 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.4 (FT)

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.6 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 1.15 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0
TIME (MIN) = 20	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 40	DISCHARGE (CFS) = 0
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 100	DISCHARGE (CFS) = 0.1
TIME (MIN) = 110	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 130	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 170	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 190	DISCHARGE (CFS) = 0.1
TIME (MIN) = 200	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 220	DISCHARGE (CFS) = 0.2
TIME (MIN) = 230	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.5
TIME (MIN) = 250	DISCHARGE (CFS) = 1.15
TIME (MIN) = 260	DISCHARGE (CFS) = 0.2
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 280	DISCHARGE (CFS) = 0.1
TIME (MIN) = 290	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 310	DISCHARGE (CFS) = 0.1
TIME (MIN) = 320	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-1

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir	
No. of orif:	1			Invert:	0.50 ft
Invert:	0 ft			L:	6.0 ft
Slot height	0.25 ft			C_w:	3.1
Slot width	0.5 ft				
A	0.125	0.125			
C_o:	0.60				

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.037	0.000	0.037	
0.667	0.167	0.105	0.000	0.105	
0.750	0.250	0.194	0.000	0.194	
0.833	0.333	0.549	0.000	0.549	
0.917	0.417	0.576	0.000	0.576	
1.000	0.500	0.602	0.000	0.602	RISER STRUCTURE
1.083	0.583	0.626	0.447	1.074	
1.167	0.667	0.650	1.266	1.916	
1.250	0.750	0.673	2.325	2.998	
1.333	0.833	0.695	3.580	4.275	
1.417	0.917	0.716	5.003	5.719	
1.500	1.000	0.737	6.576	7.313	
1.583	1.083	0.757	8.287	9.044	
1.667	1.167	0.777	10.125	10.902	
1.750	1.250	0.796	12.081	12.877	
1.833	1.333	0.815	14.149	14.964	
1.917	1.417	0.833	16.324	17.157	
2.000	1.500	0.851	18.600	19.451	

Note:

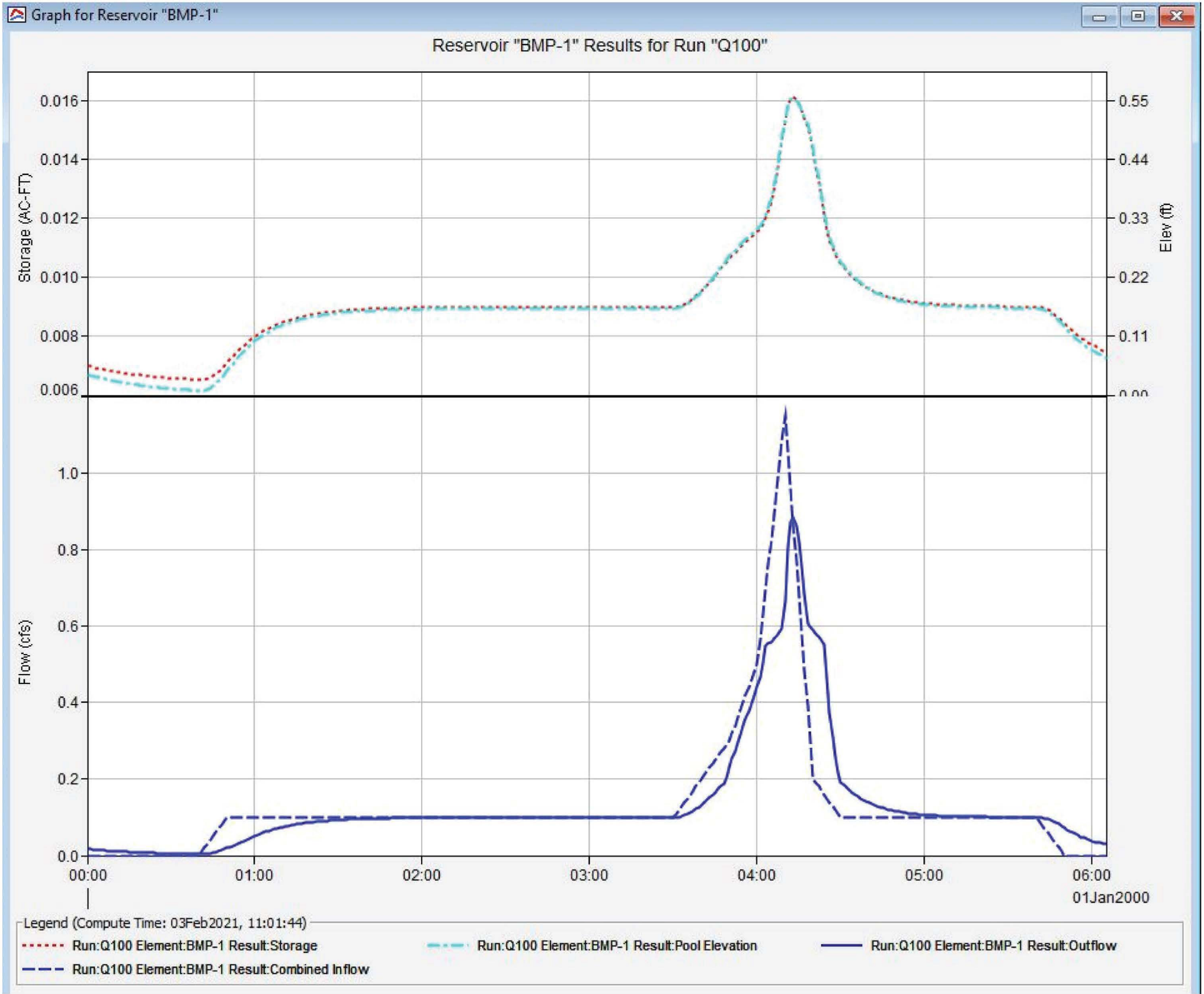
1. Weir equation, $Q=C_w L_e (h)^{3/2}$
2. Orifice equation, $Q=C_o A_e (2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-1

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	473	0
0.083	488	40
0.167	504	83
0.250	519	128
0.333	535	176
0.417	551	226
0.500	567	280
0.583	584	336
0.667	600	395
0.750	617	456
0.833	634	521
0.917	651	589
1.000	668	660
1.083	685	733
1.167	702	809
1.250	719	888
1.333	736	970
1.417	753	1055
1.500	770	1142

Stage-Storage-Discharge of BMP-1

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0064	0.000
0.083	0.0077	0.037
0.167	0.0091	0.105
0.250	0.0105	0.194
0.333	0.0120	0.549
0.417	0.0135	0.576
0.500	0.0151	0.602
0.583	0.0168	1.074
0.667	0.0186	1.916
0.750	0.0204	2.998
0.833	0.0223	4.275
0.917	0.0242	5.719
1.000	0.0262	7.313



Graph for Reservoir "BMP-1"
Reservoir "BMP-1" Results for Run "Q100"
Storage (AC-FT)
0.016
0.014
0.012
0.010
0.008
0.006
Elev (ft)
0.55
0.44
0.33
0.22
0.11
0.00
Flow (cfs)
1.0
0.8
0.6
0.4
0.2
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-1 Result:Storage
Run:Q100 Element:BMP-1 Result:Pool Elevation
Run:Q100 Element:BMP-1 Result:Outflow
Run:Q100 Element:BMP-1 Result:Combined Inflow

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.8 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 1.41 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 40	DISCHARGE (CFS) = 0.1
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 100	DISCHARGE (CFS) = 0.1
TIME (MIN) = 110	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 130	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 170	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 190	DISCHARGE (CFS) = 0.2
TIME (MIN) = 200	DISCHARGE (CFS) = 0.2
TIME (MIN) = 210	DISCHARGE (CFS) = 0.2
TIME (MIN) = 220	DISCHARGE (CFS) = 0.2
TIME (MIN) = 230	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.7
TIME (MIN) = 250	DISCHARGE (CFS) = 1.41
TIME (MIN) = 260	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 280	DISCHARGE (CFS) = 0.1
TIME (MIN) = 290	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 310	DISCHARGE (CFS) = 0.1
TIME (MIN) = 320	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outline Structure for Discharge of BMP-2

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir		
No. of orif:	1			Invert:	0.50	ft
Invert:	0	ft		L:	6.0	ft
Slot height	0.25	ft		C_w:	3.1	
Slot width	1	ft				
A	0.250		0.25			
C_o:	0.60					

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.075	0.000	0.075	
0.667	0.167	0.211	0.000	0.211	
0.750	0.250	0.388	0.000	0.388	
0.833	0.333	1.099	0.000	1.099	
0.917	0.417	1.152	0.000	1.152	
1.000	0.500	1.204	0.000	1.204	RISER STRUCTURE
1.083	0.583	1.253	0.447	1.700	
1.167	0.667	1.300	1.266	2.566	
1.250	0.750	1.346	2.325	3.671	
1.333	0.833	1.390	3.580	4.970	
1.417	0.917	1.433	5.003	6.435	
1.500	1.000	1.474	6.576	8.050	
1.583	1.083	1.515	8.287	9.802	
1.667	1.167	1.554	10.125	11.679	
1.750	1.250	1.592	12.081	13.673	
1.833	1.333	1.630	14.149	15.779	
1.917	1.417	1.667	16.324	17.991	
2.000	1.500	1.702	18.600	20.302	

Note:

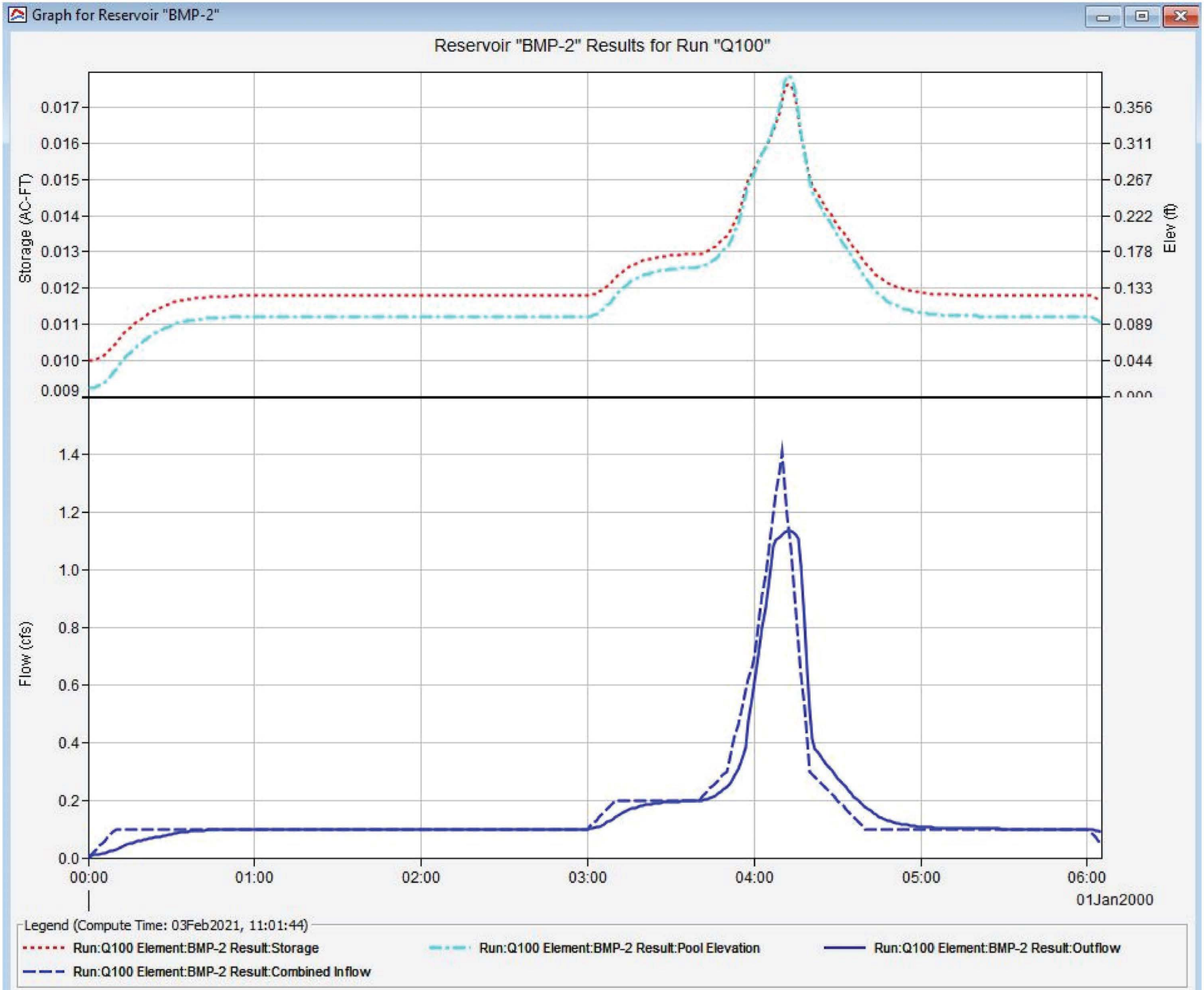
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	858	0
0.083	858	72
0.167	858	143
0.250	858	215
0.333	858	286
0.417	858	358
0.500	858	429
0.583	858	501
0.667	858	572
0.750	858	644
0.833	858	715
0.917	858	787
1.000	858	858
1.083	858	930
1.167	858	1001
1.250	858	1073
1.333	858	1144
1.417	858	1216
1.500	858	1287

Stage-Storage-Discharge of BMP-2

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0098	0.000
0.083	0.0115	0.075
0.167	0.0131	0.211
0.250	0.0148	0.388
0.333	0.0164	1.099
0.417	0.0181	1.152
0.500	0.0197	1.204
0.583	0.0213	1.700
0.667	0.0230	2.566
0.750	0.0246	3.671
0.833	0.0263	4.970
0.917	0.0279	6.435
1.000	0.0295	8.050



Graph for Reservoir "BMP-2"
Reservoir "BMP-2" Results for Run "Q100"
Storage (AC-FT)
Elev (ft)
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.356
0.311
0.267
0.222
0.178
0.133
0.089
0.044
0.000
Flow (cfs)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-2 Result:Storage
Run:Q100 Element:BMP-2 Result:Pool Elevation
Run:Q100 Element:BMP-2 Result:Outflow
Run:Q100 Element:BMP-2 Result:Combined Inflow

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 5 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 1.3 ACRES
RUNOFF COEFFICIENT 0.75
PEAK DISCHARGE 4.29 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0.1
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 15	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.2
TIME (MIN) = 25	DISCHARGE (CFS) = 0.2
TIME (MIN) = 30	DISCHARGE (CFS) = 0.2
TIME (MIN) = 35	DISCHARGE (CFS) = 0.2
TIME (MIN) = 40	DISCHARGE (CFS) = 0.2
TIME (MIN) = 45	DISCHARGE (CFS) = 0.2
TIME (MIN) = 50	DISCHARGE (CFS) = 0.2
TIME (MIN) = 55	DISCHARGE (CFS) = 0.2
TIME (MIN) = 60	DISCHARGE (CFS) = 0.2
TIME (MIN) = 65	DISCHARGE (CFS) = 0.2
TIME (MIN) = 70	DISCHARGE (CFS) = 0.2
TIME (MIN) = 75	DISCHARGE (CFS) = 0.2
TIME (MIN) = 80	DISCHARGE (CFS) = 0.2
TIME (MIN) = 85	DISCHARGE (CFS) = 0.2
TIME (MIN) = 90	DISCHARGE (CFS) = 0.2
TIME (MIN) = 95	DISCHARGE (CFS) = 0.2
TIME (MIN) = 100	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 110	DISCHARGE (CFS) = 0.2
TIME (MIN) = 115	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 125	DISCHARGE (CFS) = 0.2
TIME (MIN) = 130	DISCHARGE (CFS) = 0.2
TIME (MIN) = 135	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 145	DISCHARGE (CFS) = 0.3
TIME (MIN) = 150	DISCHARGE (CFS) = 0.3
TIME (MIN) = 155	DISCHARGE (CFS) = 0.3
TIME (MIN) = 160	DISCHARGE (CFS) = 0.3
TIME (MIN) = 165	DISCHARGE (CFS) = 0.3
TIME (MIN) = 170	DISCHARGE (CFS) = 0.3
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 180	DISCHARGE (CFS) = 0.3
TIME (MIN) = 185	DISCHARGE (CFS) = 0.4
TIME (MIN) = 190	DISCHARGE (CFS) = 0.4
TIME (MIN) = 195	DISCHARGE (CFS) = 0.4
TIME (MIN) = 200	DISCHARGE (CFS) = 0.4
TIME (MIN) = 205	DISCHARGE (CFS) = 0.5
TIME (MIN) = 210	DISCHARGE (CFS) = 0.5
TIME (MIN) = 215	DISCHARGE (CFS) = 0.6
TIME (MIN) = 220	DISCHARGE (CFS) = 0.6
TIME (MIN) = 225	DISCHARGE (CFS) = 0.8
TIME (MIN) = 230	DISCHARGE (CFS) = 0.9
TIME (MIN) = 235	DISCHARGE (CFS) = 1.3
TIME (MIN) = 240	DISCHARGE (CFS) = 3.9
TIME (MIN) = 245	DISCHARGE (CFS) = 4.29
TIME (MIN) = 250	DISCHARGE (CFS) = 1
TIME (MIN) = 255	DISCHARGE (CFS) = 0.7
TIME (MIN) = 260	DISCHARGE (CFS) = 0.5
TIME (MIN) = 265	DISCHARGE (CFS) = 0.4
TIME (MIN) = 270	DISCHARGE (CFS) = 0.4
TIME (MIN) = 275	DISCHARGE (CFS) = 0.3
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 285	DISCHARGE (CFS) = 0.3
TIME (MIN) = 290	DISCHARGE (CFS) = 0.3
TIME (MIN) = 295	DISCHARGE (CFS) = 0.3
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 305	DISCHARGE (CFS) = 0.2
TIME (MIN) = 310	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 320	DISCHARGE (CFS) = 0.2
TIME (MIN) = 325	DISCHARGE (CFS) = 0.2
TIME (MIN) = 330	DISCHARGE (CFS) = 0.2
TIME (MIN) = 335	DISCHARGE (CFS) = 0.2
TIME (MIN) = 340	DISCHARGE (CFS) = 0.2
TIME (MIN) = 345	DISCHARGE (CFS) = 0.2
TIME (MIN) = 350	DISCHARGE (CFS) = 0.2
TIME (MIN) = 355	DISCHARGE (CFS) = 0.2
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 365	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-3

Discharge vs. Elevation Table

Lower slot orifice				Emergency Weir		
No. of orif:	1			Invert:	0.50	ft
Invert:	0	ft		L:	8.0	ft
Slot height	0.25	ft		C_w:	3.1	
Slot width	1.25	ft				
A	0.313		0.3125			
C_o:	0.60					

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot\text{-}low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.093	0.000	0.093	
0.667	0.167	0.264	0.000	0.264	
0.750	0.250	0.484	0.000	0.484	
0.833	0.333	1.374	0.000	1.374	
0.917	0.417	1.441	0.000	1.441	
1.000	0.500	1.505	0.000	1.505	RISER STRUCTURE
1.083	0.583	1.566	0.597	2.163	
1.167	0.667	1.625	1.687	3.313	
1.250	0.750	1.682	3.100	4.782	
1.333	0.833	1.737	4.773	6.510	
1.417	0.917	1.791	6.670	8.461	
1.500	1.000	1.843	8.768	10.611	
1.583	1.083	1.893	11.049	12.942	
1.667	1.167	1.943	13.499	15.442	
1.750	1.250	1.991	16.108	18.099	
1.833	1.333	2.037	18.866	20.903	
1.917	1.417	2.083	21.766	23.849	
2.000	1.500	2.128	24.800	26.928	

Note:

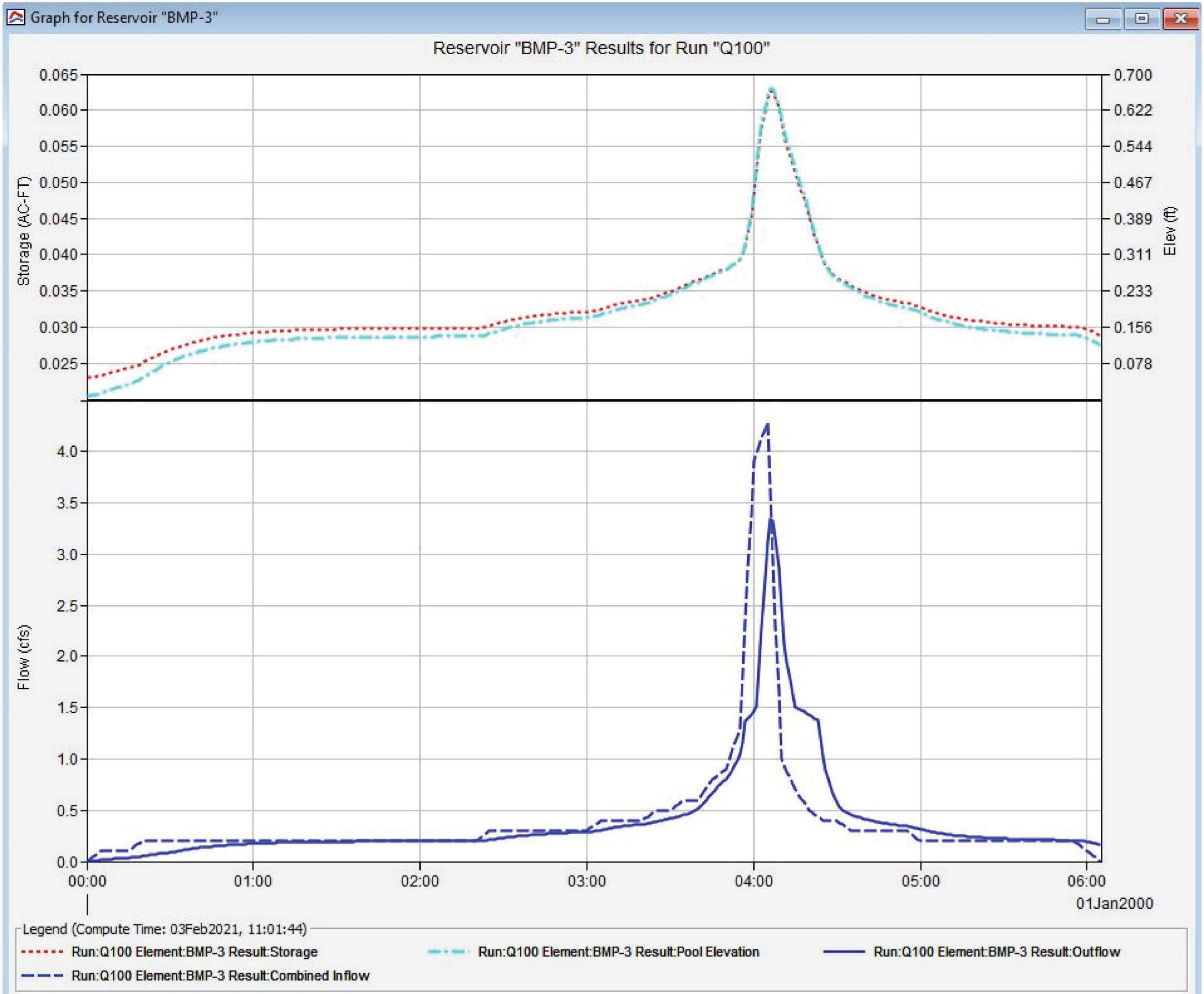
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	1725	0
0.083	1770	146
0.167	1815	299
0.250	1860	459
0.333	1905	628
0.417	1950	803
0.500	1995	986
0.583	2040	1177
0.667	2085	1375
0.750	2130	1581
0.833	2175	1794
0.917	2220	2014
1.000	2265	2243
1.083	2310	2478
1.167	2355	2721
1.250	2400	2972
1.333	2445	3230
1.417	2490	3496
1.500	2535	3769

