Initial Study/Mitigated Negative Declaration

Kindred Church Expansion Project

Development Project Number: DEV2020-00016

Appendix F – Preliminary Water Quality Management Plan

Prepared for

Planning Services Division
City of Anaheim
200 South Anaheim Boulevard
Anaheim, California 92805

Prepared by

Psomas
5 Hutton Centre Drive, Suite 300
Santa Ana, California 92707-8794

March 2022

OTH 2020-01264

PRELIMINARY

CITY OF ANAHEIM
Priority Project
Water Quality Management Plan (WQMP)

Project Name:

KINDRED CHURCH MASTER PLAN

8712-8720 E. SANTA ANA CANYON ROAD

APN 354-321-01 & 354-321-03

Prepared for:

KINDRED OUTREACH MINISTRIES, INC.

8712 E. Santa Ana Canyon Road

Anaheim, CA 92808

(714) 282-9941

Prepared by:

Anacal Engineering Co.

1211 N. Tustin Avenue

Anaheim, CA 92807

(714) 774-1763 – dave@anacalengineering.com

Original Prepared date: February 24, 2020

Revision Date(s): 1) April 28th, 2021

2)September 20th, 2021

3)November 15, 2021

4)December 16, 2021

Project Owner's Certification			
Planning Application No. (If applicable)	OTH 2020-01264	Grading Permit No.	
Tract/Parcel Map and Lot(s) No.		Building Permit No.	
Address of Project Site: 8712 – 8720 E. Santa Ana Canyon, Anaheim APN 354-321-01 & 354-321-03			

This Water Quality Management Plan (WQMP) has been prepared for Kindred Church Outreach ministries, Inc., by Anacal Engineering Co. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title			
Company	Kindred Church Outreach Ministries, Inc.		
Address	8712 E. Santa Ana Canyon, Anaheim, CA 92808		
Email			
Telephone #	(714) 282-9941		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature		Date	

Preparer (Engineer): David C. Queyrel			
Title	Civil Engineer	PE Registration #	42812
Company	Anacal Engineering Co.		
Address	1211 N. Tustin Avenue, Anaheim, CA 92807		
Email	dave@anacalengineering.com		
Telephone #	(714) 774-1763		

I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.

Preparer Signature		Date	12-16-21
Place Stamp Here	REGISTERED PROFESSIONAL ENGINEER DAVID C. QUEYREL No. 42812 Exp. 03/31/22 CIVIL STATE OF CALIFORNIA		

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Attachments

Section I Permit(s) and Water Quality Conditions of Approval or Issuance

Provide discretionary or grading/building permit information and water quality conditions of approval, or permit issuance, applied to the project. If conditions are unknown, please request applicable conditions from staff. *Refer to Section 2.1 in the Technical Guidance Document (TGD) available on the OC Planning website (ocplanning.net).*

Project Infomation			
Permit/Application No. (If applicable)	OTH 2020-01264	Grading or Building Permit No. (If applicable)	
Address of Project Site (or Tract Map and Lot Number if no address) and APN	8712 – 8720 E. Santa Ana Canyon Road, Anaheim, CA APN 354-321-01 & 354-321-03		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)			
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	There is an existing WQMP on the project from the previous Sanctuary construction done in 2004 under OTH 2004-00165		

Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	Santa Ana River Watershed No WIHMPs established TMDLS established for Santa Ana River Reach 2 Indicator Bacteria 2021

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

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

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

Description of Proposed Project				
Development Category (From Model WQMP, Table 7.11-2; or -3):	Commercial Development / Parking Lot			
Project Area (ft^2): 259,549	Number of Dwelling Units: 3		SIC Code: 8661	
Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	130,024	50.1%	129,525	49.9%
Post-Project Conditions	87,445	33.7%	172,104	66.3%
Drainage Patterns/Connections	The majority of the site drains to existing grate inlets that are connected to an existing city storm drain constructed for Tract 12990 which traverses the site. Flow is Northerly to the Santa Ana River. Off-site flows are directed to two culvert crossings also connected to drainage facilities connected to the Santa Ana River.			

Narrative Project Description:	The project consists of the development of 2 existing parcels to be merged into a redeveloped master plan for an expansion of the existing sanctuary and parking lots additionally there are non-permanent canopy structures along with new and relocated classrooms. Proposed is the relocation of 3 modular buildings and the addition of 4 modular buildings adding an area of 5,688 s.f onto the existing sanctuary for a total new building area of approximately 11,448 s.f. The proposed parking lot areas include the replacement of the water feature with a new parking lot in the campus center, the realignment and reduction of the southeast parking area for new modular buildings and a fabric building, and the addition of new planters in the existing lot north of the water feature. Total new or replaced parking and drive area is approximately 42,579 s.f. Total new or replaced hardscape area is approximately 45,838 s.f. New landscape areas are provided within parking lots, sanctuary area and slopes totalling 22,651 s.f. Total disturbed area consisting of construction/replacing of new impermeable and permeable area equates to a total area of 2.81 ac. We plan to capture the areas that drain towards the respective DMA's which include capturing of the areas surrounding the disturbed areas, as a sort of run-on. This is why the plans show more treatment and capture than the disturbed area of 2.81ac. We are to capture the required DCV from the 85th percentile, 24-hr storm which is to equal 12,507 ft^3, approximately treating 259,549 sf or 5.96 AC. This is done using 6 DMA's as shown on the WQMP site plan. We plan to capture the volume using a new storm drain system that is to reliably drain the site towards a proposed underground infiltration area located north of the site. Prior to capture, pre-treatment will be provided using filterra units by Contech to filter at least 50% of the required flow per City of Anaheim requirements prior to entering the storm drain system. This filter is designed for full capture of sediment, debris and hydrocarbons. Flowrate calculations can be found in Attachment A. In the event of overflow, water is to be rerouted and tied to the existing main stormdrain system. The trash enclosures are proposed in the rear of the facility and are to be walled with rain tight lids. Existing and proposed slopes are to be planted and irrigated to prevent erosion. Food preparation and dining shall be done in roofed structures.

II.2 Potential Stormwater Pollutants

Determine and list expected stormwater pollutants based on land uses and site activities. *Refer to Section 2.2.2 and Table 2.1 in the Technical Guidance Document (TGD) for guidance.*

Pollutants of Concern			
Pollutant	Check One for each: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E X	N ☐	
Nutrients	E X	N ☐	
Heavy Metals	E X	N ☐	
Pathogens (Bacteria/Virus)	E X	N ☐	Bacteria is a pollutant of concern for Santa Ana River
Pesticides	E X	N ☐	
Oil and Grease	E X	N ☐	
Toxic Organic Compounds	E X	N ☐	
Trash and Debris	E X	N ☐	

II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are potentially susceptible to hydromodification impacts. *Refer to Section 2.2.3.1 in the Technical Guidance Document (TGD) for North Orange County or Section 2.2.3.2 for South Orange County.*

☐ No – Show map

☒ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the Technical Guidance Document (TGD).*

Runoff from each DMA area; G, 3I, IF and 2F along with the adjacent run-on is calculated using TR20 software for the pre-construction and post-construction conditions. The results are indicated in the table below.

Area 2F is considered 0 for a more conservative approach. We plan to capture that area completely, since this almost all pervious space will become an impervious parking lot.

Area 4G is not considered as it is an existing parking lot with construction limited to the addition of permeable planters.

Area 3G is not considered as it is all existing area with no development to take place.

The disturbed area of the site is 2.81 AC and the capture area for the 2-year 24hr storms is 5.1 AC of the 14.8 AC site

Designation	Area	Pre-const. runoff TR20	Post-const. runoff TR20	Pre-Const. T_C min.	Post-Const. T_C	Pre-Const V (cf)	Post-Const V (cf)
1G	2.43 AC	0.423 in.	0.708 in.	6.0	6.0	3,731	6,245
3I	0.90 AC	0.103 in.	0.334 in.	6.0	6.0	337	1,212
1F	0.80 AC	0.092 in.	0.29 in.	6.0	6.0	267	842
2F	1.3 AC	0	1.078 in.	0	13.4	0	2,856
						4,335	11,155

Δ Q2 = 11,155 cf – 4,335 cf = 6,820 cf
BMP capture volume = 12,871 cf

II.4 Post Development Drainage Characteristics

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

Drainage from the proposed project area drains to an existing city-maintained storm drain constructed for Tract 12990 Plan SP-1949.

The proposed development has been broken into 6 DMAs based on their connection to the existing public storm drain. DMA 5 consists of various existing and proposed re-development and new construction that consists mainly of new building and sidewalk hardscape. The existing parking lot is slightly disturbed by replace planters for the reconstruction. The area is collected in existing and proposed grate inlets and to existing storm drains that connect to the public storm drain at a location approximately 300 ft. south of the crossing at Santa Ana Canyon Road.

DMA-1 consists of new developed hardscape that is to be built on the existing water feature. This new hardscape will server as a new parking lot with planters. The drainage from the parking lot will flow north towards a filterra unit then to the proposed catch basin.

DMA-3 and DMA-2 consists of the 2 relocated modular along with a new hardscape that replaces existing hardscape. Run-off is to drain to grate inlets routed towards the proposed storm drain system. DMA-3 drainage is to tie into DMA -4 storm drain system while DMA-2 is designed to outlet onto DMA-1 where it will be collected and treated in the same Filterra unit prior to entering the drainage system.

DMA-3 & DMA-4 run-off is collected through an inlet that is located near the edge of the proposed landscape and tied to the existing storm drain line. This line captures the drainage coming in from DMA 3, 4, 5, and 6.

All DMA's draining to the catch basins will have FloGard filters and are designed to capture 100% trash & debris. See WQMP Site Plan for locations of catch basins & Filters.

All drainage converges through the main storm drain line and are routed via junction boxes and ultimately to the proposed infiltration chambers.

Total proposed redevelopment is 122,516 sf.
Total mitigated area is 259,549 sf.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the Technical Guidance Document*

The property is owned and maintained by:

Kindred Outreach Ministries, Inc.
8712 E. Santa Ana Canyon Road
Anaheim, CA 92808
(714) 282-9941

Section III Site Description

III.1 Physical Setting

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

Name of Planned Community/Planning Area (if applicable)	Anaheim Hills
Location/Address	8712 E. Santa Ana Canyon Road
	Anaheim
General Plan Land Use Designation	Sycamore Canyon Specific Plan
Zoning	T – Transitional Zone
Acreage of Project Site	14.8 AC total, area of new development/disturbed = 2.81 AC
Predominant Soil Type	Quaternary Alluvial Deposits, HGS C Soils, according to TGD.

III.2 Site Characteristics

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

Site Characteristics	
Precipitation Zone	0.90"
Topography	Site is a previously graded terraced areas partially developed

Drainage Patterns/Connections	The majority of the site drains to existing grate inlets that are connected to an existing city storm drain constructed for Tract 12990 which traverses the site. Flow is Northerly to the Santa Ana River. Off-site flows are directed to two culvert crossings also connected to drainage facilities connected to the Santa Ana River.
Soil Type, Geology, and Infiltration Properties	Soil report TGR Geotechnical # 15-5382 dated August 10, 2016. Report indicates as having infiltration rates of 2.8in/hr.
Hydrogeologic (Groundwater) Conditions	Ground water was found at 18.5′ in borings mapped to be at approx. 20′. No contamination site within 250′. A water well is located at the Northeast and Northwest corners of property and used for irrigation water. See WQMP site plan for well locations. Infiltration shall be 100′ from well site.
Geotechnical Conditions (relevant to infiltration)	None determined
Off-Site Drainage	Off-site drainage is captured in existing drainage courses and gutters and conveyed to downstream facilities which consist of (3) 60″ storm drains crossing the 91 freeway to the Santa Ana River. Only adjacent run-on to DMA areas are considered in BMP design. All other areas are routed away from the proposed DMAs per the existing conditions.
Utility and Infrastructure Information	Site is served currently by water and electricity available through public easements. Sewer is septic.

III.3 Watershed Description

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.3 in the Technical Guidance Document (TGD).*

Receiving Waters	Drains to Santa Ana River
303(d) Listed Impairments	Indicator Bacteria
Applicable TMDLs	Indicator Bacteria 2020
Pollutants of Concern for the Project	Bacteria

Environmentally Sensitive and Special Biological Significant Areas	N/A to City of Anaheim

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

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

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

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

Project Performance Criteria	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Subject to Hydromodification. Provide for capture of Δ 2 year storm. Delta Q2=6,820 c.f. See attachment A for calculations
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Priority project: Priority project must infiltrate, harvest and use, evapotranspire or biotreat/biofilter the 85th percentile, 24-hour storm event (design capture volume). √ol. Req = 0.9" – d (HSC) x c x area (ac) x 43, 560 sf/ac x 1"/12"ft = (C.F.) Where: d (HSC) – Source control depth c – Runoff co-efficient
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Priority project: Priority project must infiltrate, harvest and use, evapotranspire or biotreat/biofilter the 85th percentile, 24-hour storm event (design capture volume)
Calculate LID design storm capture volume for Project.	DCV (Design capture volume) for the project is 12,507 C.F. Find LID DCV calcs in **attachment A**

IV.2. Site Design and Drainage

Describe site design and drainage including

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

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

Site runoff is directed away from proposed buildings and to permeable areas where practical. Portions of roof and rear yard areas drain to private storm drain system via proposed swales and storm drain inlets located in DMA 3, 4 & 5. We plan capture DMA 3, DMA 4, and DMA 5 which includes new hardscapes, new/relocated modular, the building expansion, and reconstruction of planters. DMA-5 contains very minimal disturbance, which includes landscape, roof and sidewalk area along with some reconstruction of planters, but no hardscape work in the parking lot. Since this area includes roadways and per the city/s requirements, we will capture DMA-5 and effectively treat 50% of the design flow prior to entering the drainage system. As for DMA-3 and DMA-4, no pretreatment is required since all runoff is roof, landscape and sidewalk areas. As such, the areas are to be tied directly into the storm drain system and head towards the infiltration chambers.

DMA-1 involves the development of a new parking lot replacing the previous water feature. DMA 2 involves some reconstruction of the planters and the construction of additional parking area where the modular were previously placed. DMA-2 is to be captured through catch basins and will spill onto DMA-1. From there, the run-off accumulated by both DMA-s will enter a filterra device to undergo the 50% treatment requirement. After pretreatment the runoff is to tie into the existing storm drain which routes downstream to a junction structure and then to the proposed underground infiltration system located at the base of the site.

The existing parking lot located north of the water feature is only to receive new striping and reconstructed planters. We are not planning on capturing this area of our site since very minimal disturbance will take place here. We are capturing DMA-6 where no new construction is to take place and treating this area as well as other undisturbed areas to offset not capturing the existing parking lot and drive areas. Total disturbed area=2,680sf whereas the captured area in DMA-6 is 26,573s.f.

Our overall capture areas of DMA-1 through DMA-6 equate to almost double our disturbed area. This capture will mitigate the effects of HCOC as well as our DCV which is found to be greater than the 24-hr storm, thus making it design option.

**Per the city of Anaheim WQMP template, we are capturing and infiltrating the DCV which was calculated using the areas tributary to the BMP. For treatment, we are using filterra units to bio-treat the runoff to a minimum of 50% the required flow with bypass capabilities to mitigate 100% of the DCV.*
Any overflow will exit through the underground chambers and tie back into the main storm drain line. See the WQMP Site plan for further clarification.
****Full Trash Capture BMPs will be installed in each catch basin****

Area	HSC Type	BMP	DCV cf	Capture Volume	GPS Coords.
DMA-1	None	INF-7 underground chambers	2,425		33.864242° 117.723238°
DMA-2	None	INF-7 underground chambers	1,614		33.86366° 117.72359°
DMA-3	None	INF-7 underground chambers	732		33.86528° 117.72278°
DMA-4	None	INF-7 underground chambers	1,967		33.86353° 117.72301°
DMA-5	None	INF-7 underground chambers	5,391		33.86412° 117.72189°
DMA-6	None	INF-7 underground chambers	378		33.86441° 117.72260°
Overall:			12,507	12,626	

IV.3 LID BMP Selection and Project Conformance Analysis

Each sub-section below documents that the proposed design features conform to the applicable project performance criteria via check boxes, tables, calculations, narratives, and/or references to worksheets. *Refer to Section 2.4.2.3 in the Technical Guidance Document (TGD) for selecting LID BMPs and Section 2.4.3 in the Technical Guidance Document (TGD) for conducting conformance analysis with project performance criteria.*

IV.3.1 Hydrologic Source Controls (HSCs)

If required HSCs are included, fill out applicable check box forms. If the retention criteria are otherwise met with other LID BMPs, include a statement indicating HSCs not required.

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☐
Street trees (canopy interception)	☐
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐
Other: HSCs not used	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

HSCs not required, LID DCV is reliably retained in underground infiltration chambers.

IV.3.2 Infiltration BMPs

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

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

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

DMA-1 | Area=1.28 AC, Imp = 57%, DCV = 2,425 cf

DMA-2 | Area=0.76 AC, Imp = 67%, DCV = 1,614 cf

DMA-3 | Area=0.38 AC, Imp = 58%, DCV = 732 cf

DMA-4 | Area=0.86 AC, Imp = 73%, DCV = 1,967 cf

DMA-5 | Area=2.06 AC, Imp = 87%, DCV = 5,391 cf

DMA-6 | Area=0.61 AC, Imp = 5% , DCV = 378 cf

Overall DCV=12,507 cf

Underground Infiltration Storage=12,626 cf

See attachment A for Bmp calculations

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, describe any evapotranspiration and/or rainwater harvesting BMPs included.

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

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

IV.3.4 Biotreatment BMPs

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

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

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

Not applicable

IV.3.5 Hydromodification Control BMPs

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

Hydromodification Control BMPs	
BMP Name	**BMP Description**
INF-7 underground Chambers	Provide Contech underground chamber system for req. 6,820 cf V prov. 12,626 cf

IV.3.6 Regional/Sub-Regional LID BMPs

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

Regional/Sub-Regional LID BMPs
Not applicable

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs. Describe treatment control BMPs including sections for selection, sizing, and infeasibility, as applicable.

Treatment Control BMPs	
BMP Name	**BMP Description**
Contech's Filterra Bio-filtration	Units are to be installed in their respective DMAs prior to entering the private storm drain system. They are to treat 50% of the design flow. Used Capture Efficiency Method, worksheet D for treatment flow.

IV.3.8 Non-structural Source Control BMPs

Fill out non-structural source control check box forms or provide a brief narrative explaining if non-structural source controls were not used.

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No CCRs
N6	Local Industrial Permit Compliance	☐	☒	No use requiring
N7	Spill Contingency Plan	☐	☒	No hazardous waste storage
N8	Underground Storage Tank Compliance	☐	☒	None
N9	Hazardous Materials Disclosure Compliance	☐	☒	None
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	None
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	None

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if structural source controls were not used.

Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	None allowed
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☒	☐	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Not in San Diego Region
S6	Dock areas	☐	☒	None
S7	Maintenance bays	☐	☒	None
S8	Vehicle wash areas	☐	☒	None
S9	Outdoor processing areas	☐	☒	None
S10	Equipment wash areas	☐	☒	None
S11	Fueling areas	☐	☒	None
S12	Hillside landscaping	☒	☐	
S13	Wash water control for food preparation areas	☒	☐	
S14	Community car wash racks	☐	☒	None

IV.4 Alternative Compliance Plan (If Applicable)

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the WQMP.* Not applicable

IV.4.1 Water Quality Credits

Determine if water quality credits are applicable for the project. *Refer to Section 3.1 of the Model WQMP for description of credits and Appendix VI of the Technical Guidance Document (TGD) for calculation methods for applying water quality credits.*

Description of Proposed Project				
Project Types that Qualify for Water Quality Credits (Select all that apply):				
☐Redevelopment projects that reduce the overall impervious footprint of the project site.	☐Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).		
☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).		☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned		☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).
☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐ Developments in a city center area.	☐ Developments in historic districts or historic preservation areas.	☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.

Calculation of Water Quality Credits (if applicable)	Not applicable

IV.4.2 Alternative Compliance Plan Information

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the Model WQMP.*

Not applicable

Section V Inspection/Maintenance Responsibility for BMPs

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

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
N1 - Education for Property Owners, Tenants and Occupants	Owner	Provide literature and instruction pertaining to environmental awareness included in Section VII Educational Material to all employees and residences.	Once yearly and for new employees
N2 - Activity Restrictions	Owner	See Attachment D for restrictions. Report any violations relating to activity restrictions listed herein.	Continuous
N3 - Common Area Landscape management	Owner	Hire contractor familiar with Orange County guidelines for use of fertilizers and pesticides. Maintain all landscape equipment improper working order.	Monthly
N4 - BMP Maintenance	Owner	See Attachment D for maintenance required.	Continuous
N11 - Common Area Litter Control	Owner	Inspect parking and trash areas, clean and dispose of all litter. Report any violations to the owner.	Weekly

N12 - Employee Training	Owner	Educate all employees on environmental awareness. Instruct on proper use of chemicals and cleanup procedures.	Once yearly prior to storm season
N14 - Common Area Catch Basin Inspection	Owner	Inspect catch basin, clean debris; replace filters as required by manufacturer's specifications. Repaint "No dumping-drains to ocean" with faces 40%.	Bi-monthly from April 15 – October 15; Monthly from October 15 – April 15
N15 - Street Sweeping Private Streets and Parking Lots	Owner	Sweep parking and drive areas. No hosing down of areas is allowed. Dispose of debris offsite.	Once every two months from October 15 – April 15
Irrigation	Owner	Inspect for siltation or debris washing out of planters. Sweep silt to planters and check amount of irrigation used and for properly functioning irrigation. Check irrigation system for leaks and over spray, provide maintenance as required.	Monthly
Landscape	Owner	Check for landscape to be in healthy conditions. Replace dead or barren areas with plants consistent with the approved landscape plans.	Monthly
Trash Container Area	Owner	Inspect for spills and trash. Wipe clean spills and dispose of trash.	Bi-weekly
Catch Basin Inserts	Owner	Inspect catch basin, clean debris. Replace filters as required by manufacturer's recommendations.	Once prior to rainy season October 15 and after significant rain event

Contech's Filterra Bio-filtration	Owner	Activation and first year maintenance is included. After the first year of maintenance, maintenance responsibly falls on the owner. This included inspecting the surrounding area and removing any trash or debris. Add mulch to a depth of 3". Replace Filterra grates if applicable. See manufactures recommendations on Owners Manuel for more details in Section VII.	Maintenance performed once per year before the rainy season on Oct.15th. See Owners Manuel for more information.
Underground chambers	Owner	Inspect for standing water 48 hours after rain storm. Vacuum sediment when reaches 1/3 capacity.	Once prior to rainy season – October 15 and after significant rainfall.

Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan)

Include a BMP Exhibit (Site Plan), at a size no less than 24" by 36," which includes the following minimum information:

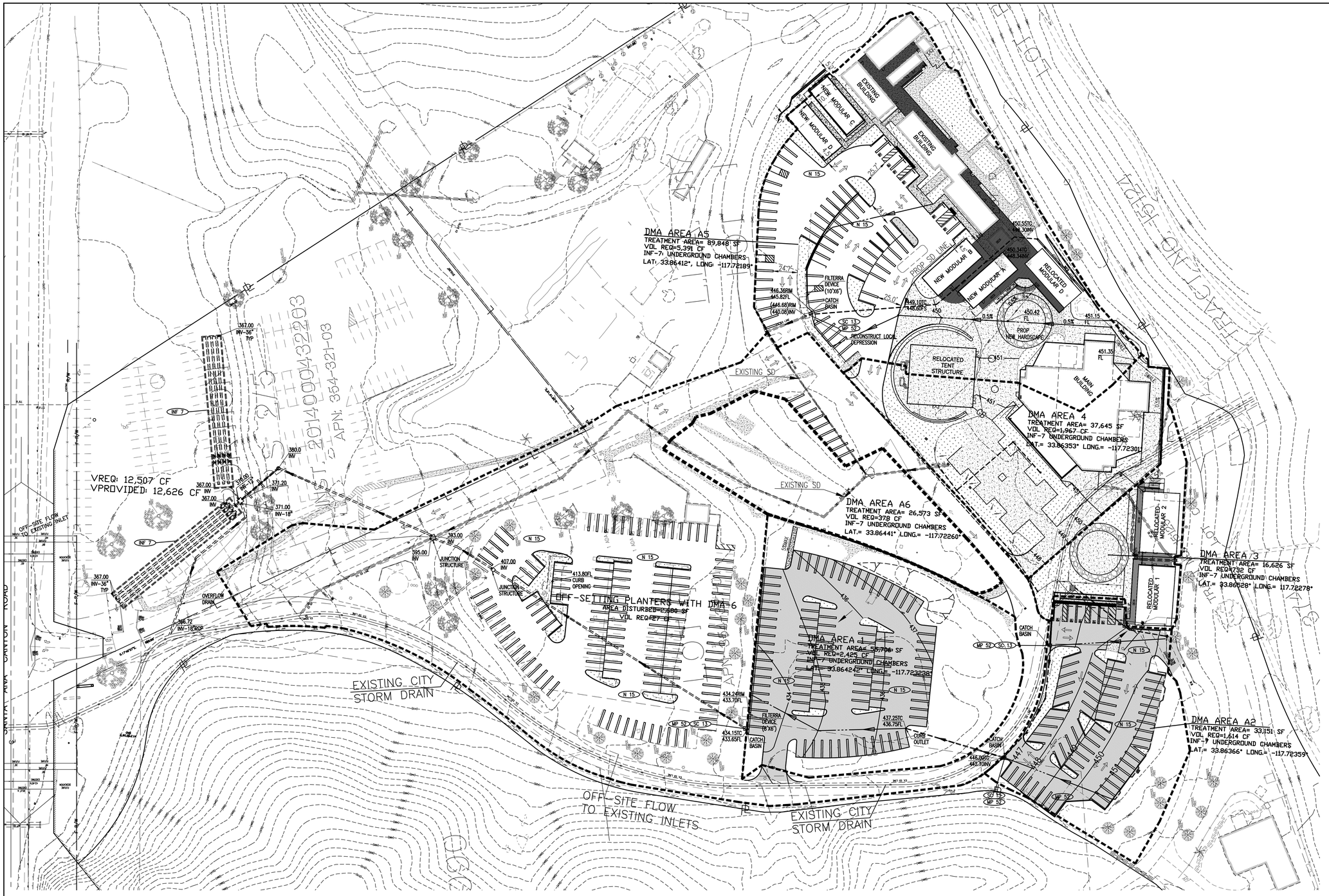
- Insert in the title block (lower right hand corner) of BMP Exhibit: the WQMP Number (assigned by staff) and the grading/building or Planning Application permit numbers
- Project location (address, tract/lot number(s), etc.)
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Delineate the area being treated by each structural BMP
- GIS coordinates for LID and Treatment Control BMPs
- Drainage connections
- BMP details
- Preparer name and stamp

Please do not include any areas outside of the project area or any information not related to drainage or water quality. The approved BMP Exhibit (Site Plan) shall be submitted as a plan sheet on all grading and building plan sets submitted for plan check review and approval. The BMP Exhibit shall be at the same size as the rest of the plan sheets in the submittal and shall have an approval stamp and signature prior to plan check submittal.

VI.2 Submittal and Recordation of Water Quality Management Plan

Following approval of the Final Project-Specific WQMP, three copies of the approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be submitted. In addition, these documents shall be submitted in a PDF format.

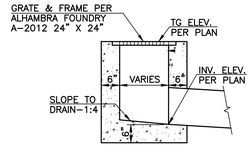
Each approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be recorded in the Orange County Clerk-Recorder's Office, prior to close-out of grading and/or building permit. Educational Materials are not required to be included.



GRAPHIC SCALE

40 30 20 10 0 20 40 80 120

(IN FEET)



CATCH BASIN DETAIL

NO SCALE

LEGEND

- FLOW IN STORM DRIAN
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- DRAINAGE BOUNDARY
- FLOW LINE
- PROPOSED GRAVEL
- PROPOSED LANDSCAPE AREA
- PROPOSED ASPHALT
- PROPOSED CONCRETE
- EXISTING CONCRETE

BMP'S

- N 15 — STREET SWEEPING PARKING LOT
- INF 7 — UNDERGROUND INFILTRATION
- N 14 — CATCH BASIN MAINTENANCE
- MP 52 — CATCH BASIN INSERT (FLOGARD FGP-24F)
- SC 13 — STORM DRAIN SIGNAGE

REVISIONS					
NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:

CITY OF ANAHEIM B.M. NO. 4A-129

BRASS CAP MARKED CITY OF ANAHEIM BM, IN THE TOP OF CURB AT THE NE BCR. SANTA ANA CANYON ROAD AND MOHLER DR.

ELEVATION 324.14 FT. (NAVD88)

PREPARED BY:
ANACAL ENGINEERING COMPANY
CIVIL ENGINEERING & LAND SURVEYING
1211 N TUSTIN AVENUE ~ ANAHEIM, CA. 92807
PHONE (714) 774-1763 ~ FAX (714) 774-4690
EMAIL ADDRESS: anacal@anacalengineering.com
WEBSITE: anacalengineering.com

JOB NO. 19-155GP-R5-WQMP DATE: 12/16/21

PWQMP SITE PLAN

SITE ADDRESS:CONCEPTUAL MASTER GRADING PLAN
KINDRED COMMUNITY CHURCH
8720 E. SANTA ANA CANYON ROAD

GRA -

SHEET 1 OF 1

SCALE: 1" = 40' | DRAWN BY: J. M. | CHECKED BY: DCQ

CITY OF ANAHEIM

D -

Section VII Educational Materials

Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Please only attach the educational materials specifically applicable to this project. Other materials specific to the project may be included as well and must be attached.

