Appendix G Water Quality Management Plan

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OTH2019-01151

County of Orange/Santa Ana Region Preliminary Priority Project Water Quality Management Plan (WQMP)

Project Name:

Lincoln at Euclid

APN 072-110-50, 072-110-19 & 072-110-21

Prepared for:

Shopoff Realty Investments, L.P.

2 Park Plaza, Suite 700

Irvine, CA 92614

(949) 417-1396



Prepared by:

Huitt-Zollars

2603 Main Street, Suite 400

Irvine, CA 92614

(949) 988-5815

Date Prepared 09/16/2019



1. Provide Owner's signature. – Signature provided.

2. On Page 5, include "Heavy Metals" as a pollutant of concern since surface parking is proposed. – Surface parking text has been provided.

3. Include technical memorandum as an attachment to the PWQMP. – Technical memorandum is provided in attachment 4

4. Clearly label all proposed drainage facilities and site features on WQMP Plot Plan. – Drainage features and site facilities have been provided on WQMP Exhibit.

5. Include attached Approved Cover Sheet. - Approved cover sheet has been provided.

6. Include a printout of the following items 1-4: - Items have been provided hereon.

The following comments will be addressed during final engineering:

1. Expand discussion on how 2-year flows will be retained on-site drywell via infiltration. Include drawdown times for infiltration of hydromod volume. Clarify how flows captured within the detention system beyond the 2-year volume will be managed. Will they infiltrate as well? Will there be any ponded water for greater than 96 hours that could potentially cause vector concerns? Will they exit via high flow outlet? Provide associated weir heights, invert elevations, slopes and design calculations that are consistent with grading & storm drain plans at final design. – Comment will be addressed during final engineering.

2. Adequate pre-treatment of runoff is required prior to runoff infiltration in the drywells, relative to the land use and anticipated pollutants of the site (i.e., "moderate contamination potential" per Table 1 of the Draft Drywell Guidelines). If detention system is to be utilized as part of a treatment train for pre-treatment of runoff, provide the following supporting information and documentation in the Final WQMP:

· Clearly describe treatment train flow process and how runoff will enter/exit the system, how pre-treatment will occur, and how higher flows being routed through the detention system will not cause resuspension of pollutants previously collected within system. – Comment will be addressed during final engineering.

· The system shall be designed to achieve at a minimum 50% removal of total suspended solids (TSS) consistent with acceptable performance standards (Washington TAPE Pretreatment GULD and TARP Certification are accepted – see specific protocols for influent/effluent concentrations & removal efficiencies). – Comment will be addressed during final engineering.

o Describe how sizing and performance was calculated to achieve this, including providing settling times for specific particle sizes and assumed inflow TSS concentration ranges (or hydraulic loading rates) meeting the accepted performance standards (e.g., Washington TAPE or TARP Protocol), design flow rates for treatment, the amount of retention time or hydraulic residence times needed vs provided in the tank, the basin length or footprints required in order to achieve settling retention times, and any safety factors to account for turbulent flows or mixing during higher flow events. Include both narrative

descriptions of process and methodology, and attach all associated calculations and references utilized. – Comment will be addressed during final engineering.

3. If any upstream pre-treatment devices are provided, devices should meet full trash capture requirements to ensure adequate removal of trash & debris. Note that per WQMP Review Checklist Item No. 4.15, catch basin inserts per BMP Fact Sheet PRE-2 are not acceptable. However, devices that are designed for higher level of treatment (such as cartridge media filters or biofiltration systems), are sturdy and robust (e.g., no systems that rely solely on filter fabric), and designed for full trash capture may be considered for use as part of the treatment train. Systems will be evaluated or considered for use during Final WQMP review process. – Comment will be addressed during final engineering.

4. Acceptance by OCWD is required prior to approval of proposed focused infiltration systems (the City will coordinate this effort). – Comment will be addressed during final engineering.

7. Be aware that the proposed infiltration system has not been submitted to OCWD for review. This will be done at the Final WQMP stage. If the proposed infiltration is not approved by OCWD, the approach to Storm Water Treatment. In order to account for this potential of a change in direction please include the following or similar language in the Preliminary WQMP:

"The preliminary phase of the project proposes an infiltration BMP to satisfy water quality requirements. Due to the current clean-up efforts of contamination from previous land uses, a more detailed analysis will be prepared in final design phases of the project to confirm infiltration feasibility. As infiltration is the first BMP to assess on the BMP hierarchy outlined in the Technical Guidance Document, it will be implemented to the MEP for the project. However, if further field investigations and analysis conducted in final design phases conclude that infiltration should not be implemented due to contamination concerns, harvest and reuse BMPs and biofiltration BMPs will be included in final design. The City of Anaheim as well as the respective groundwater agency will be coordinated with to make this final BMP design determination." – Comment will be addressed during final engineering.

Project Owner's Certification			
Planning Application No. (If applicable)	OTH2019-01151	Grading Permit No.	T.B.D.
Tract/Parcel Map and Lot(s) No.	N/A	Building Permit No.	T.B.D.
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)			APN 072-110-50,072-110-19 & 072-110-021

This Water Quality Management Plan (WQMP) has been prepared for SLF-West Lincoln, LLC by Huitt-Zollars. 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: Brian Rupp			
Title	Executive Vice President – Development		
Company	SLF-West Lincoln, LLC		
Address	2 Park Plaza, Suite 700 Irvine, CA 92614		
Email	brupp@shopoff.com		
Telephone #	(949) 417-1396		
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	2/2/20

Preparer (Engineer): Jeffrey T Okamoto			
Title	Principle/Vice President	PE Registration #	46049
Company	Huitt-Zollars		
Address	2603 Main Street, Suite 400 Irvine, CA 92614		
Email	okamoto@huitt-zollars.com		
Telephone #	(949) 988-5815		

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	2/10/20
Place Stamp Here	REGISTERED PROFESSIONAL ENGINEER JEFFREY T OKAMOTO No. 46049 Expiration 12-31-20 CIVIL STATE OF CALIFORNIA		

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Attachments

Attachment 1 . ..... Vicinity Map & Site Plans
Attachment 2 . ..... Construction Plans
Attachment 3 . ..... Soils Information
Attachment 4 . ..... BMP Design Details
Attachment 5 . ..... Hydromodification
Attachment 6 . ..... Source Control
Attachment 7 . ..... O&M
Attachment 8 . ..... Educational Materials

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)	OTH2019-01151	Grading or Building Permit No. (If applicable)	T.B.D.
Address of Project Site (or Tract Map and Lot Number if no address) and APN	APNs 072-110-21, 072-110-19 & 072-110-50		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	T.B.D.		
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	This document has been prepared for the Conceptual WQMP submittal.		

Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	No on-site conditions found in the OCPW WIHMP Map which impact infiltration potential Coyote Creek Watershed – TMDLs: Copper, Lead, Zinc

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):	Priority Project Category for North County Permit Area: • New Development project that creates 10,000 square feet of more of impervious surface; • Parking lots 5,000 square feet or more; • Significant redevelopment project			
Project Area (ft^2): 332,798	Number of Dwelling Units: 115		SIC Code: 1522	
Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	225,205	67.6%	107,593	32.3%
Post-Project Conditions	99,839	30%	232,959	70%
Drainage Patterns/Connections	Drainage runoff from the existing site flows, via sheet flow, south toward Lincoln Avenue. There is no existing on-site underground drainage infrastructure. Drainage in the proposed condition is to maintain the same direction of flow (south to Lincoln Avenue). Proposed site improvements include the construction of drain inlets and underground facilities to capture and convey runoff to the existing storm drain infrastructure within Lincoln Avenue.			

Narrative Project Description: (Use as much space as necessary.)	In the existing condition, the Project Site is comprised of an industrial use (APN 072-110-21), General Commercial (APN 072-110-19) and a vacant parcel (APN 072-110-50). The industrial and general commercial portions of the Project Site is fully built-out, 100% impervious, and includes concrete/asphalt parking lots, an industrial buildings and a commercial building. The Project will demolish and remove the existing parking lots and buildings and proposes a multi-family development with residential buildings, associated utilities, parking and drive aisles, recreational facilities that include a swimming pool, landscape areas and concrete walkways. It was assumed for preliminary purposed that the proposed site will consist of 70% percent (232,959 square feet) of impervious surfaces (roofs homes, concrete sidewalks, streets, parking and hardscape) and 30% (99,839 square feet) of pervious surfaces (open space, trees, plants and grass). Drainage of the multi-family homes, streets, landscape and recreational facilities will include inlets on pervious and impervious surfaces through the site that are meant to capture storm water runoff and convey the runoff to the proposed on-site storm drain pipes. The runoff in the storm drain pipes is then transported into its designated pre-treatment device, storage chamber and drywell (treatment) prior to being released into the public right-of-way. Proposed drainage infrastructure will maintain the existing pattern of runoff draining south to existing infrastructure within Lincoln Avenue. The proposed swimming pool will drain via a sanitary sewer line (grey water). It is to be determined with the City of Anaheim if trash enclosures and catch basin trash filters will be required as a form of trash management for the proposed development.

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 ☒	N ☐	
Nutrients	E ☒	N ☐	
Heavy Metals	E ☒	N ☐	Private Streets & Surface Parking
Pathogens (Bacteria/Virus)	E ☒	N ☐	
Pesticides	E ☒	N ☐	
Oil and Grease	E ☒	N ☐	
Toxic Organic Compounds	E ☐	N ☒	
Trash and Debris	E ☒	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).*

Per the Orange County Watershed Master Planning *Susceptibility Analysis San Gabriel-Coyote Creek* exhibit, dated Dec. 2012), the Project Site is within an area of "Potential Areas of Erosion, Habitat & Physical Structure Susceptibility". The exhibit shows that there are "Earth (Unstable)", "Earth (Stabilized)", and "Stabilized" portions of channel infrastructure downstream of the Project Site.

A comparison for the 2-year storm event pre vs post development (unmitigated) was analyzed using Advance Engineering Software (AES) for at compliance point 106. Hydrologic node 106 is downstream of DMA A and DMA B, where flows comingle. The results from the analysis are summarized in the table below for peak flow rate, runoff volume and time of concentration.

UNMITIGATED FLOWS			
EXISTING CONDITIONS			
Drainage Designation	**Q_2 (CFS)**	**V_2 (CF)**	**Tc_2 (MIN.)**
NODE 106	5.88	23,087	16.5
PROPOSED CONDITIONS			
Drainage Designation	**Q_2 (CFS)**	**V_2 (CF)**	**Tc_2 (MIN.)**
NODE 106	18.31	95,396	15.00
Pre vs Post Unmitigated Flows			
DMA A DELTA (%)	+211.4%	+313.2%	-9.1%

Without mitigation, the proposed improvements would pose hydrologic conditions of concerns (HCOC) for increased peak discharge, increased volume, and reduced time of concentration. To mitigate the peak discharge, Underground Chamber #A was sized to fully retain and infiltrate the 2-year runoff volume from DMA A (0.53 acre-feet). Underground Chamber #A allows for the mitigation of flows at Hydrologic Node 106. The resulting 2-year peak discharge is of 3.24 cfs, which meets the mitigation requirements set forth in the TGD. See post-development drainage description under Section II.4.

Mitigated Flows At Node 106			
Condition	Existing	Proposed	Delta
2-year Peak Discharge (cfs)	5.88	3.24	-44.90%

See routing computations in Attachment 4.

II.4 Post Development Drainage Characteristics

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

Proposed development of the site include multi-family residential, parking and drive aisles, community amenities, and associated utilities. The project will include on-site drainage improvements to capture and convey runoff to existing facilities. Proposed drainage infrastructure will maintain the existing pattern of runoff draining south to existing infrastructure maintained by the City of Anaheim within Lincoln Avenue.

The underground storage chambers are sized for storm water storage, flood control and hydromodification. Drywells are sized for storm water infiltration, treatment and hydromodification. Inclusion of storage chambers and drywells to meet hydromodification, flood control and LID treatment requirements will further reduce the proposed runoff to the City maintained existing storm drain system. Once the chambers and drywells are filled to their full capacity during a heavy storm event flows are to sheet flow through an outlet structure from the drywells and onto Lincoln Avenue.