Stage-Storage-Discharge of BMP-3

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0226	0.000
0.083	0.0270	0.093
0.167	0.0316	0.264
0.250	0.0363	0.484
0.333	0.0412	1.374
0.417	0.0462	1.441
0.500	0.0515	1.505
0.583	0.0569	2.163
0.667	0.0625	3.313
0.750	0.0682	4.782
0.833	0.0742	6.510
0.917	0.0802	8.461
1.000	0.0865	10.611


Graph for Reservoir "BMP-3"
Reservoir "BMP-3" Results for Run "Q100"
Storage (AC-FT)
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
Elev (ft)
0.700
0.622
0.544
0.467
0.389
0.311
0.233
0.156
0.078
Flow (cfs)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-3 Result:Storage
Run:Q100 Element:BMP-3 Result:Pool Elevation
Run:Q100 Element:BMP-3 Result:Outflow
Run:Q100 Element:BMP-3 Result:Combined Inflow

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 2.7 ACRES
RUNOFF COEFFICIENT 0.65
PEAK DISCHARGE 6.97 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.3
TIME (MIN) = 20	DISCHARGE (CFS) = 0.3
TIME (MIN) = 30	DISCHARGE (CFS) = 0.3
TIME (MIN) = 40	DISCHARGE (CFS) = 0.3
TIME (MIN) = 50	DISCHARGE (CFS) = 0.3
TIME (MIN) = 60	DISCHARGE (CFS) = 0.3
TIME (MIN) = 70	DISCHARGE (CFS) = 0.3
TIME (MIN) = 80	DISCHARGE (CFS) = 0.3
TIME (MIN) = 90	DISCHARGE (CFS) = 0.3
TIME (MIN) = 100	DISCHARGE (CFS) = 0.4
TIME (MIN) = 110	DISCHARGE (CFS) = 0.4
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 130	DISCHARGE (CFS) = 0.4
TIME (MIN) = 140	DISCHARGE (CFS) = 0.4
TIME (MIN) = 150	DISCHARGE (CFS) = 0.5
TIME (MIN) = 160	DISCHARGE (CFS) = 0.5
TIME (MIN) = 170	DISCHARGE (CFS) = 0.5
TIME (MIN) = 180	DISCHARGE (CFS) = 0.6
TIME (MIN) = 190	DISCHARGE (CFS) = 0.7
TIME (MIN) = 200	DISCHARGE (CFS) = 0.7
TIME (MIN) = 210	DISCHARGE (CFS) = 0.9
TIME (MIN) = 220	DISCHARGE (CFS) = 1
TIME (MIN) = 230	DISCHARGE (CFS) = 1.5
TIME (MIN) = 240	DISCHARGE (CFS) = 2.5
TIME (MIN) = 250	DISCHARGE (CFS) = 6.97
TIME (MIN) = 260	DISCHARGE (CFS) = 1.2
TIME (MIN) = 270	DISCHARGE (CFS) = 0.8
TIME (MIN) = 280	DISCHARGE (CFS) = 0.6
TIME (MIN) = 290	DISCHARGE (CFS) = 0.5
TIME (MIN) = 300	DISCHARGE (CFS) = 0.4
TIME (MIN) = 310	DISCHARGE (CFS) = 0.4
TIME (MIN) = 320	DISCHARGE (CFS) = 0.4
TIME (MIN) = 330	DISCHARGE (CFS) = 0.3
TIME (MIN) = 340	DISCHARGE (CFS) = 0.3
TIME (MIN) = 350	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-4

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	4		Invert:	0.50 ft
Invert:	0 ft		L:	8.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1.25 ft			
A	0.313	0.3125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.373	0.000	0.373	
0.667	0.167	1.055	0.000	1.055	
0.750	0.250	1.938	0.000	1.938	
0.833	0.333	5.494	0.000	5.494	
0.917	0.417	5.762	0.000	5.762	
1.000	0.500	6.019	0.000	6.019	RISER STRUCTURE
1.083	0.583	6.264	0.597	6.861	
1.167	0.667	6.501	1.687	8.188	
1.250	0.750	6.729	3.100	9.829	
1.333	0.833	6.950	4.773	11.723	
1.417	0.917	7.164	6.670	13.834	
1.500	1.000	7.371	8.768	16.140	
1.583	1.083	7.573	11.049	18.622	
1.667	1.167	7.770	13.499	21.270	
1.750	1.250	7.962	16.108	24.070	
1.833	1.333	8.149	18.866	27.015	
1.917	1.417	8.333	21.766	30.098	
2.000	1.500	8.512	24.800	33.312	

Note:

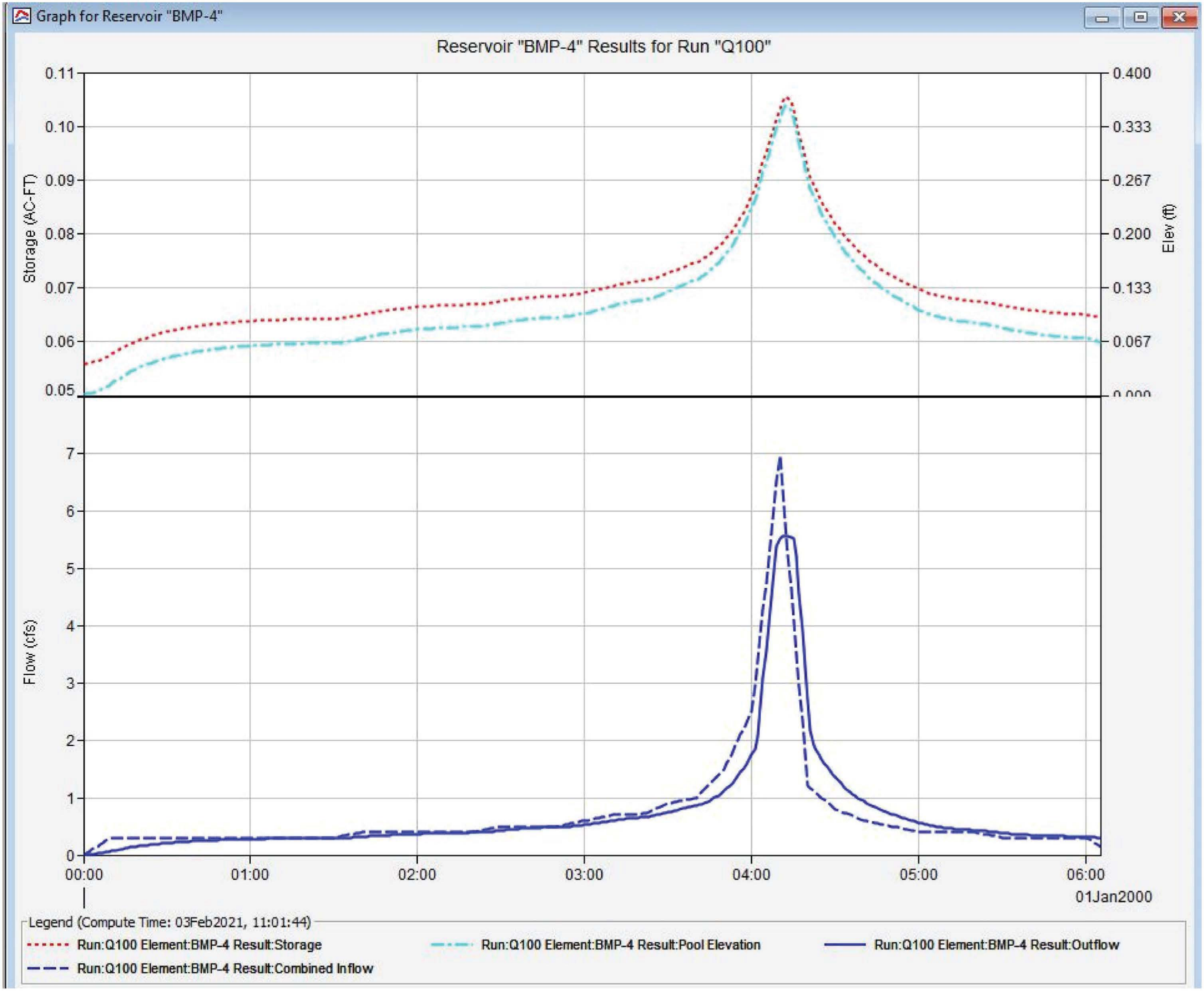
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-4

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	4252	0
0.083	4363	359
0.167	4472	736
0.250	4586	1132
0.333	4698	1547
0.417	4810	1981
0.500	4921	2433
0.583	5032.714286	2903
0.667	5144.392857	3392
0.750	5256.071429	3900
0.833	5367.75	4427
0.917	5479.428571	4972
1.000	5591	5535
1.083	5703	6118
1.167	5815	6719
1.250	5927	7339
1.333	6039	7977
1.417	6151	8635
1.500	6263	9311

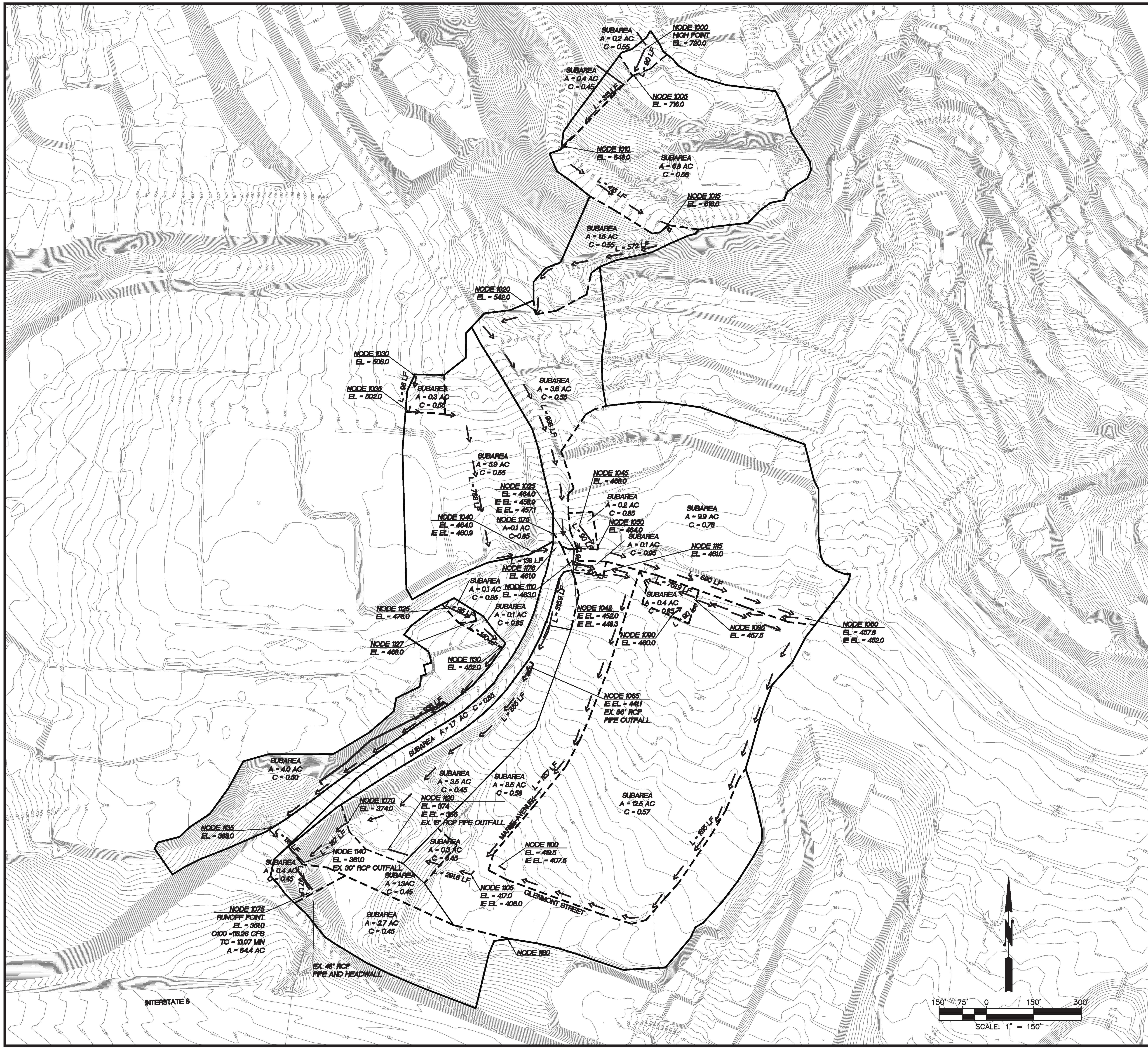
Stage-Storage-Discharge of BMP-4

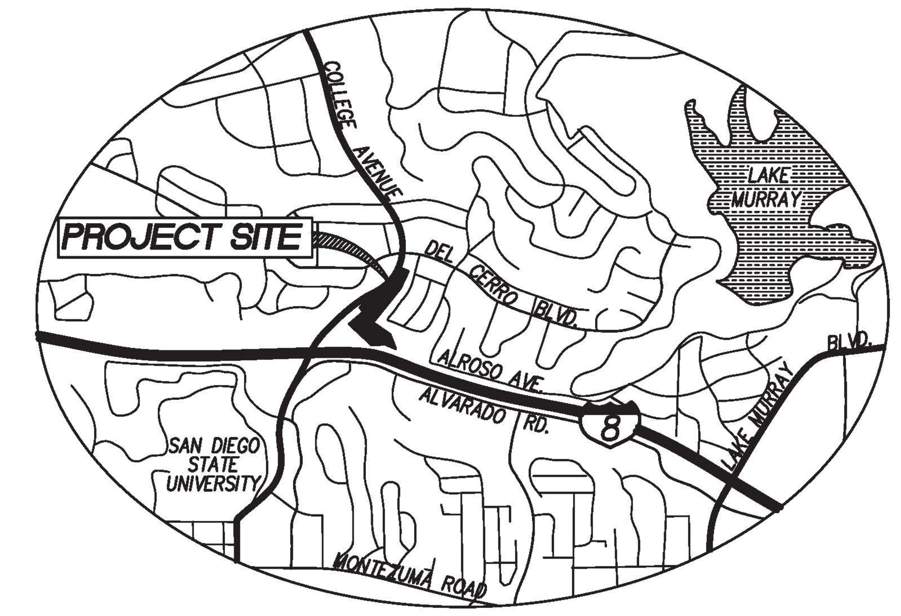
Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0558	0.000
0.083	0.0666	0.373
0.167	0.0779	1.055
0.250	0.0895	1.938
0.333	0.1016	5.494
0.417	0.1141	5.762
0.500	0.1271	6.019
0.583	0.1404	6.861
0.667	0.1542	8.188
0.750	0.1685	9.829
0.833	0.1831	11.723
0.917	0.1982	13.834
1.000	0.2137	16.140



Graph for Reservoir "BMP-4"
Reservoir "BMP-4" Results for Run "Q100"
Storage (AC-FT)
0.11
0.10
0.09
0.08
0.07
0.06
0.05
Elev (ft)
0.400
0.333
0.267
0.200
0.133
0.067
0.000
Flow (cfs)
7
6
5
4
3
2
1
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-4 Result:Storage
Run:Q100 Element:BMP-4 Result:Pool Elevation
Run:Q100 Element:BMP-4 Result:Outflow
Run:Q100 Element:BMP-4 Result:Combined Inflow

Appendix 2
Existing and Proposed Drainage Exhibits





VICINITY MAP

NOT TO SCALE

LEGEND:

MAJOR–BASIN BOUNDARY

SUB–BASIN BOUNDARY

FLOW PATH

NODE 1060
EL = 458.0
IE EL = 452.0
HYDROLOGIC NODE

SUBAREA
A = 9.9 AC
C = 0.78
HYDROLOGIC AREA

150' 75' 0 150' 300'

SCALE: 1" = 150'

EXISTING HYDROLOGY

ALL PEOPLES CHURCH

INTERSTATE 8 • COLLEGE AVENUE, SAN DIEGO, CA

PROJECT NUMBER: PLSA 2936

SCALE: 1" = 150'

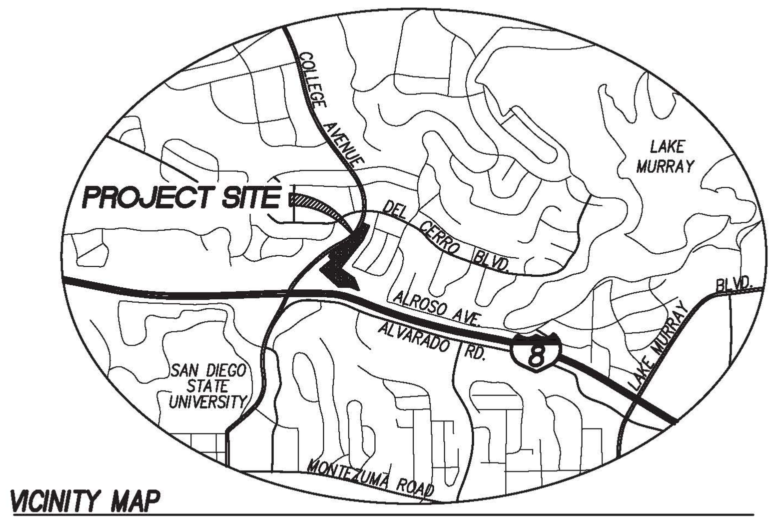
DATE: FEBRUARY 2021

SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

FILE: J:\ACTIVE JOBS\2936 ALL PEOPLE'S CHURCH\CIVIL\REPORTS\HYDROLOGY\2021-1-29\2936_HYDRO_EX.dwg DATE: Feb 02, 21 1:55pm by:gknudson

POST HYDROLOGY EXHIBIT



VICINITY MAP

NOT TO SCALE

LEGEND

- RIGHT-OF-WAY — R/W
- PROPERTY LINE — P/L
- DRAINAGE BOUNDARY
- DRAINAGE SUB-BOUNDARY
- PROPOSED PERMABLE PAVEMENT
- PROPOSED ROOF/HARDSCAPE AREA
- BIOFILTRATION BASIN
- PROPOSED STORM DRAIN PIPE
- FLOW PATH
- HYDROLOGY NODE
  Q100 (CFS)

SOIL INFORMATION

SOIL: TYPE D

LAND USE

COMMERCIAL (APPROXIMATELY 80% IMPERVIOUS)

RUNOFF COEFFICIENT

THE DEVELOPED CONDITION RUNOFF COEFFICIENT IS ESTIMATED BASED ON LAND USE AND SOIL TYPE IN ACCORDANCE WITH CITY OF SAN DIEGO STANDARDS. AN APPROPRIATE RUNOFF COEFFICIENT (C) FOR EACH TYPE OF LAND USE IN THE SUBAREA WAS SELECTED FROM TABLE A-1 OF THE CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL (JANUARY 2017) AND MULTIPLIED BY THE PERCENTAGE OF TOTAL AREA (A) INCLUDED IN THAT CLASS. THE SUM OF PRODUCTS FOR ALL LAND USES IS THE WEIGHTED RUNOFF COEFFICIENT (Σ[C]).