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐	Filterra Owners Manuel	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☒		☐
Responsible Pest Control	☐		☐
Sewer Spill			☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance			☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

Filterra Owner's Manual

filterra®

Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

This Owner's Manual applies to all precast Filterra Configurations, including Filterra Bioscape Vault.

filterra®
Bioretention Systems

Table of Contents

CONTECH®
ENGINEERED SOLUTIONS

Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system's biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

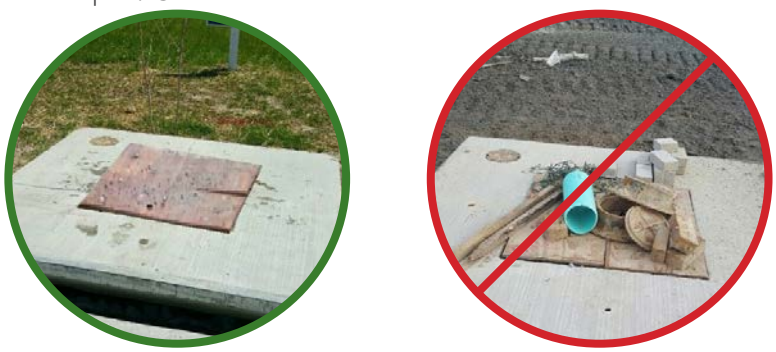
- Removal of construction runoff protection devices
- Planting of the system's vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.

Minimum Requirements

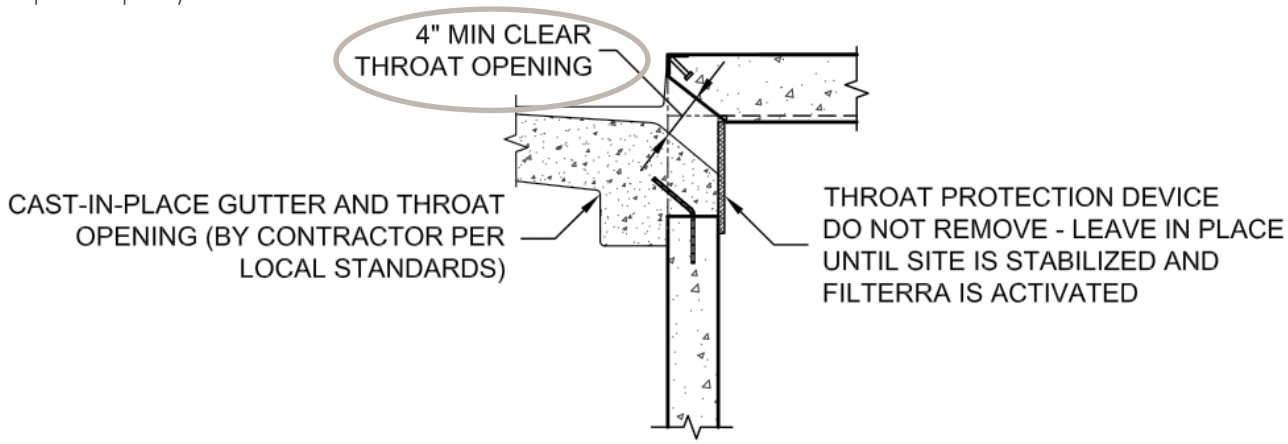
The minimum requirements for Filterra Activation are as follows:

1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.

3. Where curb inlets are included as part of the Filterra system, Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

Filterra Plant Selection Overview

A Plant List is available on the Contech website highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The "Planting Requirements for Filterra Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are typically scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the maintenance provider of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.

Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate (where applicable) and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates, where applicable (up to 170 lbs each). If tree grate opening expansion is necessary, safety glasses/goggles and a 3lb or greater mini sledgehammer are required. Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Media Bay Length	Media Bay Width	Filter Surface Area (ft^2)	Volume at 3" (ft^3)	# of 2 ft^3 Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

Other sizes not listed - 1 bag per 8 ft^2 of media.

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate (if applicable)	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate (if applicable) and erosion control stones

- Remove cast iron grates for access into Filterra box (if applicable).
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
Buckets Removed	_____

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____

4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates (if applicable) correctly using appropriate lifting or moving tools, taking care not to damage the plant.
- Where applicable, if 6" tree grate opening is too close to plant trunk, the grate opening may be expanded to 12" using a mini sledgehammer. Refer to instructions in Appendix 3.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above top of Filterra Unit	_____ (ft)
Width at Widest Point	_____ (ft)
Health	healthy | unhealthy
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

Filterra Inspection & Maintenance Log

Filterra System Size/Model:_____**Location:** _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Top of Vault	Vegetation Species	Issues with System	Comments
1/1/17	*5 – 5 gal Buckets*	*3"*	*Lowe's Premium Brown Mulch*	*4'*	*Galaxy Magnolia*	*- Standing water in downstream structure*	*- Removed blockage in downstream structure*

Appendix 1 – Filterra® Activation Checklist

Project Name:______________________________ Company:______________________________

Site Contact Name: ______________________________ Site Contact Phone/Email: ____________________

Site Owner/End User Name:____________________ Site Owner/End User Phone/Email: ____________________

Preferred Activation Date: ______________________________ (provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	

Attach additional sheets as necessary.

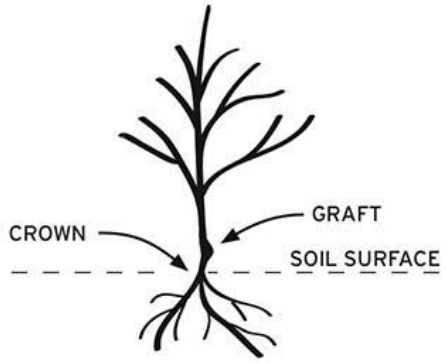
NOTE: A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

______________________________ ____________________

Signature Date

Appendix 2 – Planting Requirements for Filterra® Systems

Plant Material Selection



- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21" media depth, a 7 – 15 gallon container size shall be used. Media less than 21" (Filterra boxes only) may require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some with a tree grate of the faster growing species, or species known to produce basal sprouts.

Plant Installation

- During transport protect the plant foliage from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

Mulch Installation

- Only mulch that meets Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the top/tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.

Appendix 3 – Filterra® Tree Grate Opening Expansion Procedure

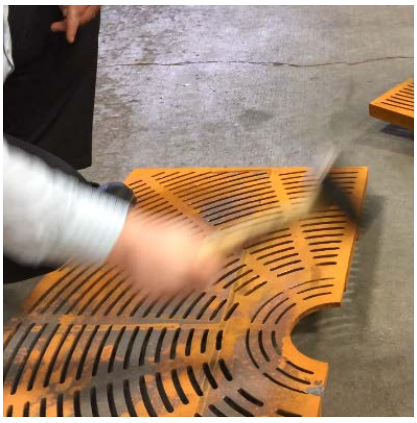
The standard grates used on all Filterra configurations that employ Tree Grates are fabricated with a 6″ opening that is designed with a breakaway section that can be removed, allowing the grate opening to be expanded to 12″ as the tree matures and the trunk widens.

The following tools are required to expand the opening:

- Mini sledgehammer (3 lb. or greater)
- Safety Glasses / Goggles

The following guidelines should be followed to properly expand the tree opening from 6″ to 12″:

1. Remove the grate from the Filterra frame, place it flat on a hard surface, and support the grate by stepping on the edge or using other weighted items such as a few mulch bags if this is being done during a Filterra maintenance event. Put on safety glasses/goggles. Align the mini sledgehammer as shown in the figure to the left. The head of the sledgehammer should be aimed just inside the wide cast iron bar between the larger grate section and the breakaway section.



2. Repeatedly hit the grate at this spot with the mini sledgehammer.

3. After several hits, the breakaway section should snap cleanly off of the larger grate section. Reinstall the grate into the Filterra grate frame. Recycle or dispose of the breakaway section per local guidelines.

filterra®
Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

9025 Centre Pointe Drive, Suite 400
West Chester, OH 45069
info@conteches.com | 800-338-1122
www.ContechES.com

PDF 6/21

Attachment A

Kindred Community Church

BMP Calculations & Worksheets

Site: 8712-8720 E. Santa Ana Canyon Rd.

APN: 354-321-01 & 354-321-03

INF-7: Underground Infiltration

Underground infiltration is a vault or chamber with an open bottom that used to store runoff and percolate into the subsurface. A number of vendors offer proprietary infiltration products that allow for similar or enhanced rates of infiltration and subsurface storage while offering durable prefrabricated structures. There are many varieties of proprietary infiltration BMPs that can be used for roads and parking lots, parks and open spaces, single and multi-family residential, or mixed-use and commercial uses.

Also known as:

- *Infiltration vault*
- *Recharge vault*

Underground Infiltration

Source: http://www.contech-cpi.com

Feasibility Screening Considerations

- Infiltration bains shall pass infeasible screening criteria to be considered for use.
- Underground infiltration galleries pose a potential risk of groundwater contamination; pretreatment should be used.

Opportunity Criteria

- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Appropriate for sites with limited surface space.
- Can be placed beneath roads, parking lots, parks, and athletic fields.
- Potential for groundwater contamination can be mitigated through isolation of pollutant sources, pretreatment of inflow, and/or demonstration of adequate treatment capacity of underlying soils.
- Infiltration is into native soil, or depth of engineered fill is ≤ 5 feet from the bottom of the facility to native material and infiltration into fill is approved by a geotechnical professional.
- Tributary area land uses include mixed-use and commercial, sngle-family and multi-family, roads and parking lots, and parks and open spaces. High pollutant land uses should not be tributary to infiltration BMPs.

OC-Specific Design Criteria and Considerations

- ☐ Placement of BMPs should observe geotechnical recommendations with respect to geological hazards (e.g. landslides, liquefaction zones, erosion, etc.) and set-backs (e.g., foundations, utilities, roadways, etc.)
- ☐ Minimum separation to mounded seasonally high groundwater of 10 feet shall be observed.
- ☐ Minimum pretreatment should be provided upstream of the infiltration facility, and water bypassing pretreatment should not be directed to the facility.
- ☐ Underground infiltration should not be used for drainage areas with high sediment production potential unless preceded by full treatment control with a BMP effective for sediment removal.
- ☐ Design infiltration rate should be determined as described in **Appendix VII**.
- ☐ Inspection ports or similar design features shall be provided to verify continued system performance and identify need for major maintenance.

☐ For infiltration facilities beneath roads and parking areas, structural requirements should meet H-20 load requirements.

Computing Underground Infiltration Device Size

Underground infiltration devices vary by design and by proprietary designs. The sizing method selected for use must be based on the BMP type it most strongly resembles.

- For underground infiltration devices with open pore volume (e.g., vaults, crates, pipe sections, etc), sizing will be most similar to infiltration basins.
- For underground infiltration devices with pore space (e.g., aggregate reservoirs), sizing will be most similar to permeable pavement.

Additional References for Design Guidance

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 5: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**

Worksheet B: Simple Design Capture Volume Sizing Method DMA-1

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.28	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.57	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.58	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	2,425	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	572	sq-ft

Worksheet B: Simple Design Capture Volume Sizing Method DMA-2

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.76	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	67%	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.65	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1,614	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	381	sq-ft

Worksheet B: Simple Design Capture Volume Sizing Method DMA-3

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.38	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.58	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.59	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	732	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	172	sq-ft

Worksheet B: Simple Design Capture Volume Sizing Method DMA-4

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.86	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	73%	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.70	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1,967	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	464	sq-ft

Worksheet B: Simple Design Capture Volume Sizing Method DMA-5

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	2.06	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.87	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.80	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	5,391	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	1,271	sq-ft

Worksheet B: Simple Design Capture Volume Sizing Method DMA-6

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.9	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	------	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.9	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.61	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.05	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.19	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	378	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (**Appendix VII**)	$K_{measured}$=	2.8	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	2.63	
3	Calculate design infiltration rate, $K_{design} = K_{measured} \times S_{final}$	K_{design}=	1.06	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	4.24	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	90	sq-ft

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.50
		Predominant soil texture	0.25	3	0.75
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.75
B	Design	Tributary area size	0.25	2	0.50
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy	0.25	2	0.50
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1.50
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.63
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					2.8
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					1.06

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Percolation testing was done utilizing the Porchet Method by TGR Geotechnical, Reference Project No. 15-5382 .
Infiltration test rates were determined in general accordance with Orange County Public Works technical guidance document.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Worksheet I: Summary of Groundwater-related Feasibility Criteria

1	Is project large or small? (as defined by **Table VIII.2**) circle one	(Large)		Small
2	What is the tributary area to the BMP?	A	5.96	acres
3	What type of BMP is proposed?	Inf-7: Underground Infiltraiton		
4	What is the infiltrating surface area of the proposed BMP?	A_{BMP}	6,200	sq-ft
5	What land use activities are present in the tributary area (list all) -Community Church -Commercial Use			
6	What land use-based risk category is applicable?	L	(M)	H
7	If M or H, what pretreatment and source isolation BMPs have been considered and are proposed (describe all): We plan to use Contech Filterra bio-retention system to help treat the run-off prior to entering the proposed storm drain system.			
8	What minimum separation to mounded seasonally high groundwater applies to the proposed BMP? See Section **VIII.2** (circle one)	5 ft		(10 ft)
9	Provide rationale for selection of applicable minimum separation to seasonally high mounded groundwater: Based on Soil Engineers findings, groundwater was encountered previously at a depth of 18.5 ft below existing grade.			
10	What is separation from the infiltrating surface to seasonally high groundwater?	SHGWT	18.5'	ft
11	What is separation from the infiltrating surface to mounded seasonally high groundwater?	Mounded SHGWT	3.3'	ft
12	Describe assumptions and methods used for mounding analysis: Used the "simulation of groundwater mounding" worksheet from USGS, see following pages for inputs and results.			
13	Is the site within a plume protection boundary (See **Figure**	Y	(N)	N/A

Worksheet I: Summary of Groundwater-related Feasibility Criteria

	VIII.2)?	
14	Is the site within a selenium source area or other natural plume area (See Figure VIII.2)?	Y (N) N/A
15	Is the site within 250 feet of a contaminated site?	Y (N) N/A
16	If site-specific study has been prepared, provide citation and briefly summarize relevant findings: N/A	
17	Is the site within 100 feet of a water supply well, spring, septic system?	Y (N) N/A
18	Is infiltration feasible on the site relative to groundwater-related criteria?	(Y) N
Provide rationale for feasibility determination: Due to a good infiltration rate and criteria in the TGD, infiltration is deemed to be feasible.		

Note: if a single criterion or group of criteria would render infiltration infeasible, it is not necessary to evaluate every question in this worksheet.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
2.4800	*R*	**Recharge (infiltration) rate (feet/day)**
0.200	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
56.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
77.500	x	**1/2 length of basin (x direction, in feet)**
10.000	y	**1/2 width of basin (y direction, in feet)**
10.000	t	**duration of infiltration period (days)**
13.500	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

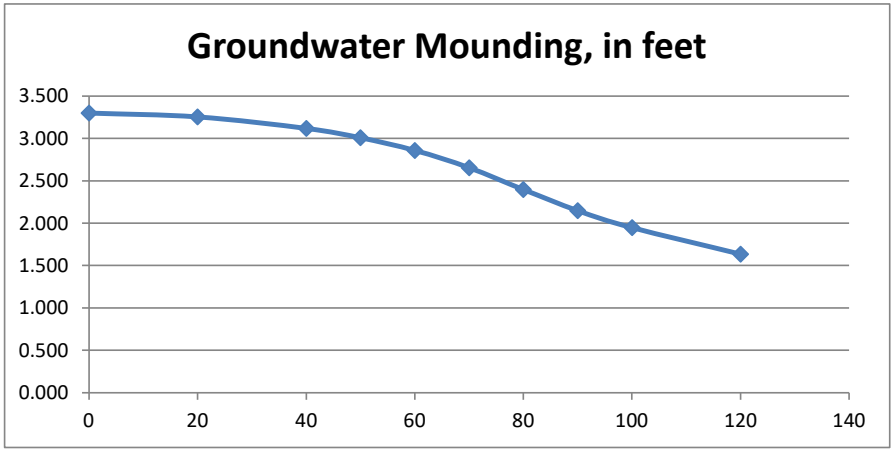
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

16.799	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.299	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.299	0
3.256	20
3.120	40
3.009	50
2.860	60
2.655	70
2.398	80
2.149	90
1.947	100
1.635	120

Re-Calculate Now



Disclaimer

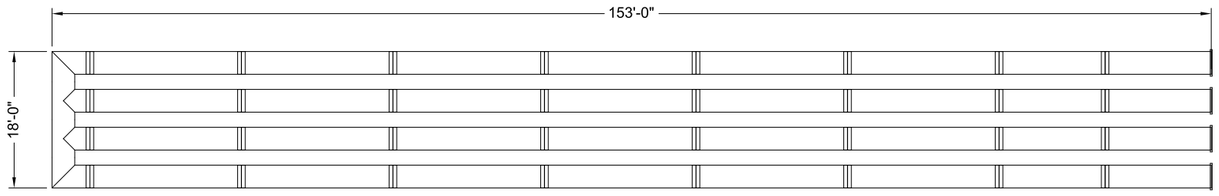
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 618 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 4,368 cf.
- BACKFILL STORAGE VOLUME = 1,944 cf.
- TOTAL STORAGE PROVIDED = 6,313 cf.

PIPE DETAILS
- DIAMETER = 36 IN.
- CORRUGATION = 2 2/3x1/2
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 24 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 0 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

DATE	REVISION DESCRIPTION	BY

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CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO7334 Kindred Church
Underground Infiltration
Anaheim, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4569	7334	12/8/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

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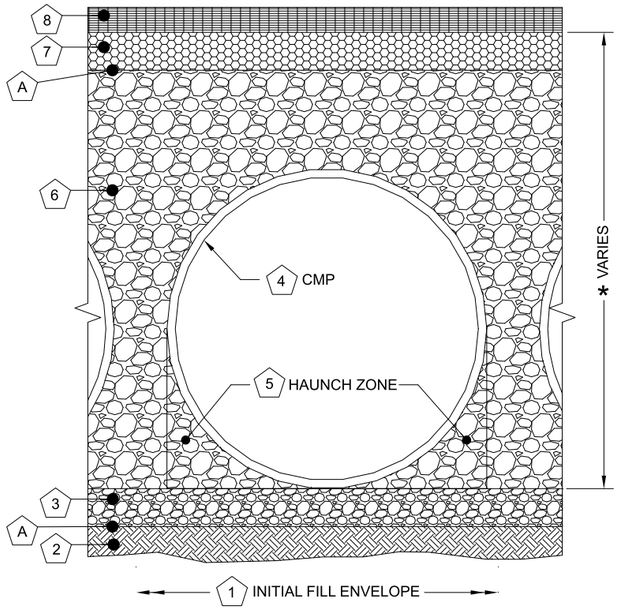


Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

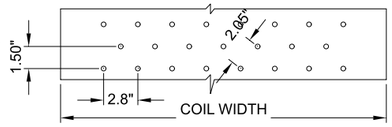
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

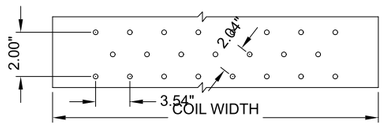
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



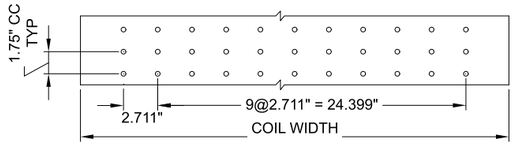
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



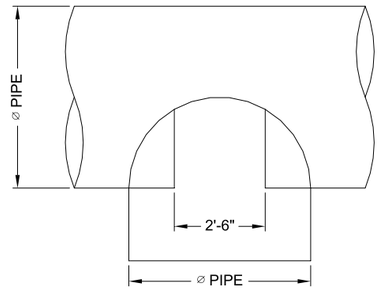
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

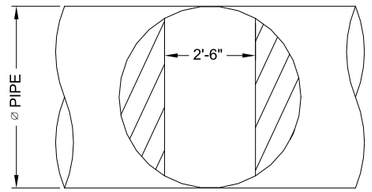
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

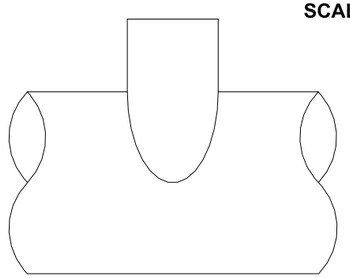


FRONT

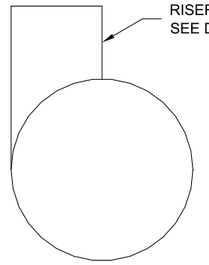
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

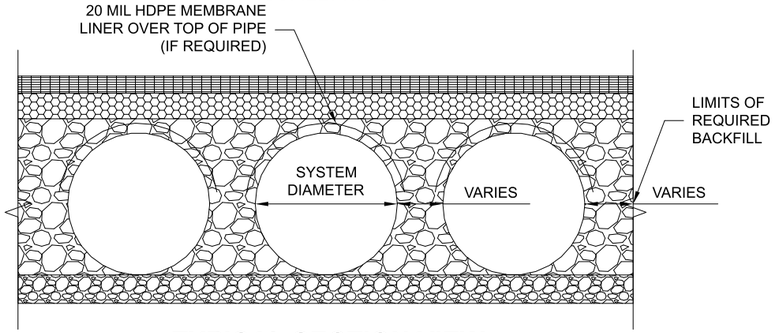


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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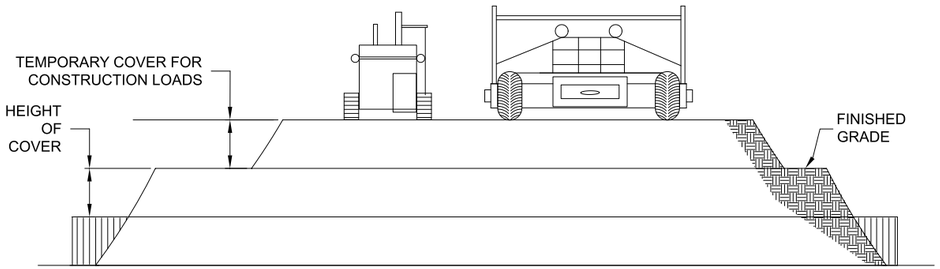


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

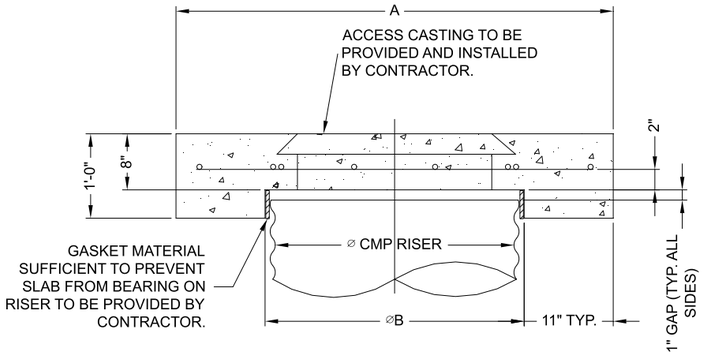
ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

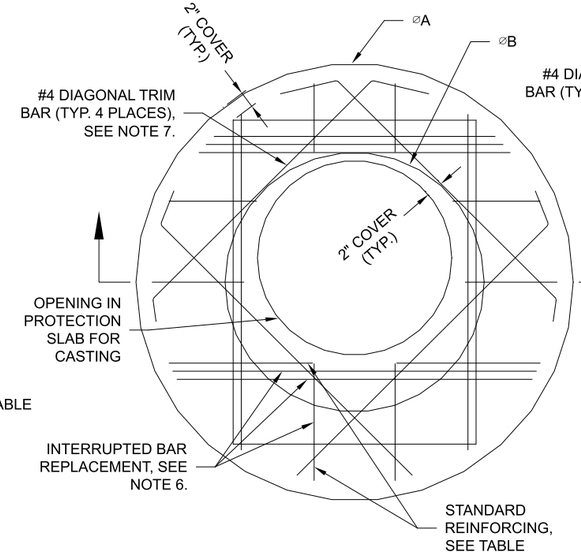
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



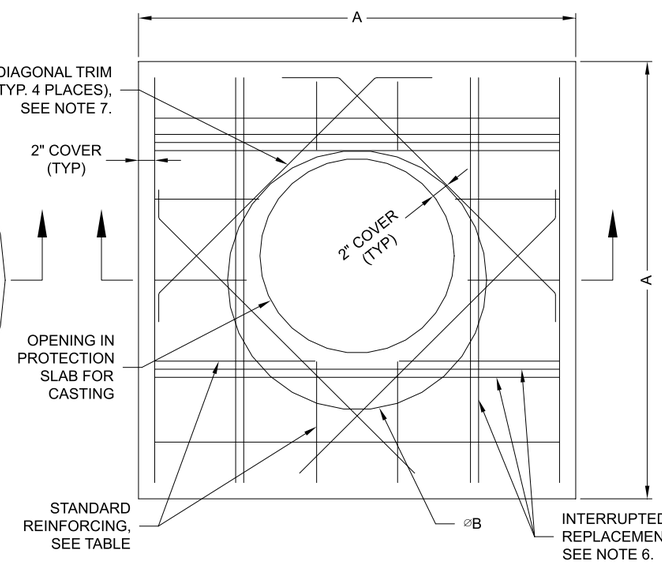
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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DYO7334 Kindred Church
Underground Infiltration
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DETENTION SYSTEM

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4569	7334	12/8/2021
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SHEET NO.: D3		

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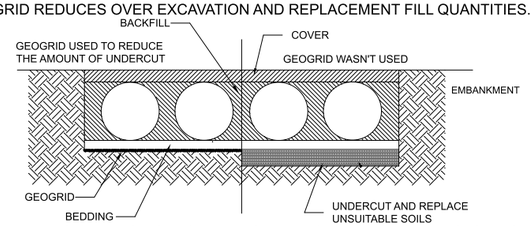
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

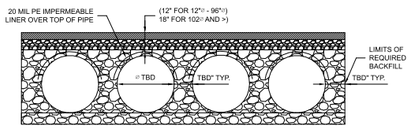


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

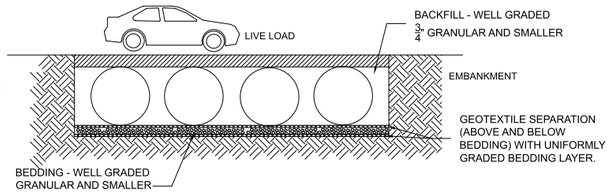
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

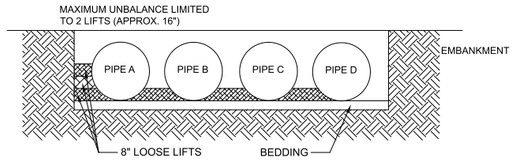
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



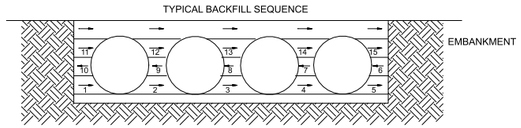
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

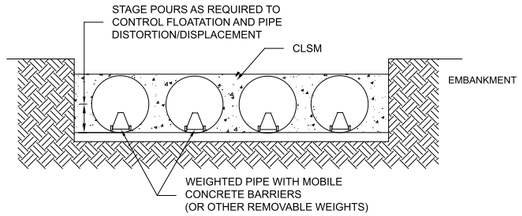


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

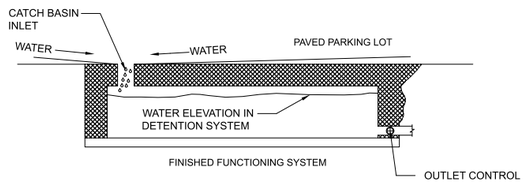


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

C:\EXPORTS\TEMPLATES\CMP_V5.DWG 10/18/2019 10:02 AM

DATE	REVISION DESCRIPTION	BY

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

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO7334 Kindred Church
Underground Infiltration
Anaheim, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
4569	7334	12/8/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	***Yes***	***No***
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to **Appendix VIII (Worksheet I)** for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): • The BMP can only be located less than 50 feet away from slopes steeper than 15 percent • The BMP can only be located less than eight feet from building foundations or an alternative setback. • A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.		X
Provide basis: BASED ON SOIL REPORT APP. B Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		X
Provide basis: NONE FOR SANTA ANA RIVER Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

INF 3

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

	Partial Infeasibility Criteria	***Yes***	***No***
4	Is proposed infiltration facility **located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?		X
Provide basis: SOIL REPORT BY TGR APPENDIX B Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	Is **measured infiltration rate below proposed facility less than 0.3 inches per hour**? This calculation shall be based on the methods described in **Appendix VII**.		X
Provide basis: SOIL REPORT APP. B Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Would **reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: N/A Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
7	Would **an increase in infiltration over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: NO USES EFFECTED Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Design Treatment Calculations

Treatment Calculations

* We are Using Filterra devices to treat water prior to entering the private Stormdrain System.