The Project site is located within the upper reaches of Drainage Basin 8 of the Carbon Creek Watershed, and is tributary to the Broadway Storm Drain, Carbon Creek Channel, Coyote Creek Channel, San Gabriel River, and the Pacific Ocean. Off-site flows from the hillside located west of the site are proposed to be captured on-site via a v-ditch gutter and inlet. Once the off-site flows are captured by an inlet they will be transported to the proposed storm drain infrastructure and into a pre-treatment device, underground storage chambers and drywells. See off-site tributary areas on WQMP Exhibit.

Drainage Management Area A

All tributary drainage runoff drains to the proposed Underground Chamber #A (120" CMP Pipe) of total storage capacity 36,759 CF. The Underground Chamber #A serves multiple purposes:

1. Retention of the 2-year 24-hour volume from the proposed condition (0.53 AF)
2. Retention of the DCV from the proposed condition (0.245 AF)
3. Pre-treatment, of equivalent performance to City standards, upstream of drywells
4. Mitigation of proposed 10-yr, 25-yr, and 100-yr Q below the respective existing Qs

Retention of volumes up to the 2-year 24-hour volume is made feasible due to the presence of two (2) drywells (see attached calculations from Torrent Resources). The invert of the overflow weir located in the overflow manhole is set at 5.2 feet (storage of 0.53 AF) above the invert of underground chamber A. See Section C-C on Proposed Hydrology Exhibit. The drywell infiltration rate is 0.0381 cfs per drywell.

A low flow weir vault (See Section D-D on Proposed Hydrology Exhibit) is proposed downstream of Underground Chamber #A and upstream of the two drywells. The height of the weir (2.42 feet) is set at the DCV (0.245 feet) to create a backwater effect in the chamber, reducing velocities. A small orifice allows low flows to eventually drain to the drywells for infiltration.

During storms larger than the 2-year frequency event, excessive runoff is detained within Underground

Chamber #A and slowly released through an overflow pipe system that runs through Drainage Management Area B then resurfaces at a curb inlet located at the southwest corner of the entrance to site. Curb flows are released to Lincoln Avenue. The following hydraulic structures are included:

1. Overflow weir vault (See Section C-C of Proposed Hydrology Exhibit) located past the high point separating DMA and DMA B. The overflow weir vault includes a weir orifice set at the elevation (5.2 feet) of the retained 2-year volume. During a 100-year event, the maximum water height in the chamber is 7.89 feet, which is also the top of internal weir for emergency overflow, should the orifice be clogged.

2. A 24-inch PVC pipe for high flows

3. A standard 14-foot long curb inlet vault that allows the release of flows as gutter flows to Lincoln Avenue. The length of the curb inlet was determined to allow for full release of the unmitigated Q100 for emergency purposes.

At the point of compliance, all peak discharges, including the 2-year event (HCOC), are mitigated to below existing levels from both DMA A and DMA B combined.

Drainage Management Area B

All tributary drainage runoff drains to the proposed Underground Chamber #B (72" CMP Pipe) of total storage capacity 5,351 CF. The Underground Chamber #B serves multiple purposes:

1. Retention of the DCV from the proposed condition (0.120 AF)

2. Pre-treatment, of equivalent performance to City standards, upstream of drywells

Note that during events of lower frequency than the 85th percentile event, flows will flow through Underground Chamber B and fill the vault located at the southwest corner of the entrance way along Lincoln Avenue. Excessive flows will resurface and be released through the curb inlet and drain westbound along Lincoln Avenue.

II.5 Property Ownership/Management

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

Multi-family residential units will be for sale condominiums. All parking and drive aisles and community amenities will be maintained by the future Homeowner's Association.

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)	Lincoln at Euclid
Location/Address	North east corner of the Lincoln Avenue and Euclid Street intersection
General Plan Land Use Designation	General Commercial
Zoning	"T" Zone (Transitional), "C-G" General Commercial and "I" Zone (Industrial)
Acreage of Project Site	7.64 acres
Predominant Soil Type	Sandy Loam, Hydrologic Soil Group B

III.2 Site Characteristics

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

Site Characteristics	
Precipitation Zone	0.85
Topography	The site is generally flat, with slopes ranging from 0% - 2%.
Drainage Patterns/Connections	Runoff from the existing site drains, via sheet flow, south toward Lincoln Avenue. Existing of-site catch basin and storm drain pipe connects to Coyote Creek, San Gabriel River and then the Pacific Ocean.

Soil Type, Geology, and Infiltration Properties	Quaternary-aged young alluvial fan deposits, undocumented fill Moderate infiltration potential
Hydrogeologic (Groundwater) Conditions	Per Valley LGC soils report (Project No. 184014-01) dated July 19th, 2019 groundwater was not encountered to a maximum explored depth of 70 feet below existing grade within the subject site. The California Department of Water Resources most recent data indicates a groundwater level of 80 feet to more than 110 feet below existing ground surface. As stated by LGC Valley, the groundwater is not considered a concern for on-site storm water infiltration.
Geotechnical Conditions (relevant to infiltration)	Per the LGC Valley Geotechnical report dated July 19, 2019 (Project Number 184014-01) infiltration test borings of 0.48, 0.88 and 1.01 inches per represent the soils in the northern drywell of the western facility, the southern drywell of the western facility and both dry wells of the middle facility. The geotechnical report also states that data obtained though Geotracker and EnviroStor demonstrate that there are two known sites that have once been or are currently considered contaminated. The LUST Cleanup site located on APN 072-110-21 (1631 W, Lincoln Avenue) and an off-site parcel with known contaminants on APN 072-110-49 (1683 W. Lincoln Avenue). Per Roux, Inc. Site Specific Study Assessing the Impact of Proposed Infiltration BMPs within 250 feet of a Contaminated Site, project number 3224.0003L002 dated April 4, 2019 (Located in Appendix E of Geotechnical report), found that the concentrations of the contaminants in the on-site soil do not indicate that stormwater will cause adverse impacts to the ground water quality. The Roux, Inc. report also found that during the Phase 1 Site Assessment for APN 072-110-49 (1683 W. Lincoln Avenue) a past-dry cleaning operation was performed.
Off-Site Drainage	The Project Site receives off-site drainage from the hillside located far west (0.59 acres). Off-site runoff is proposed to be captured via a v-ditch gutter, transferred to an inlet, diverted to the proposed storm drain pipes and conveyed to an outlet structure. Both the pre-treatment system and the drywells are sized to account for off-site runoff. Once the chambers and drywells are filled to max capacity during a heavy storm event runoff sheet flows via an outlet structure from the drywells and onto Lincoln Avenue.
Utility and Infrastructure Information	There are no on-site utilities or infrastructure which would limit infiltration locations.