BASIN 1: ACTUAL IMPERVIOUSNESS: 0% , PERMEABLE PAVEMENT 52%
BASIN 2: ACTUAL IMPERVIOUSNESS: 6% , PERMEABLE PAVEMENT 80%
BASIN 3: ACTUAL IMPERVIOUSNESS: 71% , PERMEABLE PAVEMENT 14%
BASIN 4: ACTUAL IMPERVIOUSNESS: 61% , PERMEABLE PAVEMENT 7%

TABULATED IMPERVIOUSNESS: 41%

C=0.45 PERVIOUS
C=0.85 IMPERVIOUS

BASIN 1: RUNOFF COEFFICIENT =0%/80% * 0.85=0 =MIN. VALUE 0.50
BASIN 2: RUNOFF COEFFICIENT = 6%/80% * 0.85 = 0.06 = MIN. VALUE 0.50
BASIN 3: RUNOFF COEFFICIENT = 71&/80% * 0.85 = 0.75
BASIN 4: RUNOFF COEFFICIENT = 61%/80% * 0.85= 0.65

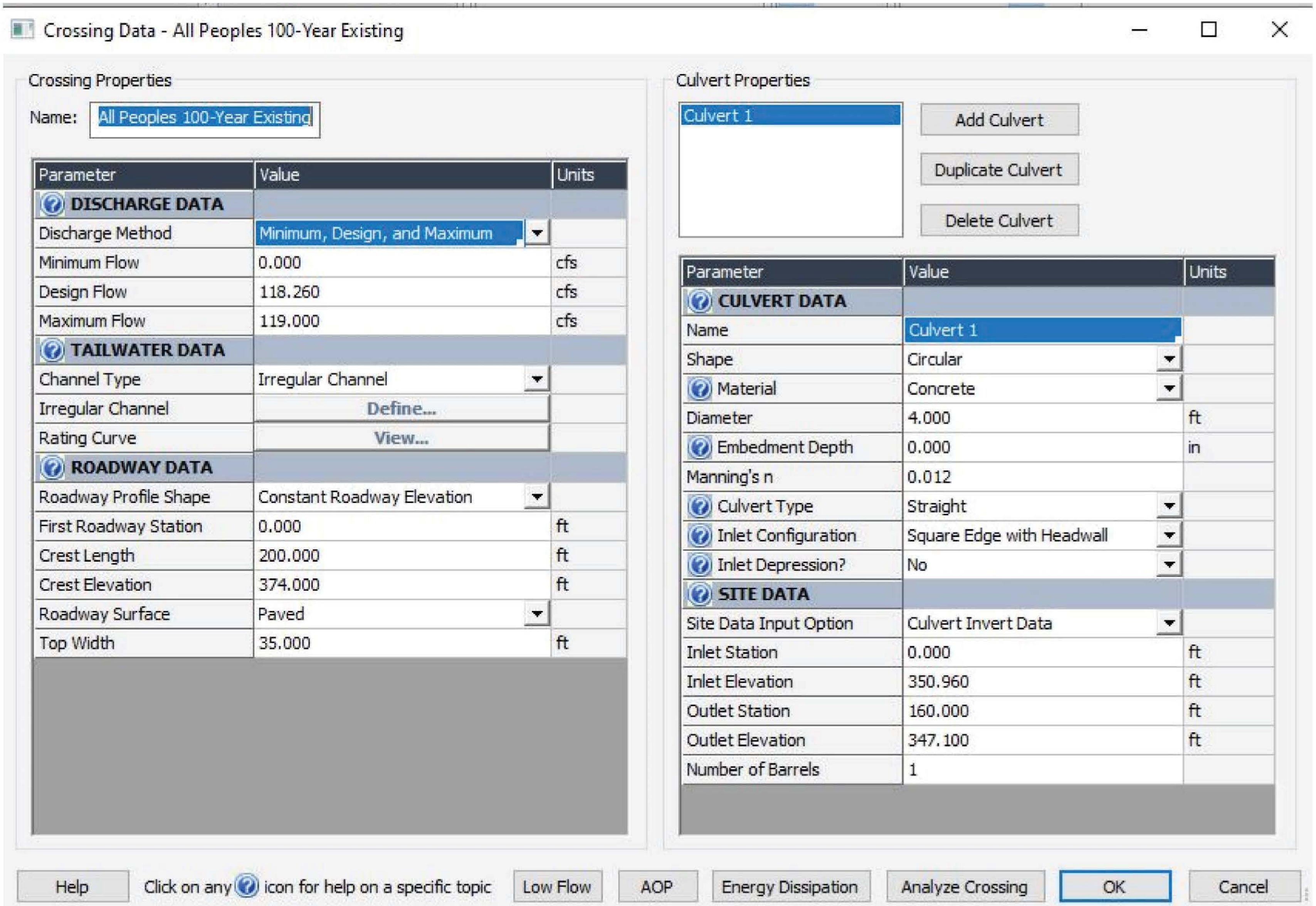
PROPOSED CONDITION HYDROLOGY EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PREPARED BY:

PASCO LARET SUITER
& ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

Appendix 3
Caltrans Headwall Calculations


Crossing Data - All Peoples 100-Year Existing
Crossing Properties
Name: All Peoples 100-Year Existing
Parameter
Value
Units
DISCHARGE DATA
Discharge Method
Minimum, Design, and Maximum
Minimum Flow
0.000
cfs
Design Flow
118.260
cfs
Maximum Flow
119.000
cfs
TAILWATER DATA
Channel Type
Irregular Channel
Irregular Channel
Define...
Rating Curve
View...
ROADWAY DATA
Roadway Profile Shape
Constant Roadway Elevation
First Roadway Station
0.000
ft
Crest Length
200.000
ft
Crest Elevation
374.000
ft
Roadway Surface
Paved
Top Width
35.000
ft
Culvert Properties
Culvert 1
Add Culvert
Duplicate Culvert
Delete Culvert
Parameter
Value
Units
CULVERT DATA
Name
Culvert 1
Shape
Circular
Material
Concrete
Diameter
4.000
ft
Embedment Depth
0.000
in
Manning's n
0.012
Culvert Type
Straight
Inlet Configuration
Square Edge with Headwall
Inlet Depression?
No
SITE DATA
Site Data Input Option
Culvert Invert Data
Inlet Station
0.000
ft
Inlet Elevation
350.960
ft
Outlet Station
160.000
ft
Outlet Elevation
347.100
ft
Number of Barrels
1
Help
Click on any icon for help on a specific topic
Low Flow
AOP
Energy Dissipation
Analyze Crossing
OK
Cancel

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: All Peoples 100-Year Existing

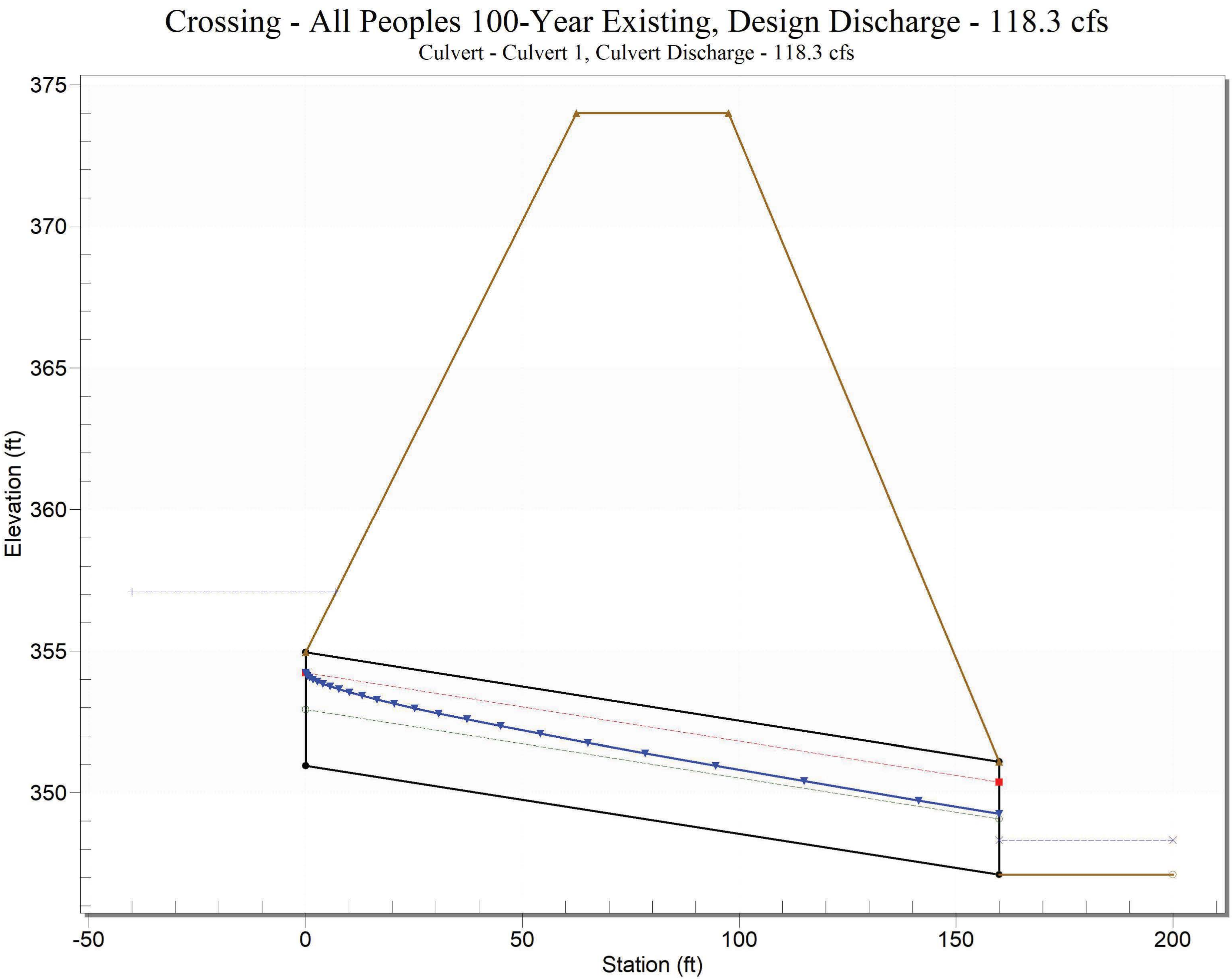
Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
350.96	0.00	0.00	0.00	1
352.31	11.90	11.90	0.00	1
352.91	23.80	23.80	0.00	1
353.48	35.70	35.70	0.00	1
353.98	47.60	47.60	0.00	1
354.44	59.50	59.50	0.00	1
354.89	71.40	71.40	0.00	1
355.36	83.30	83.30	0.00	1
355.89	95.20	95.20	0.00	1
357.09	118.26	118.26	0.00	1
357.13	119.00	119.00	0.00	1
374.00	279.92	279.92	0.00	Overtopping

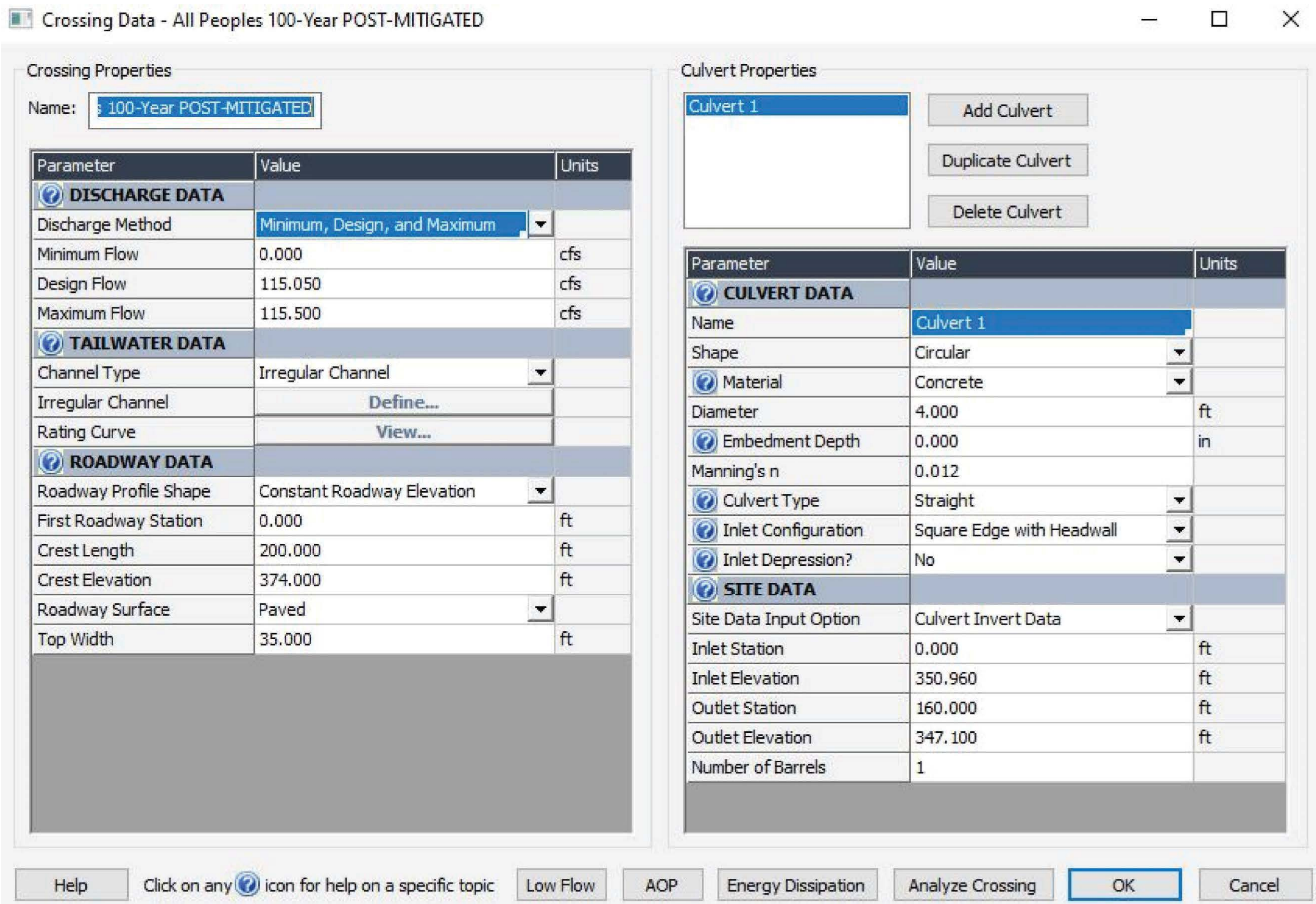
HY-8 Analysis Results

Culvert Summary Table - Culvert 1

Culvert Crossing: All Peoples 100-Year Existing

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	350.96	0.00	0.0	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
11.90	11.90	352.31	1.35	0.0*	1-S2n	0.60	1.01	0.60	0.33	10.01	15.43
23.80	23.80	352.91	1.95	0.0*	1-S2n	0.85	1.44	0.87	0.50	11.75	19.19
35.70	35.70	353.48	2.52	0.0*	1-S2n	1.04	1.78	1.07	0.63	13.13	21.66
47.60	47.60	353.98	3.02	0.0*	1-S2n	1.20	2.07	1.26	0.74	14.07	23.53
59.50	59.50	354.44	3.48	0.0*	1-S2n	1.35	2.32	1.42	0.84	14.86	25.06
71.40	71.40	354.89	3.93	0.0*	1-S2n	1.49	2.55	1.58	0.93	15.40	26.36
83.30	83.30	355.36	4.40	0.39	5-S2n	1.62	2.77	1.74	1.01	15.93	27.49
95.20	95.20	355.89	4.93	1.03	5-S2n	1.74	2.96	1.88	1.08	16.39	28.51
118.26	118.26	357.09	6.13	2.76	5-S2n	1.97	3.28	2.15	1.22	17.18	30.21
119.00	119.00	357.13	6.17	2.80	5-S2n	1.98	3.29	2.16	1.22	17.20	30.26


Crossing - All Peoples 100-Year Existing, Design Discharge - 118.3 cfs
Culvert - Culvert 1, Culvert Discharge - 118.3 cfs
Elevation (ft)
Station (ft)
375
370
365
360
355
350
-50
0
50
100
150
200


Crossing Data - All Peoples 100-Year POST-MITIGATED

Crossing Properties

Name: 100-Year POST-MITIGATED

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	0.000	cfs
Design Flow	115.050	cfs
Maximum Flow	115.500	cfs
TAILWATER DATA		
Channel Type	Irregular Channel	
Irregular Channel	Define...	
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	200.000	ft
Crest Elevation	374.000	ft
Roadway Surface	Paved	
Top Width	35.000	ft

Culvert Properties

Culvert 1

Add Culvert

Duplicate Culvert

Delete Culvert

Parameter	Value	Units
CULVERT DATA		
Name	Culvert 1	
Shape	Circular	
Material	Concrete	
Diameter	4.000	ft
Embedment Depth	0.000	in
Manning's n	0.012	
Culvert Type	Straight	
Inlet Configuration	Square Edge with Headwall	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	350.960	ft
Outlet Station	160.000	ft
Outlet Elevation	347.100	ft
Number of Barrels	1	

Help | Click on any icon for help on a specific topic | Low Flow | AOP | Energy Dissipation | Analyze Crossing | OK | Cancel

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: All Peoples 100-Year POST-MITIGATED

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
350.96	0.00	0.00	0.00	1
352.29	11.55	11.55	0.00	1
352.88	23.10	23.10	0.00	1
353.44	34.65	34.65	0.00	1
353.92	46.20	46.20	0.00	1
354.37	57.75	57.75	0.00	1
354.81	69.30	69.30	0.00	1
355.26	80.85	80.85	0.00	1
355.76	92.40	92.40	0.00	1
356.91	115.05	115.05	0.00	1
356.93	115.50	115.50	0.00	1
374.00	279.92	279.92	0.00	Overtopping

HY-8 Analysis Results

Culvert Summary Table - Culvert 1

Culvert Crossing: All Peoples 100-Year POST-MITIGATED

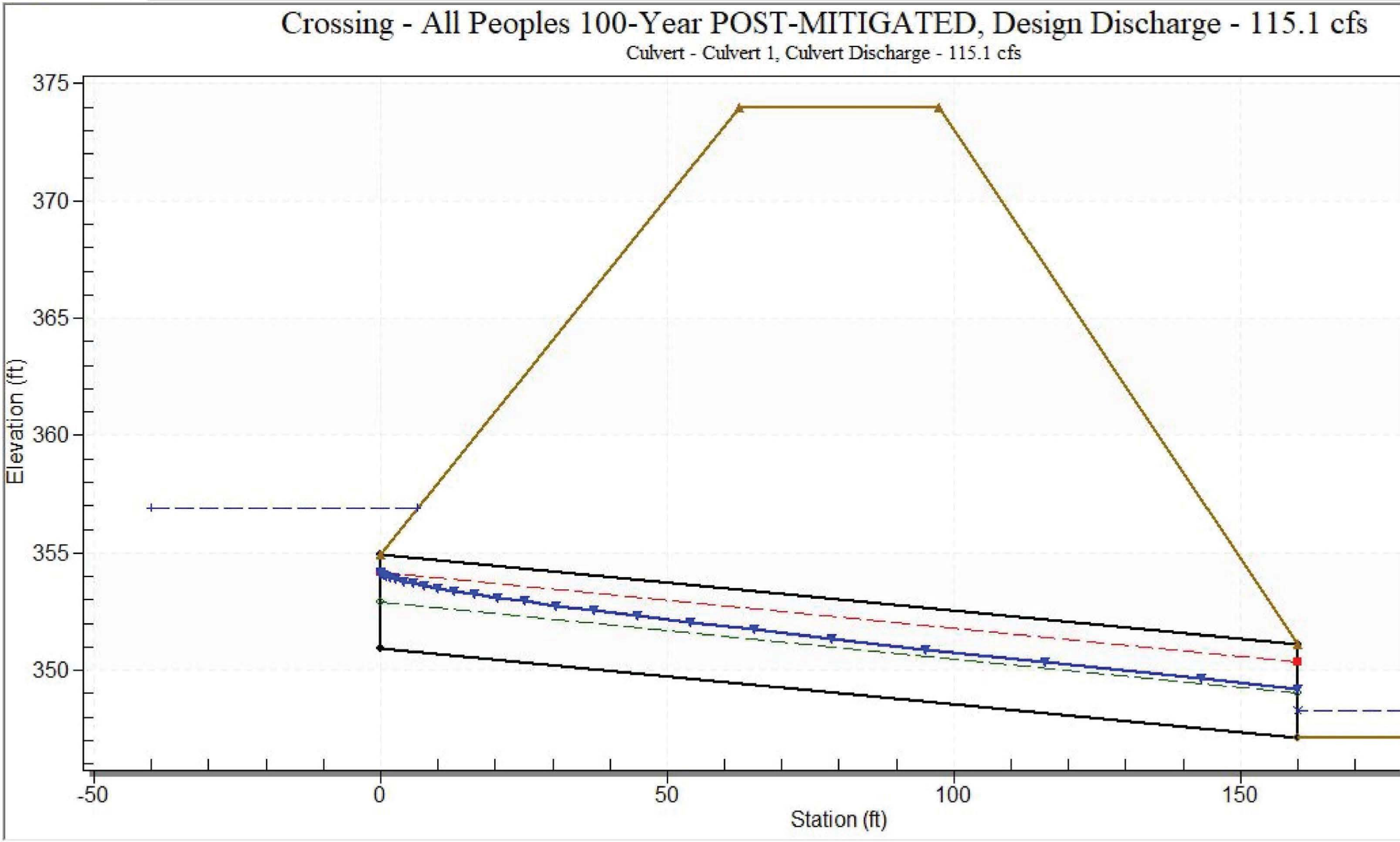
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	350.96	0.00	0.0	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
11.55	11.55	352.29	1.33	0.0*	1-S2n	0.59	0.99	0.59	0.33	9.93	15.28
23.10	23.10	352.88	1.92	0.0*	1-S2n	0.83	1.42	0.86	0.49	11.59	19.01
34.65	34.65	353.44	2.48	0.0*	1-S2n	1.02	1.75	1.05	0.62	13.15	21.47
46.20	46.20	353.92	2.96	0.0*	1-S2n	1.18	2.04	1.23	0.73	14.03	23.33
57.75	57.75	354.37	3.41	0.0*	1-S2n	1.33	2.29	1.40	0.82	14.72	24.85
69.30	69.30	354.81	3.85	0.0*	1-S2n	1.46	2.52	1.56	0.91	15.32	26.14
80.85	80.85	355.26	4.30	0.26	5-S2n	1.59	2.72	1.71	0.99	15.82	27.27
92.40	92.40	355.76	4.80	0.87	5-S2n	1.71	2.91	1.85	1.07	16.28	28.28
115.05	115.05	356.91	5.95	2.58	5-S2n	1.94	3.24	2.11	1.20	17.07	29.99
115.50	115.50	356.93	5.97	2.61	5-S2n	1.95	3.24	2.12	1.20	17.09	30.02

ALL PEOPLE'S CHURCH\CIVIL\REPORTS\HYDROLOGY\2021-2-8\Caltrans Headwall\HY-8\100-Year Post-Mitigated\All Peoples Church Headwater Cal

dow Help

tomary Units | Outlet Control: Profiles | Exit Loss: Standard Method

Culvert Stations



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Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 786-5661

All Peoples Church
c/o Hamann Companies
1000 Pioneer Way
El Cajon, CA 92020

January 20, 2020
P/W 1805-05
Report No. 1805-05-B-3

Attention: **Mrs. Linda Richardson**

Subject: **Updated Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-010-1000, San Diego, California 90212**

Gentlemen:

In accordance with your request, presented herein are the results of Advanced Geotechnical Solutions, Inc.'s (AGS) updated preliminary geotechnical investigation and design recommendations for the proposed church development northeast of the intersection of College Avenue and Interstate 8, in the City of San Diego, California. It is our understanding that the site will be graded to support a church, a parking structure and associated improvements.

AGS appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have questions regarding this report, please contact the undersigned at (619) 850-3980.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

Prepared by:

SHANE P. SMITH
Staff Engineer

Reviewed by:

ANDRES BERNAL, Sr. Geotechnical Engineer
RCE 62366, RGE 2715, Reg. Exp. 9-30-21

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-21

REGISTERED PROFESSIONAL ENGINEER
ANDRES BERNAL
No. 2715
Exp. 9/30/21
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Distribution: (3) Addressee

ORANGE AND L.A. COUNTIES (714) 786-5661
INLAND EMPIRE (619) 708-1649
SAN DIEGO AND IMPERIAL COUNTIES (619) 867-0487

TABLE OF CONTENTS

ATTACHMENTS:

UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED CHURCH AND PARKING STRUCTURES COLLEGE AVENUE AND INTERSTATE 8 SAN DIEGO, CALIFORNIA

1.0 INTRODUCTION

1.1. Purpose and Background

This study is aimed at providing geologic and geotechnical information and recommendations for the development of the proposed church and parking structure. This report has been prepared in a manner consistent with City of San Diego geotechnical report guidelines and the current standard of practice.

1.2. Scope of Work

The scope of our preliminary geotechnical investigation consisted of the following tasks:

- Review readily available geologic maps, literature, aerial photographs, and previous geotechnical studies (Appendix A);
- Compile previous subsurface data (Appendix B) and laboratory test results (Appendix C);
- Prepare a geotechnical/geologic map depicting exploratory locations, approximate distribution of geologic units onsite, and proposed improvements (Plate 1);
- Prepare geologic cross-sections A-A' and B-B' depicting underlying geology, existing and proposed conditions (Plate 2);
- Evaluate groundwater conditions and potential effects on construction;
- Analyze and discuss excavation characteristics (i.e. rippability) of onsite materials, earthwork recommendations, unsuitable soil removals, and compaction criteria for use of on-site earth materials as compacted fill for the proposed development;
- Provide seismic design parameters in accordance with 2019 California Building Code;
- Provide foundation design recommendations based upon anticipated site geotechnical conditions.
- Prepare preliminary foundation and retaining wall design parameters and recommendations;
- Evaluate the impacts of the proposed improvements and excavations on adjacent improvements; and,
- Summarize this data in a report suitable for design, bidding and regulatory review..