Filterra Unit located at DMA-1 is to Take the flow from DMA 2 & DMA 1

- DMA-1 Treatmat flow = 0.18cfs
- DMA-2 Treatment flow = 0.12cfs

* See worksheet 1) for calcs

Total flow needing treatment = 0.3cfs

* Using 8' (L) x 6' (W) filtera Box *

Filtered Flow = 0.19 cfs

Treatment Req = 0.15 ← per 50%. treatment flow

0.15 < 0.19 cfs ✓

Using another filterra for DMA-5 capture.

- DMA 5 treatment flow = 0.41 cfs

After 50%. reduction = 0.20 cfs

* Using 10' (L) x 6' (W) Filtera Box *

Filtered flow = 0.24 cfs > 0.2 cfs ✓

* DMA 3 & 4 are not to be treated since all runoff is to be roof, sidewalk & landscape.

Filterra Sizing Spreadsheet
Uniform Intensity Approach
Storm Intensity = 0.20 in/hr

Filterra Infiltration Rate = 175 (in/hr)
Filterra Flow per Square Foot = 0.0041 (ft3/sec/ft2)

Filterra Flow Rate, Q = 0.0032 ft3/sec x Filterra Surface Area
Rational Method, Q = C x I x A

Site Flowrate, Q = (C x DI x DA x 43560) / (12 x3600)
OR DA = (12 x 3600 x Q) / (C x 43560 x DI)

where
Q = Flow (ft3/sec)
DA = Drainage Area (acres)
DI = Design Intensity (in/hr)
C = Runoff coefficient (dimensionless)

Using 8X6 & 10X6

			DI 0.2	C 1.00	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra Flow Rate, Q	100% Imperv. DA	Commercial max DA	Residential max DA
L (ft)	W (ft)	Filterra Surface Area (ft2)	(ft3/sec)	(acres)	(acres)	(acres)
4	4	16	0.0648	0.321	0.378	0.643
4.5	4	18	0.0729	0.362	0.425	0.723
6	4	24	0.0972	0.482	0.567	0.964
6.5	4	26	0.1053	0.522	0.614	1.045
8	4	32	0.1296	0.643	0.756	1.286
12	4	48	0.1944	0.964	1.134	1.928
6	6	36	0.1458	0.723	0.851	1.446
8	6	48	0.1944	0.964	1.134	1.928
10	6	60	0.2431	1.205	1.418	2.410
12	6	72	0.2917	1.446	1.702	2.893
13	7	91	0.3686	1.828	2.151	3.656
14	8	112	0.4537	2.250	2.647	4.500
16	8	128	0.5185	2.571	3.025	5.142
12	8	96	0.3889	1.928	2.269	3.857
14	8	112	0.4537	2.250	2.647	4.500

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

DMA-1

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	6 min	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.25	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	------	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	------	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	------	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.25	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.28	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	57%	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.58	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.18	cfs

Supporting Calculations

Describe system:

Using Contech's Filterra Device to pre-treat 50% of treatment flow prior to entering the stormdrain system. Overflow will be collected and bypassed using a catch basin.

Provide time of concentration assumptions:

Drainage is mainly on impervious surface and through storm drain pipes.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

DMA-2

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	6 min	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.25	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	------	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	------	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	------	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.25	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.76	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	67%	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.65	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.12	cfs

Supporting Calculations

Describe system:

Using Contech's Filterra Device to pre-treat 50% of treatment flow prior to entering the stormdrain system. Overflow will be collected and bypassed using a catch basin.

Provide time of concentration assumptions:

Drainage is mainly on impervious surface and through storm drain pipes.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

DMA-5

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	6 min	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.25	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	------	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	------	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	------	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.25	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	2.06	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	87%	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.80	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.41	cfs

Supporting Calculations

Describe system:

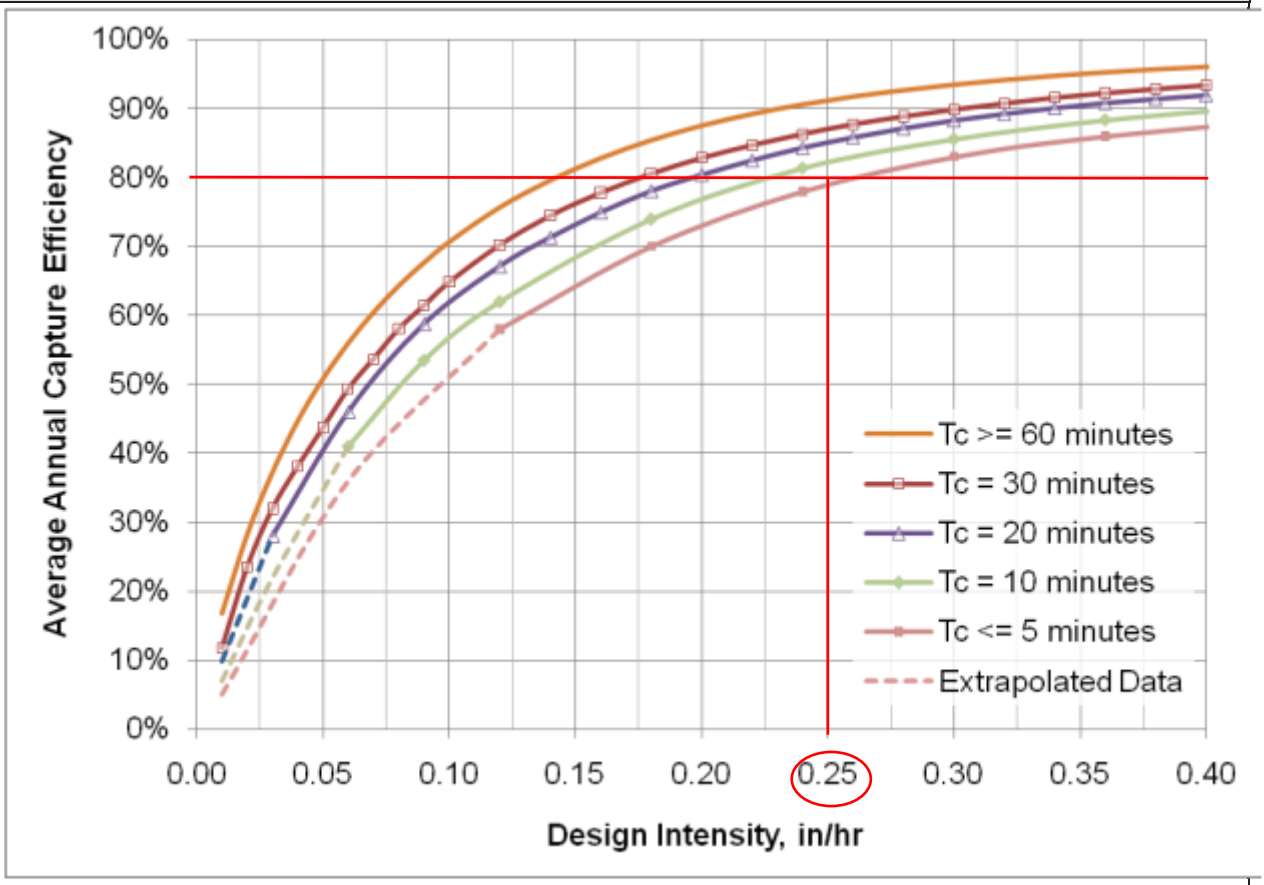
Using FloGard filters for catch basins as pretreatment of Underground Infiltration Gallery. Using FloGard Model FGP-24F with a filtered flow capacity of 1.5 cfs and bypass capacity of 6.1 cfs.

Provide time of concentration assumptions:

Calculated through drainage study. Drainage path is all impervious untill it reaches catch basin.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

Attachment B

Kindred Community Church

2-Year Storm Event Hydrology Calculations

Site: 8712-8720 E. Santa Ana Canyon Rd.

APN: 354-321-01 & 354-321-03

HYDROMODIFICATION

Kindred Community Church
8720 E. Santa Ana Canyon Road
Anaheim, CA

Prepared by:
Anacal Engineering Co.
1211 N Tustin Ave.
Anaheim, CA 92807
(714) 774-1763

Prepared for:
Kindred Community Church
100 Chaparral Court Ste. 100
Anaheim, CA 92808

Prepared under the supervisions of:

_____

David C. Queyrel RCE 42812 Exp. 3/31/22

Table of Contents

Exhibits

Purpose

The purpose of this report is to provide a run-off study based on Orange County LID manual for hydromodification and DCV purposes. Stormchamber design tool is designed to size facilities to handle the required volume based on the criteria. Proposed is a master plan for new parking and relocatable classrooms. A existing city of Anaheim storm drain traverses the property and is designed to accept a portion of the project area. Additionally, there are two 60" culverts which drain the project area north to the Santa Ana River. Drainage from a portion of the existing parking lot and new parking areas are development with low impact criteria designed to infiltrate the design capture volume.

Conclusion

The study shows that runoff from the new development site can be infiltrated on-site in accordance with the current Orange county LID manual. The hydromodification criteria is achieved in accordance with the manual and concluded that the project has no detrimental effects on downstream drainage.

```
WinTR-20 Printed Page File      Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10                  0         0         0.05
KINDRED CHURCH
AREA G PRE

SUB-AREA:
          DMA G PRE Outlet              .0038     77.       .1

STREAM REACH:

STORM ANALYSIS:
          2-Yr                          2.05      Type I    2

STRUCTURE RATING:


GLOBAL OUTPUT:
          2         0.05                YYYYN     YYYYNN



WinTR-20 Printed Page File      End of Input Data List
```

KINDRED CHURCH
AREA G PRE

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA G PRE	0.004		0.423		9.95	0.60	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.688	0.05	0.05	0.06	0.06	0.06	0.07	0.07
9.732	0.08	0.08	0.09	0.10	0.11	0.11	0.12
9.776	0.13	0.14	0.15	0.16	0.17	0.18	0.19
9.820	0.20	0.21	0.23	0.24	0.27	0.29	0.32
9.864	0.34	0.37	0.40	0.43	0.45	0.48	0.50
9.909	0.52	0.54	0.56	0.58	0.59	0.59	0.60
9.953	0.60	0.60	0.59	0.59	0.59	0.59	0.59
9.997	0.59	0.59	0.59	0.59	0.58	0.57	0.56
10.041	0.54	0.52	0.49	0.46	0.43	0.41	0.38
10.085	0.36	0.34	0.32	0.30	0.29	0.28	0.27
10.130	0.26	0.26	0.25	0.25	0.24	0.24	0.23
10.174	0.23	0.22	0.22	0.22	0.22	0.22	0.22
10.218	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.262	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.306	0.20	0.20	0.20	0.19	0.19	0.19	0.19
10.351	0.19	0.19	0.19	0.18	0.18	0.18	0.18
10.395	0.18	0.18	0.18	0.18	0.18	0.18	0.17
10.439	0.17	0.17	0.17	0.17	0.17	0.16	0.16
10.483	0.16	0.16	0.16	0.16	0.16	0.16	0.15
10.528	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10.572	0.15	0.14	0.14	0.14	0.14	0.14	0.14
10.616	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.660	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.704	0.14	0.13	0.13	0.13	0.13	0.13	0.13
10.749	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.793	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.837	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.881	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.925	0.13	0.12	0.12	0.12	0.12	0.12	0.12
10.970	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.014	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.058	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.102	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.146	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.191	0.12	0.12	0.12	0.12	0.12	0.12	0.12

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
11.235	0.12	0.12	0.12	0.11	0.11	0.11	0.11
11.279	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.323	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.368	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.412	0.11	0.11	0.11	0.11	0.11	0.11	0.11

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
11.456	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.500	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.544	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.589	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.633	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.677	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.721	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.765	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.810	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.854	0.11	0.11	0.11	0.11	0.10	0.10	0.10
11.898	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.942	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.986	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.031	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.075	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.119	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.163	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.208	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.252	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.296	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.340	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.384	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.429	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.473	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.517	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.561	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.605	0.10	0.10	0.10	0.10	0.10	0.09	0.09
12.650	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.694	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.738	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.782	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.826	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.871	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.915	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.959	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.003	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.048	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.092	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.136	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.180	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.224	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.269	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.313	0.09	0.09	0.09	0.08	0.08	0.08	0.08
13.357	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.401	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.445	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.490	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.534	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.578	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.622	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.666	0.08	0.08	0.08	0.08	0.08	0.08	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.711	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.755	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.799	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.843	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.888	0.08	0.08	0.08	0.08	0.07	0.07	0.07
13.932	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.976	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.020	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.064	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.109	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.153	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.197	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.241	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.285	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.330	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.374	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.418	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.462	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.506	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.551	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.595	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.639	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.683	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.728	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.772	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.816	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.860	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.904	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.949	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.993	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

15.037	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.081	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.125	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.170	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.214	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.258	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.302	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.346	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.391	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.435	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.479	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.523	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.568	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.612	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.656	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.700	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.744	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.789	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.833	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.877	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.921	0.07	0.07	0.07	0.07	0.07	0.07	0.07

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
15.965	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.010	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.054	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.098	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.142	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.186	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.231	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

16.275	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.319	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.363	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.408	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.540	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.584	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.629	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.673	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.717	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.761	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.805	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.850	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.894	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.938	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.982	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.026	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.071	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.115	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.159	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.203	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.248	0.07	0.06	0.06	0.06	0.06	0.06	0.06
17.292	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.336	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.380	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.424	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.469	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.513	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.557	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.601	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.645	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.690	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.734	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.778	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.822	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.866	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.911	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

17.955	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.999	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.043	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.088	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.132	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.176	0.06	0.06	0.06	0.06	0.06	0.06	0.06

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
18.220	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.264	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.309	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.353	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.397	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.441	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.485	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.574	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.618	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.662	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.706	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.751	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.795	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.839	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.883	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.016	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.060	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.104	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

19.193	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.237	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.281	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.325	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.458	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.502	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.546	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.635	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.679	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.723	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.768	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.812	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.856	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.900	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.944	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.989	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.033	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.077	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.121	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.165	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.210	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.254	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.298	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.342	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.386	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.431	0.05	0.05	0.05	0.05	0.05	0.05	0.05

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

20.475	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.519	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.563	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.608	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.652	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.696	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.740	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.784	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.873	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.917	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.961	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.005	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.094	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.138	0.05	0.05					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.004		0.423		9.95	0.60	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.688	0.05	0.05	0.06	0.06	0.06	0.07	0.07
9.732	0.08	0.08	0.09	0.10	0.11	0.11	0.12
9.776	0.13	0.14	0.15	0.16	0.17	0.18	0.19
9.820	0.20	0.21	0.23	0.24	0.27	0.29	0.32
9.864	0.34	0.37	0.40	0.43	0.45	0.48	0.50
9.909	0.52	0.54	0.56	0.58	0.59	0.59	0.60
9.953	0.60	0.60	0.59	0.59	0.59	0.59	0.59
9.997	0.59	0.59	0.59	0.59	0.58	0.57	0.56
10.041	0.54	0.52	0.49	0.46	0.43	0.41	0.38
10.085	0.36	0.34	0.32	0.30	0.29	0.28	0.27

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

10.130	0.26	0.26	0.25	0.25	0.24	0.24	0.23
10.174	0.23	0.22	0.22	0.22	0.22	0.22	0.22
10.218	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.262	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.306	0.20	0.20	0.20	0.19	0.19	0.19	0.19
10.351	0.19	0.19	0.19	0.18	0.18	0.18	0.18
10.395	0.18	0.18	0.18	0.18	0.18	0.18	0.17
10.439	0.17	0.17	0.17	0.17	0.17	0.16	0.16
10.483	0.16	0.16	0.16	0.16	0.16	0.16	0.15
10.528	0.15	0.15	0.15	0.15	0.15	0.15	0.15
10.572	0.15	0.14	0.14	0.14	0.14	0.14	0.14
10.616	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.660	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.704	0.14	0.13	0.13	0.13	0.13	0.13	0.13

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
10.749	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.793	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.837	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.881	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.925	0.13	0.12	0.12	0.12	0.12	0.12	0.12
10.970	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.014	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.058	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.102	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.146	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.191	0.12	0.12	0.12	0.12	0.12	0.12	0.12
11.235	0.12	0.12	0.12	0.11	0.11	0.11	0.11
11.279	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.323	0.11	0.11	0.11	0.11	0.11	0.11	0.11

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

11.368	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.412	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.456	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.500	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.544	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.589	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.633	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.677	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.721	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.765	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.810	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.854	0.11	0.11	0.11	0.11	0.10	0.10	0.10
11.898	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.942	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.986	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.031	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.075	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.119	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.163	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.208	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.252	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.296	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.340	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.384	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.429	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.473	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.517	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.561	0.10	0.10	0.10	0.10	0.10	0.10	0.10
12.605	0.10	0.10	0.10	0.10	0.10	0.09	0.09
12.650	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.694	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.738	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.782	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.826	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.871	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.915	0.09	0.09	0.09	0.09	0.09	0.09	0.09
12.959	0.09	0.09	0.09	0.09	0.09	0.09	0.09

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.003	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.048	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.092	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.136	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.180	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.224	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.269	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.313	0.09	0.09	0.09	0.08	0.08	0.08	0.08
13.357	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.401	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.445	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.490	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.534	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.578	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.622	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.666	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.711	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.755	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.799	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.843	0.08	0.08	0.08	0.08	0.08	0.08	0.08
13.888	0.08	0.08	0.08	0.08	0.07	0.07	0.07
13.932	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.976	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.020	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.064	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.109	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.153	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.197	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.241	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

14.285	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.330	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.374	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.418	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.462	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.506	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.551	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.595	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.639	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.683	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.728	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.772	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.816	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.860	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.904	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.949	0.07	0.07	0.07	0.07	0.07	0.07	0.07
14.993	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.037	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.081	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.125	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.170	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.214	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
15.258	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.302	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.346	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.391	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.435	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.479	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

15.523	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.568	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.612	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.656	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.700	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.744	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.789	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.833	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.877	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.921	0.07	0.07	0.07	0.07	0.07	0.07	0.07
15.965	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.010	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.054	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.098	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.142	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.186	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.231	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.275	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.319	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.363	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.408	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.540	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.584	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.629	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.673	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.717	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.761	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.805	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.850	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.894	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.938	0.07	0.07	0.07	0.07	0.07	0.07	0.07
16.982	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.026	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.071	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.115	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.159	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

17.203	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.248	0.07	0.06	0.06	0.06	0.06	0.06	0.06
17.292	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.336	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.380	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.424	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.469	0.06	0.06	0.06	0.06	0.06	0.06	0.06

KINDRED CHURCH
AREA G PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
17.513	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.557	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.601	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.645	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.690	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.734	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.778	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.822	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.866	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.911	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.955	0.06	0.06	0.06	0.06	0.06	0.06	0.06
17.999	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.043	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.088	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.132	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.176	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.220	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.264	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.309	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.353	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.397	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

18.441	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.485	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.574	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.618	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.662	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.706	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.751	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.795	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.839	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.883	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.016	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.060	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.104	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.193	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.237	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.281	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.325	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.458	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.502	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.546	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.635	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.679	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.723	0.06	0.06	0.06	0.06	0.06	0.06	0.06

KINDRED CHURCH
AREA G PRE

Line
Start Time ---------- Flow Values @ time increment of 0.006 hr ----------

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

(hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
19.768	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.812	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.856	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.900	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.944	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.989	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.033	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.077	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.121	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.165	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.210	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.254	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.298	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.342	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.386	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.431	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.475	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.519	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.563	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.608	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.652	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.696	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.740	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.784	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.873	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.917	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.961	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.005	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.094	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.138	0.05	0.05					

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

KINDRED CHURCH
AREA G PRE

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
DMA G PRE	0.004		0.60				
OUTLET	0.004		0.60				

```
WinTR-20: Version 1.10                0         0         0.05
ED CHURCH                                                          (continued)
AREA G PRE
                                          STORM 2-Yr
SUB-AREA:
          DMA G PRE Outlet              .0038     77.       .1

STREAM REACH:
```

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA G PRE

STORM 2-Yr

SUB-AREA:
DMA G PRE Outlet .0038 77. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: AREA G PRE
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA G-PRE.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA G PRE		Outlet	2.43	77	0.1

Total area: 2.43 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA G PRE
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA G PRE
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA G PRE	0.60
REACHES	
OUTLET	0.60

ANACAL ENG

KINDRED CHURCH
AREA G PRE
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)
SUBAREAS		
DMA G PRE	0.60	9.95
REACHES		
OUTLET	0.60	

KINDRED CHURCH
AREA G PRE
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA G PRE	2.43	0.100	77	Outlet	

Total Area: 2.43 (ac)

KINDRED CHURCH
AREA G PRE
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA G PRE							
SHEET	100	0.0200	0.011				0.025
SHALLOW	240	0.0150	0.025				0.027
						Time of Concentration	0.1

KINDRED CHURCH
AREA G PRE
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA G PRE	Open space; grass cover > 75% (good)	A	.86	39
	Paved parking lots, roofs, driveways	A	1.57	98
	Total Area / Weighted Curve Number		2.43	77

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WinTR-20 Printed Page File      Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10                  0         0         0.05
KINDRED CHURCH
2YEAR HYDRO ANALYSIS

SUB-AREA:
          DMA G POSTOutlet              .0038     83.       .1

STREAM REACH:

STORM ANALYSIS:
          2-Yr                          2.05      Type I    2

STRUCTURE RATING:


GLOBAL OUTPUT:
          2         0.05                YYYYN     YYYYNN



WinTR-20 Printed Page File      End of Input Data List
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KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA G POST	0.004		0.708		9.94	1.19	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.178	0.05	0.05	0.05	0.05	0.05	0.05	0.05
9.222	0.05	0.06	0.06	0.06	0.06	0.06	0.06
9.267	0.06	0.06	0.06	0.06	0.06	0.06	0.06
9.311	0.07	0.07	0.07	0.07	0.07	0.07	0.07
9.355	0.07	0.07	0.07	0.07	0.07	0.08	0.08
9.399	0.08	0.08	0.08	0.08	0.08	0.08	0.08
9.443	0.08	0.08	0.09	0.09	0.09	0.09	0.09
9.488	0.09	0.09	0.09	0.09	0.09	0.10	0.10
9.532	0.10	0.10	0.11	0.11	0.12	0.12	0.12
9.576	0.13	0.13	0.14	0.14	0.14	0.15	0.15
9.620	0.15	0.16	0.16	0.17	0.18	0.19	0.20
9.665	0.21	0.22	0.23	0.23	0.24	0.25	0.26
9.709	0.26	0.27	0.28	0.29	0.30	0.32	0.34
9.753	0.35	0.37	0.39	0.41	0.43	0.45	0.47
9.797	0.49	0.50	0.52	0.53	0.55	0.58	0.61
9.841	0.65	0.69	0.74	0.79	0.84	0.89	0.94
9.886	0.98	1.03	1.07	1.10	1.13	1.16	1.18
9.930	1.19	1.19	1.19	1.18	1.17	1.16	1.14
9.974	1.13	1.11	1.10	1.09	1.08	1.08	1.07
10.018	1.06	1.04	1.02	0.99	0.94	0.90	0.84
10.062	0.79	0.74	0.69	0.64	0.60	0.57	0.54
10.107	0.51	0.49	0.47	0.46	0.44	0.43	0.42
10.151	0.41	0.40	0.39	0.38	0.38	0.37	0.37
10.195	0.36	0.36	0.36	0.36	0.35	0.35	0.35
10.239	0.35	0.34	0.34	0.34	0.33	0.33	0.33
10.283	0.32	0.32	0.32	0.32	0.32	0.32	0.32
10.328	0.31	0.31	0.31	0.31	0.30	0.30	0.30
10.372	0.29	0.29	0.29	0.29	0.29	0.28	0.28
10.416	0.28	0.28	0.28	0.28	0.27	0.27	0.27
10.460	0.26	0.26	0.26	0.25	0.25	0.25	0.25
10.505	0.25	0.25	0.24	0.24	0.24	0.24	0.24
10.549	0.24	0.23	0.23	0.23	0.23	0.23	0.22
10.593	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.637	0.22	0.22	0.21	0.21	0.21	0.21	0.21
10.681	0.21	0.21	0.21	0.21	0.21	0.21	0.21

10.726	0.21	0.21	0.21	0.21	0.21	0.20	0.20
10.770	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.814	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.858	0.20	0.20	0.19	0.19	0.19	0.19	0.19
10.902	0.19	0.19	0.19	0.19	0.19	0.19	0.19

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.947	0.19	0.19	0.19	0.19	0.19	0.18	0.18
10.991	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.035	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.079	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.123	0.18	0.18	0.17	0.17	0.17	0.17	0.17
11.168	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.212	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.256	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.300	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.345	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.389	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.433	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.477	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.521	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.566	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.610	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.654	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.698	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.742	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.787	0.16	0.16	0.15	0.15	0.15	0.15	0.15
11.831	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.875	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.919	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.963	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12.008	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12.052	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12.096	0.15	0.15	0.15	0.15	0.14	0.14	0.14
12.140	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.185	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.229	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.273	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.317	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.361	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.406	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.450	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.494	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.538	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.582	0.14	0.14	0.13	0.13	0.13	0.13	0.13
12.627	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.671	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.715	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.759	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.803	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.848	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.892	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.936	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.980	0.13	0.13	0.13	0.13	0.13	0.13	0.13
13.025	0.13	0.13	0.13	0.13	0.12	0.12	0.12
13.069	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.113	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.157	0.12	0.12	0.12	0.12	0.12	0.12	0.12

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.201	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.246	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.290	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.334	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.378	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.422	0.12	0.12	0.12	0.12	0.12	0.12	0.11
13.467	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.511	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.555	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.599	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.643	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.688	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.732	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.776	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.820	0.11	0.11	0.11	0.11	0.10	0.10	0.10
13.865	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.909	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.953	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.997	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.041	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.086	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.130	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.174	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.218	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.262	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.307	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.351	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.395	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.439	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.483	0.10	0.10	0.10	0.10	0.10	0.10	0.10

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

14.528	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.572	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.616	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.660	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.705	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.749	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.793	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.837	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.881	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.926	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.970	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.014	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.058	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.102	0.10	0.10	0.10	0.10	0.10	0.09	0.09
15.147	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.191	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.235	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.279	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.323	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.368	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.412	0.09	0.09	0.09	0.09	0.09	0.09	0.09

Line Start Time (hr) — Flow Values @ time increment of 0.006 hr (cfs)

15.456	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.500	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.545	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.589	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.633	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.677	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.721	0.09	0.09	0.09	0.09	0.09	0.09	0.09

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

15.766	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.810	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.854	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.898	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.942	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.987	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.031	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.075	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.119	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.163	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.208	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.252	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.296	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.340	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.385	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.429	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.473	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.517	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.561	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.606	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.650	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.694	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.738	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.782	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.827	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.871	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.915	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.959	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.003	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.048	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.092	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.136	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.180	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.225	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.269	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.313	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.357	0.09	0.09	0.09	0.09	0.09	0.08	0.08
17.401	0.08	0.08	0.08	0.08	0.08	0.08	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

17.446	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.490	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.534	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.578	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.622	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.667	0.08	0.08	0.08	0.08	0.08	0.08	0.08

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
17.711	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.755	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.799	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.843	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.888	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.932	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.976	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.020	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.065	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.109	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.153	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.197	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.241	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.286	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.330	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.374	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.418	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.462	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.507	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.551	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.595	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.639	0.08	0.08	0.08	0.08	0.08	0.08	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

18.683	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.728	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.772	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.816	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.860	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.905	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.949	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.993	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.037	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.081	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.126	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.170	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.214	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.258	0.08	0.08	0.08	0.07	0.07	0.07	0.07
19.302	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.347	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.391	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.435	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.479	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.523	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.568	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.612	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.656	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.700	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.745	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.789	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.833	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.877	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.921	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

19.966	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.010	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.054	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.098	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.142	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.187	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.231	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.275	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.319	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.363	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.408	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.540	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.585	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.629	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.673	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.717	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.761	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.806	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.850	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.894	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.938	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.982	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.027	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.071	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.115	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.159	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.203	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.248	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.292	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.336	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.380	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.425	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.469	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.513	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.557	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

21.601	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.646	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.690	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.734	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.778	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.822	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.867	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.911	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.955	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.999	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.043	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.088	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.132	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.176	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
22.220	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.265	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.309	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.353	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.397	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.441	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.486	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.574	0.06	0.05	0.05	0.05	0.05	0.05	0.05
22.618	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.662	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.707	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.751	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.795	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

22.839	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.883	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.928	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.972	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.016	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.060	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.105	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.149	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.193	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.237	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.281	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.326	0.05	0.05	0.05	0.05	0.05		