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	Coyote Creek, San Gabriel River Reach 1
303(d) Listed Impairments	Bacterial Indicators/Pathogens, Nutrients, Pesticides, Toxicity,
Applicable TMDLs	Copper, Lead, Zinc
Pollutants of Concern for the Project	Suspended Soild/Sediments, Nutrients, Pathogens (Bacteria/Virus) Pesticides, Oil & Grease, Trash & Debris
Environmentally Sensitive and Special Biological Significant Areas	None

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

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

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

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

Project Performance Criteria	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	If a hydrologic condition of concern (HCOC) exists, priority projects shall implement on-site or regional hydromodification controls such that: • Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and • Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to: • Retain the excess volume from the two-year runoff event to the MEP, and • Implement on-site or regional hydromodification controls such that the postdevelopment runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	• Priority Projects must infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). • A properly designed biotreatment system may only be considered if infiltration, harvest and use, and evapotranspiration (ET) cannot be feasibly implemented for the full design capture volume. In this case, infiltration, harvest and use, and ET practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume. A diversity of controls will be provided, if feasible, to achieve the greatest feasible retention of the Design Capture Volume, then if necessary, biotreatment of the remaining design capture volume. Equivalent performance criteria have been synthesized from permit requirements with consideration of the MEP standard and analysis of local precipitation and ET patterns. The following performance criteria result in capture and retention and/or biotreatment of 80 percent of average annual stormwater runoff volume. The performance criteria for LID are stated as follows: • LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff up to 80 percent average annual capture efficiency • LID BMPs must be designed to: o Retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and o Recover (i.e., draw down) the storage volume as soon as possible after a storm event (see criteria for maximizing drawdown rate in the TGD Appendix XI), and, if necessary o Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment), and, if necessary o NOC Permit Area only – retain or biotreat, in a regional facility, the remaining

	runoff up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment, on-site plus off-site), and, if necessary o Fulfill alternative compliance obligations for runoff volume not retained or biotreated up to 80 percent average annual capture efficiency using treatment controls or other alternative approaches as described in Section 7.II-3.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits.
Calculate LID design storm capture volume for Project.	**DMA A** C=(0.7*0.75) +0.15=0.675 d= 0.85 inches = 0.0708 ft A=5.13 acres DCV=(0.675)*(0.0708 ft)*(5.13 acres*43560 ft^2 /acres) = 10,679.3 ft^3 **DMA B** C=(0.7*0.75) +0.15=0.675 d= 0.85 inches = 0.0708 ft A=2.51 acres DCV=(0.675)*(0.0708 ft)*(2.51 acres*43560 ft^2 /acres) = 5,225.1 ft^3

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).

Storm water runoff is proposed to be conveyed to on-site streets where it's captured by catch basins and then transported to underground storage chambers and drywells via proposed storm drain infrastructure. Retention depth provided by the underground storage chambers equals or exceeds the depth that would drawdown down in 48 hours. If the chambers and drywells exceed their full volume during a heavy storm event, overflow structures will be proposed in the final engineering design to allow runoff to safely overflow off-site.

DMA Name	Surface Type	BMP Name
A	Mixed Surface Types (Asphalt, Concrete, Roofs, Landscape)	Underground storage chamber and drywells
B	Mixed Surface Types (Asphalt, Concrete, Roofs, Landscape)	Underground storage chamber and drywell

The development is composed of townhomes. The recommended proposed imperviousness per the County's Hydrology Manual is 70% for 8-10 dwellings per acre, which include open space and landscape areas. All DMAs drain to the proposed underground storage chambers and drywells as shown in the BMP Exhibit.

DMA A DCV Calculation
C=(0.7*0.75) +0.15=0.675
d= 0.85 inches = 0.0708 ft
A=5.13 acres
DCV=(0.675)*(0.0708 ft)*(5.13 acres*43560 ft^2 /acres) = 10,679.3 ft^3

DMA B DCV Calculation
C=(0.7*0.75) +0.15=0.675
d= 0.85 inches = 0.0708 ft
A=2.51 acres
DCV=(0.675)*(0.0708 ft)*(2.51 acres*43560 ft^2 /acres) = 5,225.1 ft^3

The northing (N) and easting (E) coordinates for the underground storage chambers will be provided in Final WQMP report. Prior to infiltration a pre-treatment device is proposed to contain a weir height sized at the

DCV with a low flow orifice. During heavy storm events the pre-treatment device is sized to allow high flows to overtop the weir. Flows are then diverted from the pre-treatment device and into the drywells. Drywells are sized per pre vs post runoff volume or DCV (greater of the two volumes). See Attachment 4 for conceptual sections of underground retention chambers and pre-treatment devices.

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:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

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 A DCV Calculation
C=(0.7*0.75) +0.15=0.675
d= 0.85 inches = 0.0708 ft
A=5.13 acres
DCV=(0.675)*(0.0708 ft)*(5.13 acres*43560 ft² /acres) = 10,679.3 ft³
12,650 ft³ proposed volume ≥ DCV, therefore, OK

DMA B DCV Calculation
C=(0.7*0.75) +0.15=0.675
d= 0.85 inches = 0.0708 ft
A=2.51 acres
DCV=(0.675)*(0.0708 ft)*(2.51 acres*43560 ft² /acres) = 5,225.1 ft³
5,300 ft³ proposed volume ≥ DCV, therefore, OK

Drawdown time of DCV is 48 hours or less for vector control. Infiltration Feasibility and Groundwater feasibility worksheets demonstrate that infiltration is acceptable due to site conditions. See attachment 3 for reference.

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.

N/A

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.