2.0 REPORT LIMITATIONS

The conclusions and recommendations in this report are based on the data developed during our previous investigation at the site and a review of readily available geologic and geotechnical information. The materials immediately adjacent to, or beneath those observed in the exploratory excavations may have different characteristics and no representations are made as to the quality or extent of materials not observed. The recommendations presented herein are specific to the development as reflected on the current grading plan. Modifications to the design or development plans could necessitate revisions to these recommendations.

3.0 SITE LOCATION AND DESCRIPTION

The site consists of an approximately 9.2-acre L-shaped parcel located northeast of the intersection of College Avenue and Interstate 8 West, in the City of San Diego, California (see Figure 1, Site Location Map). The site is currently vacant, supporting a light growth of seasonal grasses, shrubs, and small trees. Access to the site is via northbound College Avenue. The site topography generally slopes down toward the southwest. Approximate elevations range from 450 feet above mean sea level (msl) at the northerly limits to 356 feet msl at the southwest corner of the site. Ascending slopes up to approximately 25 feet in height are present along the westerly/northwesterly property boundary adjacent to College Avenue. Existing slopes descend to a minor drainage basin at the southwesterly corner of the site.

4.0 PREVIOUS DEVELOPMENT

As part of our preliminary investigation several historic aerial photos and topographic maps of the project area were reviewed by representatives of AGS. Based on our review it was determined that the site was previously graded to its current configuration. This grading was likely accomplished in multiple phases. The first phase of grading appears to have occurred in the late 1950’s to early 1960’s during construction of the residential development superjacent to the east, College Avenue to the west, Interstate 8 (previously Highway 80) and associated College Avenue off ramp to the south and southwest.

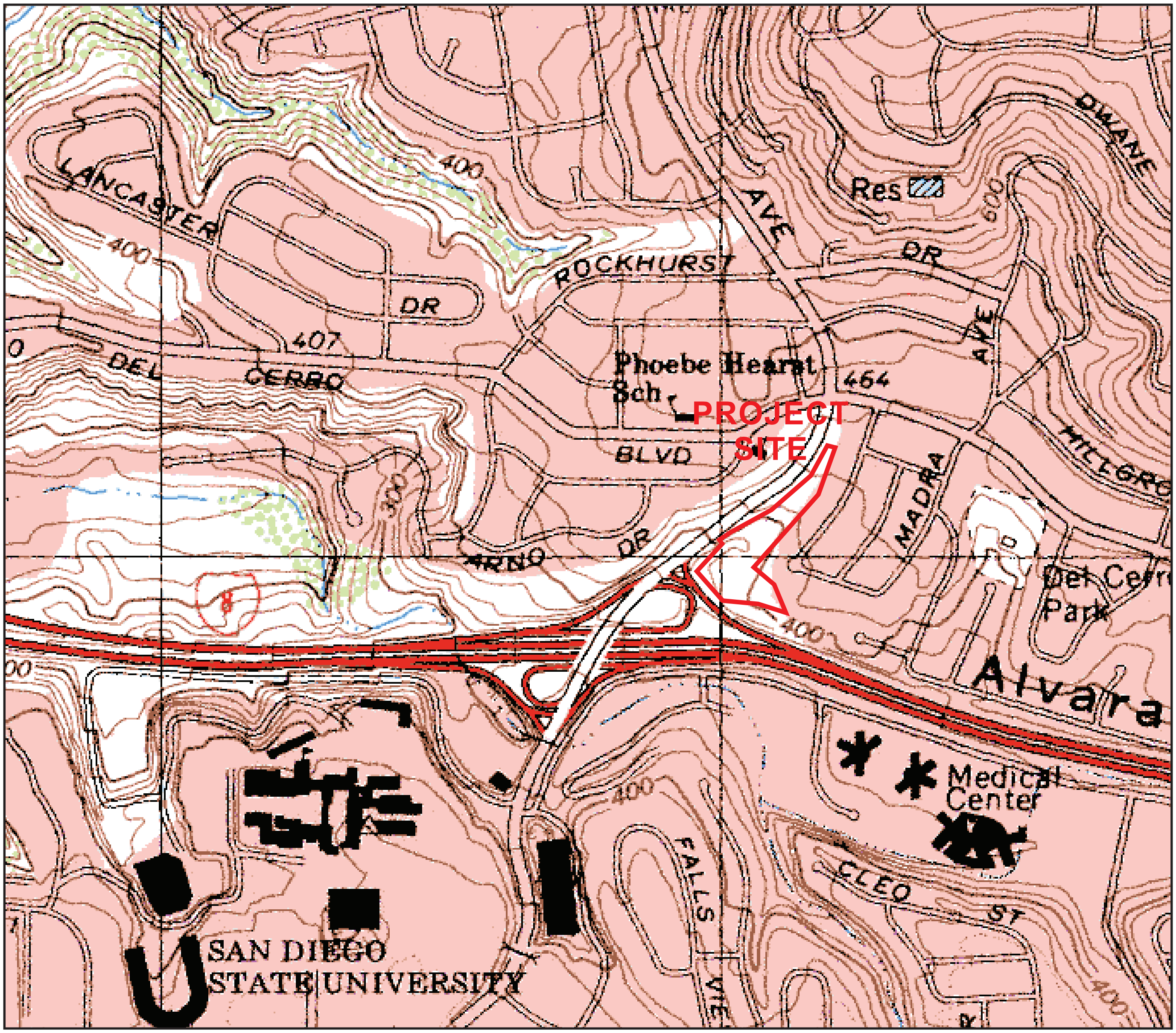
Pre-development photos show a moderate sized drainage trending southwest through the approximate central portion of the site. Minor modifications to this drainage occurred during the first phase of grading activities. Subsequently, a second phase of grading appears to have occurred in the mid- to late-1960’s. During this phase, the drainage appears to have been filled and a level pad constructed in the southwest portion of the site with graded slopes descending the west and southwest. Based on our review of historic photos and topographic maps it is anticipated that fills on the order of 20 to 30 feet deep were placed in the southwesterly portion of the site. The fill materials placed during this second phase of grading may have been derived from the residential development to the southeast (Del Cerro Court).

5.0 PROPOSED DEVELOPMENT

Based on our review of the 40-scale preliminary grading plan for All Peoples Church prepared by Pasco Laret Suiter & Associates (PLSA) dated January 20, 2020, it is our understanding that the subject site will be graded to support a nearly 37,000 square-foot church structure to the west, a two-level parking structure in the central portion of the site, paved driveways and parking areas, and several retaining walls and slopes. It is anticipated that the church will consist of a two- to three-story concrete and/or steel frame structure supported by a shallow slab-on-grade foundation system. The two-level parking garage is anticipated to be a concrete structure supported by a shallow slab-on-grade foundation system.

6.0 SUBSURFACE INVESTIGATION

As part of our previous investigation at the site, AGS excavated and logged ten (10) exploratory test pits in December 2014. The test pits were excavated with a Caterpillar 328D tracked excavator equipped with a two-foot bucket. The exploratory test pits extended to a maximum depth of 27 feet below existing grade. In addition, four (4) borehole percolation tests (P-1 through P-4) were performed evaluate the feasibility of storm water infiltration at the site. The approximate locations of the test pits, percolation test borings, interpreted geology and geologic contacts have been plotted on the 40-scale preliminary grading plan prepared by PLSA and are presented in the attached Plate 1, Geologic Map and Exploration Location Plan.



N

SITE LOCATION MAP
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

P/W 1805-05

FIGURE 1

SOURCE MAP - TOPOGRAPHIC MAP OF THE LA MESA 7.5 MINUTE QUADRANGLE, SAN DIEGO COUNTY, CALIFORNIA

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 786-5661

7.0 ENGINEERING GEOLOGY

7.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California and extends southward to the southern tip of Baja California. In general, the province consists of young, steeply sloped, northwest trending mountain ranges underlain by metamorphosed Late Jurassic to Early Cretaceous-aged extrusive volcanic rock and Cretaceous-aged igneous plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province, where the subject site is located, is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges' dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

7.2. Site Geology

A majority of the site is mantled with pre-existing undocumented fill soils. The undocumented fill is locally underlain by young alluvium and older alluvium where a pre-development drainage was filled in. The fill and alluvial soils are underlain to maximum depths explored by Tertiary-aged Stadium Conglomerate and Cretaceous-age Santiago Peak Volcanics (see Figure 2, Regional Geologic Map). A brief description of the earth materials encountered on this site is presented in the following sections. More detailed description of these materials is provided in the test pit logs included in Appendix B.

7.2.1. Artificial Fill - Undocumented (Map Symbol afu)

The site is mantled with undocumented fill soils ranging from 2 to 22 feet in thickness. As encountered, these materials generally consist of fine to coarse grained sand and silty sand with abundant cobbles and some boulders up to 4 feet in diameter. These materials were observed to be slightly moist to very moist in a loose to medium dense condition. Buried trash and construction debris were encountered in test pit EX-9. An area of large hard rock boulders (shot rock) up to 8 feet in diameter is exposed at the surface in the central portion of the site in proximity to the proposed parking structure location.

7.2.2. Young Alluvium (Qal)

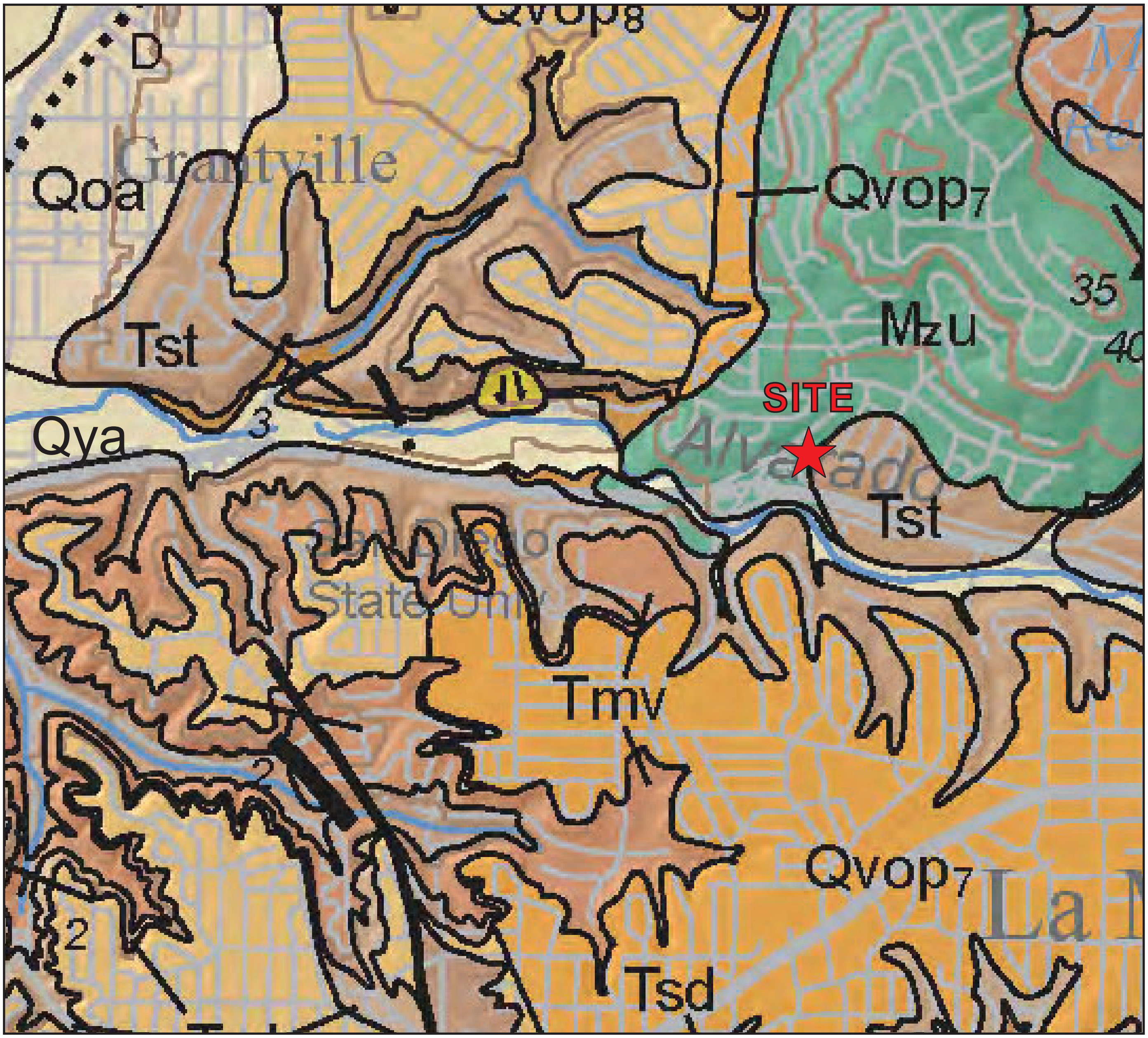
Young alluvium was encountered underlying undocumented fill in test pits EX-3 and EX-5 at 21 to 22 feet below ground surface. The alluvium encountered ranged from a few feet to as much as 4 feet thick. As encountered these materials generally consist of brown to gray, clayey silt with sand and gravel, in a very moist and firm to stiff condition.

7.2.3. Older Alluvium (Map Symbol Qoa)

Older Alluvium was encountered in test pits EX-4 through EX-7. As encountered these materials generally consist of fine-grained, yellow silty sand with silty clay lenses in a slightly moist to moist and moderately dense to dense condition.

7.2.4. Stadium Conglomerate (Map Symbol Tst)

Tertiary aged Stadium Conglomerate was encountered in test pits EX-1, EX-8 and EX-9 below undocumented fill. As encountered, these materials consist of moderately hard, cobble



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REGIONAL GEOLOGIC MAP
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

Qya	Young Alluvium
Qoa	Older Alluvium
Tst	Stadium Conglomerate (Middle Eocene)
Mzu	Metamorphosed and Unmetamorphosed Volcanic and Sedimentary Rocks, Undivided (Mesozoic)

P/W 1805-05

FIGURE 2

SOURCE MAP(S):Geologic Map of the San Diego 30' x 60'Quadrangle, California, Kennedy and Tan 2008

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485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 786-5661

conglomerate, in a brownish yellow, silty sandstone matrix. Cobbles were generally on the order of 3 to 6 inches in diameter and composed of rounded volcanic 'Poway' clasts.

7.2.5. Santiago Peak Volcanics (Map Symbol Jsp)

As encountered, this unit can generally be described as moderately to slightly weathered, moderately hard to hard, metavolcanic bedrock that is reddish brown to brownish yellow on weathered surfaces, and gray on fresh surfaces.

7.3. Geologic Structure

The Stadium Conglomerate non-conformably overlies the basement rocks of the Santiago Peak Volcanics and appears to be confined to the easterly portion of the site. Based on review of historic aerial photos, the original surface contact between the Stadium Conglomerate and Santiago Peak Volcanics appears to coincide with the pre-development drainage that transected the site in a roughly northeast to southwest direction. The Stadium Conglomerate is massively bedded and is anticipated to be near horizontal to very slightly dipping to the west in line with the overall regional dip.

7.4. Groundwater

Groundwater was not encountered to the depths explored at the site. Minor seepage was observed in EX-2 at the fill and bedrock contact. No other natural groundwater condition is known to exist at the site that would impact the proposed site development. However, it should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field exploration.

7.5. Faulting and Seismicity

The site is located in the tectonically active Southern California area, and will therefore likely experience shaking effects from earthquakes. The type and severity of seismic hazards affecting the site are to a large degree dependent upon the distance to the causative fault, the intensity of the seismic event, and the underlying soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

7.5.1. Surface Fault Rupture

No known active faults have been mapped at or near the subject site. The nearest known active surface fault is the Silver Strand section of the Newport-Inglewood-Rose Canyon fault zone, located approximately 7.1 miles southwest of the site. Accordingly, the potential for fault surface rupture on the subject site is considered very low to remote. This conclusion is based on our literature and map review.

7.5.2. Seismicity

As noted, the site is within the tectonically active southern California area, and is approximately 7 miles from an active fault. Given the proximity of the site to the nearest active fault the potential exists for strong ground motion that may affect future improvements.

At this point in time, non-critical structures (commercial, residential, and industrial) are designed according to the California Building Code (2019) and the requirements of the controlling local agency.

7.5.3. Liquefaction

Given the dense nature of the formational materials underlying the site, the proposed remedial grading as recommended herein, and the lack of a shallow groundwater table at the project site, the potential for seismically induced liquefaction is considered remote.

7.5.4. Dynamic Settlement

Dynamic settlement occurs in response to an earthquake event in loose sandy earth materials. The potential of dynamic settlement at the subject site is considered to be remote due to the presence of well consolidated/indurated formational materials underlying the site and the proposed removal of loose, sandy soils as recommended herein.

7.5.5. Seismically Induced Landsliding

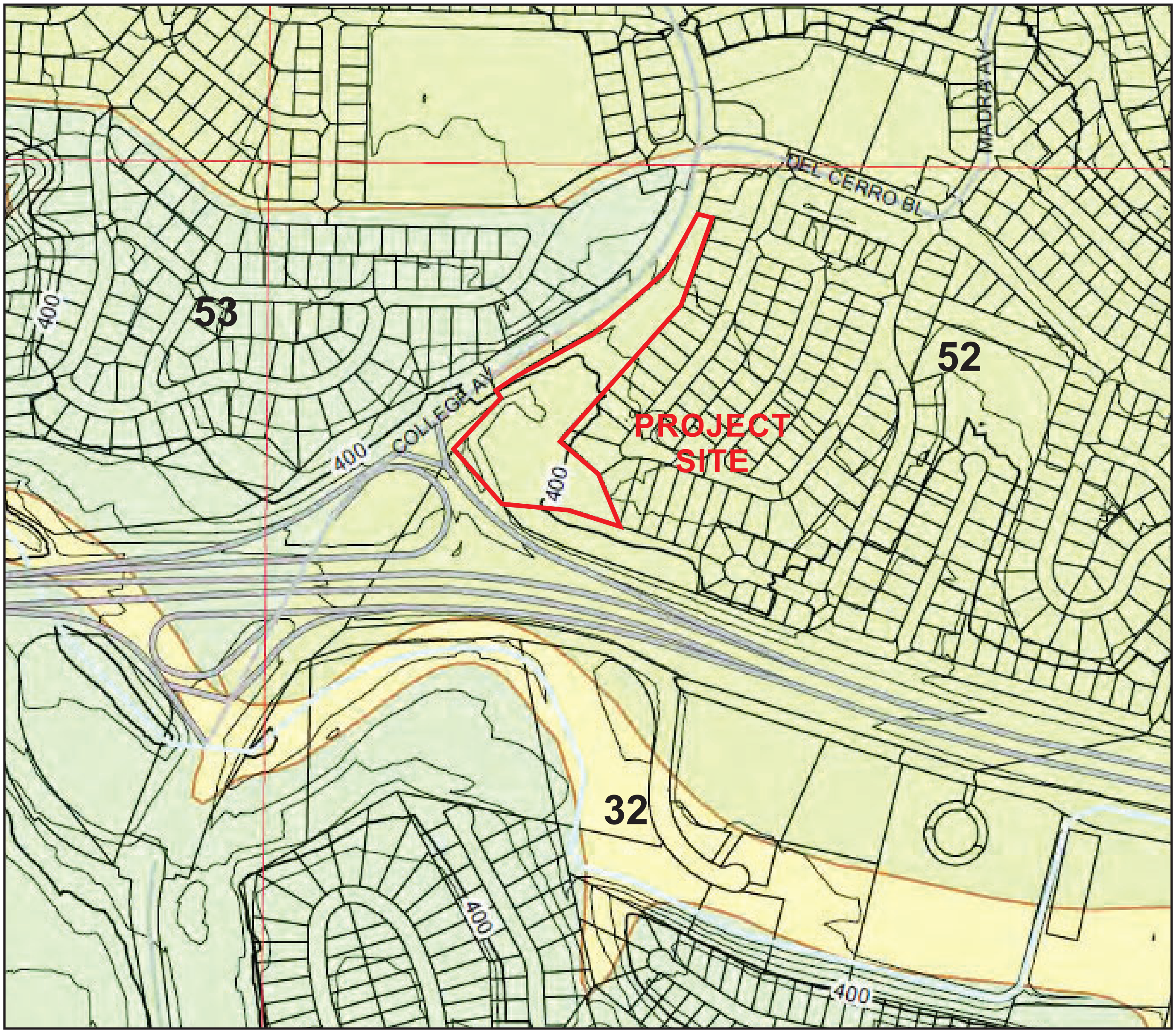
Evidence of landsliding at the site was not observed during our field observations, nor are there any geomorphic features indicative of landsliding noted in our review of published geologic maps. The nearest known landslide is approximately ¾-mile west of the project and developed within exposures of Friars Formation. If the recommendations provided in this report are followed, the likelihood for seismically induced landsliding is considered to be remote.

7.5.6. City of San Diego Seismic Safety Study

As indicated in Figure 3 (excerpted from the San Diego Seismic Safety Study Grid Tile 22), the site is mapped under Geologic Hazard Category 52: Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk.

7.6. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 270 m/s. Table 7.5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 32.7805°N and Longitude 117.0640°W. The seismic provisions of the 2019 CBC are significantly different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located on Site Class D and E soil conditions which was performed as described in Section 7.7.



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CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

32 Low Potential (liquefaction) – fluctuating groundwater minor drainages.

52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk.

53 Level or sloping Terrain, unfavorable geologic structure, Low to moderate risk.

P/W 1805-05

FIGURE 3

SOURCE MAP - CITY OF SAN DIEGO
SEISMIC SAFETY STUDY, GRID TILE 22
DATED APRIL 3, 2008

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485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 786-5661

TABLE 7.5.7 - 2019 CBC SEISMIC DESIGN PARAMETERS (SITE CLASS D)	
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	0.889g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.316g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.067g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.711g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	0.470g
Seismic Design Category	N/A[3]

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8

7.7. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra, including the probabilistic and deterministic seismic hazard analyses, are presented in Figure 4, Site-Specific Design Response Spectrum. The detailed analyses and results are described below.