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.004		0.708		9.94	1.19	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.178	0.05	0.05	0.05	0.05	0.05	0.05	0.05
9.222	0.05	0.06	0.06	0.06	0.06	0.06	0.06
9.267	0.06	0.06	0.06	0.06	0.06	0.06	0.06
9.311	0.07	0.07	0.07	0.07	0.07	0.07	0.07
9.355	0.07	0.07	0.07	0.07	0.07	0.08	0.08
9.399	0.08	0.08	0.08	0.08	0.08	0.08	0.08
9.443	0.08	0.08	0.09	0.09	0.09	0.09	0.09
9.488	0.09	0.09	0.09	0.09	0.09	0.10	0.10
9.532	0.10	0.10	0.11	0.11	0.12	0.12	0.12
9.576	0.13	0.13	0.14	0.14	0.14	0.15	0.15
9.620	0.15	0.16	0.16	0.17	0.18	0.19	0.20
9.665	0.21	0.22	0.23	0.23	0.24	0.25	0.26
9.709	0.26	0.27	0.28	0.29	0.30	0.32	0.34
9.753	0.35	0.37	0.39	0.41	0.43	0.45	0.47

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.797	0.49	0.50	0.52	0.53	0.55	0.58	0.61
9.841	0.65	0.69	0.74	0.79	0.84	0.89	0.94
9.886	0.98	1.03	1.07	1.10	1.13	1.16	1.18
9.930	1.19	1.19	1.19	1.18	1.17	1.16	1.14
9.974	1.13	1.11	1.10	1.09	1.08	1.08	1.07
10.018	1.06	1.04	1.02	0.99	0.94	0.90	0.84
10.062	0.79	0.74	0.69	0.64	0.60	0.57	0.54
10.107	0.51	0.49	0.47	0.46	0.44	0.43	0.42
10.151	0.41	0.40	0.39	0.38	0.38	0.37	0.37
10.195	0.36	0.36	0.36	0.36	0.35	0.35	0.35
10.239	0.35	0.34	0.34	0.34	0.33	0.33	0.33
10.283	0.32	0.32	0.32	0.32	0.32	0.32	0.32
10.328	0.31	0.31	0.31	0.31	0.30	0.30	0.30
10.372	0.29	0.29	0.29	0.29	0.29	0.28	0.28
10.416	0.28	0.28	0.28	0.28	0.27	0.27	0.27
10.460	0.26	0.26	0.26	0.25	0.25	0.25	0.25
10.505	0.25	0.25	0.24	0.24	0.24	0.24	0.24
10.549	0.24	0.23	0.23	0.23	0.23	0.23	0.22
10.593	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.637	0.22	0.22	0.21	0.21	0.21	0.21	0.21
10.681	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.726	0.21	0.21	0.21	0.21	0.21	0.20	0.20
10.770	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.814	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.858	0.20	0.20	0.19	0.19	0.19	0.19	0.19
10.902	0.19	0.19	0.19	0.19	0.19	0.19	0.19
10.947	0.19	0.19	0.19	0.19	0.19	0.18	0.18
10.991	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.035	0.18	0.18	0.18	0.18	0.18	0.18	0.18

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

11.079	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.123	0.18	0.18	0.17	0.17	0.17	0.17	0.17
11.168	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.212	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.256	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.300	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.345	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.389	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.433	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.477	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.521	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.566	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.610	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.654	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.698	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.742	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.787	0.16	0.16	0.15	0.15	0.15	0.15	0.15
11.831	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.875	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.919	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.963	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12.008	0.15	0.15	0.15	0.15	0.15	0.15	0.15

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.052	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12.096	0.15	0.15	0.15	0.15	0.14	0.14	0.14
12.140	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.185	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.229	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.273	0.14	0.14	0.14	0.14	0.14	0.14	0.14

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

12.317	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.361	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.406	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.450	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.494	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.538	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.582	0.14	0.14	0.13	0.13	0.13	0.13	0.13
12.627	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.671	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.715	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.759	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.803	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.848	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.892	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.936	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.980	0.13	0.13	0.13	0.13	0.13	0.13	0.13
13.025	0.13	0.13	0.13	0.13	0.12	0.12	0.12
13.069	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.113	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.157	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.201	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.246	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.290	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.334	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.378	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.422	0.12	0.12	0.12	0.12	0.12	0.12	0.11
13.467	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.511	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.555	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.599	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.643	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.688	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.732	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.776	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.820	0.11	0.11	0.11	0.11	0.10	0.10	0.10
13.865	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.909	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.953	0.10	0.10	0.10	0.10	0.10	0.10	0.10

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

13.997	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.041	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.086	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.130	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.174	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.218	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.262	0.10	0.10	0.10	0.10	0.10	0.10	0.10

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
14.307	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.351	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.395	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.439	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.483	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.528	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.572	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.616	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.660	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.705	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.749	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.793	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.837	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.881	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.926	0.10	0.10	0.10	0.10	0.10	0.10	0.10
14.970	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.014	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.058	0.10	0.10	0.10	0.10	0.10	0.10	0.10
15.102	0.10	0.10	0.10	0.10	0.10	0.09	0.09
15.147	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.191	0.09	0.09	0.09	0.09	0.09	0.09	0.09

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

15.235	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.279	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.323	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.368	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.412	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.456	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.500	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.545	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.589	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.633	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.677	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.721	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.766	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.810	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.854	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.898	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.942	0.09	0.09	0.09	0.09	0.09	0.09	0.09
15.987	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.031	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.075	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.119	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.163	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.208	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.252	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.296	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.340	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.385	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.429	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.473	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.517	0.09	0.09	0.09	0.09	0.09	0.09	0.09

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line
Start Time ---------- Flow Values @ time increment of 0.006 hr ----------

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

(hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
16.561	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.606	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.650	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.694	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.738	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.782	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.827	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.871	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.915	0.09	0.09	0.09	0.09	0.09	0.09	0.09
16.959	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.003	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.048	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.092	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.136	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.180	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.225	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.269	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.313	0.09	0.09	0.09	0.09	0.09	0.09	0.09
17.357	0.09	0.09	0.09	0.09	0.09	0.08	0.08
17.401	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.446	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.490	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.534	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.578	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.622	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.667	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.711	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.755	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.799	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.843	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.888	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.932	0.08	0.08	0.08	0.08	0.08	0.08	0.08
17.976	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.020	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.065	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.109	0.08	0.08	0.08	0.08	0.08	0.08	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

18.153	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.197	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.241	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.286	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.330	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.374	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.418	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.462	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.507	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.551	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.595	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.639	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.683	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.728	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.772	0.08	0.08	0.08	0.08	0.08	0.08	0.08

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
18.816	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.860	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.905	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.949	0.08	0.08	0.08	0.08	0.08	0.08	0.08
18.993	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.037	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.081	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.126	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.170	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.214	0.08	0.08	0.08	0.08	0.08	0.08	0.08
19.258	0.08	0.08	0.08	0.07	0.07	0.07	0.07
19.302	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.347	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

19.391	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.435	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.479	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.523	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.568	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.612	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.656	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.700	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.745	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.789	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.833	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.877	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.921	0.07	0.07	0.07	0.07	0.07	0.07	0.07
19.966	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.010	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.054	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.098	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.142	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.187	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.231	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.275	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.319	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.363	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.408	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.540	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.585	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.629	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.673	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.717	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.761	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.806	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.850	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.894	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.938	0.07	0.07	0.07	0.07	0.07	0.07	0.07
20.982	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.027	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
21.071	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.115	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.159	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.203	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.248	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.292	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.336	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.380	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.425	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.469	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.513	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.557	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.601	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.646	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.690	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.734	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.778	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.822	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.867	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.911	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.955	0.06	0.06	0.06	0.06	0.06	0.06	0.06
21.999	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.043	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.088	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.132	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.176	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.220	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.265	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

22.309	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.353	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.397	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.441	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.486	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22.574	0.06	0.05	0.05	0.05	0.05	0.05	0.05
22.618	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.662	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.707	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.751	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.795	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.839	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.883	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.928	0.05	0.05	0.05	0.05	0.05	0.05	0.05
22.972	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.016	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.060	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.105	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.149	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.193	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.237	0.05	0.05	0.05	0.05	0.05	0.05	0.05
23.281	0.05	0.05	0.05	0.05	0.05	0.05	0.05

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
23.326	0.05	0.05	0.05	0.05	0.05		

```
WinTR-20: Version 1.10                  0         0         0.05
ED CHURCH                                                                (continued)
2YEAR HYDRO ANALYSIS
                                           STORM 2-Yr
SUB-AREA:
          DMA G POSTOutlet              .0038     83.       .1

STREAM REACH:
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WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
DMA G POST	0.004		1.19				
OUTLET	0.004		1.19				

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA G POSTOutlet .0038 83. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: 2YEAR HYDRO ANALYSIS
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA G-POST.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA G POST		Outlet	2.43	83	0.1

Total area: 2.43 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA G POST	1.19
REACHES	
OUTLET	1.19

ANACAL ENG

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
DMA G POST	1.19 9.94
REACHES	
OUTLET	1.19

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA G POST	2.43	0.100	83	Outlet	

Total Area: 2.43 (ac)

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA G POST							
SHEET	100	0.0050	0.011				0.044
SHALLOW	240	0.0270	0.025				0.020
						Time of Concentration	0.1

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA G POST	Open space; grass cover > 75% (good)	A	.607	39
	Paved parking lots, roofs, driveways	A	1.82	98
	Total Area / Weighted Curve Number		2.43	83

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WinTR-20: Version 1.10 0 0 0.05
KINDRED CHURCH
AREA I PRE

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

STORM ANALYSIS:
2-Yr 2.05 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

KINDRED CHURCH
AREA I PRE

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA 3I-PRE	0.001		0.103		9.95	0.22	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.782	0.05	0.06	0.06	0.06	0.07	0.07	0.07
9.826	0.08	0.08	0.09	0.10	0.11	0.12	0.13
9.871	0.14	0.15	0.16	0.17	0.18	0.19	0.19
9.915	0.20	0.21	0.21	0.22	0.22	0.22	0.22
9.959	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.003	0.22	0.22	0.22	0.22	0.21	0.21	0.20
10.048	0.19	0.18	0.17	0.16	0.15	0.14	0.13
10.092	0.12	0.12	0.11	0.11	0.10	0.10	0.10
10.136	0.10	0.09	0.09	0.09	0.09	0.09	0.08
10.180	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.224	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.269	0.08	0.07	0.07	0.07	0.07	0.07	0.07
10.313	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.357	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.401	0.07	0.07	0.07	0.07	0.07	0.06	0.06
10.445	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.490	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.534	0.06	0.06	0.06	0.06	0.05	0.05	0.05
10.578	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.622	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.666	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.711	0.05	0.05					

Area or	Drainage	Rain Gage	Runoff	Peak Flow

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

Reach Identifier	Area (sq mi)	ID or Location	Amount (in)	Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.001		0.103		9.95	0.22	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.782	0.05	0.06	0.06	0.06	0.07	0.07	0.07
9.826	0.08	0.08	0.09	0.10	0.11	0.12	0.13
9.871	0.14	0.15	0.16	0.17	0.18	0.19	0.19
9.915	0.20	0.21	0.21	0.22	0.22	0.22	0.22
9.959	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.003	0.22	0.22	0.22	0.22	0.21	0.21	0.20
10.048	0.19	0.18	0.17	0.16	0.15	0.14	0.13

KINDRED CHURCH
AREA I PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
10.092	0.12	0.12	0.11	0.11	0.10	0.10	0.10
10.136	0.10	0.09	0.09	0.09	0.09	0.09	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

10.180	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.224	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.269	0.08	0.07	0.07	0.07	0.07	0.07	0.07
10.313	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.357	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.401	0.07	0.07	0.07	0.07	0.07	0.06	0.06
10.445	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.490	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.534	0.06	0.06	0.06	0.06	0.05	0.05	0.05
10.578	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.622	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.666	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10.711	0.05	0.05					

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WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

KINDRED CHURCH
AREA I PRE

Area or Drainage ---------- Peak Flow by Storm ----------

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:

DMA 3I-PRE	Outlet	.00141	77.	.1

STREAM REACH:

Reach Identifier	Area (sq mi)	Alternate (cfs)	2-Yr (cfs)	(cfs)	(cfs)	(cfs)
DMA 3I-PRE	0.001	0.22				
OUTLET	0.001	0.22				

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA I PRE

STORM 2-Yr

SUB-AREA:
DMA 3I-PREOutlet .00141 77. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: AREA I PRE
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA I-PRE.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA 3I-PRE		Outlet	0.9	77	0.1

Total area: .90 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA I PRE
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA I PRE
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA 3I-PRE	0.22
REACHES	
OUTLET	0.22

ANACAL ENG

KINDRED CHURCH
AREA I PRE
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
DMA 3I-PRE	0.22 9.95
REACHES	
OUTLET	0.22

KINDRED CHURCH
AREA I PRE
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA 3I-PRE	.90	0.100	77	Outlet	

Total Area: .90 (ac)

KINDRED CHURCH
AREA I PRE
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA 3I-PRE							
SHEET	100	0.0200	0.011				0.025
SHALLOW	170	0.0150	0.025				0.019
						Time of Concentration	0.1

KINDRED CHURCH
AREA I PRE
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA 3I-PRE	Open space; grass cover > 75% (good)	A	.315	39
	Paved parking lots, roofs, driveways	A	.585	98
	Total Area / Weighted Curve Number		.9	77
			==	==

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TR20.inp

WinTR-20: Version 1.10                  0         0         0.05
KINDRED CHURCH
2YEAR HYDRO ANALYSIS

SUB-AREA:
          DMA 3I-POSOutlet              .00141    83.       .1

STREAM REACH:

STORM ANALYSIS:
          2-Yr                          2.05      Type I    2

STRUCTURE RATING:


GLOBAL OUTPUT:
          2         0.05                YYYYN     YYYYNN



WinTR-20 Printed Page File      End of Input Data List
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KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA 3I-POS	0.001		0.334		9.94	0.44	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.589	0.05	0.05	0.05	0.05	0.06	0.06	0.06
9.633	0.06	0.06	0.07	0.07	0.07	0.08	0.08
9.677	0.08	0.09	0.09	0.09	0.10	0.10	0.10
9.721	0.10	0.11	0.11	0.12	0.12	0.13	0.14
9.766	0.15	0.15	0.16	0.17	0.17	0.18	0.19
9.810	0.19	0.20	0.21	0.22	0.23	0.24	0.26
9.854	0.28	0.29	0.31	0.33	0.35	0.37	0.38
9.898	0.40	0.41	0.42	0.43	0.44	0.44	0.44
9.942	0.44	0.44	0.44	0.43	0.42	0.42	0.41
9.987	0.41	0.41	0.40	0.40	0.40	0.39	0.39
10.031	0.38	0.37	0.35	0.33	0.31	0.29	0.27
10.075	0.26	0.24	0.22	0.21	0.20	0.19	0.18
10.119	0.18	0.17	0.16	0.16	0.16	0.15	0.15
10.163	0.15	0.14	0.14	0.14	0.14	0.14	0.13
10.208	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.252	0.13	0.12	0.12	0.12	0.12	0.12	0.12
10.296	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.340	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.385	0.11	0.11	0.11	0.11	0.10	0.10	0.10
10.429	0.10	0.10	0.10	0.10	0.10	0.10	0.10
10.473	0.10	0.09	0.09	0.09	0.09	0.09	0.09
10.517	0.09	0.09	0.09	0.09	0.09	0.09	0.09
10.561	0.09	0.08	0.08	0.08	0.08	0.08	0.08
10.606	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.650	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.694	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.738	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.782	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.827	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.871	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.915	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.959	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.003	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.048	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.092	0.07	0.07	0.07	0.07	0.07	0.07	0.06

11.136	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.180	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.225	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.269	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.313	0.06	0.06	0.06	0.06	0.06	0.06	0.06

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
11.357	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.401	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.446	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.490	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.534	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.578	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.622	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.667	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.711	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.755	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.799	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.843	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.888	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.932	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.976	0.06	0.06	0.06	0.06	0.05	0.05	0.05
12.020	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.065	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.109	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.153	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.197	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.241	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.286	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.330	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.374	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.418	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.462	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.507	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.551	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.595	0.05	0.05	0.05				

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.001		0.334		9.94	0.44	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.589	0.05	0.05	0.05	0.05	0.06	0.06	0.06
9.633	0.06	0.06	0.07	0.07	0.07	0.08	0.08
9.677	0.08	0.09	0.09	0.09	0.10	0.10	0.10
9.721	0.10	0.11	0.11	0.12	0.12	0.13	0.14
9.766	0.15	0.15	0.16	0.17	0.17	0.18	0.19
9.810	0.19	0.20	0.21	0.22	0.23	0.24	0.26
9.854	0.28	0.29	0.31	0.33	0.35	0.37	0.38
9.898	0.40	0.41	0.42	0.43	0.44	0.44	0.44
9.942	0.44	0.44	0.44	0.43	0.42	0.42	0.41
9.987	0.41	0.41	0.40	0.40	0.40	0.39	0.39
10.031	0.38	0.37	0.35	0.33	0.31	0.29	0.27

KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
10.075	0.26	0.24	0.22	0.21	0.20	0.19	0.18
10.119	0.18	0.17	0.16	0.16	0.16	0.15	0.15
10.163	0.15	0.14	0.14	0.14	0.14	0.14	0.13
10.208	0.13	0.13	0.13	0.13	0.13	0.13	0.12
10.252	0.13	0.12	0.12	0.12	0.12	0.12	0.12

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA 3I-POSOutlet .00141 83. .1

STREAM REACH:

10.296	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.340	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.385	0.11	0.11	0.11	0.11	0.10	0.10	0.10
10.429	0.10	0.10	0.10	0.10	0.10	0.10	0.10
10.473	0.10	0.09	0.09	0.09	0.09	0.09	0.09
10.517	0.09	0.09	0.09	0.09	0.09	0.09	0.09
10.561	0.09	0.08	0.08	0.08	0.08	0.08	0.08
10.606	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.650	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.694	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.738	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.782	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.827	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.871	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.915	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.959	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.003	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.048	0.07	0.07	0.07	0.07	0.07	0.07	0.07
11.092	0.07	0.07	0.07	0.07	0.07	0.07	0.06
11.136	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.180	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.225	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.269	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.313	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.357	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.401	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.446	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.490	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.534	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.578	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.622	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.667	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.711	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.755	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.799	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.843	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.888	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.932	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.976	0.06	0.06	0.06	0.06	0.05	0.05	0.05
12.020	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.065	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.109	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.153	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.197	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.241	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.286	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
12.330	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.374	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.418	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.462	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.507	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12.551	0.05	0.05	0.05	0.05	0.05	0.05	0.05

```
WinTR-20: Version 1.10                  0         0         0.05
ED CHURCH                                                                (continued)
2YEAR HYDRO ANALYSIS
                                          STORM 2-Yr
SUB-AREA:
          DMA 3I-POSOutlet              .00141    83.       .1

STREAM REACH:
    12.595      0.05      0.05      0.05
```


KINDRED CHURCH
2YEAR HYDRO ANALYSIS

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
DMA 3I-POS	0.001		0.44				
OUTLET	0.001		0.44				

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
2YEAR HYDRO ANALYSIS

STORM 2-Yr

SUB-AREA:
DMA 3I-POSOutlet .00141 83. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: 2YEAR HYDRO ANALYSIS
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA I-POST.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA 3I-POS		Outlet	0.9	83	0.1

Total area: .90 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA 3I-POS	0.44
REACHES	
OUTLET	0.44

ANACAL ENG

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
DMA 3I-POS	0.44 9.94
REACHES	
OUTLET	0.44

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA 3I-POS	.90	0.100	83	Outlet	

Total Area: .90 (ac)

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA 3I-POS							
SHEET	100	0.0200	0.011				0.025
SHALLOW	170	0.0150	0.025				0.019
					Time of Concentration		0.1

KINDRED CHURCH
2YEAR HYDRO ANALYSIS
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA 3I-POS	Open space; grass cover > 75% (good)	A	.225	39
	Paved parking lots, roofs, driveways	A	.675	98
	Total Area / Weighted Curve Number		.9	83
			==	==

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
KINDRED CHURCH
1F PRE

SUB-AREA:
1F PRE Outlet .00125 77. .1

STREAM REACH:

STORM ANALYSIS:
2-Yr 2.05 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

KINDRED CHURCH
1F PRE

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
1F PRE	0.001		0.092		9.95	0.20	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.795	0.05	0.05	0.06	0.06	0.06	0.07	0.07
9.839	0.08	0.09	0.10	0.10	0.11	0.12	0.13
9.883	0.14	0.15	0.16	0.17	0.17	0.18	0.18
9.928	0.19	0.19	0.20	0.20	0.20	0.20	0.20
9.972	0.19	0.19	0.19	0.19	0.19	0.19	0.19
10.016	0.19	0.19	0.19	0.18	0.18	0.17	0.16
10.060	0.15	0.14	0.13	0.13	0.12	0.11	0.10
10.104	0.10	0.10	0.09	0.09	0.09	0.08	0.08
10.149	0.08	0.08	0.08	0.08	0.07	0.07	0.07
10.193	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.237	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.281	0.07	0.07	0.07	0.06	0.06	0.06	0.06
10.325	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.458	0.06	0.05	0.05	0.05	0.05	0.05	0.05
10.502	0.05	0.05	0.05	0.05	0.05	0.05	

Area or Drainage Rain Gage Runoff ---------- Peak Flow ----------

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
1F PRE

STORM 2-Yr

SUB-AREA:

1F PRE	Outlet	.00125	77.	.1	

STREAM REACH:

Reach Identifier	Area (sq mi)	ID or Location	Amount (in)	Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.001		0.092		9.95	0.20	157.31

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.795	0.05	0.05	0.06	0.06	0.06	0.07	0.07
9.839	0.08	0.09	0.10	0.10	0.11	0.12	0.13
9.883	0.14	0.15	0.16	0.17	0.17	0.18	0.18
9.928	0.19	0.19	0.20	0.20	0.20	0.20	0.20
9.972	0.19	0.19	0.19	0.19	0.19	0.19	0.19
10.016	0.19	0.19	0.19	0.18	0.18	0.17	0.16
10.060	0.15	0.14	0.13	0.13	0.12	0.11	0.10
10.104	0.10	0.10	0.09	0.09	0.09	0.08	0.08
10.149	0.08	0.08	0.08	0.08	0.07	0.07	0.07
10.193	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.237	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.281	0.07	0.07	0.07	0.06	0.06	0.06	0.06

KINDRED CHURCH
1F PRE

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.325	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.458	0.06	0.05	0.05	0.05	0.05	0.05	0.05

```
WinTR-20: Version 1.10                  0         0         0.05
ED CHURCH                                                                (continued)
1F PRE
                                           STORM 2-Yr
SUB-AREA:
          1F PRE    Outlet              .00125    77.       .1

STREAM REACH:
    10.502      0.05      0.05      0.05      0.05      0.05      0.05
```

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
1F PRE

STORM 2-Yr

SUB-AREA:
1F PRE Outlet .00125 77. .1

STREAM REACH:

KINDRED CHURCH
1F PRE

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
1F PRE	0.001		0.20				
OUTLET	0.001		0.20				

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
1F PRE

STORM 2-Yr

SUB-AREA:

1F PRE	Outlet	.00125	77.	.1

STREAM REACH:

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
1F PRE

STORM 2-Yr

SUB-AREA:
1F PRE Outlet .00125 77. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: 1F PRE
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA 1F-PRE.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
1F PRE		Outlet	0.8	77	0.1

Total area: .80 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
1F PRE
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
1F PRE
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
1F PRE	0.20
REACHES	
OUTLET	0.20

ANACAL ENG

KINDRED CHURCH
1F PRE
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
1F PRE	0.20 9.95
REACHES	
OUTLET	0.20

KINDRED CHURCH
1F PRE
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
1F PRE	.80	0.100	77	Outlet	

Total Area: .80 (ac)

KINDRED CHURCH
1F PRE
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
1F PRE							
SHEET	100	0.0200	0.011				0.025
SHALLOW	125	0.0200	0.025				0.012
						Time of Concentration	0.1

KINDRED CHURCH
1F PRE
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
1F PRE	Open space; grass cover > 75% (good)	A	.28	39
	Paved parking lots, roofs, driveways	A	.52	98
	Total Area / Weighted Curve Number		.8	77
			==	==

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
KINDRED CHURCH
AREA 1F POST

SUB-AREA:
  DMA-AREA 1Outlet .00125 83. .1

STREAM REACH:

STORM ANALYSIS:
  2-Yr 2.05 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
  2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

KINDRED CHURCH
AREA 1F POST

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA-AREA 1	0.001		0.290		9.94	0.39	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.620	0.05	0.05	0.05	0.06	0.06	0.06	0.06
9.665	0.07	0.07	0.07	0.08	0.08	0.08	0.08
9.709	0.09	0.09	0.09	0.10	0.10	0.10	0.11
9.753	0.12	0.12	0.13	0.14	0.14	0.15	0.15
9.797	0.16	0.16	0.17	0.18	0.18	0.19	0.20
9.841	0.21	0.23	0.24	0.26	0.28	0.29	0.31
9.886	0.32	0.34	0.35	0.36	0.37	0.38	0.39
9.930	0.39	0.39	0.39	0.39	0.39	0.38	0.38
9.974	0.37	0.37	0.36	0.36	0.36	0.35	0.35
10.018	0.35	0.34	0.34	0.32	0.31	0.29	0.28
10.062	0.26	0.24	0.23	0.21	0.20	0.19	0.18
10.107	0.17	0.16	0.16	0.15	0.15	0.14	0.14
10.151	0.13	0.13	0.13	0.13	0.12	0.12	0.12
10.195	0.12	0.12	0.12	0.12	0.12	0.12	0.11
10.239	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.283	0.11	0.11	0.11	0.10	0.10	0.10	0.10
10.328	0.10	0.10	0.10	0.10	0.10	0.10	0.10
10.372	0.10	0.10	0.10	0.09	0.09	0.09	0.09
10.416	0.09	0.09	0.09	0.09	0.09	0.09	0.09
10.460	0.09	0.09	0.08	0.08	0.08	0.08	0.08
10.505	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.549	0.08	0.08	0.08	0.08	0.07	0.07	0.07
10.593	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.637	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.681	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.726	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.770	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.814	0.07	0.07	0.07	0.07	0.07	0.06	0.06
10.858	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.902	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.947	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.991	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.035	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.079	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.123	0.06	0.06	0.06	0.06	0.06	0.06	0.06

11.168	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.212	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.256	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.300	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.345	0.06	0.06	0.06	0.06	0.06	0.06	0.06

KINDRED CHURCH
AREA 1F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.389	0.06	0.05	0.05	0.05	0.05	0.05	0.05
11.433	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.477	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.521	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.566	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.610	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.654	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.698	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.742	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.787	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.831	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.875	0.05	0.05					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.001		0.290		9.94	0.39	314.33

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.620	0.05	0.05	0.05	0.06	0.06	0.06	0.06
9.665	0.07	0.07	0.07	0.08	0.08	0.08	0.08
9.709	0.09	0.09	0.09	0.10	0.10	0.10	0.11
9.753	0.12	0.12	0.13	0.14	0.14	0.15	0.15
9.797	0.16	0.16	0.17	0.18	0.18	0.19	0.20
9.841	0.21	0.23	0.24	0.26	0.28	0.29	0.31
9.886	0.32	0.34	0.35	0.36	0.37	0.38	0.39
9.930	0.39	0.39	0.39	0.39	0.39	0.38	0.38
9.974	0.37	0.37	0.36	0.36	0.36	0.35	0.35
10.018	0.35	0.34	0.34	0.32	0.31	0.29	0.28
10.062	0.26	0.24	0.23	0.21	0.20	0.19	0.18
10.107	0.17	0.16	0.16	0.15	0.15	0.14	0.14
10.151	0.13	0.13	0.13	0.13	0.12	0.12	0.12
10.195	0.12	0.12	0.12	0.12	0.12	0.12	0.11
10.239	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.283	0.11	0.11	0.11	0.10	0.10	0.10	0.10
10.328	0.10	0.10	0.10	0.10	0.10	0.10	0.10
10.372	0.10	0.10	0.10	0.09	0.09	0.09	0.09
10.416	0.09	0.09	0.09	0.09	0.09	0.09	0.09
10.460	0.09	0.09	0.08	0.08	0.08	0.08	0.08
10.505	0.08	0.08	0.08	0.08	0.08	0.08	0.08
10.549	0.08	0.08	0.08	0.08	0.07	0.07	0.07
10.593	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.637	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.681	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.726	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.770	0.07	0.07	0.07	0.07	0.07	0.07	0.07
10.814	0.07	0.07	0.07	0.07	0.07	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 1F POST

STORM 2-Yr

SUB-AREA:
DMA-AREA 1Outlet .00125 83. .1

STREAM REACH:

KINDRED CHURCH
AREA 1F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.858	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.902	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.947	0.06	0.06	0.06	0.06	0.06	0.06	0.06
10.991	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.035	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.079	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.123	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.168	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.212	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.256	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.300	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.345	0.06	0.06	0.06	0.06	0.06	0.06	0.06
11.389	0.06	0.05	0.05	0.05	0.05	0.05	0.05
11.433	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.477	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.521	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.566	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.610	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.654	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.698	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.742	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.787	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.831	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11.875	0.05	0.05					

WinTR-20 Printed Page File TR20.inp Beginning of Input Data List

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 1F POST

STORM 2-Yr

SUB-AREA:
DMA-AREA 1Outlet .00125 83. .1

STREAM REACH:

KINDRED CHURCH
AREA 1F POST

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
DMA-AREA 1	0.001		0.39				
OUTLET	0.001		0.39				

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WinTR-20: Version 1.10                0         0         0.05
ED CHURCH                                                          (continued)
AREA 1F POST
                                          STORM 2-Yr
SUB-AREA:
          DMA-AREA 1Outlet              .00125    83.       .1

STREAM REACH:
```