N/A

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**
Underground storage chambers and drywells	Underground storage chamber #A is sized for DCV storage, hydromodification (2-year) storage, and flood control mitigation. Two drywells are proposed to infiltrate both the DCV and the 2-year volume in less than 48 and 96 hours, respectively. See sizing and drawdown calculations in Appendix 4. Underground storage chamber #B is sized for DCV storage only. One drywell is proposed to infiltrate the DCV within 39 hours. See sizing and drawdown calculations in Appendix 4. Storm water runoff is proposed to be conveyed to on-site streets where it's captured by catch basins and then transported to underground storage chambers and drywells via proposed storm drain infrastructure. Per the OC TGD, pre-treatment is required upstream of infiltration-based BMPs. Redundancy in the pre-treatment train is preferred. It is our understanding that a draft version of Pre-Treatment Guidelines is being reviewed by the City prior to being released for implementation on City projects. Our concept to achieve pre-treatment is two-fold: 1. To achieve redundancy in the treatment train, curb inlet baskets will be implemented at all curb inlets to remove larger trash, debris, and other gross solids. 2. The Underground Chamber #A will serve as the settling basin to achieve a minimum 50% removal rate of TSS, as requested by April McMillian during the October 16, 2019 meeting. A low flow weir vault (See Section D-D on Proposed Hydrology Exhibit) is proposed downstream of Underground Chamber #A and upstream of the two drywells. The height of the weir (2.42 feet) is set at the DCV (0.245 feet) to create a backwater effect in the chamber, reducing velocities. A small orifice allows low flows to

	eventually drain to the drywells for infiltration. A minimum 50% removal of TSS is achieved, as follows: 1. Per the Geotechnical Report prepared by LGC Valley (dated April 5, 2019), all test pit logs indicate that the upper approx. 3' are made of undocumented artificial fill on top of young alluvial fan deposits. The Undocumented Artificial Fill is principally made of silty sandy GRAVEL and gravelly silty SAND. Below, the young alluvial fan deposits are made of silty fine SAND. No cohesiveness is assumed in this analysis. To be conservative, the finest sediment that may be found locally was determined to be Silty Fine Sand. (See geotechnical report) 2. The typical Grain Size Distribution for Silty Fine Sand is obtained from the NRCS (NEH Part 654). For base soil, D15 and D50 are of 0.11 mm and 0.265 mm, respectively. (See annotated GSD from NRCS). 3. As the rock base surrounding the CMP of Underground Chamber A starts filling up during a water quality event, we anticipate that velocities will be negligible. Settling during dynamic conditions is not considered in this analysis. Settling during quiescent conditions is to be calculated using Stokes Law. 4. Using standard parameters in Stokes Law, the anticipated settling time for D15 and D50 are of 17.5 minutes and 1.1 minutes, respectively. (See Stokes Law spreadsheet) As conceptually designed, the pre-treatment system achieves a minimum of 50% removal of TSS. The underground chambers will serve as pre-treatment device of equivalent performance upstream of the drywells. During heavy storm events the pre-treatment device is sized to allow high flows to overtop the overflow weir. See Attachment 4 for water quality memorandum, conceptual sections of underground retention chambers and pre-treatment devices.

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
N/A

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**
N/A	N/A

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)	☐	☒	Project does not include recycled water.
N6	Local Industrial Permit Compliance	☐	☒	N/A to multi-family residential
N7	Spill Contingency Plan	☐	☒	N/A to multi-family residential
N8	Underground Storage Tank Compliance	☐	☒	N/A to multi-family residential
N9	Hazardous Materials Disclosure Compliance	☐	☒	N/A to multi-family residential
N10	Uniform Fire Code Implementation	☐	☒	The proposed residential project will not store toxic or highly toxic compressed gases.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☐	☒	N/A to multi-family residential
N13	Housekeeping of Loading Docks	☐	☒	N/A to multi-family residential
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	N/A to multi-family residential

N1 Education of Property Owners, Tenants and Occupants:

Practical information will be provided to the tenants by the Property Manager on general housekeeping practices for reach type of site occupancy that contribute to protection of storm water quality. Information will include, but not limited to the attachments provided in Attachment 8. The following resources can be contacted to obtain updated educational information at the County of Orange Stormwater Program website (http://ocwatersheds.com/PublicED/) and the California Storm water Quality Association's (CASQA) BMP Handbooks ((http://www.casqa.org/resources/bmphandbooks).

N2 Activity Restrictions:

The owners/HOA is to develop continuous activity restrictions that include potential impacts to stormwater quality. The following is a list of activity restrictions, but are not limited:

- Do not wash water from concrete, mortar or other construction activities to enter the storm drain system.
- No unauthorized car washing will be permitted on the premises.
- No changing of car oil or other auto repairs will be permitted on the premises.
- On-Site Cleaning of trash dumpsters with water is prohibited.
- Do not sweep grass clippings, dead leaves into catch basins or other landscaping related debris into catch basins.
- Keep trash container areas, free of liter.
- Do not perform paint cleanup activities in paved areas or allow rinse water from these activities to enter the storm drain system.
- Do not use detergents or other chemicals additives when washing concrete sidewalks or building exteriors, use potable water only when and collect wash water runoff using a vacuum truck, for proper offsite disposal.

N3 Common Area Landscape Managment:

Maintenance activities for landscape areas shall be consistent with County/City and manufacturer guidelines for fertilizer and pesticide use. Maintenance includes trimming, weeding and debris removal and vegetation planting and replacement. Stockpiled materials during maintenance activities shall be placed away from drain inlets and runoff conveyance devices. Wastes shall be properly disposed of or recycled. Maintenance for common areas and landscape parking islands is scheduled by future HOA

N4 BMP Maintence:

Responsibility for implementation, inspection and maintenance of all BMPs (structural and non-structural) shall be consistent with the BMP Inspection and Maintenance Responsibilities Matrix provided in Section V of this WQMP, with documented records of inspections and maintenance activities completed. Cleaning of all structural BMP Facilities is scheduled by future HOA.

N11 Common Area Litter Control:

Litter control onsite will include the use of litter patrols, violation reporting and clean up during landscaping maintenance activities and as needed to ensure good housekeeping of the project's common areas.