7.7.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

7.7.2. Deterministic Seismic Hazard Analysis

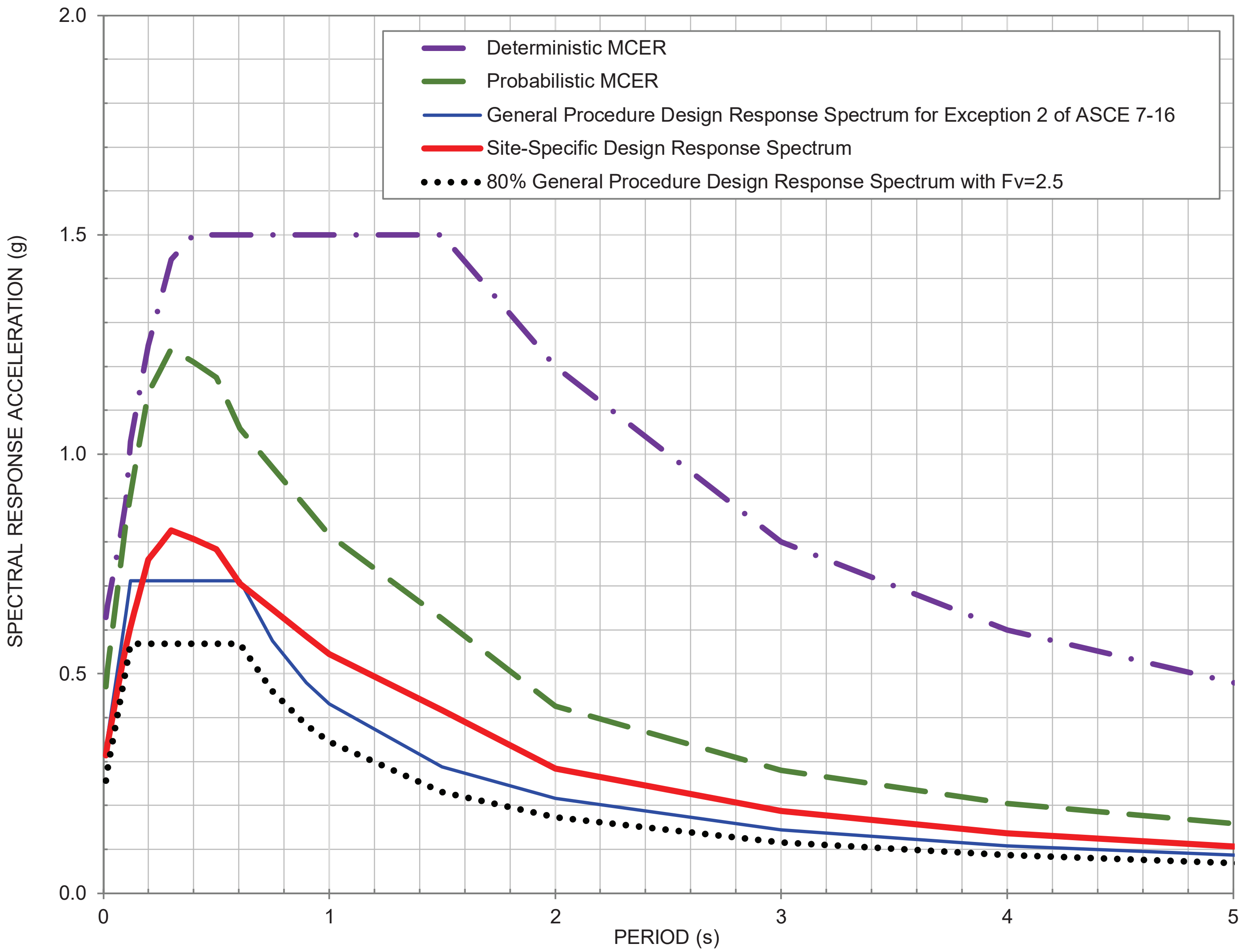
A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation, we selected three "controlling" sources and seismic events: the Rose Canyon (Silver Strand section-Downtown Graben fault), Rose Canyon (San Diego section) and Rose Canyon (Silver Strand section) faults. Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

7.7.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 7.7.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.314
0.02	0.341
0.03	0.369
0.05	0.424
0.075	0.494
0.10	0.563
0.121	0.605
0.15	0.661
0.2	0.759
0.25	0.793
0.3	0.827

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	0.806
0.5	0.784
0.606	0.705
0.8	0.647
0.9	0.586
1.0	0.544
1.5	0.417
2.0	0.284
3.0	0.187
4.0	0.136
5.0	0.106



Note: See Table 7.7.3A of the report for values of the various curves.

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SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

PROJECT NO.	DATE	FIGURE 4
1805-05	01/20	

TABLE 7.7.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.320	0.896	0.525	0.470	0.544	0.628	0.628	0.470	0.256	0.314
0.02	0.355	0.896	0.571	0.512	0.545	0.656	0.656	0.512	0.284	0.341
0.03	0.390	0.896	0.618	0.553	0.555	0.684	0.684	0.553	0.312	0.369
0.05	0.461	0.896	0.710	0.637	0.622	0.741	0.741	0.637	0.368	0.424
0.075	0.549	0.896	0.826	0.740	0.756	0.811	0.811	0.740	0.439	0.494
0.1	0.637	0.896	0.942	0.844	0.893	0.881	0.893	0.844	0.509	0.563
0.1212	0.711	0.896	1.012	0.907	1.029	0.941	1.029	0.907	0.569	0.605
0.15	0.711	0.896	1.107	0.992	1.109	1.022	1.109	0.992	0.569	0.661
0.2	0.711	0.896	1.271	1.139	1.247	1.163	1.247	1.139	0.569	0.759
0.25	0.711	0.897	1.326	1.189	1.345	1.303	1.345	1.189	0.569	0.793
0.3	0.711	0.898	1.382	1.241	1.407	1.444	1.444	1.241	0.569	0.827
0.4	0.711	0.900	1.344	1.210	1.415	1.500	1.500	1.210	0.569	0.806
0.5	0.711	0.902	1.304	1.175	1.363	1.500	1.500	1.175	0.569	0.784
0.6061	0.711	0.904	1.171	1.058	1.229	1.500	1.500	1.058	0.569	0.705
0.75	0.575	0.906	1.071	0.970	1.135	1.500	1.500	0.970	0.460	0.647
0.9	0.479	0.909	0.966	0.878	1.036	1.500	1.500	0.878	0.383	0.586
1	0.431	0.911	0.896	0.817	0.971	1.500	1.500	0.817	0.345	0.544
1.5	0.287	0.911	0.687	0.625	0.670	1.500	1.500	0.625	0.230	0.417
2	0.216	0.911	0.468	0.426	0.495	1.200	1.200	0.426	0.172	0.284
3	0.144	0.911	0.308	0.280	0.314	0.800	0.800	0.280	0.115	0.187
4	0.108	0.911	0.223	0.204	0.211	0.600	0.600	0.204	0.086	0.136
5	0.086	0.911	0.174	0.159	0.150	0.480	0.480	0.159	0.069	0.106

The site-specific design response parameters are provided in Table 7.7.3B. These parameters were evaluated from Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 7.7.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	1.117g
Spectral Response Acceleration 1-second period, S_{M1}	0.938g
Design Spectral Response Acceleration for short period, S_{DS}	0.745g
Design Spectral Response Acceleration for 1-second period, S_{D1}	0.625g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.477g

7.8. Non-seismic Geologic Hazards

7.8.1. Mass Wasting

No evidence of mass wasting was observed onsite nor was any noted on the reviewed maps.

7.8.2. Flooding

According to available FEMA maps, the site is not in a FEMA identified flood hazard area.

7.8.3. Subsidence/Ground Fissuring

Due to the presence of the dense underlying materials, the potential for subsidence and ground fissuring due to settlement is unlikely.

8.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytical methods used in this report.

8.1. Soil Characteristics

The materials found in the area of the proposed improvements consist primarily of previously placed undocumented fill soils. Once the planned removals of unsuitable soils (artificial fill, young alluvium, and weathered older alluvium/bedrock) are completed, the proposed structures will be founded upon compacted fill overlying competent Older Alluvium, Stadium Conglomerate, or Santiago Peak Volcanics. In general, these materials exhibit favorable engineering characteristics. Descriptions of the units encountered/anticipated on site can be found in the test pit logs in Appendix B.

8.2. Excavation Characteristics

The onsite soils within the anticipated cut depths are anticipated to be excavatable with conventional grading equipment. Excavations in the cobble rich lenses may necessitate moderate to heavy ripping to efficiently advance. Excavations for deeper utilities and excavations encountering large boulders may require trackhoes. In the southeasterly portion of the site, design cuts are currently proposed to depths on the order of 25 feet below existing grade. Moderately hard to very hard, metavolcanic bedrock will likely be encountered necessitating the use of specialized grading techniques (large excavators with hoe rams, large bulldozers and possibly blasting) to accomplish site grading and overexcavation requirements as outlined in this document.

8.3. Compressibility

Onsite materials that are significantly compressible in their current condition include topsoil, undocumented fill materials, young alluvium, and weathered older alluvium. These materials will require complete removal prior to placement of fill, and where exposed at design grade. Compressibility of unweathered older alluvium, Stadium Conglomerate, and Santiago Peak Volcanics is not a geotechnical design concern for the proposed structures. If the recommended removals are not possible in certain areas due to property line constraints, the improvements in those areas should be designed for increased total and differential settlement potential.

8.4. Collapse Potential/Hydro-Consolidation

Given the removal recommendations presented herein and the age and density of the Older Alluvium, Stadium Conglomerate, and Santiago Peak Volcanics, the potential for hydro-consolidation is considered remote at the subject site.

8.5. Expansion Potential

In general, the onsite soils consist of silty sands with abundant cobbles and some boulders. Minor clayey/silty soils were identified during our subsurface investigation. We anticipate onsite soils will exhibit "Very Low" to "Medium" expansion potential with the majority being in the "Low" range. Final determination of expansion potential for foundation design purposes should be based on testing of the as-graded soil conditions.

8.6. Shear Strength Characteristics

Shear strength testing was not conducted as part of this investigation. Based upon our previous experience with similar soils in the vicinity of the project area, the shear strength parameters presented in Table 8.6 are recommended for compacted fill, Older Alluvium and the bedrock units observed onsite.

TABLE 8.6 SHEAR STRENGTH PARAMETERS		
Material	***Cohesion (psf)***	***Friction Angle (degrees)***
Compacted Artificial Fill	150	31
Older Alluvium	100	32
Bedrock (Tst and Jsp)	400	36

8.7. Earthwork Adjustments

The following Table 8.7 presents bulk/shrink values of the various onsite soils for use in estimating earthwork grading quantities.

TABLE 8.7 SHRINK/BULK PARAMETERS	
Artificial Fill	Shrink 5-10%
Young Alluvium	Shrink 6-10%
Older Alluvium	Bulk 2-5%
Stadium Conglomerate	Bulk 5-10%
Santiago Peak Volcanics (Rippable)	Bulk 12-18%
Santiago Peak Volcanics (Non-Rippable)	Bulk 18-25%

These values may be used in an effort to balance the earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual conditions are better defined.

8.8. Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formulas presented in *NAVFAC DM-7.1*. Allowable bearing was determined by applying a factor of safety of at least three (3) to the ultimate bearing capacity.

Static lateral earth pressures were calculated using *Rankine* methods for active and passive cases. If it is desired to use *Coulomb* forces, a separate analysis specific to the application can be conducted.

8.9. Chemical/Resistivity Analyses

Laboratory testing for sulfates, chlorides, and soil resistivity and pH was not conducted. Final design should be based upon representative sampling of the as-graded soils.

8.10. Infiltration Potential

AGS conducted four borehole percolation tests (P-1 through P-4) in accordance with the testing methods described in Appendix D of the BMP Design Manual (2018). Infiltration rates were calculated using the Porchet method. Based on the results of our subsurface investigation and testing, it was determined that the upper portions of the Stadium Conglomerate and Santiago Peak Volcanics onsite possess relatively low infiltration rates. Measured infiltration rates varied between 0.10 in./hr. and 0.39 in./hr. Preliminary design infiltration rates utilizing a factor of safety of 2.0 were determined to be 0.05 in./hr. for Stadium Conglomerate and 0.18 in./hr. for Santiago Peak Volcanics materials which correspond to a “Partial Infiltration” condition. However, it should be noted that the Santiago Peak Volcanics are virtually impermeable and that ‘infiltration’ occurred as water flowing along/through fractures in the bedrock rather than infiltrating vertically through the bedrock.

Current plans do not show proposed infiltration type BMPs for the project site. If future plans include permanent storm water BMPs, additional testing and evaluation may be necessary. It should be noted that a large portion of the site is mantled by deep pre-existing fills in excess of 5 feet in depth. The current City of San Diego Storm Water Standards (2018) considers areas with pre-existing fills greater than 5 feet deep not suitable for infiltration. As such AGS would not recommend storm water infiltration onsite.

9.0 GRADING RECOMMENDATIONS

Development of the subject site as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly impacting site development. Recommendations to mitigate these issues are presented in the text of this report.

9.1. Site Preparation and Removals

Grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current City of San Diego grading ordinance, and AGS's *Earthwork*

Specifications (Appendix C). All topsoil, undocumented artificial fill, younger alluvium, and weathered older alluvium and bedrock should be removed in structural areas planned to receive fill or where exposed at final grade. Localized areas may require removals up to 25 feet deep. Removals should expose competent Older Alluvium, Stadium Conglomerate or Santiago Peak Volcanics materials. In general, soils removed during remedial grading will be suitable for reuse in compacted fills, provided they do not contain deleterious materials and are properly moisture conditioned.

9.1.1. Stripping and Deleterious Material Removal

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to removal of unsuitable soils and placement of compacted fill.

9.1.2. Topsoil (No Map Symbol)

Topsoil, if encountered, will require complete removal and recompaction to project specifications if encountered in areas where settlement sensitive structures or improvements are planned. Topsoil onsite is anticipated to be approximately one-half to one foot thick.

9.1.3. Artificial Fill - Undocumented (Map Symbol afu)

In order to mitigate against potential post construction settlement, the undocumented artificial fill at the site will require complete removal and recompaction to project specifications. Estimated removal depths range from 2 to 25 feet. It should be anticipated that specialized grading techniques may be required to efficiently excavate and recompact these unsuitable soils due to existing offsite improvements and presence of oversize rock. Where deep removals are required in proximity to existing offsite improvements, it may be necessary to use large excavators to remove the soils in a trench wise fashion due to the limited access. The soils can then be moisture conditioned to optimum or above, placed and compacted with a sheepsfoot wheel in two (2) foot lifts until design grades are achieved.

9.1.4. Young Alluvium (Map Symbol Qal)

Young alluvium was encountered underlying undocumented fill in the southwest corner of the site extending to an approximate depth of 26 feet. Young alluvium will require complete removal and recompaction to project specifications within a 1:1 downward projection away from site improvements, where possible.

If saturated alluvium is encountered within structural fill areas, additional recommendations for partial removal and surcharge until primary consolidation settlement is completed may be provided based on observed conditions during grading. Settlement monitoring will be required with the use of buried or surface settlement devices. Final determination of alluvium removals and/or monitoring of left-in–place alluvium will be dependent upon exposed field conditions.

9.1.5. Older Alluvium (Map Symbol Qoa)

Older alluvium commonly has a thin highly weathered horizon on the order of 1 to 3 feet thick. The weathered portion of the older alluvium is unsuitable for structural support or placement of fill and should be removed and replaced with compacted fill.

9.1.6. Stadium Conglomerate / Santiago Peak Volcanics (Map Symbols Tst / Jsp)

The weathered portions of Stadium Conglomerate and Santiago Peak Volcanics materials should be removed and compacted within fill areas or where exposed at design grade. Removals are anticipated to be on the order of 1 to 2 feet thick.

9.2. Overexcavation Recommendations

It is recommended that overexcavation of cut/fill transitions located within the structure's footprint should be conducted during grading. The following general overexcavation recommendations are presented below.

9.2.1. Cut/Fill Transitions

Where design grades and/or remedial grading activities create a cut/fill transition, the cut and shallow fill portions of the building pad should be overexcavated to a minimum depth of five (5) feet or 3 feet below the bottom of footing elevation, whichever is deeper, and replaced to design grade with compacted fill. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas or the front of the pad. The entire area extending on a 1:1 (H:V) projection away for the building pad should be undercut. Replacement fills should be compacted to project specifications as discussed in Section 9.4.

9.2.2. Steep Cut/Fill Transitions

In order to reduce the differential settlement potential under the proposed structures due to steep cut/fill transitions, we recommend that the cut or shallow fill portion of steep transitions be overexcavated to a depth equal to one-third (H/3) of the deepest fill section (H) within the building pad area. Based on our field observations, the anticipated maximum fill thickness under the parking garage and church building pads will be 20 feet and 32 feet, respectively. Therefore the recommended overexcavation of the cut or shallow fill portion should extend to approximate depths of 7 feet and 11 feet for the parking garage and church building pads, respectively. Additional overexcavation recommendations may be provided during grading based on exposed conditions.

9.2.3. Utility Construction in Hard Rock

In order to facilitate utility construction consideration should be given to undercutting all proposed utility locations in Stadium Conglomerate or Santiago Peak Volcanics a minimum of one (1) foot below the deepest utility. A "Select" fill should be placed within the overexcavation limits consisting of a replacement material with maximum rock size of approximately eight- (8) inch or smaller. This "select" fill should be compacted to project specifications as discussed in Section 9.4.

9.2.4. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. Where possible, a 1:1 (H:V) projection, from toe of slope or grading limit, outward to competent materials should be established. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading.

9.3. Construction Staking and Survey

Removal bottoms, keyways, subdrains and backdrains should be surveyed by the civil engineer after approval by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations.

9.4. Earthwork Considerations

9.4.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent of the maximum dry density as determined by ASTM Test Method D1557. Care should be taken that the ultimate grade be considered when determining the compaction requirements for disposal fill areas. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix C).

9.4.2. Documentation of Removals and Drains

Removal bottoms, fill keys, backcuts, backdrains and their outlets should be observed and approved by the engineering geologist and/or geotechnical engineer and documented by the civil engineer prior to fill placement.

9.4.3. Treatment of Removal Bottoms

At the completion of removals, the exposed bottom should be scarified to a practical depth, approximately 8-inches, moisture conditioned to above optimum conditions, and compacted in-place to the standards set forth in this report.

9.4.4. Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in thin lifts [eight- (8) inch bulk], moisture conditioned to above optimum moisture content, mixed, compacted, and tested as grading progresses until final grades are attained.

9.4.5. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical, and where designated by the project geotechnical engineer or geologist, compacted fill material should be keyed and benched into competent bedrock or firm natural soil.

9.4.6. Mixing

In order to provide thorough moisture conditioning and proper compaction, processing (mixing) of materials is necessary. Mixing should be accomplished prior to, and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

9.4.7. Compaction Equipment

Compaction equipment on the project shall include a combination of rubber-tired and sheepsfoot rollers to achieve proper compaction. Adequate water trucks/pulls should be available to provide sufficient moisture and dust control.

9.4.8. Fill Slope Construction

Fill slopes shall be overfilled to an extent determined by the contractor, but not less than two (2) feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the required compaction is achieved.

Compaction of each fill lift should extend out to the temporary slope face. Backrolling during mass filling at intervals not exceeding four (4) feet in height is recommended unless more extensive overfill is undertaken.

As an alternative to overfilling, fill slopes may be built to the finish slope face in accordance with the following recommendations:

- Compaction of each fill lift shall extend to the face of the slopes.
- Backrolling during mass grading shall be undertaken at intervals not exceeding four (4) feet in height. Backrolling at more frequent intervals may be required.
- Care should be taken to avoid spillage of loose materials down the face of the slopes during grading.
- At completion of mass filling, the slope surface shall be watered, shaped and compacted first with a sheepsfoot roller or track walked with a bulldozer, such that compaction to project standards is achieved to the face slope.

Proper seeding and planting of the slopes should follow as soon as practical, to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finished slope surface.

9.5. Haul Roads

Haul roads, ramp fills, and tailing areas should be removed prior to placement of fill.

9.6. Import Materials

Import soils are anticipated to achieve design site grades and/or as select material for backfill of site retaining walls. Import materials should have similar engineering characteristics as the onsite soils and should be approved by the soil engineer at the source prior to importation to the site.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Construction of the proposed structures and associated improvements is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly affecting site development. Recommendations to mitigate these issues are presented in the text of this report.

10.1. Design Recommendations

Detailed foundation plans are not currently available; however, it is our understanding that the proposed church and parking structures will be supported by a conventional shallow foundation system or a mat foundation placed on compacted fill materials. In addition to the structures, associated parking lots and landscape areas are proposed.

10.1.1. Foundation Design Criteria

The expansion potential of the underlying soils is anticipated to range from “very low” to “medium”. For design of shallow foundations supported on compacted fill, the values presented in Table 10.1.1 should be used.

TABLE 10.1.1
SHALLOW FOUNDATION DESIGN PARAMETERS

Minimum Footing Dimensions[1]	• 24 inches in width and 24 inches in depth.
Allowable Bearing Capacity	• 2,500 pounds per square foot (psf). May be increased by 200 psf and 300 psf for each additional foot of foundation width and depth, respectively, up to a maximum of 3,500 psf. • Allowable bearing values may be increased by one-third for transient live loads from wind or seismic forces.
Estimated Static Settlement	• Total settlement: 1.5 inch • Differential settlement: 0.5 inch over 30 feet. • Static settlement of the foundation system is expected to occur on initial application of loading.
Allowable Coefficient of Friction Below Footings	0.35
Lateral Bearing[2] (Level Condition)	300 psf/foot of depth to a maximum of 3,000 psf

Notes: 1. Depth of footing embedment should be measured below lowest adjacent finish grade.
2. For resisting lateral forces on footings, lateral bearing and sliding coefficient may be combined with a maximum sliding resistance limited to ½ of dead load.

10.1.2. Mat Foundation

Mat foundations should be designed by the structural engineer and should conform to the 2019 California Building Code. The allowable bearing pressure is an average value applied to the total area of the mat foundation and was used to evaluate the overall static settlement of the foundation. In our model, the mat foundation was assumed to be rigid with respect to the soil. The recommended geotechnical design parameters are presented in Table 10.1.2.

TABLE 10.1.2 RIGID MAT FOUNDATION DESIGN PARAMETERS	
Average Allowable Bearing Capacity	• 2,000 pounds per square foot (psf). 3,000 psf maximum • Allowable bearing values may be increased by one-third for transient live loads from wind or seismic forces.
Estimated Total Static Settlement and Tilting	• Total settlement: 1.0 inch • Differential settlement (tilt): 0.5 inch over 40 feet. • Static settlement of the foundation system is expected to occur on initial application of loading.

Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils underlying the mat. For the approximate flexible design of slab-on-grade mat foundation systems a modulus of subgrade reaction (K_{v1}) of 150 pci is recommended. The modulus of subgrade reaction is based on a unit square foot area and should be adjusted for the planned mat size. The coefficient of subgrade reaction Kb for a mat of a specific width, may be evaluated using the following equation:

$$Kb = Kv_1[(b+1)/2b]^2$$

where b is the width of the foundation.

10.1.3. Foundation Excavations

Foundation excavations should be observed by the geotechnical consultant. Footings should be excavated into compacted fill materials. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement. Footing excavations should not be allowed to dry back and should be kept moist until concrete is poured.