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 1F POST

STORM 2-Yr

SUB-AREA:
DMA-AREA 1Outlet .00125 83. .1

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: 1F
Project: KINDRED CHURCH
SubTitle: AREA 1F POST
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA 1F-POST.w55

Date: 9/18/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA-AREA 1		Outlet	0.8	83	0.1

Total area: .80 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA 1F POST
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA 1F POST
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA-AREA 1	0.39
REACHES	
OUTLET	0.39

KINDRED CHURCH
AREA 1F POST
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
DMA-AREA 1	0.39 9.94
REACHES	
OUTLET	0.39

KINDRED CHURCH
AREA 1F POST
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA-AREA 1	.80	0.100	83	Outlet	

Total Area: .80 (ac)

KINDRED CHURCH
AREA 1F POST
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA-AREA 1							
SHEET	100	0.0200	0.011				0.025
SHALLOW	125	0.0200	0.025				0.012
						Time of Concentration	0.1

KINDRED CHURCH
AREA 1F POST
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA-AREA 1	Open space; grass cover > 75% (good)	A	.2	39
	Paved parking lots, roofs, driveways	A	.6	98
	Total Area / Weighted Curve Number		.8	83
			==	==

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
KINDRED CHURCH
AREA 2F PRE

SUB-AREA:
  DMA-AREA 1Outlet .00203 39. .226

STREAM REACH:

STORM ANALYSIS:
  2-Yr 2.05 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
  2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

KINDRED CHURCH
AREA 2F PRE

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
DMA-AREA 1	0.002		0.0		24.00	0.0	0.0
OUTLET	0.002		0.0		24.00	0.0	0.0

KINDRED CHURCH
AREA 2F PRE

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
DMA-AREA 1	0.002		0.0				
OUTLET	0.002		0.0				

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL ENG
Project: KINDRED CHURCH
SubTitle: AREA 2F PRE
State: California
County: Orange
Filename: E:\Users\dave\AppData\Roaming\WinTR-55\19-155-AREA 2F-PRE.w55

Date: 9/19/2020
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
DMA-AREA 1		Outlet	1.3	39	.226

Total area: 1.30 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)	-Yr (in)
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
DMA-AREA 1	.00
REACHES	
OUTLET	.00

ANACAL ENG

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
DMA-AREA 1	.00 n/a
REACHES	
OUTLET	.00

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DMA-AREA 1	1.30	0.226	39	Outlet	

Total Area: 1.30 (ac)

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DMA-AREA 1							
SHEET	100	0.0200	0.150				0.204
SHALLOW	200	0.0250	0.050				0.022
						Time of Concentration	.226

KINDRED CHURCH
AREA 2F PRE
Orange County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DMA-AREA 1	Open space; grass cover > 75%	(good)	A	1.3	39
	Total Area / Weighted Curve Number			1.3	39

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
KINDRED CHURCH
AREA 2F POST

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

STORM ANALYSIS:
2-Yr 2.05 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

KINDRED CHURCH
AREA 2F POST

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
2F	0.001		1.078		9.92	0.99	855.15

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
8.143	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.187	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.231	0.05	0.06	0.06	0.06	0.06	0.06	0.06
8.275	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.319	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.364	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.408	0.06	0.07	0.07	0.07	0.07	0.07	0.07
8.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.541	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.585	0.07	0.08	0.08	0.08	0.08	0.08	0.08
8.629	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.673	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.717	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.762	0.08	0.08	0.09	0.09	0.09	0.09	0.09
8.806	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.850	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.894	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.938	0.09	0.09	0.09	0.10	0.10	0.10	0.10
8.983	0.10	0.10	0.10	0.10	0.10	0.10	0.10
9.027	0.10	0.10	0.10	0.10	0.10	0.10	0.10
9.071	0.10	0.10	0.10	0.10	0.11	0.11	0.11
9.115	0.11	0.11	0.11	0.11	0.11	0.11	0.11
9.159	0.11	0.11	0.11	0.11	0.11	0.11	0.12
9.204	0.12	0.12	0.12	0.12	0.12	0.12	0.12
9.248	0.12	0.12	0.12	0.12	0.12	0.12	0.12
9.292	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.336	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.381	0.13	0.14	0.14	0.14	0.14	0.14	0.14
9.425	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.469	0.14	0.15	0.15	0.15	0.15	0.15	0.15
9.513	0.15	0.15	0.15	0.16	0.16	0.16	0.17
9.557	0.17	0.18	0.18	0.19	0.19	0.20	0.20
9.602	0.21	0.21	0.21	0.22	0.22	0.23	0.23
9.646	0.24	0.25	0.26	0.28	0.29	0.29	0.30

9.690	0.31	0.32	0.32	0.33	0.34	0.34	0.35
9.734	0.37	0.38	0.40	0.41	0.43	0.45	0.47
9.778	0.49	0.50	0.51	0.53	0.54	0.55	0.56
9.823	0.57	0.59	0.62	0.65	0.68	0.72	0.76
9.867	0.79	0.83	0.86	0.89	0.92	0.94	0.96

KINDRED CHURCH
AREA 2F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
9.911	0.98	0.99	0.99	0.99	0.99	0.97	0.96
9.955	0.94	0.92	0.90	0.88	0.86	0.84	0.83
9.999	0.82	0.80	0.79	0.78	0.76	0.74	0.71
10.044	0.68	0.64	0.60	0.56	0.52	0.48	0.45
10.088	0.42	0.39	0.37	0.35	0.34	0.32	0.31
10.132	0.30	0.29	0.28	0.27	0.27	0.26	0.26
10.176	0.25	0.25	0.24	0.24	0.24	0.24	0.23
10.221	0.23	0.23	0.23	0.23	0.22	0.22	0.22
10.265	0.22	0.21	0.21	0.21	0.21	0.21	0.20
10.309	0.20	0.20	0.20	0.20	0.20	0.20	0.19
10.353	0.19	0.19	0.19	0.19	0.18	0.18	0.18
10.397	0.18	0.18	0.18	0.18	0.18	0.17	0.17
10.442	0.17	0.17	0.17	0.16	0.16	0.16	0.16
10.486	0.16	0.15	0.15	0.15	0.15	0.15	0.15
10.530	0.15	0.15	0.15	0.14	0.14	0.14	0.14
10.574	0.14	0.14	0.14	0.14	0.13	0.13	0.13
10.618	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.663	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.707	0.13	0.12	0.12	0.12	0.12	0.12	0.12
10.751	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.795	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.839	0.12	0.12	0.12	0.12	0.12	0.11	0.11
10.884	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.928	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.972	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.016	0.11	0.11	0.11	0.10	0.10	0.10	0.10
11.061	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.105	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.149	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.193	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.237	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.282	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.326	0.10	0.10	0.10	0.10	0.10	0.10	0.09
11.370	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.414	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.458	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.503	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.547	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.591	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.635	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.679	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.724	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.768	0.09	0.09	0.09	0.09	0.08	0.08	0.08
11.812	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.856	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.901	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.945	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.989	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.033	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.077	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.122	0.08	0.08	0.08	0.08	0.08	0.08	0.08

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

KINDRED CHURCH
AREA 2F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.166	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.210	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.254	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.298	0.08	0.08	0.08	0.08	0.07	0.07	0.07
12.343	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.387	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.431	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.475	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.519	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.564	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.608	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.652	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.696	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.741	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.785	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.829	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.873	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.917	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.962	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.006	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.050	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.094	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.138	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.183	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.227	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.271	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.315	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.359	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.404	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.448	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

13.492	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.536	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.581	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.625	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.669	0.06	0.06	0.05	0.05	0.05	0.05	0.05
13.713	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.757	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.802	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.846	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.890	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.934	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.978	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.023	0.05	0.05					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.001		1.078		9.92	0.99	855.15

KINDRED CHURCH
AREA 2F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
8.143	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.187	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.231	0.05	0.06	0.06	0.06	0.06	0.06	0.06
8.275	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.319	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.364	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.408	0.06	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

8.452	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.496	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.541	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.585	0.07	0.08	0.08	0.08	0.08	0.08	0.08
8.629	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.673	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.717	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.762	0.08	0.08	0.09	0.09	0.09	0.09	0.09
8.806	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.850	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.894	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.938	0.09	0.09	0.09	0.10	0.10	0.10	0.10
8.983	0.10	0.10	0.10	0.10	0.10	0.10	0.10
9.027	0.10	0.10	0.10	0.10	0.10	0.10	0.10
9.071	0.10	0.10	0.10	0.10	0.11	0.11	0.11
9.115	0.11	0.11	0.11	0.11	0.11	0.11	0.11
9.159	0.11	0.11	0.11	0.11	0.11	0.11	0.12
9.204	0.12	0.12	0.12	0.12	0.12	0.12	0.12
9.248	0.12	0.12	0.12	0.12	0.12	0.12	0.12
9.292	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.336	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.381	0.13	0.14	0.14	0.14	0.14	0.14	0.14
9.425	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.469	0.14	0.15	0.15	0.15	0.15	0.15	0.15
9.513	0.15	0.15	0.15	0.16	0.16	0.16	0.17
9.557	0.17	0.18	0.18	0.19	0.19	0.20	0.20
9.602	0.21	0.21	0.21	0.22	0.22	0.23	0.23
9.646	0.24	0.25	0.26	0.28	0.29	0.29	0.30
9.690	0.31	0.32	0.32	0.33	0.34	0.34	0.35
9.734	0.37	0.38	0.40	0.41	0.43	0.45	0.47
9.778	0.49	0.50	0.51	0.53	0.54	0.55	0.56
9.823	0.57	0.59	0.62	0.65	0.68	0.72	0.76
9.867	0.79	0.83	0.86	0.89	0.92	0.94	0.96
9.911	0.98	0.99	0.99	0.99	0.99	0.97	0.96
9.955	0.94	0.92	0.90	0.88	0.86	0.84	0.83
9.999	0.82	0.80	0.79	0.78	0.76	0.74	0.71
10.044	0.68	0.64	0.60	0.56	0.52	0.48	0.45
10.088	0.42	0.39	0.37	0.35	0.34	0.32	0.31

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

10.132	0.30	0.29	0.28	0.27	0.27	0.26	0.26
10.176	0.25	0.25	0.24	0.24	0.24	0.24	0.23
10.221	0.23	0.23	0.23	0.23	0.22	0.22	0.22
10.265	0.22	0.21	0.21	0.21	0.21	0.21	0.20
10.309	0.20	0.20	0.20	0.20	0.20	0.20	0.19
10.353	0.19	0.19	0.19	0.19	0.18	0.18	0.18

KINDRED CHURCH
AREA 2F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.397	0.18	0.18	0.18	0.18	0.18	0.17	0.17
10.442	0.17	0.17	0.17	0.16	0.16	0.16	0.16
10.486	0.16	0.15	0.15	0.15	0.15	0.15	0.15
10.530	0.15	0.15	0.15	0.14	0.14	0.14	0.14
10.574	0.14	0.14	0.14	0.14	0.13	0.13	0.13
10.618	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.663	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.707	0.13	0.12	0.12	0.12	0.12	0.12	0.12
10.751	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.795	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.839	0.12	0.12	0.12	0.12	0.12	0.11	0.11
10.884	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.928	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.972	0.11	0.11	0.11	0.11	0.11	0.11	0.11
11.016	0.11	0.11	0.11	0.10	0.10	0.10	0.10
11.061	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.105	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.149	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.193	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.237	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.282	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.326	0.10	0.10	0.10	0.10	0.10	0.10	0.09

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

11.370	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.414	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.458	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.503	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.547	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.591	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.635	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.679	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.724	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.768	0.09	0.09	0.09	0.09	0.08	0.08	0.08
11.812	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.856	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.901	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.945	0.08	0.08	0.08	0.08	0.08	0.08	0.08
11.989	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.033	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.077	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.122	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.166	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.210	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.254	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.298	0.08	0.08	0.08	0.08	0.07	0.07	0.07
12.343	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.387	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.431	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.475	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.519	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.564	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.608	0.07	0.07	0.07	0.07	0.07	0.07	0.07

KINDRED CHURCH
AREA 2F POST

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

12.652	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.696	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.741	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.785	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.829	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.873	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.917	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.962	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.006	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.050	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.094	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.138	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.183	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.227	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.271	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.315	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.359	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.404	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.448	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.492	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.536	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.581	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.625	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.669	0.06	0.06	0.05	0.05	0.05	0.05	0.05
13.713	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.757	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.802	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.846	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.890	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.934	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13.978	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.023	0.05	0.05					

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:
2F Outlet .00116 97. .1

STREAM REACH:

KINDRED CHURCH
AREA 2F POST

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
2F	0.001		0.99				
OUTLET	0.001		0.99				

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:

	2F	Outlet	.00116	97.	.1

STREAM REACH:

WinTR-20: Version 1.10 0 0 0.05
ED CHURCH (continued)
AREA 2F POST

STORM 2-Yr

SUB-AREA:

2F	Outlet	.00116	97.	.1	

STREAM REACH:

WinTR-55 Current Data Description

--- Identification Data ---

User: ANACAL
Project: KINDRED CHURCH
SubTitle: AREA 2F POST
State: California
County: Orange
Filename: <new file>

Date: 9/18/2020
Units: English
Areal Units: &Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
2F	PARKING LOT	Outlet	0.74	97	0.1

Total area: .74 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

KINDRED CHURCH
AREA 2F POST
Orange County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
2.05	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

ANACAL

KINDRED CHURCH
AREA 2F POST
Orange County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr
SUBAREAS	
2F	0.99
REACHES	
OUTLET	0.99

ANACAL

KINDRED CHURCH
AREA 2F POST
Orange County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (hr)
SUBAREAS	
2F	0.99 9.92
REACHES	
OUTLET	0.99

EXISTING HYDROLOGY MAP

AEC Z

GRAPHIC SCALE

60 40 20 0 30 60 120 180

(IN FEET)
1 INCH = 60 FT.

LEGEND

DRAINAGE BOUNDARY

1A / 0.70 AREA DESIGNATION ACRES

FLOW PATH

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:

CITY OF ANAHEIM B.M. NO. 4A-129

BRASS CAP MARKED CITY OF ANAHEIM BM, IN THE TOP OF CURB AT THE NORTHEAST BEGIN OF CURB RETURN SANTA ANA CANYON ROAD AND MOHLER DRIVE

ELEVATION: 324.14 FT. (NGVD 29)

OWNER OR DEVELOPER:

KINDRED COMMUNITY CHURCH
100 CHAPARALL COURT, STE.100
ANAHEIM, CA. 92808
CONTACT: DAVE MITCHELL

SOILS ENGINEER:

TGR GEOTECHNICAL
3037 S. HARBOR BLVD.
SANTA ANA, CALIFORNIA 92704
PH: 714-641-7189 FAX: 714-641-7190

PREPARED BY: JOB NO. 19-155

ANACAL ENGINEERING CO.
CIVIL ENGINEERING & LAND SURVEYING
1900 EAST LA PALMA AVENUE ~ SUITE 202 ~
ANAHEIM, CALIFORNIA 92805
PHONE: 714-774-1763
FAX: 714-774-4690
E-MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

ANACAL ENGINEERING Civil Engineering & Land Surveying Anaheim

EXISTING HYDROLOGY PLAN
KINDRED COMMUNITY CHURCH
8720 E. SANTA ANA CANYON ROAD

GRA

SHEET 1 OF 1

SCALE: 1" = 60' | DRAWN BY: GAG-VFL | CHECKED BY: D. C. Q.

CITY OF ANAHEIM

FOR CITY USE ONLY

PROPOSED HYDROLOGY MAP

AEC

GRAPHIC SCALE

60 40 20 0 30 60 120 180

(IN FEET)
1 INCH = 60 FT.

LEGEND

DRAINAGE BOUNDARY

1A / 0.70 AREA DESIGNATION / ACRES

FLOW PATH

EXHIBIT B PROPOSED HYDROLOGY

FOR CITY USE ONLY

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:

CITY OF ANAHEIM B.M. NO. 4A-129

BRASS CAP MARKED CITY OF ANAHEIM BM, IN THE TOP OF CURB AT THE NORTHEAST BEGIN OF CURB RETURN SANTA ANA CANYON ROAD AND MOHLER DRIVE

ELEVATION: 324.14 FT. (NGVD 29)

OWNER OR DEVELOPER:

KINDRED COMMUNITY CHURCH
100 CHAPARALL COURT, STE.100
ANAHEIM, CA. 92808
CONTACT: DAVE MITCHELL

SOILS ENGINEER:

TGR GEOTECHNICAL
3037 S. HARBOR BLVD.
SANTA ANA, CALIFORNIA 92704
PH: 714-641-7189 FAX: 714-641-7190

PREPARED BY: JOB NO. 19-155

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ANAHEIM, CALIFORNIA 92805
PHONE: 714-774-1763
FAX: 714-774-4690
E-MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

I HEREBY CERTIFY THAT:

1. THESE PLANS HAVE BEEN PREPARED UNDER MY SUPERVISION:
2. THE GRADING SHOWN HEREON WILL NOT DIVERT DRAINAGE FROM ITS NATURAL DOWNSTREAM COURSE OR OBSTRUCT THE DRAINAGE OF ADJACENT PROPERTIES:
3. ALL SPECIMEN TREES LOCATED ON THIS PROPERLY ARE SHOWN:
4. EXISTING GROUND CONTOURS AND ELEVATIONS WERE OBTAINED BY FIELD SURVEY ON/AERIAL TOPOGRAPHY FLOWN ON _____

ENGINEER: DAVID C. QUEYREL R.C.E.#42812 EXPIRATION DATE: 3-31-18

PRELIMINARY HYDROLOGY PLAN
KINDRED COMMUNITY CHURCH
8720 E. SANTA ANA CANYON ROAD

GRA

SHEET 1 OF 1

SCALE: 1" = 60' | DRAWN BY: GAG-VFL | CHECKED BY: D. C. Q.

CITY OF ANAHEIM

Attachment C

Kindred Community Church

Operations and Maintenance Plan

Site: 8712-8720 E. Santa Ana Canyon Rd.

APN: 354-321-01 & 354-321-03

Exhibit A, Operations and Maintenance Plan

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Inspection / Maintenance Activities Required	Person or Entity with Operation & Maintenance Responsibility
	Non-Structural Source Control BMPs			
Y	N1. Education for Property Owners, Tenants and Occupants	Once yearly and for new employees	Provide literature and instruction pertaining to environmental awareness included in Section VII, Educational Material to all Leassies.	Owner
Y	N2. Activity Restriction	Continuous	Activities to be restricted on-site include: Prohibit discharges of fertilizers, pesticides, or animal wastes to streets or storm drains. Prohibit blowing or sweeping of debris (leaf litter, grass clippings, litter, etc.) into streets and storm drains. Prohibit vehicle maintenance or repair within common area or such that pollutants can enter streets or storm drains. Report any violations relating to activity restrictions listed herein.	Owner
Y	N3. Common Area Landscape Management	Bi-weekly	Sweep silt and debris. Replace dead vegetation, maintain irrigation in proper working order	
Y	N4. BMP Maintenance	As indicated in WQMP	Provide maintenance as instructed in all sections of this plan.	Owner
N	N5. Title 22 CCR Compliance			
N	N7. Spill Contingency Plan			

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Inspection / Maintenance Activities Required	Person or Entity with Operation & Maintenance Responsibility
N	N8. Underground Storage Tank Compliance			
N	N9. Hazardous Materials Disclosure Compliance			
N	N10. Uniform Fire Code Implementation			
Y	N11. Common Area Litter Control	*Bi-weekly*	Keep grounds free of trash and debris	Owner
Y	N12. Employee Training	Upon hire	Provide all employees with literature consistent with their activities	Owner
N	N13. Housekeeping of Loading Docks			
Y	N14. Common Area Catch Basin Inspection	Once prior to rainy season October 15-April 15	Inspect catch basin storm drains and infiltration system clean and maintain in accordance with manufacturers recommendations	
Y	N15. Street Sweeping Private Streets and Parking Lots	Once prior to rainy season October 15-April 15	Sweep parking and drive areas. No hosing down of areas is allowed. Dispose of debris offsite.	Owner
N	N17. Retail Gasoline Outlets			
	Structural Source Control BMPs			
Y	Provide Storm Drain System Stenciling and Signage	Once Yearly	.Repaint when fades 50%	Owner

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Inspection / Maintenance Activities Required	Person or Entity with Operation & Maintenance Responsibility
N	Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction			
Y	Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction	Bi-weekly	Keep lids closed at all times. Provide signage that prohibits dumping of toxic materials. Clean spills with minimal water and wipe clean	
Y	Use Efficient Irrigation Systems & Landscape Design	Inspect monthly	Test for overspray, adjust , maintain and fix irrigation	Owner
N	Protect Slopes and Channels and Provide Energy Dissipation			
N	Loading Docks			
N	Maintenance Bays			
N	Vehicle Wash Areas			
N	Outdoor Processing Areas			
N	Equipment Wash Areas			
N	Fueling Areas			
N	Hillside Landscaping			
N	Wash Water Controls for Food Preparation Areas			

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Inspection / Maintenance Activities Required	Person or Entity with Operation & Maintenance Responsibility
N	Community Car Wash Racks			
	Low Impact Development (LID) and Treatment Control BMPs			
Y	Infiltration Control BMP # 1 Infiltration in Underground Chambers By Contech	After each significant storm event for the first year. At a minimum of once per year prior to rainy season Oct. 15 thereafter.	Verify Chambers do Infiltrate within 48 hours after storm event. Remove trash and Inspect drain inlets and remove debris . If standing water persists flush system and replace gravel media if required.	Owner
Y	Pre-Treatment control BMP #2 Filterra Bioretention System By Contech	Inspections performed once or twice per year (spring and fall). Depending on the schedule made after first year of activation.	Activation and first year maintenance is included. After the first year of maintenance, maintenance responsibly falls on the owner. This included inspecting the surrounding area and removing any trash or debris. Add mulch to a depth of 3”. Replace Filterra grates if applicable. See manufactures recommendations on Owners Manuel for more details in Section VII of the WQMP.	Owner

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Attachment D

Kindred Community Church

Soil Report

Site: 8712-8720 E. Santa Ana Canyon Rd.

APN: 354-321-01 & 354-321-03

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

August 10, 2016

Project No. 15-5382

Kindred Community Church
100 South Chaparral Court
Anaheim, CA 92808

Attention: Mr. Mark Vaughan

Subject: Percolation Testing, Lower Parking Area, Kindred Church, 8720 East Santa Ana Canyon Road, Anaheim, California.

References: Giles Engineering Associates, Inc., 2014, Geotechnical Feasibility Study, Proposed Site Development, 8720 East Santa Ana Canyon Road, Anaheim Hills, California, dated March 18, 2014.

Anacal Engineering, Topographic Survey.

Mark,

In accordance with your request and authorization, TGR Geotechnical, Inc. (TGR) has completed percolation testing at the subject site. The work was performed in accordance with our proposal dated August 8, 2016 and your subsequent authorization to proceed.

During our field investigation, it was observed that the subsurface soils consist of brown, moist, silty fine sand to the depth explored. Presented below are the details of our investigation.

Scope of Work

The scope of work for this percolation testing included the following:

- Excavation of one (1) exploratory hand auger boring to an approximate depth of 5 feet below existing grade to evaluate the existing soil conditions at the subject site.
- Evaluation of infiltration rate by performing percolation testing within the boring.
- Preparation of this report summarizing our findings, conclusions, and recommendations.

Field Investigation

Field exploration was performed on August 10, 2016 by representatives from our firm who logged the boring and obtained representative samples, which were subsequently transported to the laboratory for further review and testing. The approximate location of the boring is indicated on the enclosed Boring Location Map (Plate 1).

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DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
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www.tgrgeotech.com

The subsurface conditions were explored by drilling, sampling, and logging one (1) hand auger boring. The boring was advanced to approximately 5 feet below existing grade. Percolation testing took place within the boring. Subsequent to drilling, the boring was backfilled with cuttings.

Groundwater

No groundwater was encountered in our boring to a maximum depth of 5 feet below existing grade. Based on our review of available historical groundwater information (CDMG, 1998) regional groundwater is mapped approximately 20 feet below ground surface in the general site area. During a previous investigation (Giles Engineering Associates, 2014), groundwater was encountered in the general area at a depth of 18.5 feet below existing grade. Seasonal and long-term fluctuations in the groundwater may occur as a result of variations in subsurface conditions, rainfall, run-off conditions and other factors. Therefore, variations from these observations may occur.

Percolation Testing

Percolation testing was performed at the subject site. Presented below are the infiltration rates from the percolation tests performed at the subject site. These do not include any factor of safety.

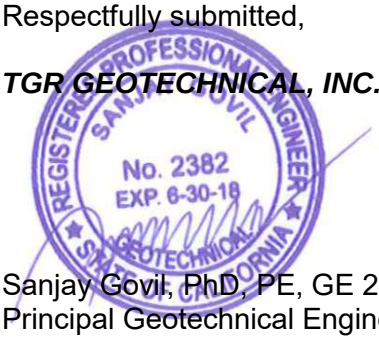
- P-1 at 0-5 feet 2.8 inches per hour

The infiltration test rates were determined utilizing the Orange County Technical Guidance Document (2011).

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

Respectfully submitted,

TGR GEOTECHNICAL, INC.



Sanjay Govil, PhD, PE, GE 2382
Principal Geotechnical Engineer

Attachments: Plate 1 – Boring Location Map

Distribution: (1) Addressee

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P-1 APPROXIMATE LOCATION OF PERCOLATION TEST

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

BORING LOCATION MAP
KINDRED COMMUNITY CHURCH
8720 EAST SANTA ANA CANYON ROAD, ANAHEIM, CALIFORNIA

PROJECT NO. 15-5382

PLATE 1

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

November 10, 2020

Project No. 15-5382

Kindred Community Church
100 South Chaparral Court
Anaheim, CA 92808

Subject: Percolation Testing Results for WQMP, Pavement Design and Building Expansion Foundation Recommendations, Kindred Church, 8720 East Santa Ana Canyon Road, Anaheim, California.

In accordance with your request and authorization, TGR Geotechnical, Inc. (TGR) has completed a geotechnical investigation to provide infiltration rates from percolation testing, asphalt concrete pavement design and Fellowship Hall main church building expansion foundation recommendations at the subject site. It is our understanding that the proposed improvements consist of the expansion of the central and southern parking lots, installation of three infiltration basins and the expansion of the main church building.

Based on our investigation the proposed improvements are feasible from a geotechnical standpoint provided the recommendations presented in this report are implemented during design and construction.

SCOPE OF SERVICES

Our scope of work included performing the following tasks:

- Site reconnaissance.
- Review of previous geotechnical reports for the subject site.
- Percolation testing in three (3) locations to a depth of approximately 10.5 feet below existing grade. Percolation testing followed the Orange County Technical Guidance Document, Appendix VII. The borings were be backfilled with soil cuttings and soil was disposed on-site.
- Sampling and logging two (2) hollow stem auger borings to a depth of approximately 5.5 feet below existing grade. The borings were backfilled with soil cuttings and sealed with cold patch asphalt upon completion. Any excess soil was disposed onsite.
- Laboratory testing of selected samples to include: in situ moisture and density, maximum dry density and optimum moisture content, shear, passing No. 200 sieve and R-Value.
- Preparation of this report presenting the results of percolation testing, infiltration rate from the percolation testing, pavement design recommendations for the proposed parking lot and geotechnical design recommendations for the proposed church building expansion.

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FIELD INVESTIGATION

Field exploration was performed on October 13, 2020 by representatives from our firm who logged the borings and obtained representative samples, which were subsequently transported to the laboratory for further review and testing. The approximate locations of the borings are indicated on the enclosed Geotechnical Map (Plate 1).

The subsurface conditions were explored by drilling, sampling, and logging two (2) borings with a truck mounted hollow stem drill rig to an approximate depth of five and one-half (5.5) feet below existing grade and three (3) borings to ten and one-half (10.5) feet below existing grade for percolation testing. Subsequent to drilling, all borings were backfilled with soil cuttings and the surface was repaired with cold patch asphalt, where appropriate. The logs of borings presenting soil conditions and descriptions are provided as Plates 2 through 6.

The drill rig was equipped with a sampling apparatus to allow for recovery of driven modified California Ring Sampler (CRS), 3-inch outside diameter, and 2.42-inch inside diameter samples. Driven samples and bulk samples of the earth materials encountered at selected intervals were recovered from the borings.

The samples were driven using an automatic 140-pound hammer falling freely from a height of 30 inches. The blow counts for CRS were converted to equivalent SPT blow counts. Soil descriptions were entered on the logs in general accordance with the Unified Soil Classification System (USCS). The locations and depths of the soil samples recovered are indicated on the logs on Plates 2 through 6.

PERCOLATION TESTING

Percolation testing was performed at the subject site utilizing the Porchet Method. Presented below are the infiltration rates from the percolation tests performed at the subject site. These do not include any factor of safety.