N14 Catch Basin Inspection Program:

All catch basin inlets and drainage facilities are to be inspected and maintained by the HOA/Owner at least once a year before the start of the rtaininy season.

N15 Street Sweeping Private Streets and Parking Lots:

The project's private streets shall be swept, at minimum, prior to the start of the traditional rainy season and as needed.

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	☐	☒	N/A to multi-family residential
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	☐	☒	Project does not include slopes or channels
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	N/A
S6	Dock areas	☐	☒	N/A to multi-family residential
S7	Maintenance bays	☐	☒	N/A to multi-family residential
S8	Vehicle wash areas	☐	☒	N/A to multi-family residential
S9	Outdoor processing areas	☐	☒	N/A to multi-family residential
S10	Equipment wash areas	☐	☒	N/A to multi-family residential
S11	Fueling areas	☐	☒	N/A to multi-family residential
S12	Hillside landscaping	☐	☒	Project does not include hillside landscaping
S13	Wash water control for food preparation areas	☐	☒	N/A to multi-family residential
S14	Community car wash racks	☐	☒	N/A to multi-family residential

S1 Provide Storm Drain Sysytems Stenceling and Signage:

Storm drain stencils or signage prohibiting dumping and discharge of materials ("No Dumping – Drains to Ocean") shall be provided adjacent to each of the project's proposed inlets. The stencils shall be inspected and re-stenciled as needed to maintain legibility.

S3 Design and Construct Trash and Waste Storgae Areas to Reduce Pollution Introduction :

Trash and waste shall be stored in containers that have lids to decrease direct precipitation into the containers. Trash enclusures and locations will be provided in Final WQMP report. Trash storage areas are to be designed per City standards.

S4 Use Efficient Irrigation Sysytems & Landscape Design, Water Conservation, Small Controllers and Source Control:

In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.

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.*

N/A

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.*

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td colspan="2">☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="2">☐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.</td><td>☐ 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).</td></tr>
<tr><td colspan="2">☐ 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).</td><td colspan="2">☐ 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</td><td>☐ 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).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ 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.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4">Project site will not apply for Water Quality Credits.</td></tr>
</table>

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.*

N/A

Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan (See Attachment 7). 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.* See attached O&M Plan in Attachment 7 and notice of transfer responsibility in Attachment 7.

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Underground Storage Chambers	HOA/Owner	Sediment and trash is evacuated through an access/ inspection manhole. A record of each inspection is to be maintained for the life of the system.	Annually
Drywells	HOA/Owner	New systems receive a visual inspection following the first significant storm events. Typical cleaning is carried out using a truck mounted hydro-vactor.	Annually and within 48 hours of a significant storm event.
Pre-Treatment Device	HOA/Owner	Maintenance includes inspecting the system at a minimum of once every six months. A standard vacuum truck is applied for the removal trash, debris and hydrocarbon filter.	Bi-annual
Non-Structural Source Control BMPs			

N-1 Provide storm drain system stenciling and signage	HOA/Owner	Educational Materials will be provided to the tenants. HOA/Owner shall distribute appropriate materials to owners and/or occupants via language, mailings, website or meeting. Educational materials can be downloaded from www.ocwatersheds.com	Annually
N-2 Activity Restrictions	HOA/Owner	Conditions, covenants and restrictions must be prepared by the developer or building operator though terms and conditions to protect surface water quality.	On-going
N-3 Common Landscape Areas	HOA/Owner	On-going landscape maintenance requirements that are consistent with the County/City.	Monthly
N-4 BMP Maintenance	HOA/Owner	Scheduled by the future HOA for cleaning of all (structural and non-structural) BMP facilities. Maintenance of BMP's implemented at the project site shall be performed at the frequency prescribed in the final WQMP. Records of inspections and BMP maintenance shall be maintained by the HOA and	Monthly

		documented in the final WQMP, and shall be available for review upon request.	
N-11 Common Area Litter Control	HOA/Owner	Litter patrol, violation inspections, reporting and other litter control activities shall be in conjunction with maintenance activities to ensure good housekeeping of the project's common areas. Litter collection and removal shall be performed on a weekly basis	Weekly
N-14 Common Area Catch Basin Inspection	HOA/Owner	On-site catch basin inlets and other drainage facilities shall be inspected at least once per year, prior to the start of the rainy season (October 1st). Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum.	Once a month to clean debris and silt in the bottom of drainage facilities. Intensified around October 1st of each year prior to the "first flush" storm.
N-15 Street Sweeping Private Streets and Parking Lots	HOA/Owner	The project's private streets shall be swept, at minimum, prior to the start of the traditional rainy season and as needed.	Annually as needed.
Structural Source Control BMPs			

S-1 Provide storm drain system stenciling and signage	HOA/Owner	Storm drains shall be inspected for legibility, at a minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible. Storm Drain should be stenciled every other year.	Inspect for re-stencilling needs and re-stencil as necessary annually. Re-stencil every other year.
S-3 Design and construct trash and waste storage areas to reduce pollution introduction	HOA/Owner	Sweep trash area at least once per week and before October 1st each year. Maintain area clean of trash and debris at all times	Weekly
S-4 Use efficient irrigation systems & landscape design, water conservation, smart controllers and source control	HOA/Owner	In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.	On-going

Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan) – See Attachment 1

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.