10.1.4. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

10.1.5. Moisture and Vapor Barrier

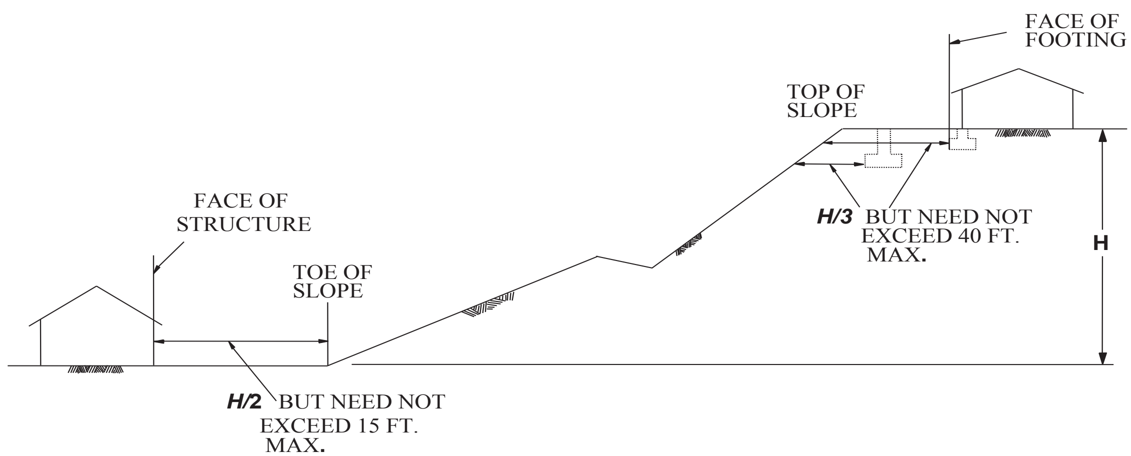
A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently, 15-mil polyolefin membrane underlayments (Stego® Wrap or similar material) have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer.

10.1.6. Deepened Footings and Structural Setbacks

It is generally recognized that improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code (CBC), require that structures be set back or footings deepened, where subject to the influence of these natural processes.

For the subject site, where foundations for structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in Figure 5.

FIGURE 5



10.1.7. Concrete Design

Laboratory testing to determine the sulfate concentration of soils at the subject site was not conducted. Final determination should be based on testing of the as-graded soils. It should be noted that some fertilizers have been known to leach sulfates into soils otherwise containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. It is incumbent upon the owner to determine whether additional protective measures are warranted to mitigate the potential for increased sulfate concentrations to onsite soils as a result of the future homeowner's actions.

10.1.8. Corrosion

Corrosivity testing was not conducted under the scope of this investigation. Final determination of the corrosivity of onsite soils should be based on testing of the as-graded soils.

10.2. Retaining Walls

It is our understanding that conventional, mechanically stabilized earth (MSE), and/or tieback walls may be part of the proposed development. For preliminary wall design purposes, the following soil parameters can be used for compacted fill materials:

- Unit Weight: 125 pcf, Cohesion: 150 psf, Friction Angle: 31 degrees.

The following earth pressures are recommended for the design of conventional retaining walls onsite utilizing select backfill material having expansion index (EI) of less than 50 and minimum internal friction angle of 31 degrees.

Static Case

TABLE 10.2
LATERAL EARTH PRESSURES

		Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Level Backfill	Active	$K_a = 0.32$	40
	Passive	$K_p = 3.12$	391
	At Rest	$K_o = 0.48$	61
2:1 Backfill	Active	$K_a = 0.50$	63
	At Rest	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls supporting more than 6 feet of backfill height should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

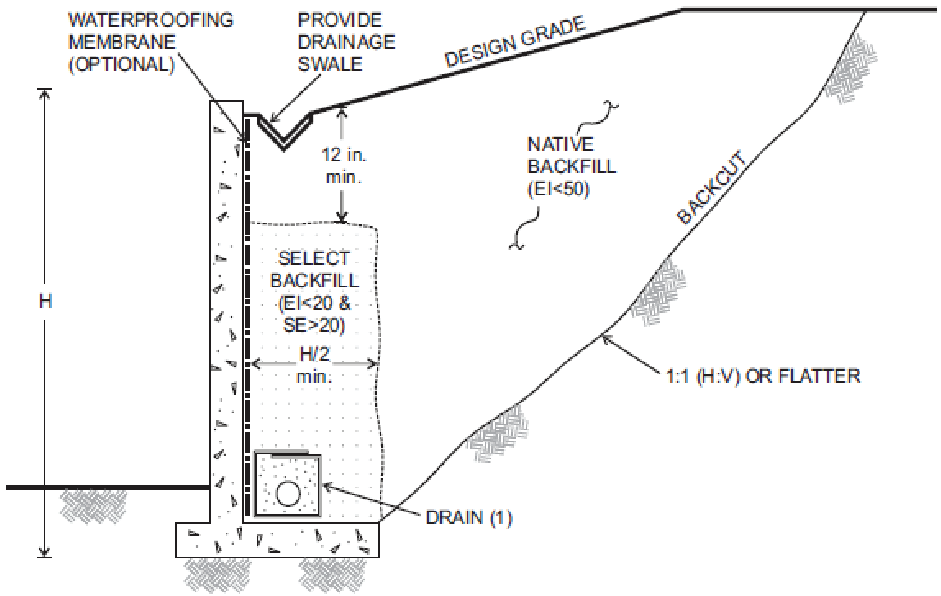
γ = soil density = 125 pcf for compacted fill

k_h = seismic pseudostatic coefficient = 0.5 * peak horizontal ground acceleration / g

The peak horizontal ground acceleration is anticipated to be on the order of 0.477g as discussed in Section 7.7.3. Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

The foundations for retaining walls of appurtenant structures structurally separated from the building structures, may bear on properly compacted fill. A bearing value of 2,000 lbs./sq.ft. may be used for design of retaining walls. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance. To relieve the potential for hydrostatic pressure wall backfill should consist of a free draining backfill (sand equivalent "SE" >20) and a heel drain should be constructed (see Figure 6). The drain should be placed at the heel of the wall and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 4 cubic feet of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent).

FIGURE 6



<u>NOTES:</u> (1) <u>DRAIN:</u> 4-INCH PERFORATED ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE PLACED PERFORATIONS DOWN AND SURROUNDED BY A MINIMUM OF 1 CUBIC FEET OF 3/4 INCH ROCK OR APPROVED EQUIVALENT SUBSTITUTE AND WRAPPED IN MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

Drainage devices should be installed along the top of the wall backfill and should be sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8-inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. The soils engineer or his representative should observe the retaining wall footings, backdrain installation and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.

10.3. Utility Trench Excavation

All utility trenches should be shored or laid back in accordance with applicable OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. AGS should be consulted on these issues during construction.

10.4. Utility Trench Backfill

Mainline and lateral utility trench backfill should be compacted to at least 90 percent relative compaction as determined by ASTM D1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

10.5. Exterior Slabs and Walkways

10.5.1. Subgrade Compaction

The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be compacted to a minimum of 90 percent relative compaction as determined by ASTM D1557.

10.5.2. Subgrade Moisture

The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content (low expansive soils) prior to concrete placement, dependent upon the expansion potential of the subgrade soils.

10.5.3. Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

10.5.4. Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight to ten feet. Exterior slabs should be designed to withstand shrinkage of the concrete.

10.5.5. Flatwork Reinforcement

Consideration should be given to reinforcing any exterior flatwork.

10.5.6. Thickened Edge

Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately eight inches below concrete slabs and should be a minimum of six inches wide.

10.6. Preliminary Pavement Design

For preliminary pavement design, we have assumed an "R" Value of 30 for the onsite subgrade soils. Utilizing City of San Diego Pavement Design Standards Schedule "J" and assuming the subject site is classified equivalent to "Local Residential" (max ADT=1200) which equates to a Traffic Index TI=6.0 the following pavement section is presented below. Additional pavement design recommendations will be provided during grading based on as-graded conditions and R-value testing.

Standard Pavement Section

3-inches Asphalt Concrete
over
8.5-inches Aggregate Base

Pavement subgrade soils should be at or near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction and should conform with the specifications in Section 26 of the Standard Specifications for the State of California Department of Transportation (Caltrans) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans Standard Specifications or Section 203-6 of the Green Book.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the grading and foundation plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from referenced reports and the borings and test pits at the locations indicated on the plans. The findings are based on the review of the field data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

REFERENCES

Advanced Geotechnical Solutions, Inc., 2014, "Preliminary Geotechnical Investigation, Del Cerro Residential Development, College Avenue and Interstate 8, San Diego, California", dated July 20, 2014, Report No. 1411-02-B-4.

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APPENDIX B

SUBSURFACE INVESTIGATION

Project College Ave/I8
Date Excavated Dec. 2014
Logged by FE
Equipment Cat 328D

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
EX-1	0.0 – 2.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND with abundant rounded COBBLES to 4-in. diameter, yellowish brown, very moist, loose; some clay.
	2.0 – 9.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded volcanic and metamorphic clasts to 6-in. diameter in a SILTY SANDSTONE matrix, light brownish yellow, moderately hard.
			TOTAL DEPTH 9.5 FT. NO GROUNDWATER, NO CAVING.
EX-2	0.0 – 3.5	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, light reddish brown, very moist, loose; with some rounded cobbles to 8-in. diameter; minor seepage at 3.5 ft.
	3.5 – 7.0		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, light gray to gray on fresh surfaces, slightly to moderately weathered, moderately hard to hard; jointed, manganese oxide along joint surfaces. @5 ft. N 60° E, Vertical - Joint N 5° W, 75° SW - Joint @6 ft. Hard, slightly weathered
			TOTAL DEPTH 7.0 FT. MINOR SEEPAGE AT 3.5 FT., NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-3	0.0 – 22.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, fine to coarse grained, brown, moist, loose; with some clay and silt.
		SM	@2 ft. SILTY SAND, pale yellow to light gray, slightly moist, moderately dense; abundant rounded COBBLES to 8-in. diameter.
	22.0 – 26.0	CL/ML	**Alluvium (Qal):** CLAYEY SILT, brown, very moist, stiff; some fine grained sand and angular gravel.
	26.0 – 27.0		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, reddish brown, moderately weathered, hard.
			TOTAL DEPTH 27.0 FT. NO GROUNDWATER, CAVING AT 3 FT.
EX-4	0.0 – 8.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, fine to coarse grained, pale yellow, slightly moist, loose. @4 ft. Moderately dense.
	6.5 – 13.0		**Older Alluvium (Qoa):** SILTY SAND, fine grained, yellow, slightly moist to moist, moderately dense to dense; some clay. @10 ft. Some ¼ to ½-in. thick SILTY CLAY lenses, olive, moist, stiff; slightly plastic.
			TOTAL DEPTH 13.0 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-5	0.0 – 21.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, reddish brown, moist, loose.
		SW	@2.5 ft. SAND with COBBLES, light gray, slightly moist, medium dense; with some silt and clay.
	21.0 – 22.0	ML	**Alluvium (Qal):** CLAYEY to SANDY SILT, dark grayish brown, moist to very moist, stiff; abundant subangular gravel.
	22.0 – 23.0		**Older Alluvium (Qoa):** SILTY SAND, fine grained, yellow, slightly moist, moderately dense to dense.
			TOTAL DEPTH 23.0 FT. NO GROUNDWATER, NO CAVING.
EX-6	0.0 – 10.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, pale yellow to light gray; with some silt and clay.
	10.0 – 15.0		**Older Alluvium (Qoa):** Interbedded CLAYEY fine grained SAND and SILTY CLAY, yellow and olive, moist, dense/stiff.
	15.0 – 15.5		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, brownish yellow, highly weathered, abundant clay development, soft to moderately hard. @15.5 ft. Slightly weathered, hard.
			TOTAL DEPTH 15.5 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-7	0.0 – 20.0	SM	**Artificial Fill – Undocumented (afu):** Angular, gray metavolcanic clasts from 8-in. to 4-ft. diameter in a SILTY SAND matrix, fine to coarse grained, yellowish brown, moist, loose. @6 ft. Some rounded cobbles to 5-in. diameter. @8 ft. Some rounded cobbles to 7-in. diameter. @19 ft. Some rounded cobbles to 10-in. diameter.
	20.0 – 24.5		**Older Alluvium (Qoa):** Fine SANDY SILT, red, slightly moist, stiff; some 1/16-in. paleo root holes. @22 ft. Some clay; no visible porosity.
			TOTAL DEPTH 24.5 FT. NO GROUNDWATER, CAVING AT 5 FT.

Test Pit No.	Depth (ft.)	USCS	Description
EX-8	0.0 – 4.5	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, fine to coarse grained, reddish brown, moist, loose; abundant rounded cobbles to 3-in. diameter.
	4.5 – 12.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded cobbles to 3-in. diameter in a SILTY SANDSTONE matrix, yellow, slightly moist, hard.
			TOTAL DEPTH 12.5 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-9	0.0 – 10.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND with COBBLES, dark brown and yellowish brown, moist, loose; some 4-in. thick asphalt slabs. @4 ft. Some angular metavolcanic clasts to 2-ft. diameter. @8 ft. Trash debris.
	10.0 – 12.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded volcanic and metamorphic clasts to 3-in. diameter, in a SILTY SANDSTONE matrix, light yellow, slightly moist, moderately hard. @11 ft. Hard.
			TOTAL DEPTH 12.5 FT. NO GROUNDWATER, CAVING AT 4 FT.
EX-10	0.0 – 22.0	SW	**Artificial Fill – Undocumented (afu):** GRAVELY SAND, reddish brown, moist, loose; with some rounded cobbles to 3-in. diameter; few metavolcanic clasts to 18-in. diameter.425
		SM-ML	@11 ft. SILTY SAND and CLAYEY SILT, dark gray, moist to very moist, firm to medium dense; some organics.
	22.0 – 22.5		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, moderately weathered, hard.
			TOTAL DEPTH 15.5 FT. NO GROUNDWATER, CAVING AT 6 FT.

APPENDIX C

GENERAL EARTHWORK SPECIFICATIONS

AND GRADING GUIDELINES

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be retained to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to appraise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

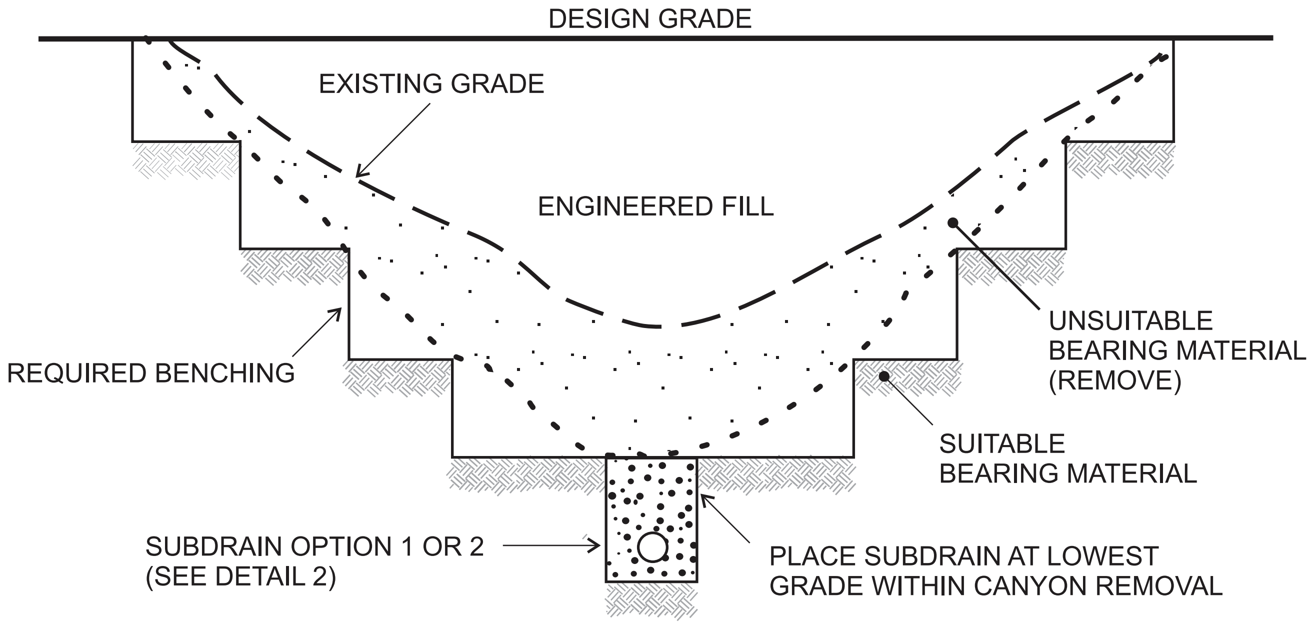
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

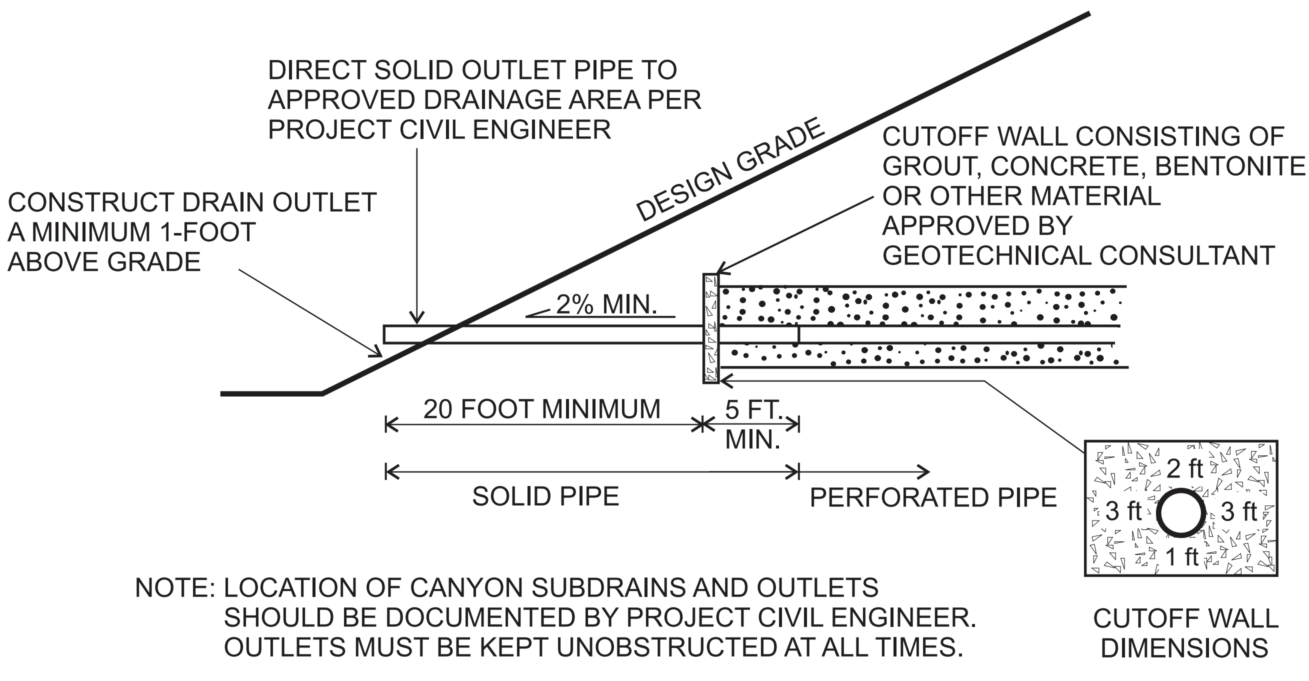
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

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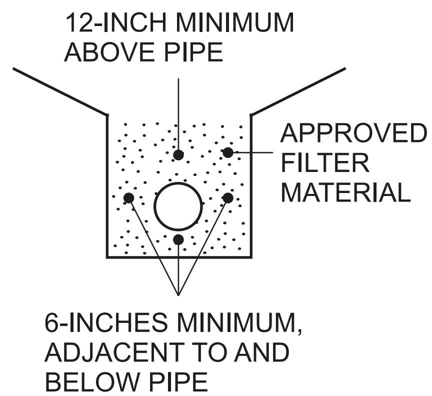
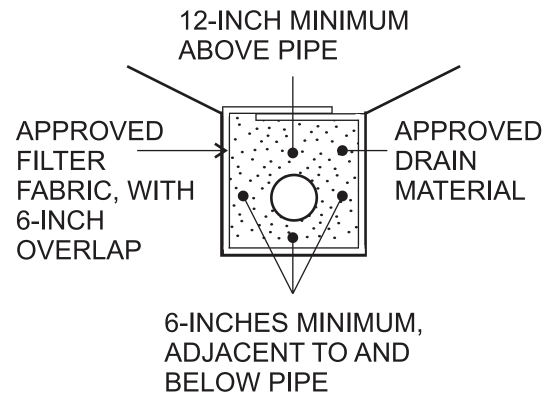
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1





OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL

OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

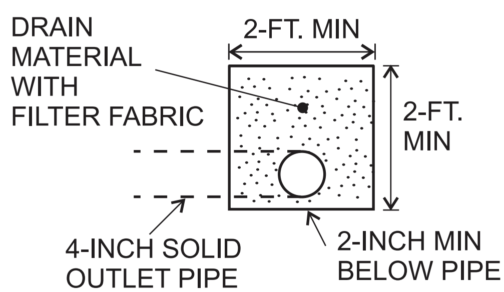
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

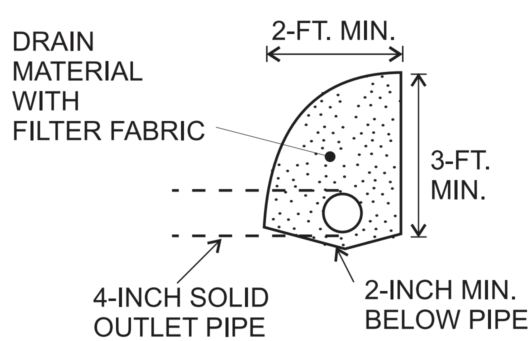
PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN





OPTION 1

OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

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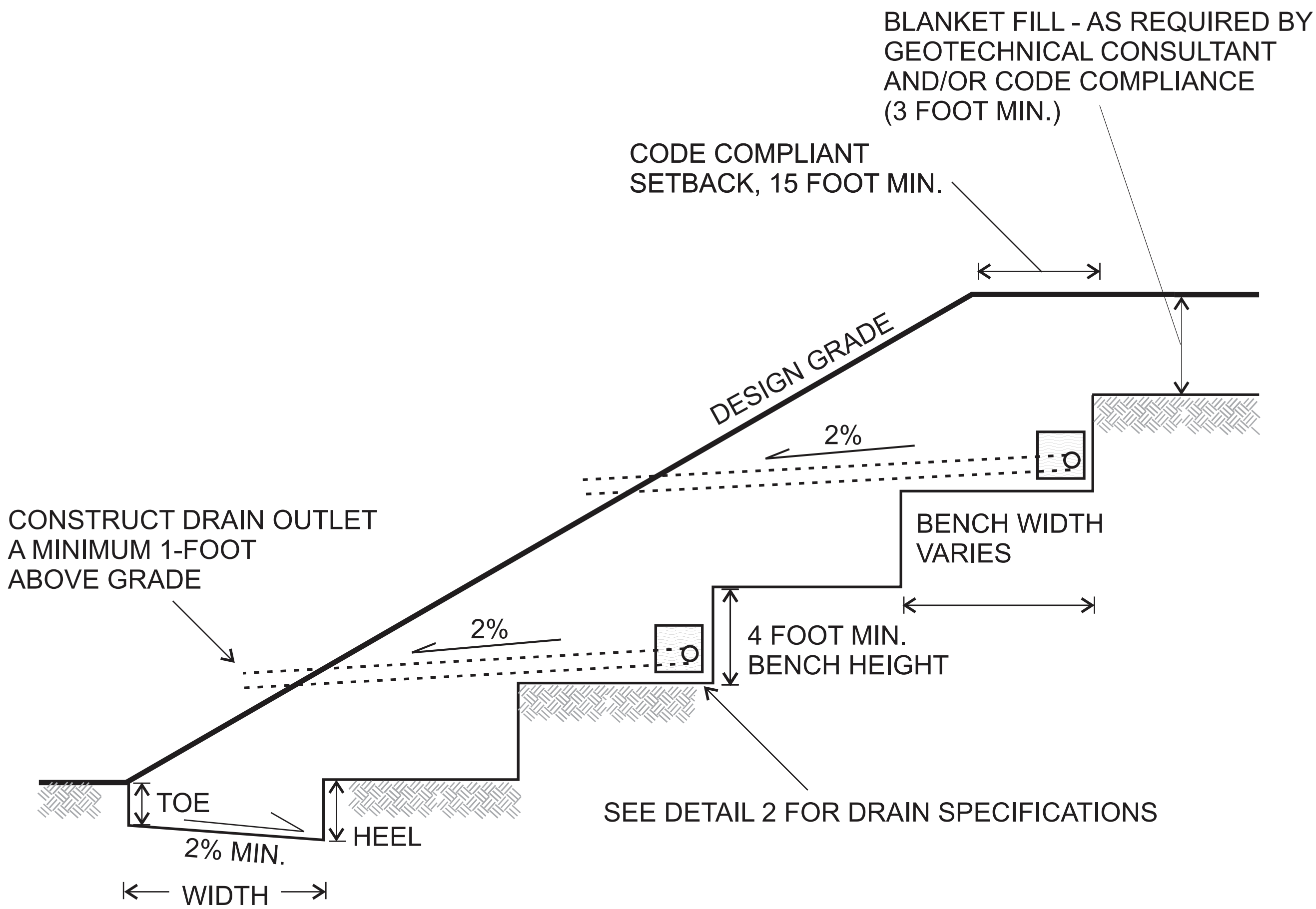
AGS ADVANCED GEOTECHNICAL SOLUTIONS	DRAIN SPECIFICATIONS	DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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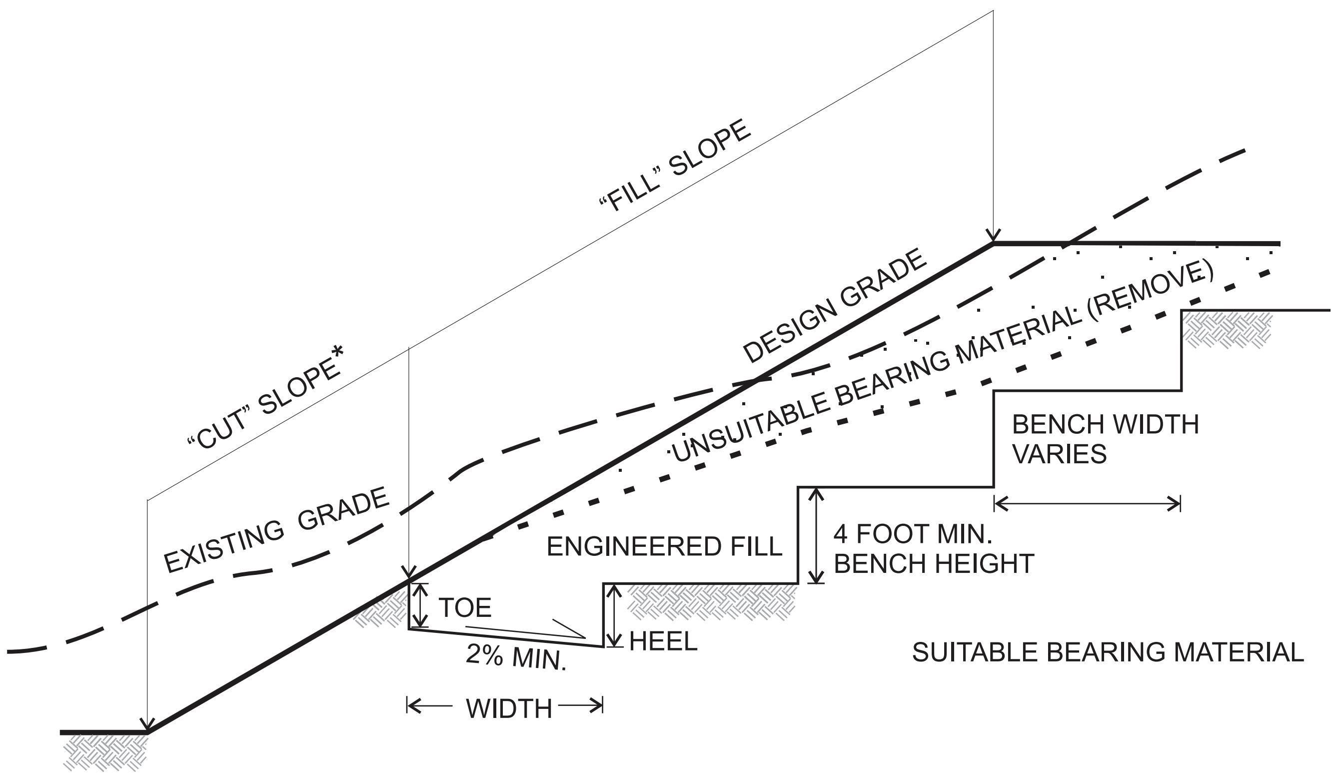
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE "CUT" PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE "FILL" PORTION



SUITABLE
BEARING MATERIAL

CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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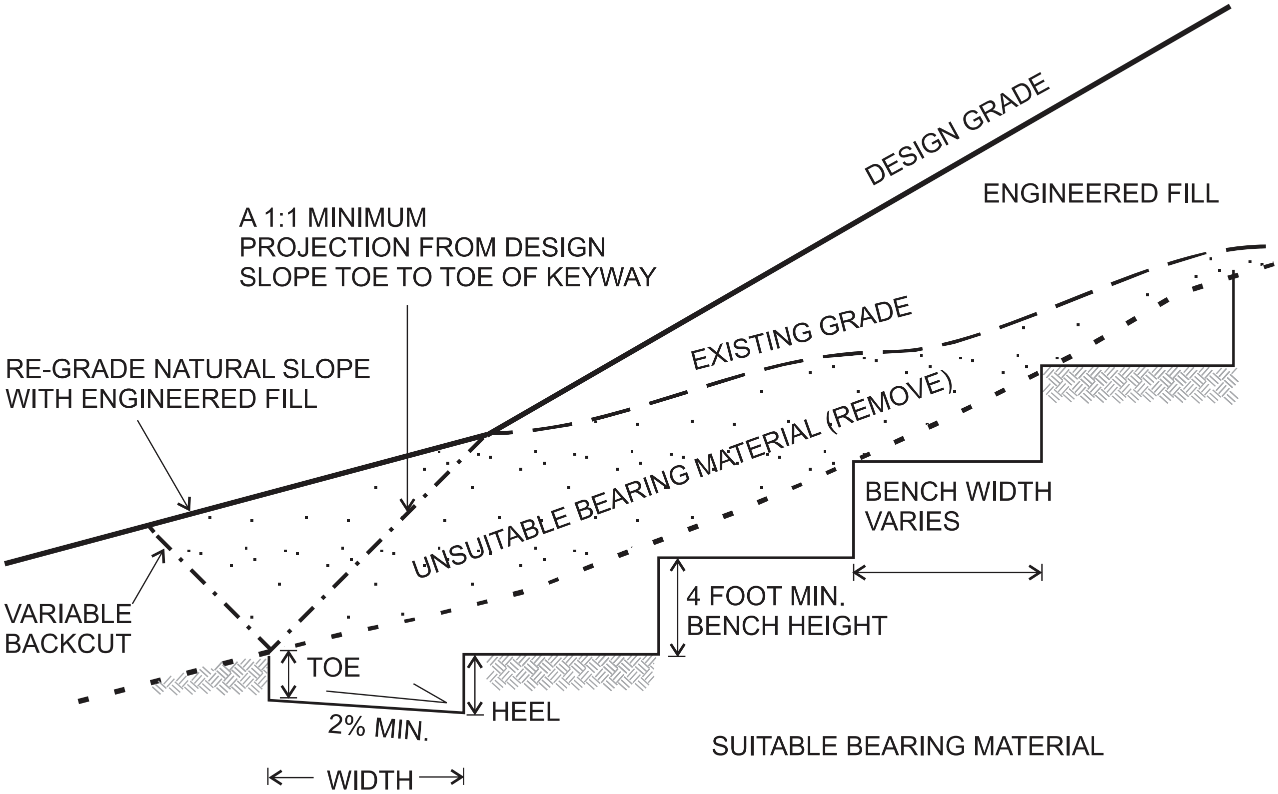
AGS ADVANCED GEOTECHNICAL SOLUTIONS	FILL OVER CUT SLOPE	DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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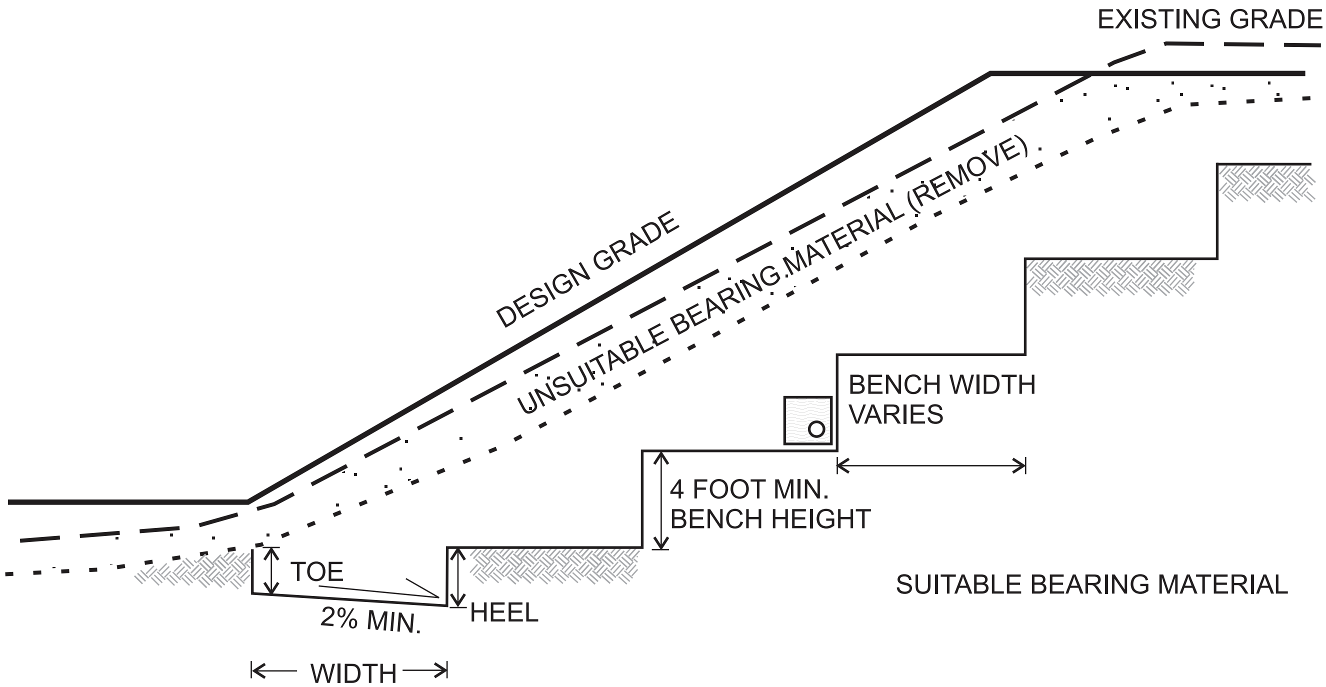
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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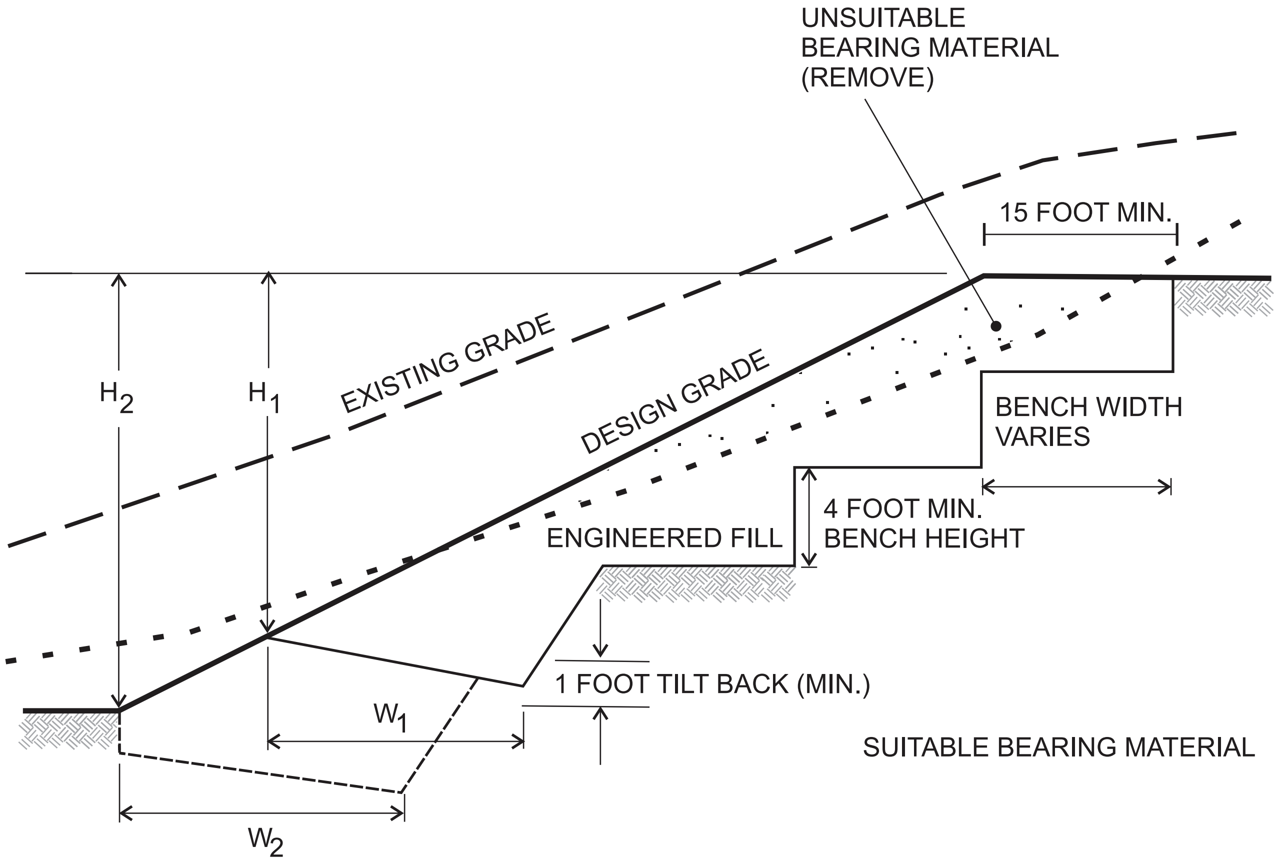
AGS ADVANCED GEOTECHNICAL SOLUTIONS	SKIN FILL CONDITION	DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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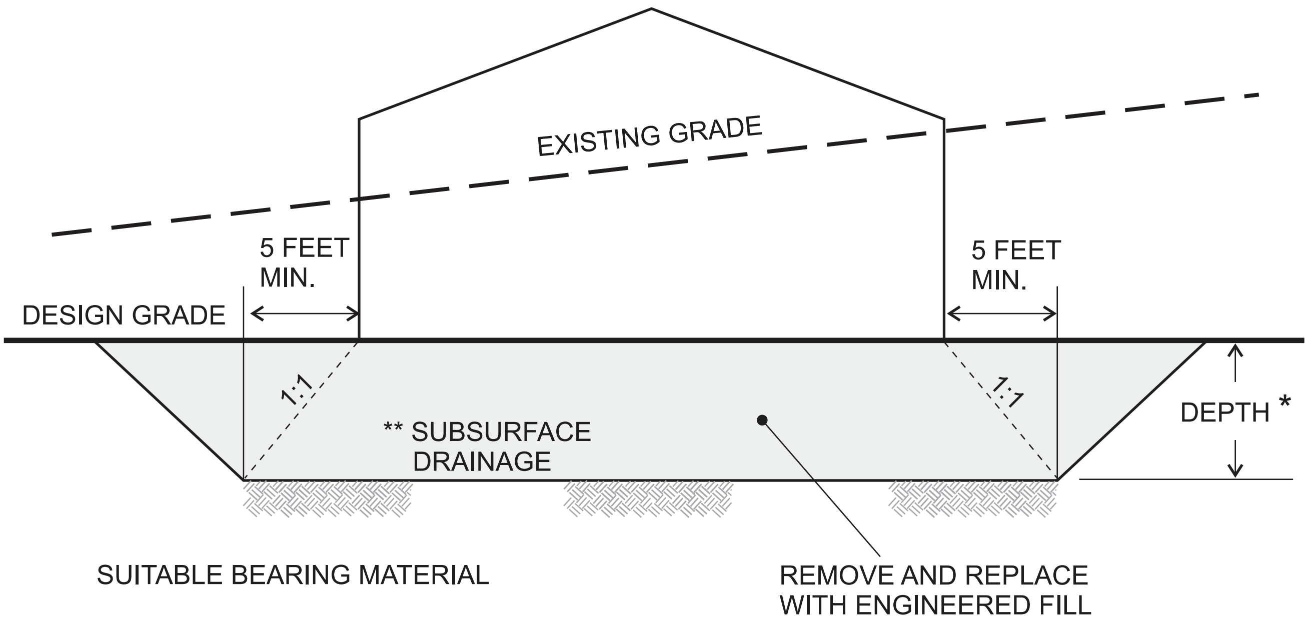
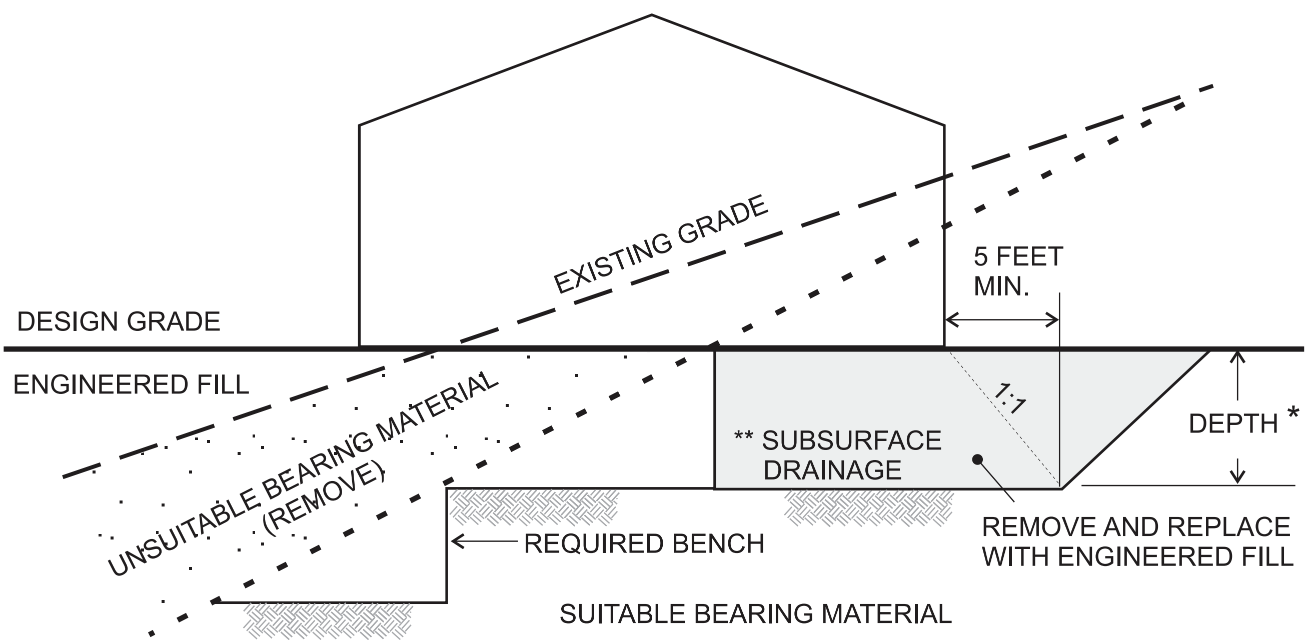
AGS ADVANCED GEOTECHNICAL SOLUTIONS	PARTIAL CUT SLOPE STABILIZATION	DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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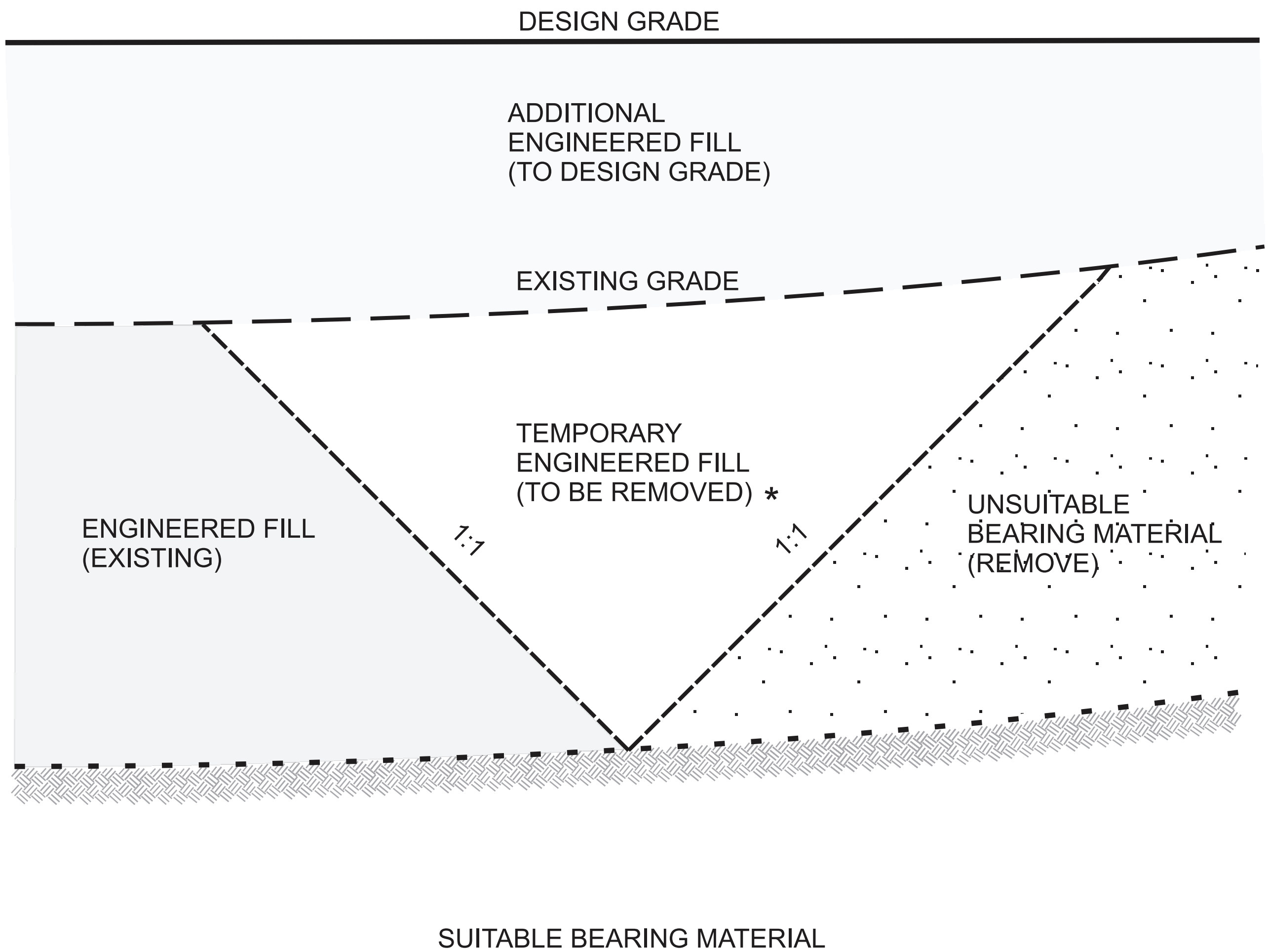
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