- P-1 at 0-10.5 feet 0.10 inches per hour
- P-2 at 0-10.5 feet 0.20 inches per hour
- P-3 at 0-10.5 feet 0.15 inches per hour

The infiltration test rates were determined in general accordance with Orange County Public Works Technical Guidance Document (2011).

LABORATORY TESTING

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to evaluate the geotechnical properties of the subsurface soils. The following tests were performed:

- In-situ moisture content (ASTM D2216) and dry density (ASTM D7263);
- Maximum Dry Density and Optimum Moisture Content (ASTM D1557);
- Direct Shear Strength (ASTM D3080);
- Expansion Potential (ASTM D4829);
- Passing No. 200 sieve (ASTM 1140);
- R-Value Determination (CAL 301); and
- Soluble Sulfate (CAL.417A).

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM Test Method D1557. The results of these tests are presented on Plate 7 and in the table below:

Sample Location	Sample Description	Maximum Dry Density (Pcf)	Optimum Moisture Content (%)
P-2 @ 0-5 feet	Clayey Sand	113.0	16.0

Direct Shear Tests: Direct shear test was performed on selected remolded and/or undisturbed sample, which was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1-hour prior to application of shearing force. The sample was tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inches per minute (depending upon the soil type). The test results are presented on Plate 8 and in the table below:

Sample Location	Sample Description	Friction Angle (degrees)	Apparent Cohesion (psf)
P-2 @ 0-5 feet	Remolded Shear – Clayey Sand	26	462

Expansion Index Tests: The expansion potential of selected materials was evaluated by the Expansion Index Test, ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch thick by 4-inch diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below:

Sample Location	Sample Description	Expansion Index	Expansion Potential
P-1 @ 0-5 feet	Clayey Sand	64	Medium

Wash Sieve Test: Typical materials were washed over No. 200 sieve (ASTM Test Method D1140). The test results are presented below:

Sample Location	% Passing No. 200 Sieve
P-1 @ 4 feet	45.5%
P-1 @ 9 feet	46.1%

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P-2 @ 4 feet	53.0%
P-2 @ 9 feet	59.0%
P-3 @ 4 feet	33.9%
P-3 @ 9 feet	43.5%

R-Value: The resistance "R"-Value was determined by the California Materials Method No. 301 for sub-grade soils. For the representative sample exudation pressure and "R"-Value was determined. The graphically determined "R"-Value at exudation pressure of 300 psi is summarized on Plates 9 and 10 and in the table below:

Sample Location	Sample description	R-Value
P-2 @ 0-5 feet	Clayey Sand	12

Soluble Sulfates: The soluble sulfate content of selected sample was determined by standard geochemical methods. The test results are presented on Plate 11 and in the table below:

Sample Location	Sample Description	Water Soluble Sulfate in Soil, (% by Weight)	Sulfate Content (ppm)	Exposure Class*
B-2 @ 0-5 feet	Clayey Sand	0.0173	173	S0

* Based on the current version of ACI 318-14 Building Code, Table No. 19.3.1.1; Exposure Categories and Classes.

EXISTING SITE CONDITION

The subject site consists of a Fellowship Hall church building and Workshop Center in the southeast portion of the property, a parking lot, nature walk and lake in the central portion of the property and Educational portable buildings in the southwest portion of the property.

The Fellowship Hall and Workshop Center were constructed on compacted artificial fill overlaying bedrock, designated as structural areas, while the remaining portions of the site are underlain by compacted artificial fill overlaying landslide debris and/or debris fill. Total removals of landslide material were made in the area of the above-mentioned structural pad in order to provide a buttress for the ascending slope to the south of the site. The approximate depth of the landslide debris in this area appears to have been in the 60 to 100 feet range. The limits of the buttress fill key extend to the north of the structural pad area approximately 60 to 100 feet. It appears that the northern limits of the structural pad are based on a 1:1 (horizontal: vertical) projection from the base of the landslide debris removals/toe of the fill key to the surface. The limits of the landslide debris removals and structural pad are presented on Plate 1.

The thickness of the remaining landslide debris to the north of the structural pad area is unknown since the mass grading plan review report for the site and surrounding areas was not available for review. However, based on the estimated depth of the removals of landslide debris

in the structural pad area we anticipate the thickness of the remaining landslide debris to the north to be similar in depth, ranging from 60 to 100 feet.

The thickness of the landslide debris on the west side of the site is also unknown since the mass grading plan review report for the site and surrounding areas was not available for review. However, based on our review of the CDMG report, the landslides on the west side of the site are similar in size to the landslides on the south side of the side. As such, we would anticipate that the thickness of the landslide debris on the west side of the site to be similar to that of the landslide debris on the south side.

The existing Fellowship Hall main church building was constructed in the structural fill area with foundations supported on two to three feet of remedially compacted engineered fill within the structural fill.

FINDINGS

Regional Geologic Setting

The subject site is located in the Anaheim Hills region, south of the Santa Ana River, within the northwestern portion of the Black Star Canyon 7.5-Minute Quadrangle, Orange County, California. Per the geologic map of the San Bernardino and Santa Ana 30' x 60' Quadrangles (Morton, 2006) the subject site is underlain by Quaternary alluvial deposits and possible mid-Miocene marine strata toward southern portions of the site (Figure 2).

Existing Soil

Based on our subsurface investigation, the subject site subsurface soils generally consist of tan to brown clayey sand and sandy clay in a moist condition to the maximum depth explored, 10.5 feet below existing grade. In the existing parking lot, in the vicinity of Borings B-1 and B-2, the clayey sand and sandy clay is underlain by blue grey and olive brown silty sand in a moist condition at a depth of 4 feet to 5.5 feet below existing grade. Detailed descriptions of the earth units encountered in our borings are presented in the log of the borings on Plates 2 through 6.

Groundwater

Subsurface water was not encountered during the exploration to a maximum depth of 10.5 feet below existing ground surface. Based on our review of available historical groundwater information for the Black Star Canyon 7.5-minute Quadrangle (CDMG, 2000) regional groundwater has been mapped in the general site area between approximately 20 to 40 feet below ground surface (Figure 3). Seasonal and long-term fluctuations in the groundwater may occur as a result of variations in subsurface conditions, rainfall, run-off conditions and other factors. Therefore, variations from our observations may occur.

Static groundwater is not anticipated to impact the proposed development.

Expansive Soil

Onsite soils have an expansion index of 64 correlating to a "medium" expansion potential. The recommendations provided in this report account for the expansion potential of the onsite soils.

RECOMMENDATIONS

Seismic Design Parameters

When reviewing the 2019 California Building Code the following data should be incorporated into the design.

Parameter	Value
Latitude (degree)	33.8635
Longitude (degree)	-117.7224
Site Class	D – Stiff Soil
Site Coefficient, F_a	1.0
Site Coefficient, F_v	N/A
Mapped Spectral Acceleration at 0.2-sec Period, S_s	1.927 g
Mapped Spectral Acceleration at 1.0-sec Period, S_1	0.679 g
Spectral Acceleration at 0.2-sec Period Adjusted for Site Class, S_{MS}	1.927 g
Spectral Acceleration at 1.0-sec Period Adjusted for Site Class, S_{M1}	N/A
Design Spectral Acceleration at 0.2-sec Period, S_{DS}	1.284 g
Design Spectral Acceleration at 1.0-sec Period, S_{D1}	N/A

Site Specific Response Spectra

The USGS Unified Hazard tool, the USGS RTGM Calculator and the USGS App for Deterministic Spectra Acceleration were utilized to develop site specific ground motion spectra. The analysis was performed utilizing the following attenuation relationships that are part of NGA as required by 2019 CBC code requirements.

- Campbell & Bozorgnia (2014)
- Boore, Stewart, Seyhan & Atkinson (2014)
- Chiou & Youngs (2014)
- Abrahamson, Silva & Kamal (2014)

The results of the Site Specific Response Spectra are incorporated in Tables 1 through 3 and on Figure 1 in Appendix B. The results include deterministic spectra at 5% damping, maximum rotated component at 0.84 fractile and the probabilistic spectra, maximum rotated component at 5% damping for a return period of 2475 year and subsequently multiplied by risk coefficient to obtain the MCER probabilistic spectral acceleration. The Vs30 utilized was 260 m/s.

The above generated spectral accelerations were compared against the minimum code requirements in ASCE7-16 (Chapters 11 and 21) resulting in the final design response spectra which is presented in Table 1 and on Figure 1 in Appendix B.

Based on Tables 1 through 3 and Figure 1, the recommended Site Specific S_{DS} and S_{D1} are as follows:

S_{DS} = 1.256
S_{D1} = 1.102

The structural consultant should review the above parameters and the 2019 California Building Code to evaluate the seismic design.

Conformance to the criteria presented in the above table for seismic design does not constitute any type of guarantee or assurance that significant structural damage or ground failure will not occur during a large earthquake event. The intent of the code is "life safety" and not to completely prevent damage of the structure, since such design may be economically prohibitive.

Pavement Design

Based on our field investigation and laboratory testing, presented below are the Asphalt Concrete (AC) pavement design recommendations for the proposed new central parking lot the expansion of the southern parking lot. The pavement section recommendations are based on the tested R-value of 12 for the anticipated pavement subgrade soils and assumed traffic index. The traffic indices shall be approved by the project civil engineer and the reviewing agency.

Pavement Utilization	Assumed Traffic Index	Asphalt Concrete (Inches)	Base (Inches)	Total Thickness (inches)
Parking Stalls	4.5	3.0	8.0	11.0
Drive Aisles	5.0	4.0	7.0	11.0

Aggregate base material for Asphalt Concrete Pavement should consist of CAB/CMB complying with the specifications in Section 200-2.2/200-2.4 of the current "Standard Specifications for Public Works Construction" and should be compacted to at least ninety-five (95) percent of the maximum dry density (ASTM D1557). The surface of the aggregate base should exhibit a firm and unyielding condition just prior to the placement of asphalt concrete paving.

The pavement subgrade should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM D1557) to a minimum depth of one (1) foot. Prior to placement of concrete, the subgrade soils should be moistened to 120 percent optimum moisture content and verified by our field representative.

The R-value and the associated pavement section should be confirmed at the completion of site grading

Church Building Expansion Foundation Design Recommendations

The proposed Fellowship Hall expansions are located to the northeast and southwest of the existing structure within the area of structural fill, shown on Plate 1. The proposed main church building expansion may be supported on continuous and/or spread footings. Bearing capacity recommendations for shallow foundations are presented below. These recommendations assume that the footings will be supported on a minimum of one (1) foot of engineered fill.

For foundations supported on one (1) foot of engineered fill with minimum ninety (90) percent relative compaction an allowable bearing pressure of 2000 pounds per square foot may be used in design.

All shallow foundations should extend a minimum of twenty-four (24) inches below the lowest adjacent grade. The minimum recommended footing width is eighteen (18) inches for continuous footing and eighteen (18) inches for pad footing. A minimum reinforcement of two (2) No. 4 steel bar top and two (2) No. 4 steel bar bottom is required for continuous footings from a geotechnical viewpoint. Foundation design details such as concrete strength, reinforcements, etc should be established by the Structural Engineer.

A one-third (1/3) increase on the aforementioned bearing pressure may be used in design for short-term wind or seismic loads.

The total and differential static and seismic settlement is anticipated to be 1-inch and 0.5-inches over 30 feet or less.

Resistance to lateral loads including wind and seismic forces may be provided by frictional resistance between the bottom of concrete and the underlying fill soils and by passive pressure against the sides of the foundations. A coefficient of friction of 0.33 may be used between concrete foundation and underlying soil. The recommended passive pressure of the engineered fill may be taken as an equivalent fluid pressure of 250 pounds per cubic foot (2,500 psf max).

Any footing excavation adjacent to existing continuous footings may require slot cutting (A-B-C slots). As an alternative, shoring or underpinning of existing footings is recommended.

All foundations excavations shall be approved prior to placement of concrete by the geotechnical consultant. Additional recommendations may be provided if unusual conditions were observed/encountered during excavation

Slab-On-Grade

Slab-on-grade should be a minimum of 5-inches thick and reinforced with a minimum of No. 4 reinforcing bar on 12-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The slab should not be structurally connected to the buildings. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of two (2) feet. Prior to placement of concrete, the subgrade soils should be moistened to 120 percent optimum moisture content and verified by our field representative. The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition and the anticipated use of the building. For moisture sensitive flooring, the floor slab should be underlain by minimum 15-mil impermeable polyethylene membrane (Stego Wrap, Moistop Plus, or any equivalent meeting the requirements of ASTM E1745, Class A rating) as a capillary break. Sand/gravel/aggregate base may be placed above and below the impermeable polyethylene membrane at the discretion of the project structural engineer/concrete contractor for proper curing and finish of the concrete slab-on-grade and protection of the membrane and is considered outside the scope of geotechnical engineering.

Due to the presence of medium expansive soils, more than normal movement of the flatwork is anticipated. This may be limited by placing a thickened edge (minimum 12-inches) and/or 6-inches of base under the flatwork.

The slab-on-grade foundation shall comply with section 1808.6.2 of the CBC (2019) and shall be designed in accordance with WRI/CRSI Design of Slab-on-Ground Foundations. As an alternate the slab-on-grade shall be supported on minimum 2 feet of non-expansive soil to reduce the impact of expansive soils.

Flatwork

Flatwork should be a minimum of 4-inches thick should be reinforced with a minimum of No. 3 reinforcing bar on 18-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The subgrade material should be compacted to a minimum of 90 percent of the maximum laboratory dry density (ASTM D1557) to a minimum depth of one (1) foot. Prior to placement of concrete, the subgrade soils should be moistened to 120 percent optimum moisture content and verified by our field representative. The actual thickness and reinforcement of the slab shall be designed by the structural engineer and should include the anticipated loading condition. Due to the presence of medium expansive soils, more than normal movement of the flatwork is anticipated. This may be limited by placing a thickened edge (minimum 12-inches) and/or 6-inches of base under the flatwork.

Cement Type and Corrosion

Concrete used should be designed in accordance with the provisions of ACI 318-14, Chapter 19 for Exposure Class S0 with a minimum unconfined compressive strength of 2,500 psi.

TGR does not practice corrosion engineering. If needed, a qualified specialist should review the site conditions and evaluate the corrosion potential of the site soil to the proposed improvements and to provide the appropriate corrosion mitigations for the project.

Expansion Potential

Soils onsite have an expansion index of 64, which correlates to a “medium” expansion potential. The slab-on-grade foundation shall comply with section 1808.6.2 of the CBC (2019) and shall be designed in accordance with WRI/CRSI Design of Slab-on-Ground Foundations. As an alternate the slab-on-grade shall be supported on minimum 2 feet of non-expansive soil to reduce the impact of expansive soils.

Site Development Recommendations

Earthwork and Demolition

Within the proposed development and demolition area, all foundations, slab-on-grade, vaults, utility lines, surface vegetation, trash, demolition debris, asphaltic concrete and Portland cement concrete should be cleared and removed from the proposed site.

Depressions resulting from the removal of objects encountered as mentioned above should be backfilled with properly compacted engineered fill under the testing and observation of the geotechnical consultant of record.

During earthwork construction, all site preparation and the general procedures of the contractor should be observed, and the fill and base selectively tested by a representative of TGR. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and/or additional recommendations will be offered.

Grading

All grading should conform to the guidelines presented in the California Building Code (2019 edition), except where specifically superseded in the text of this report. Prior to grading, TGR's representative should be present at the pre-construction meeting to provide grading guidelines, if needed, and review any earthwork.

At a minimum, the upper two (2) feet of soil under slab-on-grade, one (1) foot of soil under footings, flatwork and asphalt concrete pavement should be removed and replaced as engineered fill, compacted to minimum 90 percent relative compaction and moisture conditioned to 120 percent optimum moisture content per ASTM D1557. Site soils could be reused as engineered fill provided the recommendations presented in this report are implemented. Exposed bottoms should be scarified a minimum of 8-inches, moisture conditioned to 120 percent optimum moisture content and compacted to a minimum 90 percent relative compaction. Subsequently, site fill soils should be re-compacted to a minimum of 90 percent relative compaction at 120 percent optimum moisture content.

The depth of over-excavation should be reviewed by the Geotechnical Consultant during the actual construction. Any subsurface obstruction buried structural elements, and unsuitable material encountered during grading, should be immediately brought to the attention of the Geotechnical Consultant for proper exposure, removal and processing, as recommended.

Fill Placement

Prior to any fill placement TGR should observe the exposed surface soils. The site soils may be re-used as engineered fill provided they are free of organic content and particle size greater than 4-inches. Fill shall be moisture-conditioned to 120 percent optimum moisture content and compacted to a minimum relative compaction of 90 percent in accordance with ASTM D1557. Any import soils shall be non-expansive and approved by TGR Geotechnical Inc.

Compaction

Prior to fill placement, the exposed surface should be scarified to a minimum depth of eight (8) inches, fill placed in eight (8) inch loose lifts, moisture conditioned to 120 percent optimum moisture content and compacted to a minimum relative compaction of 90 percent in accordance with ASTM D 1557.

Temporary Excavation and Shoring

Temporary construction excavations may be anticipated during the proposed development. Site soils may be cut vertically without shoring to a depth of approximately four (4) feet below adjacent surrounding grade. For deeper cuts, the slopes should be properly shored or the entire excavation sloped back to at least 1.5H:1V (Horizontal: Vertical) or flatter. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. No surcharge loads should be permitted within a horizontal distance equal to the height of cut from the toe of excavation unless the cut is properly shored. Excavations that extend below an

imaginary plane inclined at 45 degrees below the edge of any nearby adjacent existing site facilities should be properly shored to maintain foundation support at the adjacent structures. Any excavation adjacent to existing continuous footings may require slot cutting (A-B-C slots).

Geotechnical Review of Plans

All grading plans and specifications should be reviewed and accepted by the geotechnical consultant before they are finalized to determine if the geotechnical and/or geologic information have been properly implemented. If this firm is not granted the privilege of reviewing the plans and specifications, this firm is not responsible for misinterpretation of the recommendations given in this report.

Geotechnical Observation/Testing During Construction

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, periodic special inspection shall be performed to:

- Verify materials below shallow foundations are adequate to achieve the design bearing capacity;
- Verify excavations are extended to the proper depth and have reached proper material;
- Verify classification and test compacted materials; and
- Prior to placement of compacted fill, inspect subgrade and verify that the site has been prepared properly

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, continuous special inspection shall be performed to:

- Verify use of proper materials, densities and lift thickness during placement and compaction of compacted fill.

The geotechnical consultant should also perform observation and/or testing at the following stages:

- During any grading and fill placement;
- During utility trench excavation and backfill;
- After foundation excavation and prior to placing concrete;
- During placement of aggregate base and asphalt paving;
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

LIMITATIONS

This report has been prepared for the exclusive use of Kindred Community Church and their design consultants relative to developing the subject site. No portion of this report may be used by other parties or for other purposes. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify TGR from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of TGR.

TGR considered a number of unique, project-specific factors when establishing the scope of services for this report. This report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties.

This report was necessarily based in part upon data obtained from a limited number of observances, site visits, soil and/or other samples, tests, analyses, histories of occurrences, spaced subsurface exploration and limited information on historical events and observations. Such information is necessarily incomplete. Variations can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can and do occur over time.

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

Respectfully submitted,

TGR GEOTECHNICAL, INC.

REGISTERED PROFESSIONAL ENGINEER
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No. GE2382
EXP. 6/30/2022
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL GEOLOGIST
EDWARD LOUIS BURROWS
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CERTIFIED ENGINEERING GEOLOGIST
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Sanjay Govil, PhD, PE, GE 2382
Principal Geotechnical Engineer

Edward L. Burrows, M.S, PG, CEG 1750
Principal Engineering Geologist

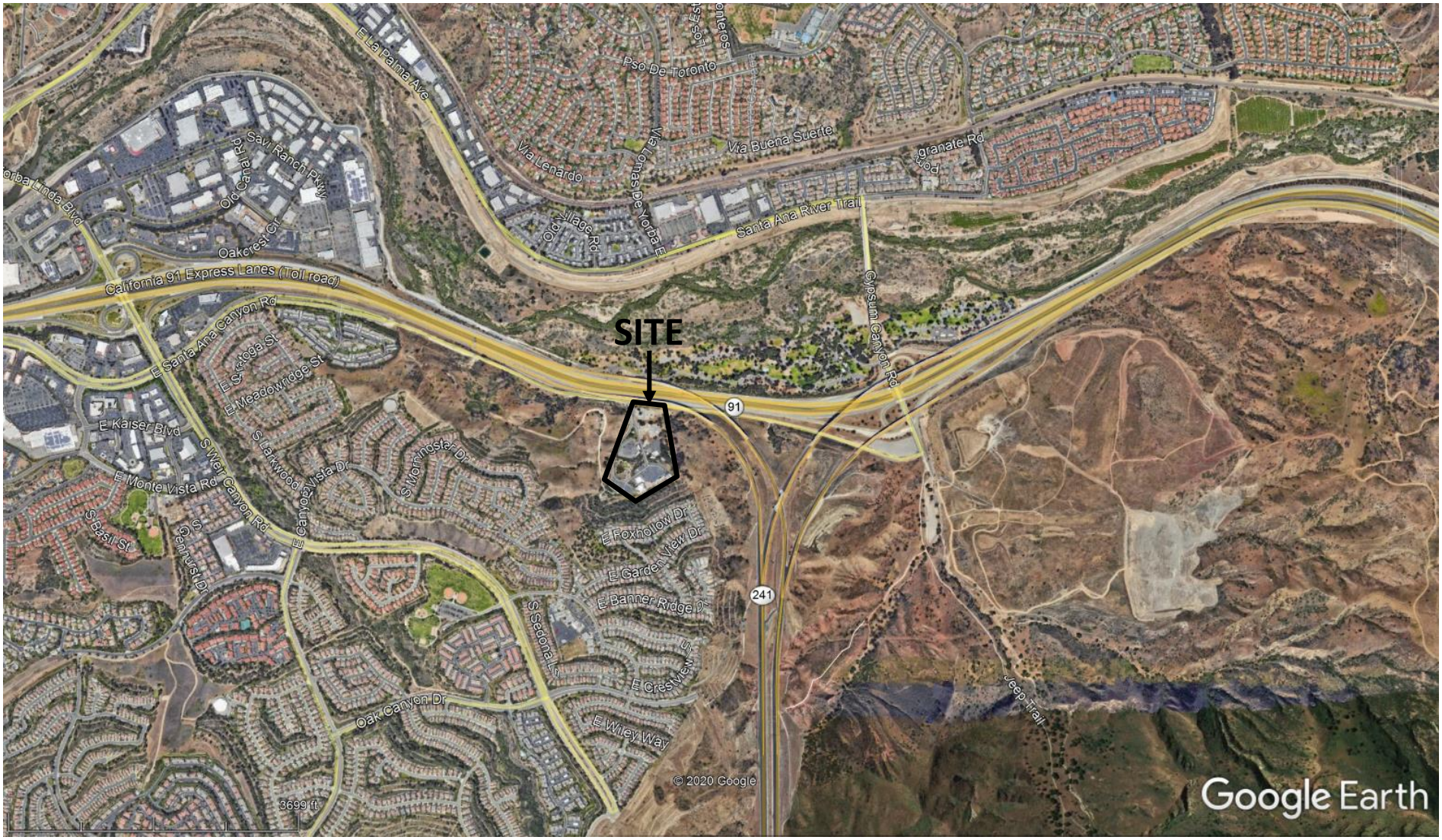
Attachments: Figure 1 – Site Location Map
Figure 2 – Regional Geology Map
Figure 3 – Historic High Groundwater Map

Plate 1 – Geotechnical Map
Plates 2 through 6 – Boring Logs
Plate 7 – Maximum Dry Density and Optimum Moisture Content
Plate 8 – Direct Shear Test Results
Plates 9 and 10 – R-Value Test Results
Plate 11 – Analytical Report for Soluble Sulfates

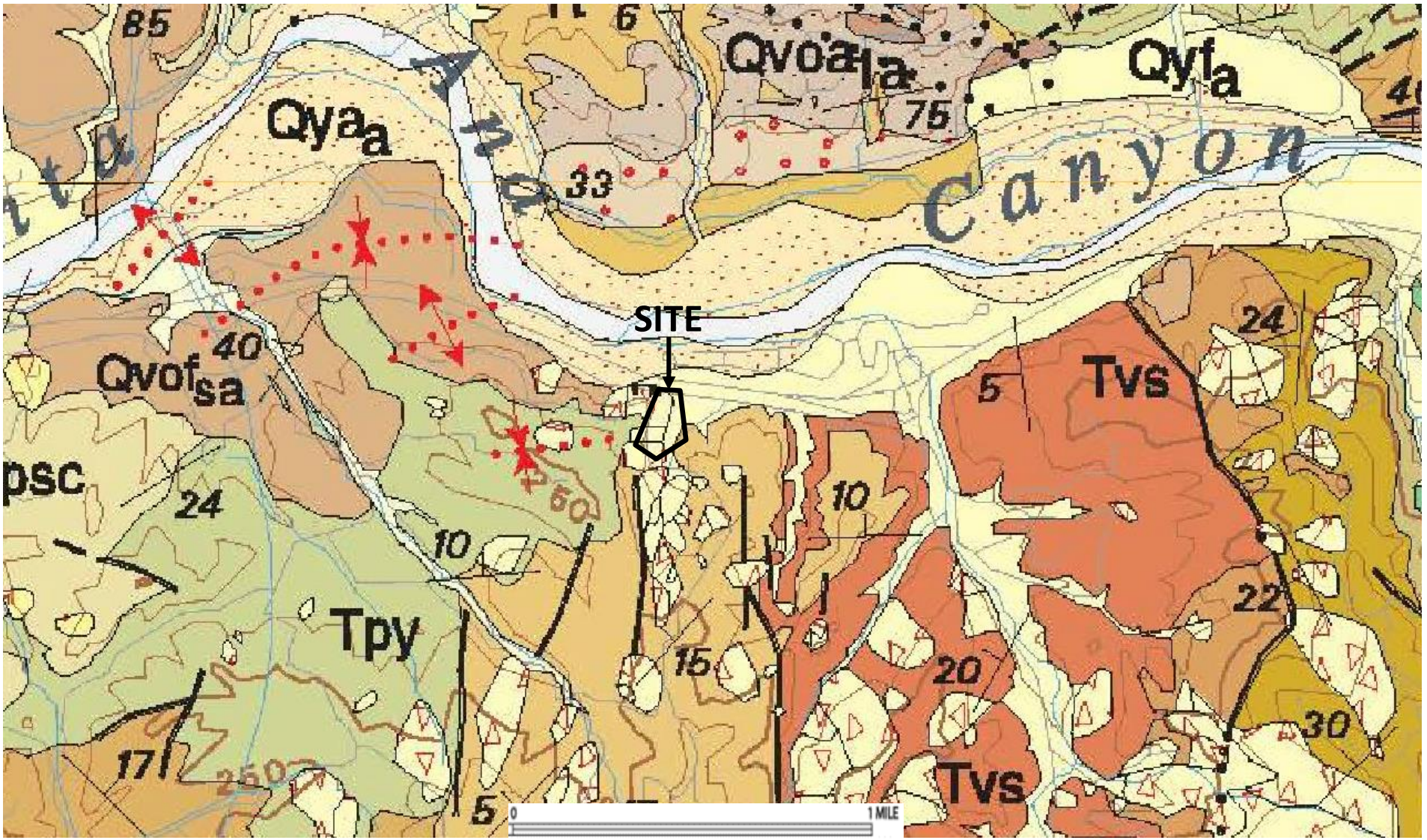
Table 1 – Percolation Test Worksheet

Appendix A – References
Appendix B – Site Seismic Design and De-Aggregated Parameters

Distribution: (1) Addressee



TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection	SITE LOCATION MAP KINDRED CHURCH, 8720 E. SANTA ANA CANYON ROAD, ANAHEIM, CALIFORNIA	PROJECT NO. 15-5382 FIGURE 1



Morton, D.M., and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey, Open-File Report OF-2006-1217, scale 1:100,000.