Section VII Educational Materials

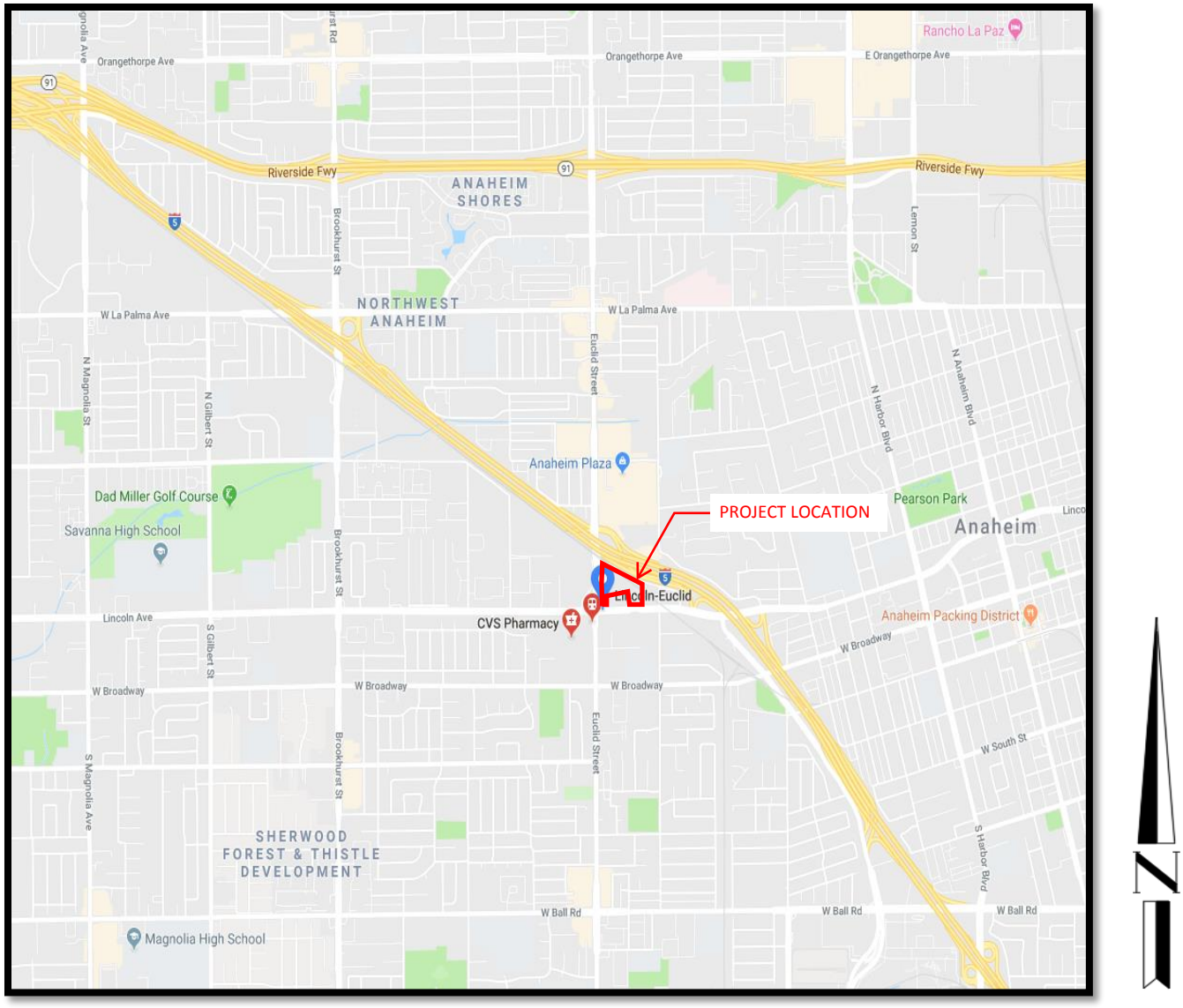
Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Please only attach the educational materials specifically applicable to this project. Other materials specific to the project may be included as well and must be attached.

The following educational materials will be provided in Appendix C of the Final WQMP report.

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 (http://www.ocwatersheds.com) (http://www.casqa.org/resources/bmp-handbooks)**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒	R-3 Automobile Parking	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	R-4 Home & Garden Care Activities	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	R-5 Disposal of Pet Waste	☒
Tips for Maintaining a Septic Tank System	☐	R-6 Disposal of Green Waste	☒
Responsible Pest Control	☒	R-7 Household Hazardous Waste	☒
Sewer Spill	☐	R-8 Water Conservation	☒
Tips for the Home Improvement Projects	☒	SD-10 Site Design & Landscape Planning	☒
Tips for Horse Care	☐	SD-11 Roof Runoff Controls	☒
Tips for Landscaping and Gardening	☒	SD-12 Efficient Irrigation	☒
Tips for Pet Care	☒	SD-13 Storm Drain Signage	☒
Tips for Pool Maintenance	☒	SD-32 Trash Storage Areas	☒

Tips for Residential Pool, Landscape and Hardscape Drains	☒		☐
Tips for Projects Using Paint	☒		☐

Attachment 1 Vicinity Map & Site Plans

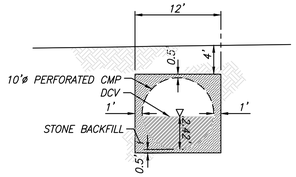


Vicinity Map

N.T.S.

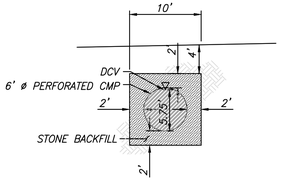
LEGEND

- SUBAREA DESTINATION – SUBAREA ACREAGE – (E-1 / XX.XX)
- HYDRAULIC NODE DESIGNATION (300)
- LONGEST FLOW PATH
- PERVIOUS AREA (LANDSCAPE, OPEN SPACE, PARK)
- PAVED AREA (DRIVEWAY, SIDEWALK, ALLEY)
- BUILDING AREA
- AREA OF DESIGN CAPTURE VOLUME (CONCEPTUAL DETAIL)
- HYDROLOGIC SUBAREA BOUNDARY
- OVERLAND FLOW
- SOURCE CONTROL BMPs WILL BE SHOWN AT FINAL ENGINEERING



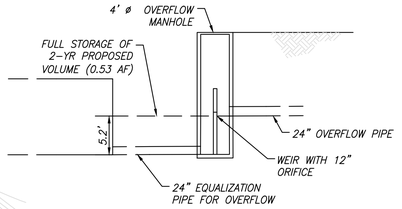
CONCEPTUAL RETENTION CHAMBER SECTION A

SCALE: 1"=10'



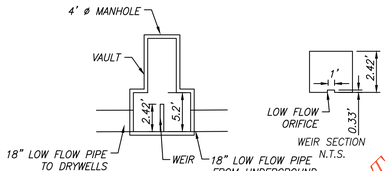
CONCEPTUAL RETENTION CHAMBER SECTION B

SCALE: 1"=10'



SECTION C
CONCEPTUAL OVERFLOW WEIR

N.T.S.