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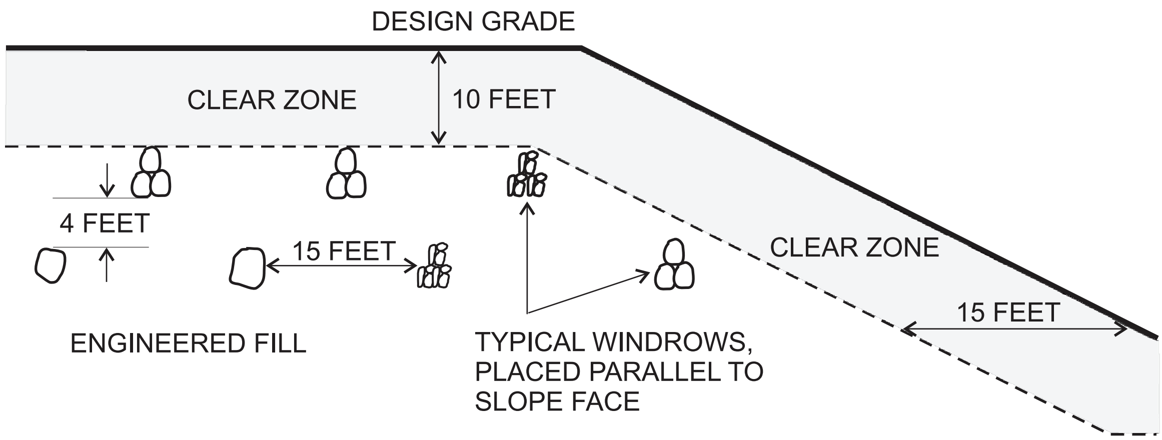
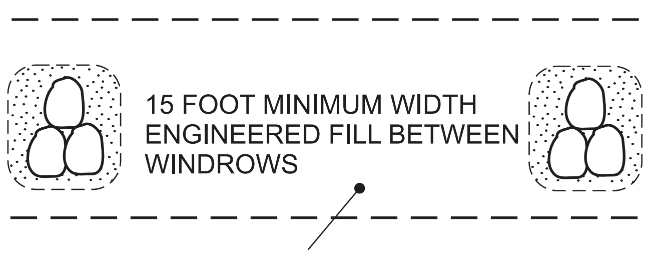
AGS ADVANCED GEOTECHNICAL SOLUTIONS	REMOVAL ADJACENT TO EXISTING FILL	DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

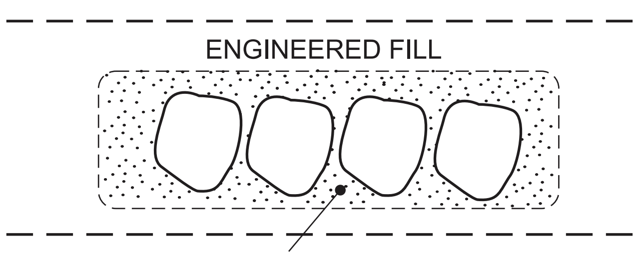
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



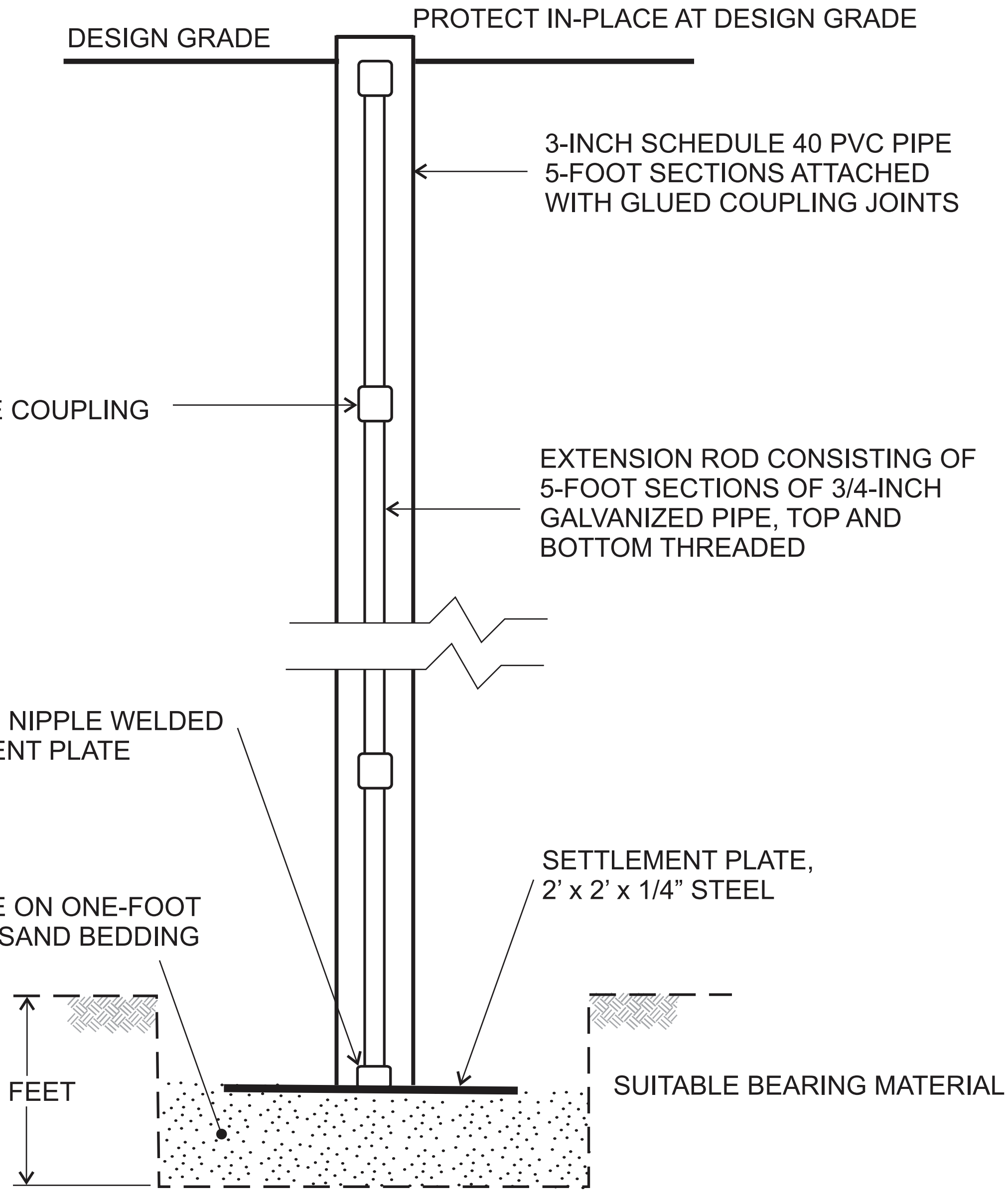
GRANULAR MATERIAL APPROVED BY THE GEOTECHNICAL CONSULTANT AND CONSOLIDATED IN-PLACE BY FLOODING

WINDROW PROFILE

VER 1.0

NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	OVERSIZED MATERIAL DISPOSAL CRITERIA	DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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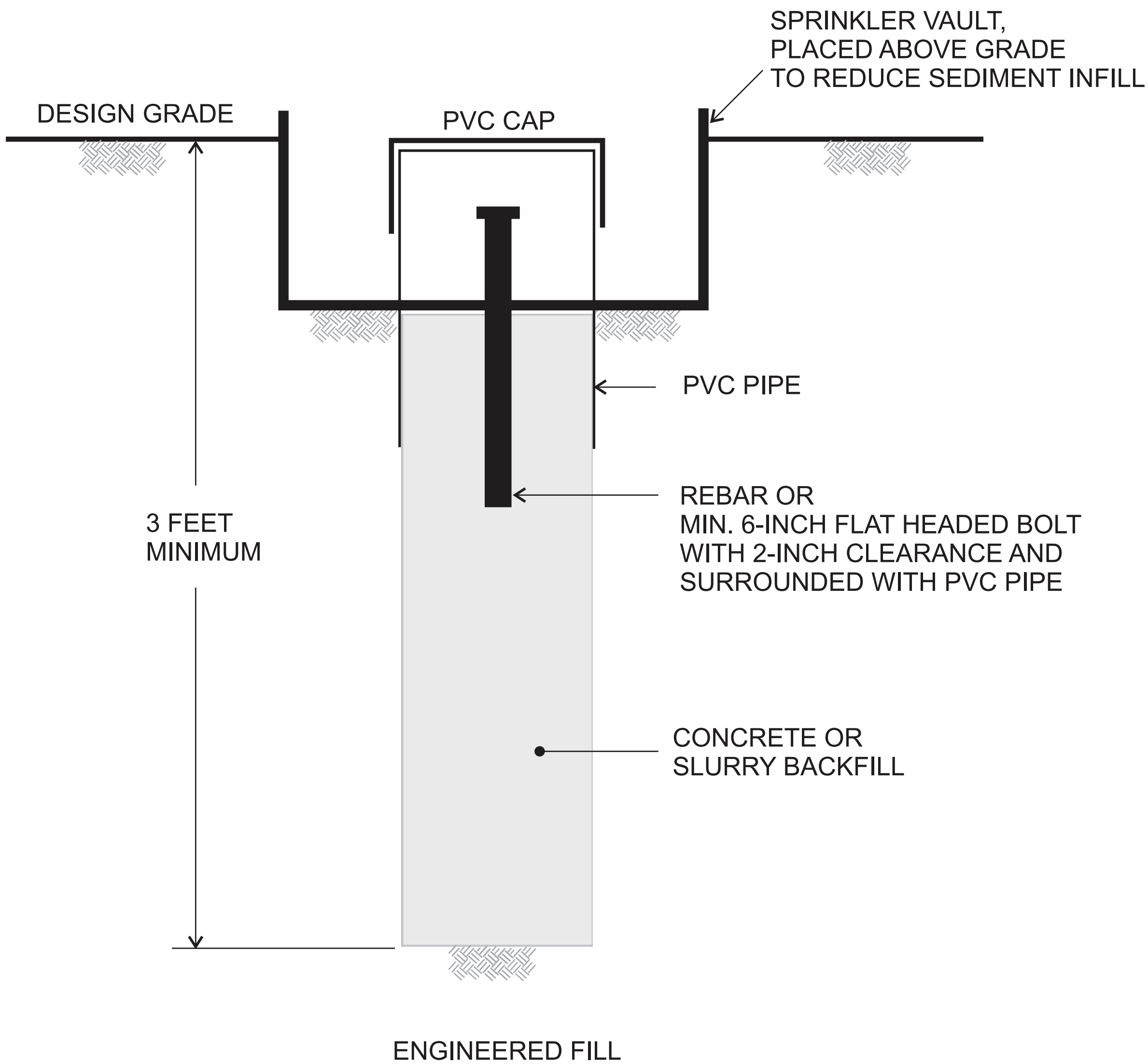
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	SETTLEMENT PLATE	DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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AGS ADVANCED GEOTECHNICAL SOLUTIONS	SETTLEMENT MONUMENT	DETAIL 12

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 92338, PLANNED DEVELOPMENT PERMIT NO. 92339, EASEMENT VACATION NO. 92340, AND TENTATIVE MAP NO. ________

ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

TOPOGRAPHY:

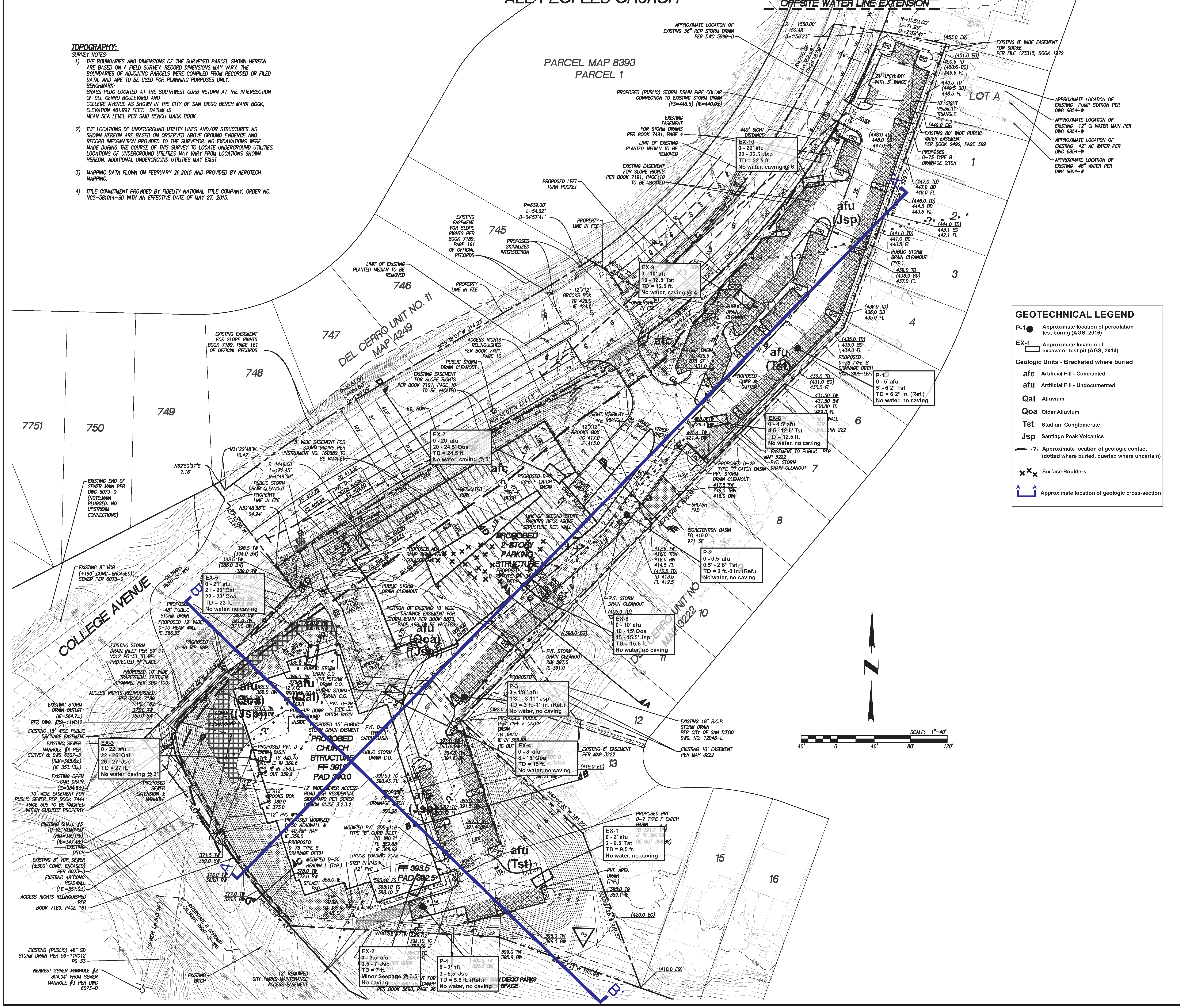
SURVEY NOTES:

1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.

2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.

3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.

4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



GEOTECHNICAL LEGEND

P-1 ● Approximate location of percolation test boring (AGS, 2016)

EX-1 Approximate location of excavator test pit (AGS, 2014)

Geologic Units - Bracketed where buried

afc	Artificial Fill - Compacted
afu	Artificial Fill - Undocumented
Qal	Alluvium
Qoa	Older Alluvium
Tst	Stadium Conglomerate
Jsp	Santiago Peak Volcanics

Approximate location of geologic contact (dotted where buried, queried where uncertain)

Surface Boulders

A A' Approximate location of geologic cross-section

LEGEND

BOUNDARY LINE
ADJACENT PROPERTY LINE
EASEMENT LINE
RIGHT OF WAY
EXISTING STREET CENTERLINE
EXISTING IMPROVEMENTS
EXISTING CONTOUR
EXISTING CURB & GUTTER
EXISTING SEWER MAIN
EXISTING STORM DRAIN MAIN
EXISTING CURB INLET
EXISTING WATER MAIN
EXISTING WATER VALVE
EXISTING FIRE HYDRANT
EXISTING STREET LIGHT
EXISTING STRUCTURE
EXISTING VEGETATION
PROPOSED IMPROVEMENTS
PROPOSED ROAD CENTERLINE
LIMIT OF WORK LINE
CURB AND GUTTER
24' RESIDENTIAL DRIVEWAY
PROPOSED CONTOURS
PROPOSED SPOT ELEVATION
RETAINING WALL
SDRSD D-75 BROW DITCH
BIORETENTION BASIN
STORM DRAIN HEADWALL
STORM DRAIN CLEANOUT
AREA DRAIN
STORM DRAIN INLET
TYPE F CATCH BASIN
RIP RAP ENERGY DISSIPATOR PER SDD-104
PVC STORM DRAIN (SIZE VARIES)
WATER SERVICE
TRAFFIC SIGNAL
PARKING GARAGE WALL
CUT/FILL SLOPE
PERMEABLE PAVERS
PROPOSED RIP-RAP
TREE PER LANDSCAPE PLANS

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2020 DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY GRADING PLAN

SHEET NUMBER: C 2.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020 11.
2. 12.

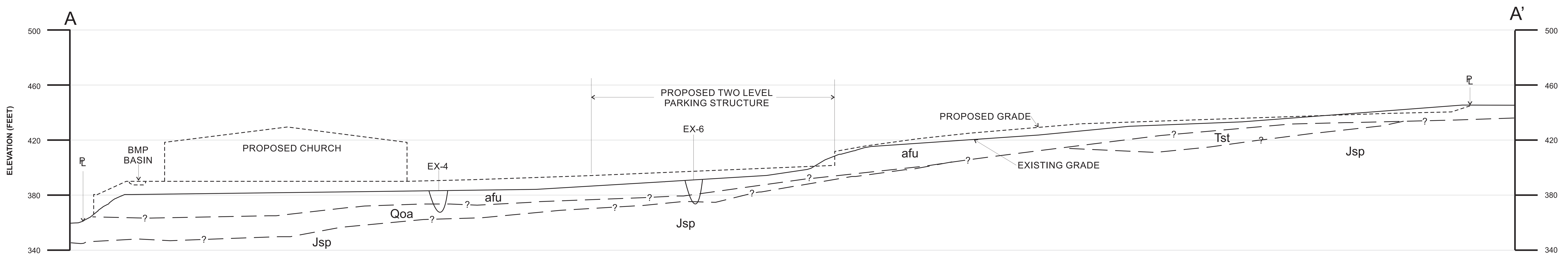
PLATE 1
Geologic Map and Exploration Location Plan

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-3	Oct. 2020

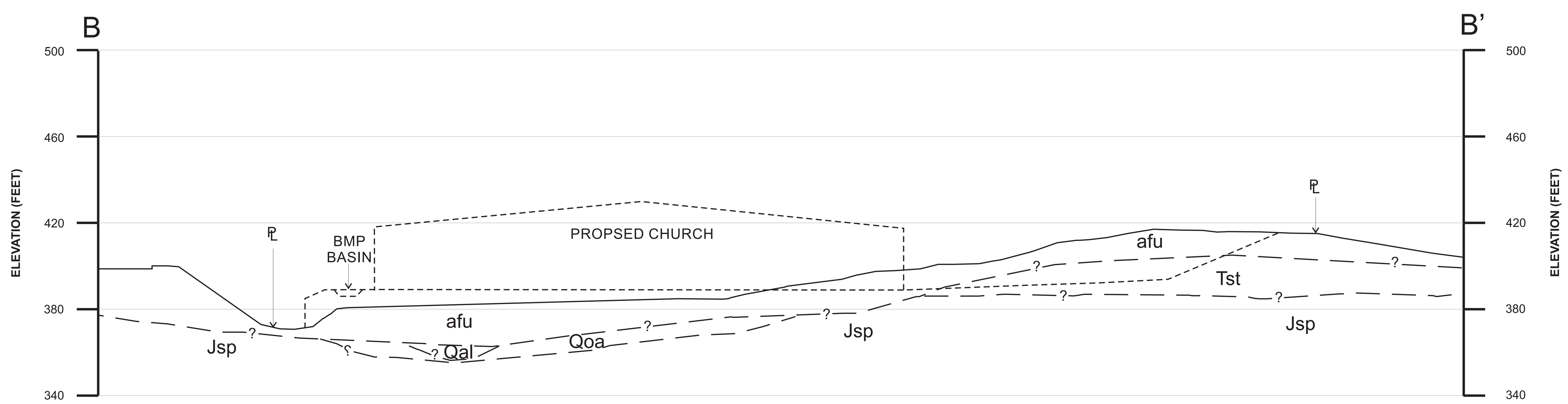
3-17-2020

PLSA 2936



CROSS-SECTION A-A'

SCALE 1"=40.0' H&V



CROSS-SECTION B-B'

SCALE 1"=40.0' H&V

PLATE 2

Geologic Cross-Sections A-A' & B-B'

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-3	Oct. 2020

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