TGR
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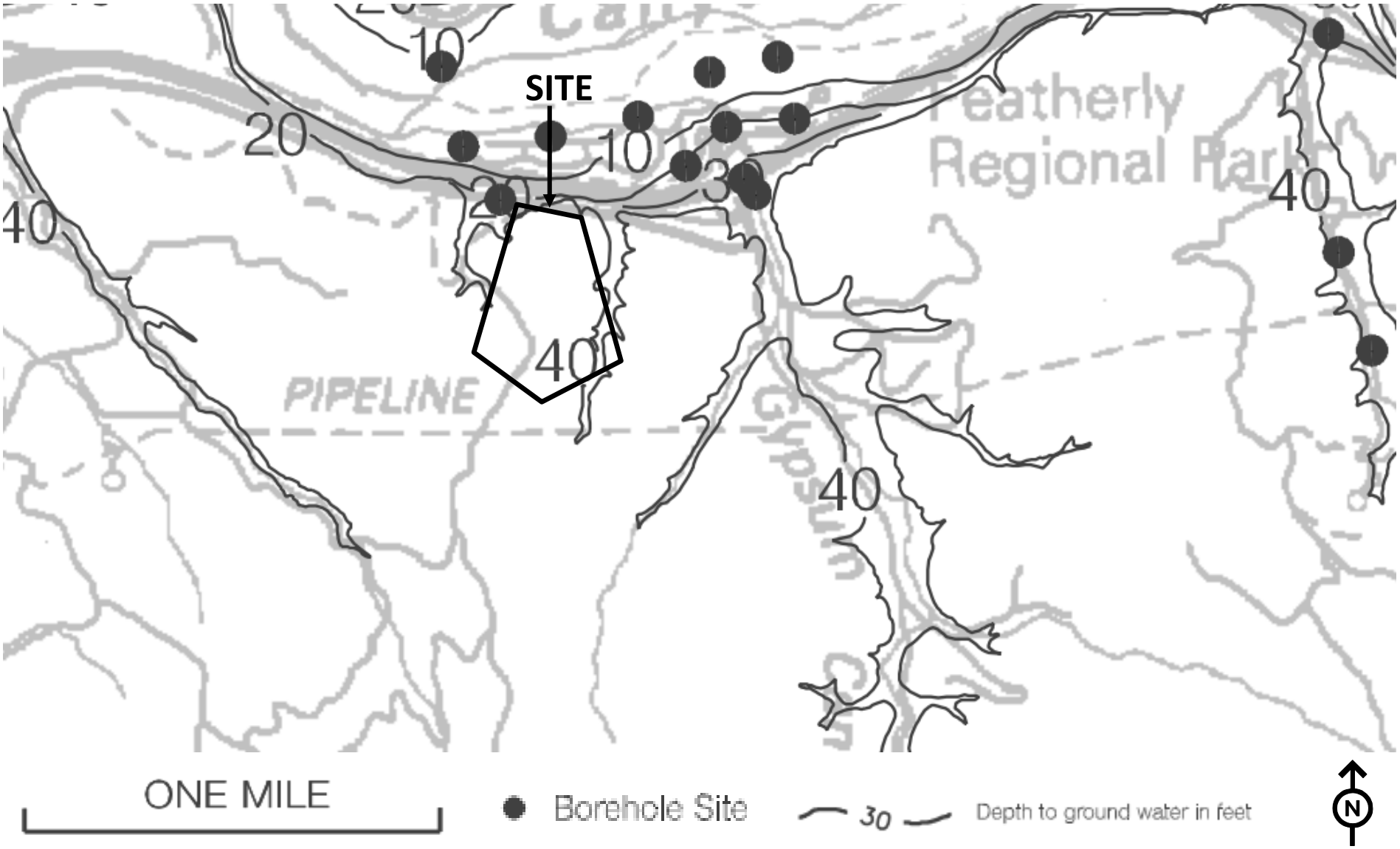
Material Testing
Construction Inspection

REGIONAL GEOLOGY MAP
KINDRED CHURCH, 8720 E. SANTA ANA CANYON ROAD, ANAHEIM, CALIFORNIA

PROJECT NO. 15-5382

FIGURE 2



Modified From: California Department of Conservation, Division of Mines and Geology, 2000, Seismic Hazard Zone Report for the Black Star Canyon 7.5-Minute Quadrangle, Los Angeles and Orange Counties, California, Report 046.

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

HISTORIC HIGH GROUNDWATER MAP
KINDRED CHURCH, 8720 E. SANTA ANA CANYON ROAD, ANAHEIM, CALIFORNIA

PROJECT NO. 15-5382

FIGURE 3

MAP LEGEND

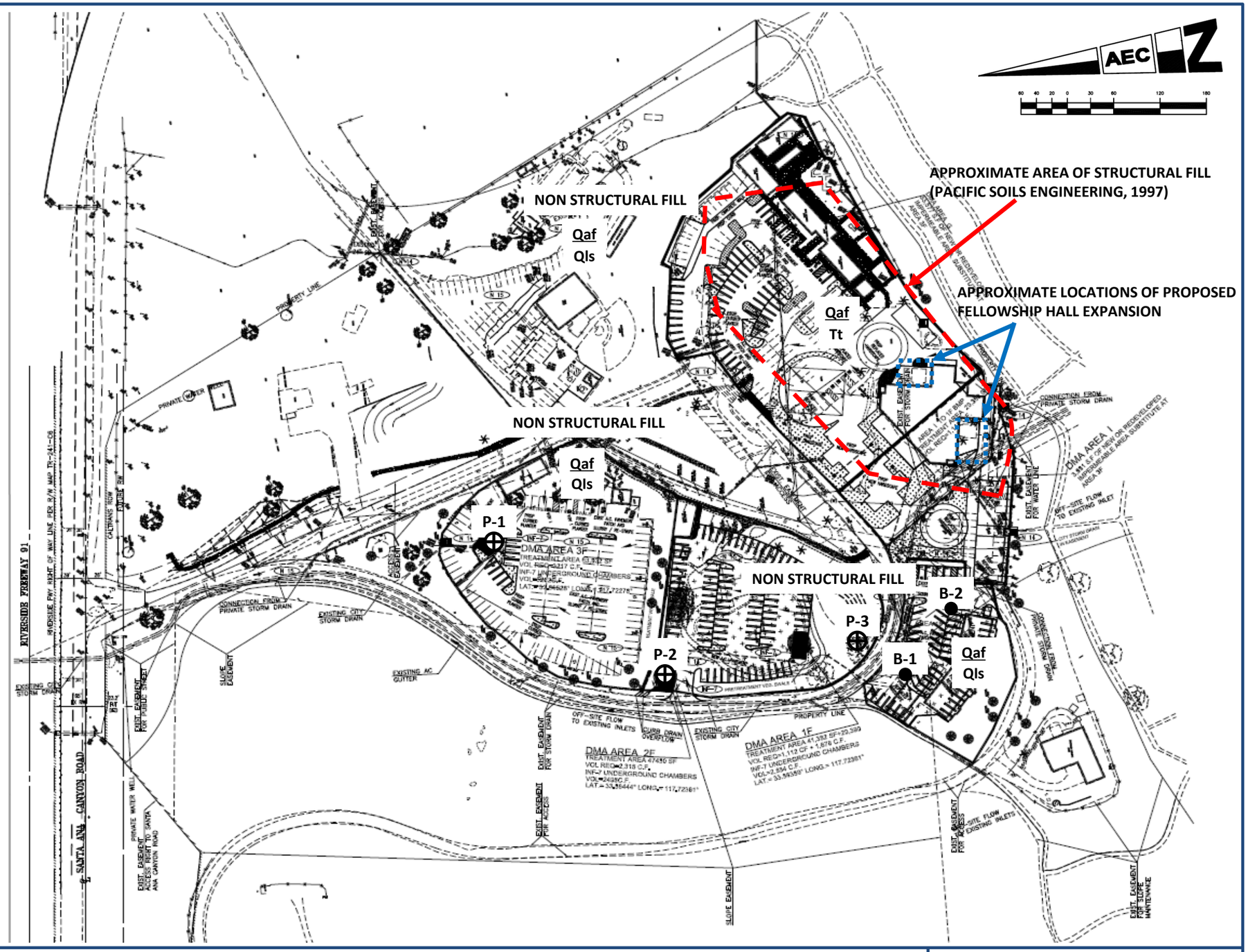
Qaf ARTIFICAL FILL

Qls LANDSLIDE DEBRIS

Tt TOPANGA FORMATION

B-2 ● APPROXIMATE LOCATION OF GEOTECHNICAL BORING

P-3 ⊕ APPROXIMATE LOCATION OF PERCOLATION BORING



Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

GEOTECHNICAL MAP
KINDRED CHURCH, 8720 E. SANTA ANA CANYON ROAD
ANAHEIM, CALIFORNIA

Project No. 15-5382

PLATE 1

LOG OF EXPLORATORY BORING B - 1

Project Number: **15-5382**
Project Name: **Kindred Community Church, Anaheim**
Date Drilled: **10/13/20 - 10/13/20**
Ground Elev:

Logged By: **RA**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Surface is 2 inches of asphalt over 12 inches of base.			
							Gravelly Sand- grey brown, moist, medium dense, fine to medium grained sand, fine to coarse grained gravel.			
				34		SC	Sand and Clay- grey brown sand, blue grey clay, moist, dense, fine to coarse grained sand, some gravel and clasts.	15	117	
5				41		SM	Silty Sand- blue grey and brown, moist, dense, fine grained sand with trace coarse.	14	118	
							Total Depth: 5.5 feet. No groundwater encountered during drilling. No caving observed. Boring backfilled with soil cuttings and sealed with cold patch asphalt upon completion.			
10										

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 2

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING B - 2

Project Number: **15-5382**
Project Name: **Kindred Community Church, Anaheim**
Date Drilled: **10/13/20 - 10/13/20**
Ground Elev:

Logged By: **RA**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Surface is 3 inches over 4 inches of base.			
							Clayey Sand- brown, very moist, medium dense, fine grained, some fine to coarse grained gravel.			
							...Same as above, blue grey clay.			
			■	25		SC		18	113	S04
							Silty Sand- olive brown, moist, medium dense, fine grained, some coarse.			
5			■	27		SM		14	115	
							Total Depth: 5.5 feet. No groundwater encountered during drilling. No caving observed. Boring backfilled with soil cuttings and sealed with cold patch asphalt upon completion.			
10										

LOG OF BORING 15-5382 KINDRED CHURCH ANAHEIM.GPJ TGR GEOTECH.GDT 10/21/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 3

TGR GEOTECHNICAL, INC.

LOG OF EXPLORATORY BORING P - 1

Sheet **1** of **1**

Project Number:	**15-5382**	Logged By:	**RA**
Project Name:	**Kindred Community Church, Anaheim**	Project Engineer:	**SG**
Date Drilled:	**10/13/20 - 10/13/20**	Drill Type:	**Hollow Stem**
Ground Elev:		Drive Wt & Drop:	**140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Surface is a planter with 6 inches of mulch and topsoil.			
							Clayey Sand with Gravel- tan, moist, medium dense, fine grained sand, fine to coarse grained gravel.			
5				46		SC	Clayey Sand- tan brown, very moist, dense, some fine grained gravel and clasts, orange oxidation.	18	110	-200= 45.5%
10				53		SC	...Same as above, very dense, some blue grey sand.	10	123	-200= 46.1%
							Organic Clay- black, moist, hard, some fine grained gravel, pieces of organic material.			
							Total Depth: 10.5 feet. No groundwater encountered during drilling. No caving observed. Boring utilized for percolation testing. Boring backfilled with soil cuttings upon completion.			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 4

TGR GEOTECHNICAL, INC.

LOG OF BORING 15-5382 KINDRED CHURCH ANAHEIM.GPJ TGR GEOTECH.GDT 10/21/20

LOG OF EXPLORATORY BORING P - 2

Sheet **1** of **1**

Project Number:	**15-5382**	Logged By:	**RA**
Project Name:	**Kindred Community Church, Anaheim**	Project Engineer:	**SG**
Date Drilled:	**10/13/20 - 10/13/20**	Drill Type:	**Hollow Stem**
Ground Elev:		Drive Wt & Drop:	**140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Surface is a dirt and vegetation area.			
							Clayey Sand- tan, moist, medium dense, fine grained sand, fine to coarse grained gravel and clasts.			Max, R-Value, Shear, EI
5				51		CL-ML	Clayey Silt and Sand- tan silt, dark grey clay, moist, hard, very fine grained sand, orange oxidation.	16	110	-200= 53.0%
							Clayey Sand- brown, moist, dense, fine grained sand, fine to coarse grained gravel.			
10				46		CLS	Sandy Clay- tan, very moist, dense, fine grained sand, orange oxidation.	18	106	-200= 59.0%
							Total Depth: 10.5 feet. No groundwater encountered during drilling. No caving observed. Boring utilized for percolation testing. Boring backfilled with soil cuttings upon completion.			

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 5

TGR GEOTECHNICAL, INC.

LOG OF BORING 15-5382 KINDRED CHURCH ANAHEIM.GPJ TGR GEOTECH.GDT 10/21/20

LOG OF EXPLORATORY BORING P - 3

Project Number: **15-5382**
Project Name: **Kindred Community Church, Anaheim**
Date Drilled: **10/13/20 - 10/13/20**
Ground Elev:

Logged By: **RA**
Project Engineer: **SG**
Drill Type: **Hollow Stem**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

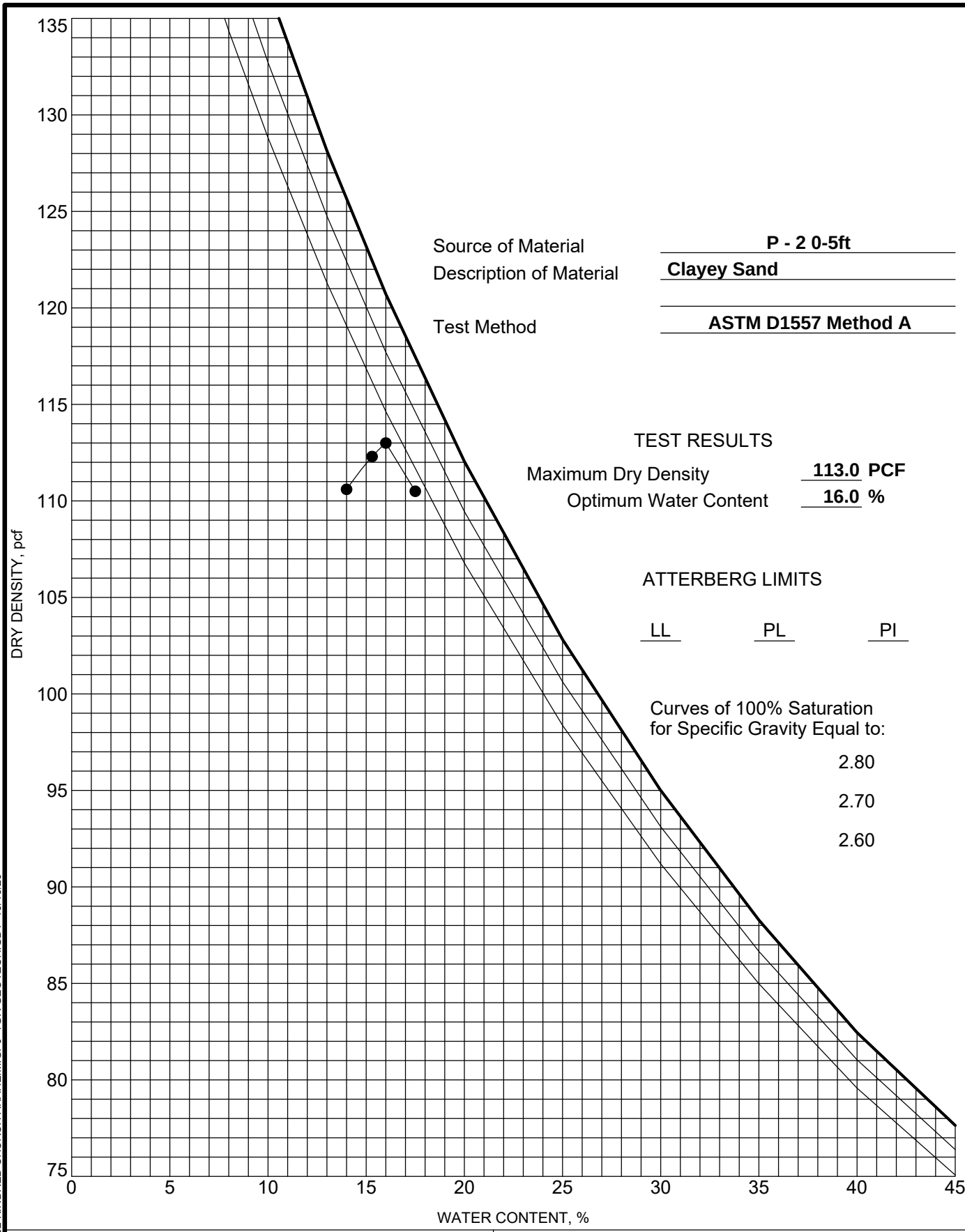
Depth (ft)	Graphic Log	FIELD RESULTS: Bulk Sample	Drive Sample	SPT blows/ft (or equivalent N)	Pocket Pen (tsf)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	LAB RESULTS: Moisture Content (%)	Dry Density, (pcf)	Other Tests
							Surface is a dirt and vegetation covered area.			
							Clayey Sand- tan, moist, medium dense, fine grained, fine to coarse pieces of caliche.			
5				22		SC	...Same as above, no caliche.	11	103	-200= 33.9%
10				29		SC	Clayey Sand- light brown sand, blue grey clay, moist, medium dense, fine grained sand, fine to coarse grained gravel and clasts, orange oxidation.	16	116	-200= 43.5%
							Total Depth: 10.5 feet. No groundwater encountered during drilling. No caving observed. Boring utilized for percolation testing. Boring backfilled with soil cuttings upon completion.			

LOG OF BORING 15-5382 KINDRED CHURCH ANAHEIM.GPJ TGR GEOTECH.GDT 10/21/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

PLATE 6

TGR GEOTECHNICAL, INC.



Source of Material: **P - 2 0-5ft**

Description of Material: **Clayey Sand**

Test Method: **ASTM D1557 Method A**

TEST RESULTS

Maximum Dry Density: **113.0 PCF**

Optimum Water Content: **16.0 %**

ATTERBERG LIMITS

LL PL PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

US COMPACTION 15-5382 KINDRED CHURCH ANAHEIM.GPJ TGR GEOTECH.GDT 10/16/20

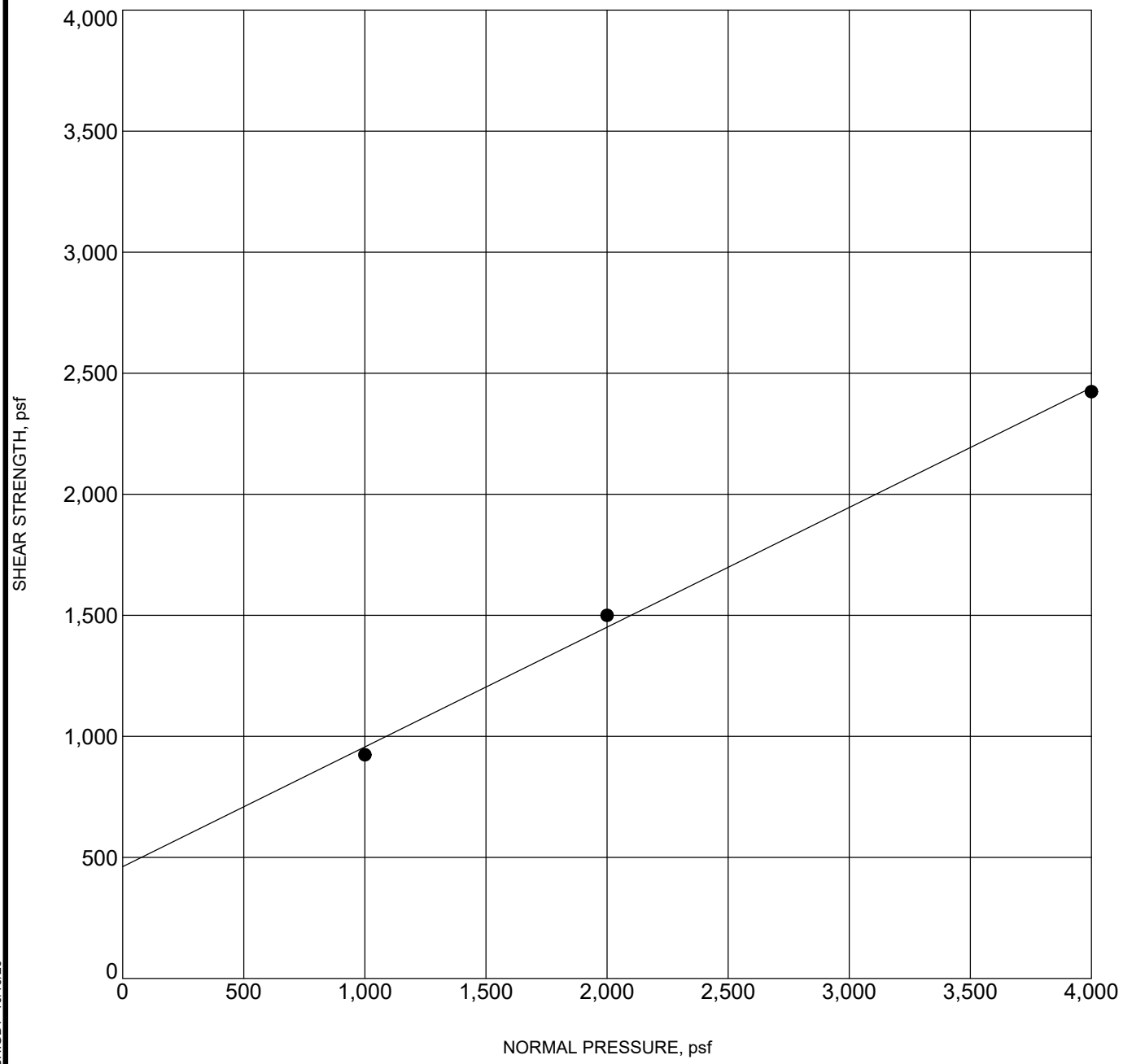
TGR GEOTECHNICAL, INC.
3037 S. Harbor Blvd
Santa Ana, CA 92704
Telephone: 714-641-7189
Fax: 714-641-7190

MOISTURE-DENSITY RELATIONSHIP

Project Number: 15-5382

PLATE 7

Project Name: Kindred Community Church, Anaheim



Specimen Identification	Classification	γ_d	MC%	c	ϕ
● **P - 2 0-5**	**Clayey Sand - Remolded - 90% RC**	**102**	**16**	**462**	**26**

TGR GEOTECHNICAL, INC.
3037 S. Harbor Blvd
Santa Ana, CA 92704
Telephone: 714-641-7189
Fax: 714-641-7190

DIRECT SHEAR TEST

Project Number: 15-5382

PLATE 8

Project Name: Kindred Community Church, Anaheim

R - VALUE DATA SHEET

LaBelle Marvin

PROJECT No. 46558

DATE: 10/16/2020

BORING NO. 15-5382

Kindred Community Church

SAMPLE DESCRIPTION: Brown Sandy Clay

R-VALUE TESTING DATA | CA TEST 301	SPECIMEN ID		
	a	b	c
Mold ID Number	16	17	18
Water added, grams	70	17	32
Initial Test Water, %	20.8	15.1	16.7
Compact Gage Pressure,psi	45	170	90
Exudation Pressure, psi	225	458	326
Height Sample, Inches	2.67	2.47	2.52
Gross Weight Mold, grams	3051	3008	3027
Tare Weight Mold, grams	1946	1940	1955
Sample Wet Weight, grams	1105	1068	1072
Expansion, Inches x 10exp-4	23	92	62
Stability 2,000 lbs (160psi)	63 / 143	33 / 81	40 / 101
Turns Displacement	4.28	3.61	3.88
R-Value Uncorrected	6	40	27
R-Value Corrected	7	40	27
Dry Density, pcf	103.8	113.8	110.4

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.95	0.61	0.75
G. E. by Expansion		0.77	3.07	2.07

Equilibrium R-Value	**12** by EXPANSION	Examined & Checked: 10 /16/ 20
REMARKS:	Gf = 1.25 0.0% Retained on the 3/4" Sieve.	REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN C 30659 CIVIL STATE OF CALIFORNIA Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

PLATE 9

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 46558

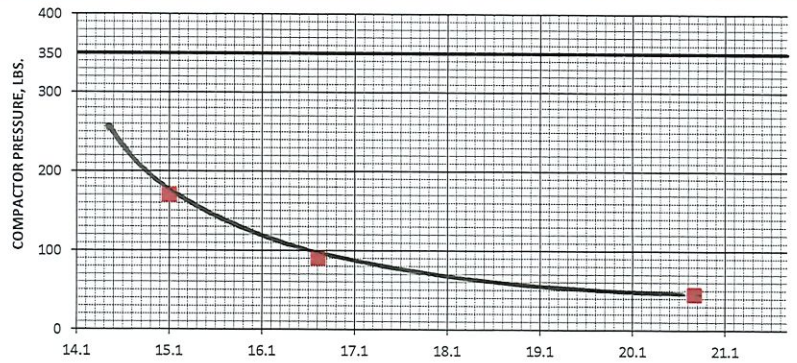
DATE: 10 /16/ 2020

REMARKS:

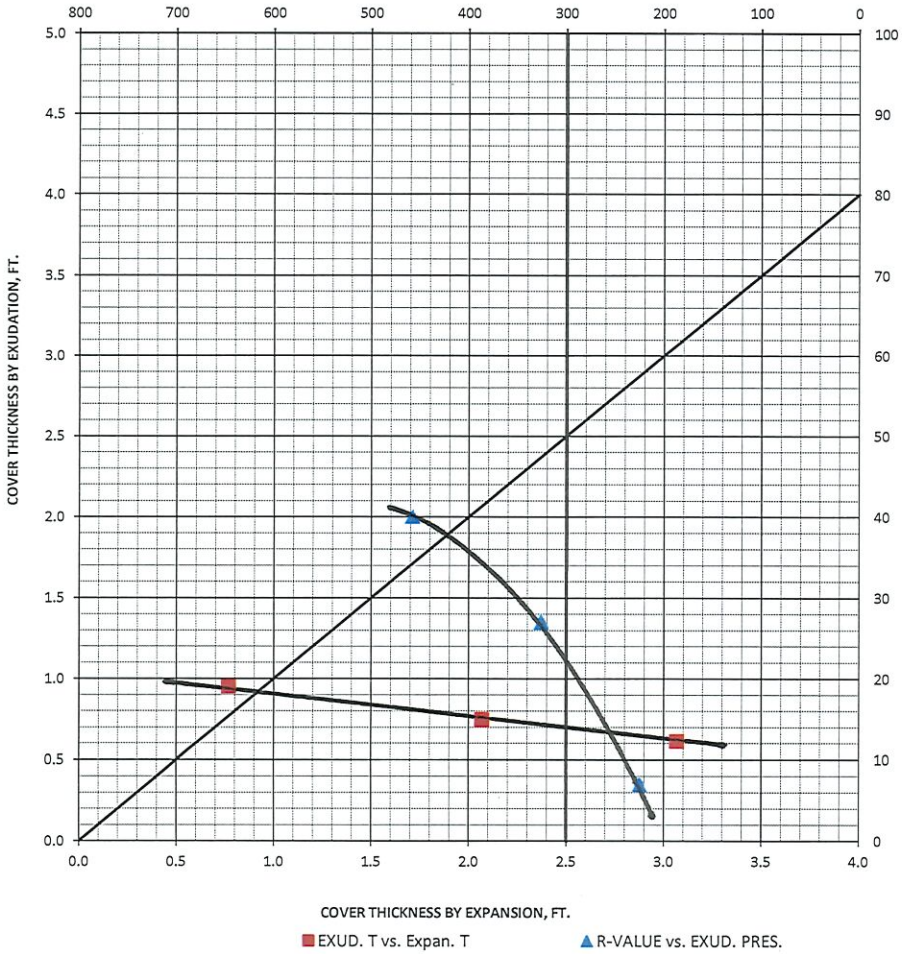
BORING NO. 15-5382

Kindred Community Church

COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %

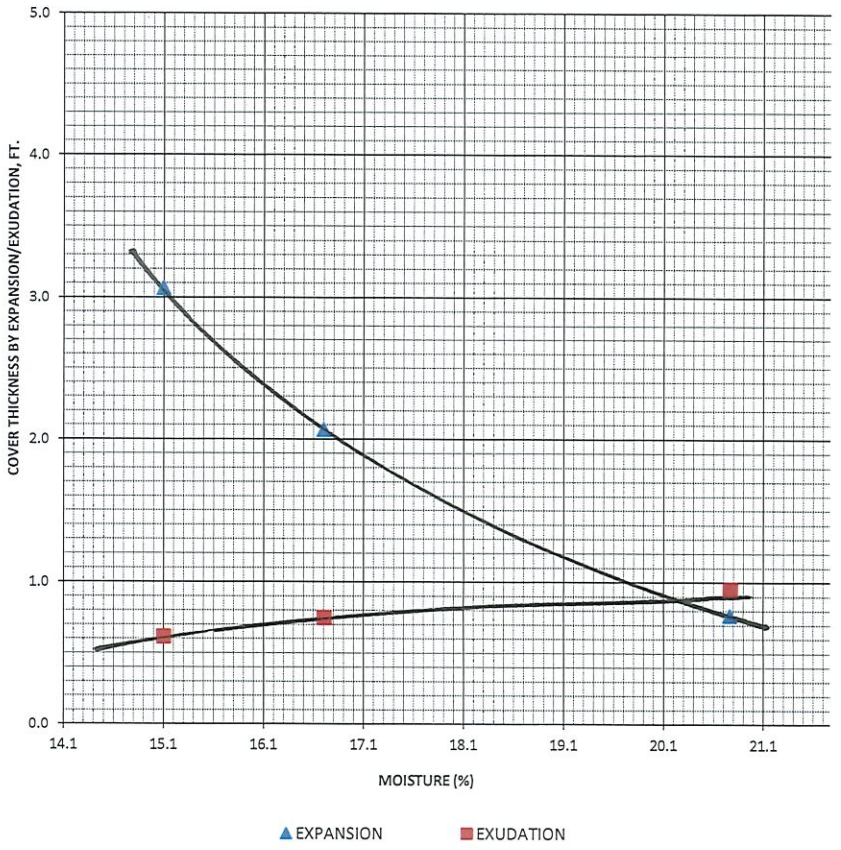


PLATE 10

ANAHEIM TEST LAB, INC.

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

TO:

TGR GEOTECHNICAL
3037 S. HARBOR BLVD.
SANTA ANA, CA. 92704

DATE: 10/20/2020

P.O. NO: VERBAL

LAB NO: C-4184

SPECIFICATION: CTM-417

MATERIAL: Soil

Project No.: 15-5382
Project: Kindred Community Church
Sample ID: B2 @ 0-5'

ANALYTICAL REPORT

SOLUBLE SULFATES
per CT. 417
ppm

218

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

PLATE 11

Test Hole	Total Depth (in)	Initial Depth (in)	Final Depth (in)	∆Water Level (in)	Initial Time (min)	Final Time (min)	∆ Time (min)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Infiltration Rate (in/hr)
P-1	126	3.5	5	1.5	0.0	10.0	10.0	122.5	121	121.75	0.15
	126	3	4.5	1.5	0.0	10.0	10.0	123	121.5	122.25	0.14
	126	3	4.5	1.5	0.0	10.0	10.0	123	121.5	122.25	0.14
	126	4	5	1	0.0	10.0	10.0	122	121	121.50	0.10
	126	3.5	5	1.5	0.0	10.0	10.0	122.5	121	121.75	0.15
	126	3	4.5	1.5	0.0	10.0	10.0	123	121.5	122.25	0.14
P-2	126	3	7	4	0.0	10.0	10.0	123	119	121.00	0.39
	126	6.5	8.5	2	0.0	10.0	10.0	119.5	117.5	118.50	0.20
	126	5	7.5	2.5	0.0	10.0	10.0	121	118.5	119.75	0.25
	126	5.5	7.5	2	0.0	10.0	10.0	120.5	118.5	119.50	0.20
	126	5.5	7.5	2	0.0	10.0	10.0	120.5	118.5	119.50	0.20
	126	6	8	2	0.0	10.0	10.0	120	118	119.00	0.20
P-3	126	4.5	7	2.5	0.0	10.0	10.0	121.5	119	120.25	0.25
	126	9	11	2	0.0	10.0	10.0	117	115	116.00	0.20
	126	9.5	11	1.5	0.0	10.0	10.0	116.5	115	115.75	0.15
	126	10.5	12	1.5	0.0	10.0	10.0	115.5	114	114.75	0.15
	126	10	11.5	1.5	0.0	10.0	10.0	116	114.5	115.25	0.15

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

ΔH = Change in height

Δt = Time interval

r = Radius

I_t Infiltration Rate

H_{ave} Average Head Height over the time interval

APPENDIX A
REFERENCES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

APPENDIX A

References

Allwest Geoscience, Inc., 1999, Remedial Grading Report for the Planned Garden Church Development, 8712 East Santa Ana Canyon Road, Anaheim, Orange County, California, Job No. 98-1342GC-1, dated December 20, 1999.

Bell/Knott & Associates, Kindred Community Church, Campus Design Development

Giles Engineering Associates, Inc., 2014, Geotechnical Feasibility Study, Proposed Site Development, 8270 East Santa Ana Canyon Road, Anaheim Hills, California, Project No. 2G-1402006, dated March 18, 2014.

California Department of Conservation Division of Mines and Geology Open-File Report 90-19, Landslide Hazards in the North Half of the Black Star Canyon Quadrangle, Orange and Riverside Counties, California, dated 1992.

Pacific Soils Engineering, Inc., 1997a, Mass Grading Report, Garden Church Site, The Summit, in the City of Anaheim, California, Work Order 101476G4, dated February 28, 1997.

_____, 1997b, Project Grading Report, Lots 3 through 25 incl., Tract 15125, Single-Family Residential Development, The Summit, in the City of Anaheim, California, Work Order 101476G4, dated April 11, 1997.

_____, 1997c, Project Grading Report, Lots 1 and 2, Tract 15125, Single-Family Residential Development, The Summit, in the City of Anaheim, California, Work Order 101476G4, dated April 28, 1997.

_____, 1997d, Project Grading Report, Lots 3 through 26 incl., Tract 15120, Single-Family Residential Development, The Summit, in the City of Anaheim, California, Work Order 101476G4, dated May 6, 1997.

Sessions Consulting Engineers, 2015, Aerial Topography Map, Kindred Community Church, 8712 E. Santa Ana Canyon Road, Anaheim California, Project No. 01-227-1, dated May 4, 2015.

APPENDIX B
SITE SEISMIC DESIGN AND DE-AGGREGATED PARAMETERS

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

TABLE 1
SITE SPECIFIC GROUND MOTION ANALYSIS
15-5382 Kindred Community Church

SA Period (sec)	Probabilistic Spectral Acceleration (g)	Risk Coefficients	Probabilistic Spectral Acceleration MCER (g)	Deterministic Spectral Acceleration (g)	Is Largest Deterministic Spectral Acceleration <1.5*Fa	Deterministic MCER	Site Specific MCER	2/3 of Site Specific MCER	80% Code Design	Site Specific Design Response Spectrum
	Rotated Maximum		Rotated Maximum	Rotated Maximum 84th Percentile						
0	0.8943	0.911	0.8147	0.9730		0.9730	0.8147	0.5431	0.4111	0.5431
0.1	1.5312	0.911	1.3949	1.4118		1.4118	1.3949	0.9299	0.7611	0.9299
0.2	2.0383	0.911	1.8569	1.8899		1.8899	1.8569	1.2379	1.0277	1.2379
0.3	2.2984	0.911	2.0938	2.3532		2.3532	2.0938	1.3959	1.0277	1.3959
0.5	2.2725	0.911	2.0702	2.6825		2.6825	2.0702	1.3801	1.0277	1.3801
0.75	1.9355	0.911	1.7632	2.5069	No	2.5069	1.7632	1.1755	1.0277	1.1755
1	1.6770	0.911	1.5277	2.2904		2.2904	1.5277	1.0185	0.9053	1.0185
2	0.9072	0.911	0.8265	1.3387		1.3387	0.8265	0.5510	0.4527	0.5510
3	0.5950	0.911	0.5420	0.8861		0.8861	0.5420	0.3614	0.3018	0.3614
4	0.4234	0.911	0.3857	0.6046		0.6046	0.3857	0.2571	0.2263	0.2571
5	0.3225	0.911	0.2938	0.4415		0.4415	0.2938	0.1959	0.1811	0.1959

Code Sds	1.285	Crs =	0.911	Code Ss =	1.927	**Site Specific S_{DS} = 1.256**
Code Sd1	1.132	Cr1 =	0.911	Code S1 =	0.679	**Site Specific S_{D1} = 1.102**
To	0.18	Code Fa =	1	Sms =	1.927	
Ts	0.88	Code Fv =	2.5	Sm1 =	1.6975	
TL	8					
Input						

FIGURE 1
Site Specific Design Response Spectra
15-5382 Kindred Community Church

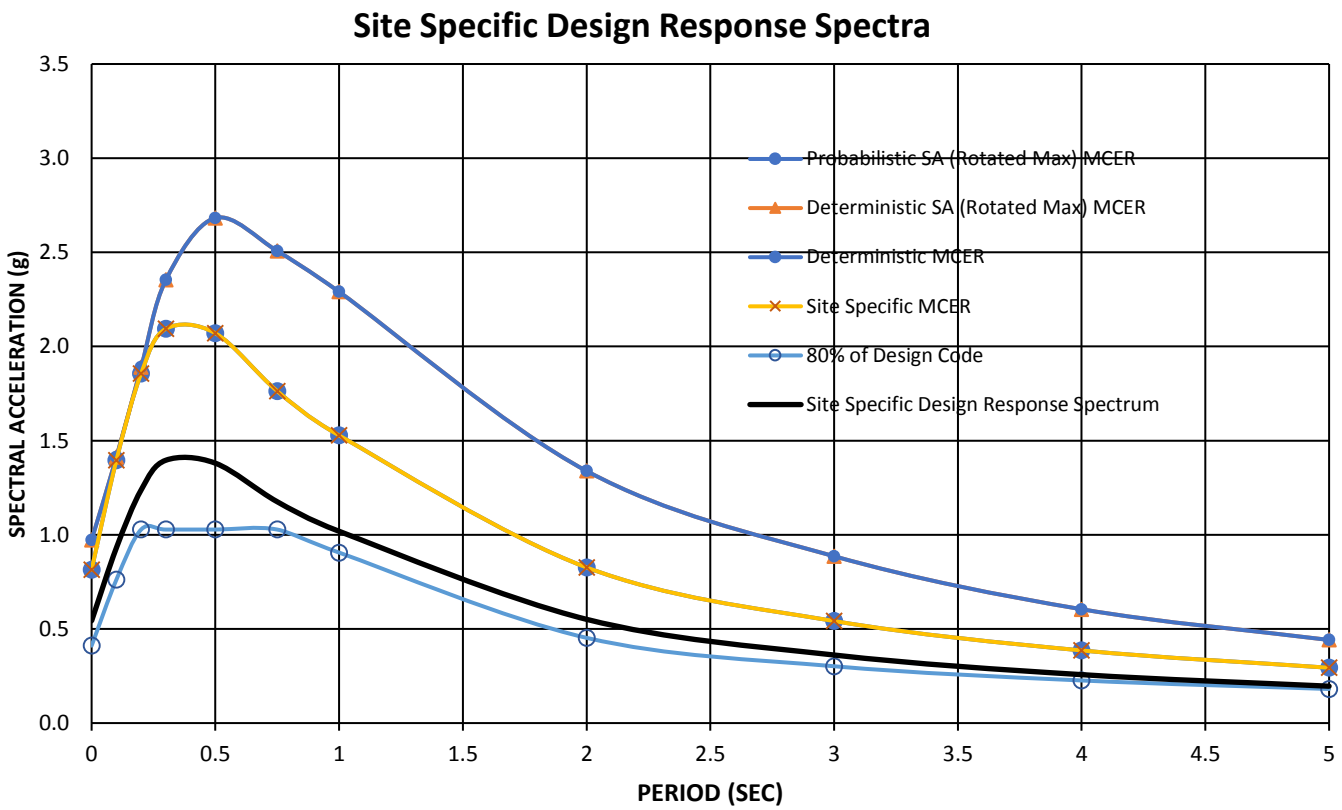


TABLE 2

Probabilistic Response Spectrum ASCE 7-16 Method 2

15-5382 Kindred Community Church

Period (g)	UHGM (g)	RTGM (g)	Max Dir Scale factor	Max Dir RTGM (g)
0	0.842	0.813	1.1	0.894
0.1	1.432	1.392	1.1	1.531
0.2	1.881	1.853	1.1	2.038
0.3	2.136	2.043	1.125	2.298
0.5	2.067	1.934	1.175	2.272
0.75	1.687	1.564	1.2375	1.935
1	1.410	1.290	1.3	1.677
2	0.734	0.672	1.35	0.907
3	0.466	0.425	1.4	0.595
4	0.320	0.292	1.45	0.423
5	0.237	0.215	1.5	0.323

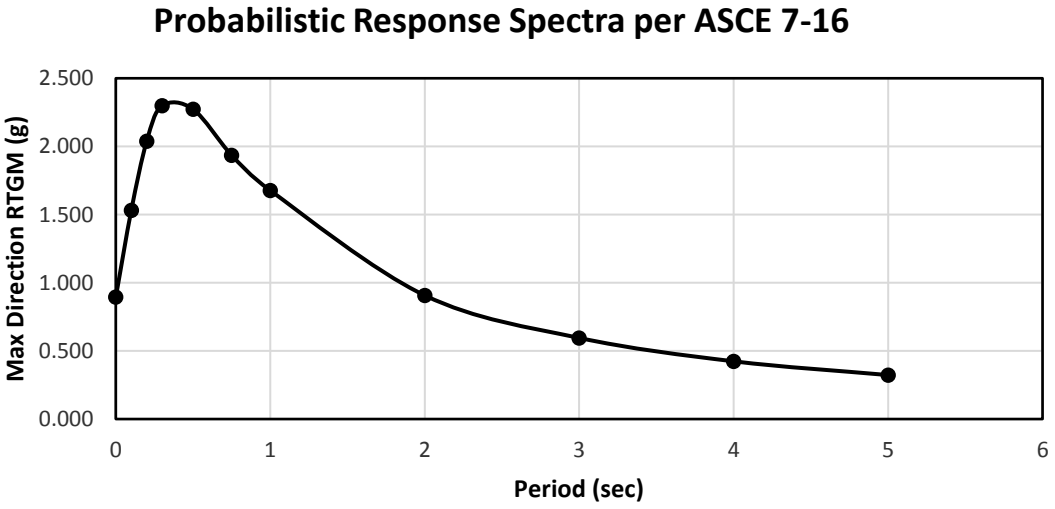
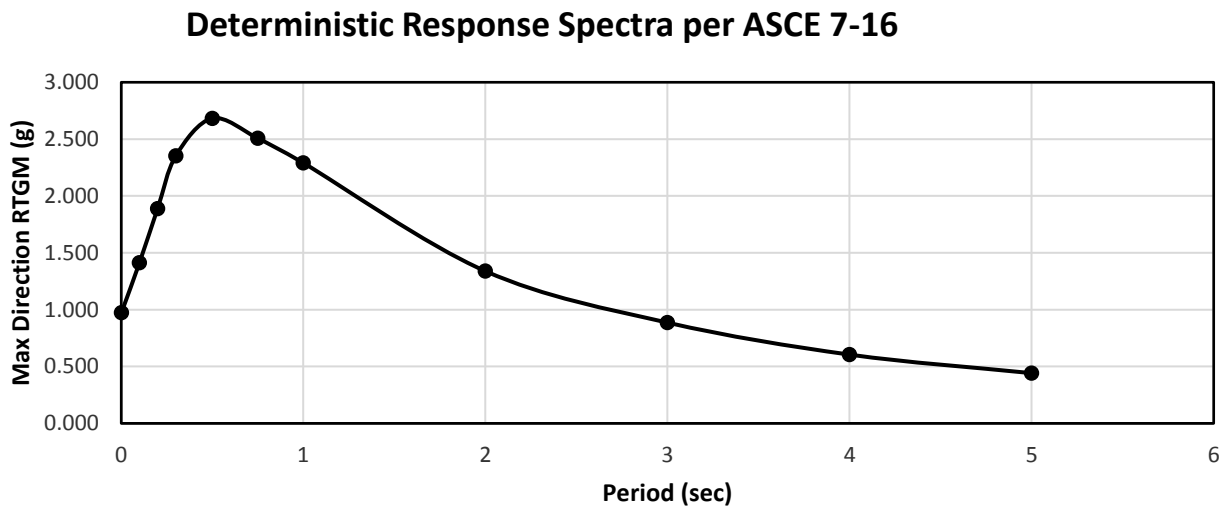


TABLE 3

Deterministic Response Spectrum ASCE 7-16

15-5382 Kindred Community Church

Period (g)	Mean Spectra (g)	Sigma (g)	84th-Percentile Spectral Acceleration (g)	Max Dir Scale factor	Max Dir Deterministic SA (g)
0.001	0.538	0.497	0.885	1.1	0.973
0.1	0.754	0.532	1.283	1.1	1.412
0.2	1.044	0.498	1.718	1.1	1.890
0.3	1.242	0.521	2.092	1.125	2.353
0.5	1.271	0.586	2.283	1.175	2.683
0.75	1.074	0.634	2.026	1.2375	2.507
1	0.906	0.666	1.762	1.3	2.290
2	0.491	0.703	0.992	1.35	1.339
3	0.311	0.710	0.633	1.4	0.886
4	0.207	0.701	0.417	1.45	0.605
5	0.146	0.702	0.294	1.5	0.441



Hazards by Location

Search Information

Coordinates: 33.8635, -117.7224

Elevation: 450 ft

Timestamp: 2020-11-09T23:39:46.837Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: III

Site Class: D

Basic Parameters

Name	Value	Description
S_S	1.927	MCE_R ground motion (period=0.2s)
S_1	0.679	MCE_R ground motion (period=1.0s)
S_{MS}	1.927	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.284	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.911	Coefficient of risk (0.2s)
CR_1	0.911	Coefficient of risk (1.0s)
PGA	0.816	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.897	Site modified peak ground acceleration
T_L	8	Long-period transition period (s)

SsRT	1.927	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.115	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.336	Factored deterministic acceleration value (0.2s)
S1RT	0.679	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.745	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.931	Factored deterministic acceleration value (1.0s)
PGAd	0.984	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.8635

Time Horizon

Return period in years

2475

Longitude

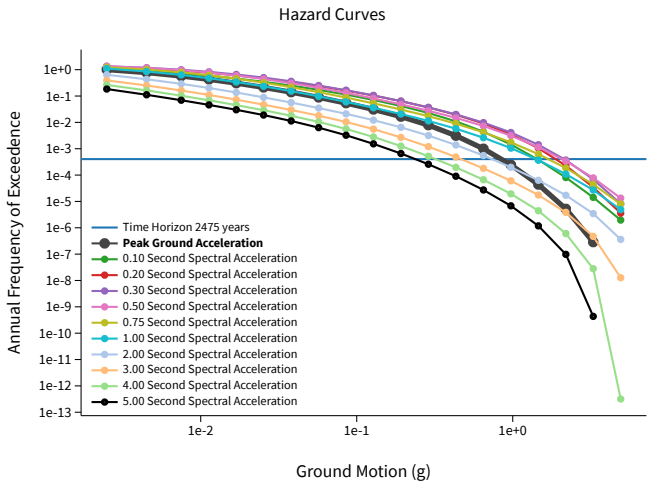
Decimal degrees, negative values for western longitudes

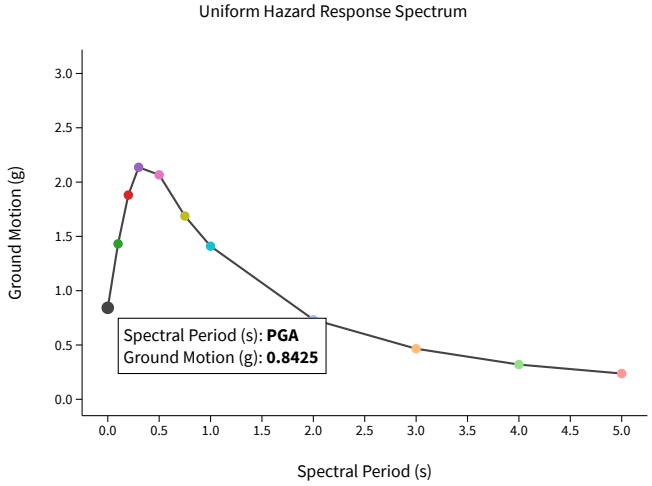
-117.7224

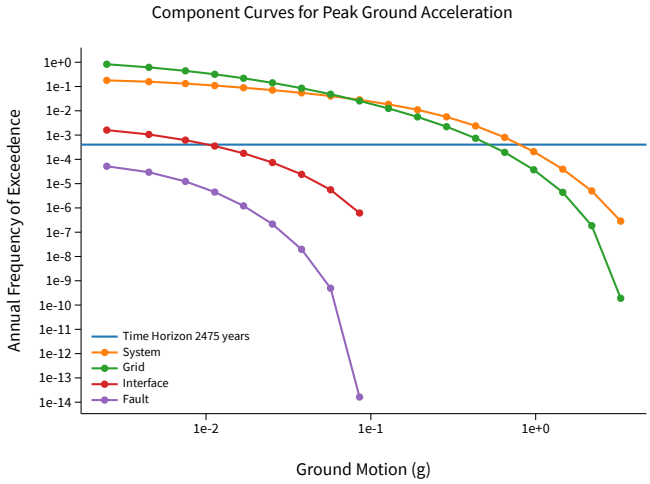
Site Class

259 m/s (Site class D)

Hazard Curve





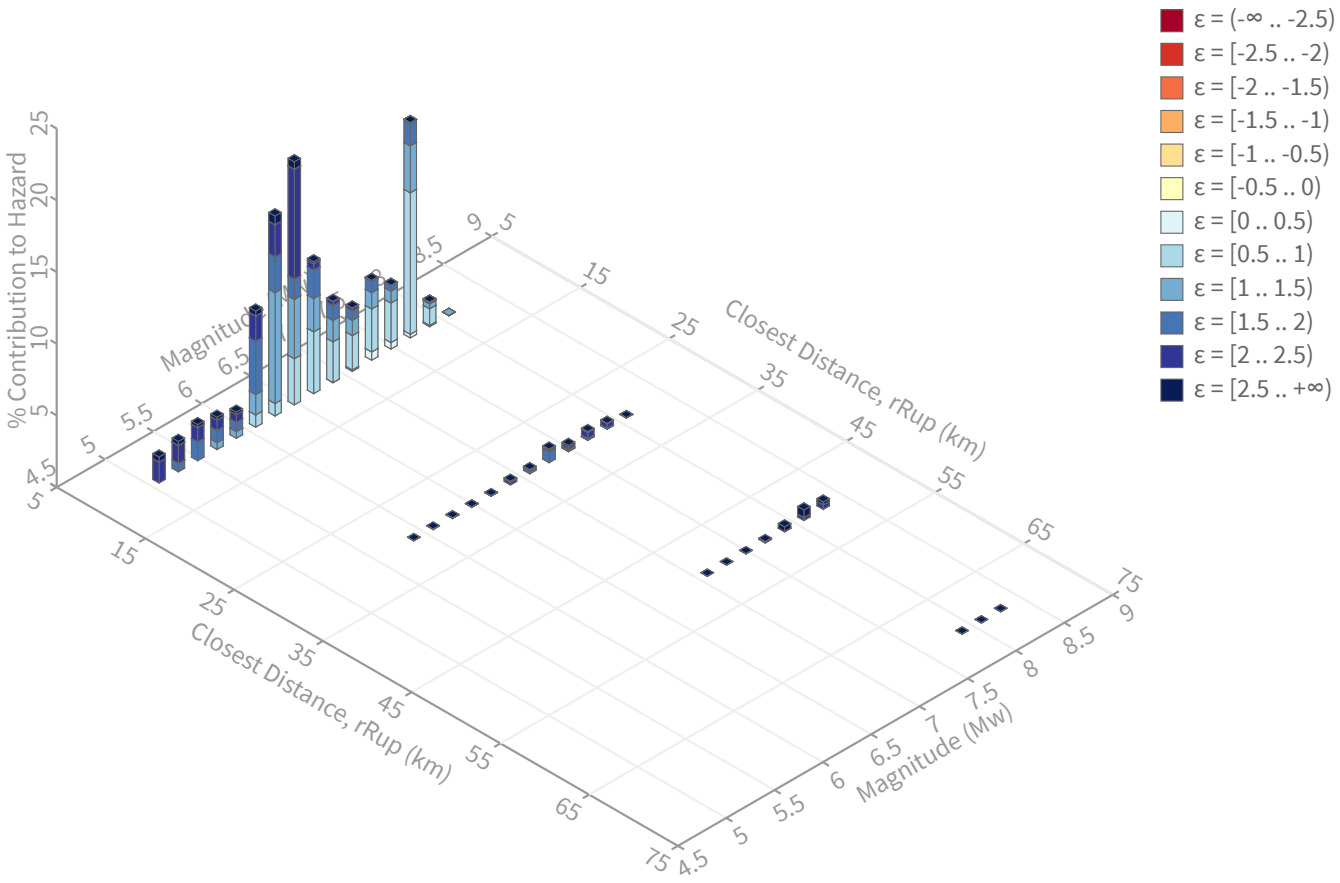


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.84246025 g

Recovered targets

Return period: 2882.8216 yrs
Exceedance rate: 0.00034688237 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.04 %

Mean (over all sources)

m: 6.74
r: 7.57 km
ε_0: 1.43 σ

Mode (largest m-r bin)

m: 6.48
r: 8.71 km
ε_0: 1.71 σ
Contribution: 16.94 %

Mode (largest m-r-ε_0 bin)

m: 7.72
r: 2.48 km
ε_0: 0.7 σ
Contribution: 9.86 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							48.44
Whittier alt 1 [2]		2.10	7.29	0.91	117.712°W	33.876°N	33.12	16.43
Chino alt 1 [3]		6.46	6.58	1.16	117.662°W	33.910°N	46.95	11.72
Elsinore (Glen Ivy) rev [0]		12.89	6.51	2.26	117.590°W	33.829°N	107.43	5.24
Chino alt 1 [2]		6.64	6.24	1.29	117.669°W	33.917°N	39.73	3.96
Chino alt 1 [1]		9.11	6.08	1.86	117.703°W	33.950°N	10.47	2.46
Whittier alt 1 [1]		2.49	6.80	1.08	117.702°W	33.874°N	58.72	2.34
Peralta Hills [0]		2.92	6.42	1.09	117.740°W	33.848°N	223.82	2.01
UC33brAvg_FM32	System							36.59
Whittier alt 2 [2]		2.18	7.49	0.86	117.719°W	33.878°N	9.51	14.00
Chino alt 2 [2]		7.57	6.85	1.22	117.658°W	33.908°N	50.26	7.36
Elsinore (Glen Ivy) rev [0]		12.89	6.50	2.27	117.590°W	33.829°N	107.43	5.35
Chino alt 2 [1]		7.84	6.35	1.40	117.670°W	33.921°N	37.27	2.75
Richfield [0]		8.71	6.33	1.88	117.803°W	33.889°N	290.83	1.69
Whittier alt 2 [1]		2.18	7.10	0.97	117.719°W	33.878°N	9.51	1.30
UC33brAvg_FM32 (opt)	Grid							7.66
PointSourceFinite: -117.722, 33.904		6.89	5.57	1.79	117.722°W	33.904°N	0.00	1.74
PointSourceFinite: -117.722, 33.904		6.89	5.57	1.79	117.722°W	33.904°N	0.00	1.74
UC33brAvg_FM31 (opt)	Grid							7.32
PointSourceFinite: -117.722, 33.904		6.93	5.52	1.82	117.722°W	33.904°N	0.00	1.51
PointSourceFinite: -117.722, 33.904		6.93	5.52	1.82	117.722°W	33.904°N	0.00	1.51

Attachment E

Kindred Community Church

Notice of Transfer of Responsibility Form

Site: 8712-8720 E. Santa Ana Canyon Rd.

APN: 354-321-01 & 354-321-03

Water Quality Management Plan
Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Anaheim: _____

Submission of this Notice of Transfer of Responsibility constitutes notice to the City of Anaheim that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/Previous Responsible Party Information

		Contact Person:	
		Title	

II. Information About Site Transferred

Name of Project (if applicable)	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable) 8712-8720 E. Santa Ana Canyon Road	
Planning Area (PA) and/or Tract Number(s) for Site	
Date WQMP Prepared (and revised if applicable)	

III. New Owner/New Responsibility Party Information

Company/Individual Name		Contact Person	
Street Address		Title	
City	State	ZIP	Phone

IV. Information About Site Transferred

General Description of Site Transferred to New Owner	General Description of Portion of Project/Parcel Subject to WQMP Retained by Owner (if any)
Lot/Tract Numbers of Site Transferred to New Owner	
Remaining Lot/Tract Numbers Subject to WQMP Still Held by Owner (if any)	
Date of Ownership Transfer	

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a

project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by Previous Owner shall be labeled as "Previously Transferred."

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Owner is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative	Title
Signature of Previous Owner Representative	Date

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative	Title
Signature	Date

Completed form shall be submitted to City of Anaheim, Engineering Division.

OWNER SELF CERTIFICATION STATEMENT

As the owner of APN 354-321-01 & 354-321-03 located at 8712-8720 E. Santa Ana Canyon Rd., Anaheim, CA for which a Water Quality Management Plan (WQMP) was approved by the City, I hereby certify under penalty of law that all Best Management Practices contained within the approved Project WQMP have been maintained and inspected in accordance with the schedule and frequency outlined in the approved Operation and Maintenance Plan.

The maintenance activities and inspections conducted, as listed in the attached table, have been performed by qualified and knowledgeable individuals.

To the best of my knowledge, the information submitted is true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and citations for violating water quality regulations.

Upon transfer of ownership the new owner or HOA shall maintain an operating budget sufficient to fund ongoing BMP maintenance for the proposed BMPs. This amount shall be reflected in the HOA budget and CC&R, an estimated minimum value which the association is expected to fund shall be $1,400/year which shall include the routine maintenance of all common area landscape and BMPs.

Signed: _____

Name: _____

Title: _____

Company: _____

Address: _____

Telephone Number: _____

Date: _____

Completed Statement shall be submitted **annually** by June 30th to City of Anaheim, Engineering Division.

BMP Implementation Tracking Table

BMP	Activity	Activity Completion Dates or Frequency
Source Control BMPs (Structural and Nonstructural)		
Low Impact Development and Treatment Control BMPs		

Required Permits

List any permits required for the implementation, operation, and maintenance of the BMPs. Possible examples are:

None to state.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordingkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request,