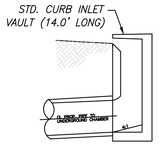


SECTION D
CONCEPTUAL LOW FLOW WEIR

N.T.S

DRAFT

At Node 106	Condition		
Frequency	Existing	Proposed	Delta
100-year Q (cfs)	19.41	18.31	-5.67%
25-year Q (cfs)	14.72	12.71	-13.65%
10-year Q (cfs)	11.95	9.00	-24.69%
2-year Q (cfs)	5.88	3.24	-44.90%



SECTION E
OVERFLOW CURB INLET
(OVERFLOW TO GUTTER)

N.T.S.

EUCLID STREET

SOUTHERN PACIFIC RAILROAD

LOARA STREET

LINCOLN AVENUE

TOPOGRAPHIC DEPRESSION (PONDING)

NO OFFSITE RUN-ON (SEE EXISTING CONDITION HYDROLOGY)

PROPERTY BOUNDARY

OFF-SITE RUNOFF FROM EXISTING HILLSIDE

DMA A-3, 0.59

DMA A-1, 0.42

DMA A-2, 3.91

DMA A, 5.13

DMA A-4, 0.20

DMA B-1, 1.43

DMA B-2, 1.08

Bldg 101, Bldg 102, Bldg 201, Bldg 202, Bldg 203, Bldg 204, Bldg 302, Bldg 304, Bldg 401, Bldg 501, Bldg 502, Bldg 503, Bldg 504, Bldg 505, Bldg 506

100: 135.4 FS

101: 132.7 FS, 128.2 INV, Q_2=0.70 CFS, Q_{10}=1.28 CFS, Q_{25}=1.52 CFS, Q_{100}=1.96 CFS

102: 126.7 INV, Q_2=7.25 CFS, Q_{10}=13.62 CFS, Q_{25}=16.41 CFS, Q_{100}=21.26 CFS

103: 130.0 INV, MITIGATED FLOWS, Q_2=0.03 CFS, Q_{10}=4.02 CFS, Q_{25}=7.18 CFS, Q_{100}=10.58 CFS

104: 131.7 FL, MITIGATED FLOWS, Q_2=3.24 CFS, Q_{10}=9.00 CFS, Q_{25}=12.71 CFS, Q_{100}=18.31 CFS

105: MITIGATED FLOWS TO LINCOLN AVE, Q_2=3.24 CFS, Q_{10}=9.00 CFS, Q_{25}=12.71 CFS, Q_{100}=18.31 CFS

106: MITIGATED FLOWS AT COMPLIANCE POINT, Q_2=3.24 CFS, Q_{10}=9.00 CFS, Q_{25}=12.71 CFS, Q_{100}=18.31 CFS

200: 134.8 FS

201: 132.2 FS, 127.7 INV, Q_2=2.03 CFS, Q_{10}=3.71 CFS, Q_{25}=4.44 CFS, Q_{100}=5.69 CFS

202: 127.5 INV, Q_2=3.55 CFS, Q_{10}=6.49 CFS, Q_{25}=7.77 CFS, Q_{100}=9.96 CFS

203: 127.5 INV, Q_2=3.20 CFS, Q_{10}=6.00 CFS, Q_{25}=7.20 CFS, Q_{100}=9.30 CFS

PROPOSED 120" CMP CHAMBER #A
DCV=0.245 AF ; 2-YR V=0.53 AF
Drawdown DCV=38.9 HRS ; 2-YR=84.2 HRS
TOTAL STORAGE: 36,759 CF
N:2251044.32
E:6048440.37

PROPOSED 72" CMP CHAMBER #B
DCV=0.120 AF
Drawdown DCV=39.0 HRS
TOTAL STORAGE: 5,351 CF
N:2250870.01
E:6048811.27

PROPOSED DRYWELL #1
4' WIDE AND 6' HIGH ROCK SHAFT
N: 2250847.00
E: 6048100.00

PROPOSED DRYWELL #2
WIDE AND 6' HIGH ROCK SHAFT
N: 2250812.00
E: 6048085.00

PROPOSED DRYWELL #3
4' WIDE AND 6' HIGH ROCK SHAFT
N: 2250809.00
E: 6048874.00

APN 072-110-48 (NOT A PART)

APN 072-110-47 (NOT A PART)

APN 072-110-49 (NOT A PART)

APN 072-110-25 (NOT A PART)

APN 072-110-21

APN 072-110-50

APN 034-070-62

TITLE REPORT PARCEL 1

TITLE REPORT PARCEL 2

EXISTING COMMERCIAL

PROPOSED CATCH BASIN

18" RCP STORM DRAIN

24" RCP STORM DRAIN

18" PVC LOW FLOW STORM DRAIN

24" HIGH FLOW STORM DRAIN

PROPOSED CURB OVERFLOW

OVERFLOW MANHOLE

PROPOSED 24" CMP OVERFLOW

PRE-TREATMENT LOW FLOW WEIR VAULT

PROPOSED 24" RCP STORM DRAIN

PROPOSED 18" RCP STORM DRAIN

PROPOSED 24" OVERFLOW PIPE

PROPOSED WEIR WITH 12" ORIFICE

PROPOSED 24" EQUALIZATION PIPE FOR OVERFLOW

PROPOSED 4' ø OVERFLOW MANHOLE

PROPOSED 18" LOW FLOW PIPE TO DRYWELLS

PROPOSED 18" LOW FLOW PIPE FROM UNDERGROUND CHAMBER

PROPOSED LOW FLOW ORIFICE

PROPOSED WEIR SECTION

PROPOSED STD. CURB INLET VAULT (14.0' LONG)

LOWER FLOWS TO BE INFILTRATED BY DRYWELLS

GUTTER FLOW L=775 FT

L=216 FT

L=284 FT

L=406 FT

L=336 FT

SCALE 1"= 40"

LINCOLN AT EUCLID

ANAHEIM, CA

CONCEPTUAL GRADING & DRAINAGE EXHIBIT

PREPARED BY: HUITT-ZOLLARS

PREPARED FOR: SHOPOFF REALTY INVESTMENTS

DATE : 08/05/2019

Attachment 2 Construction Plans

PARKING NOTES:

- ALL PARALLEL PARKING STALLS ARE TO BE 8'x22' MINIMUM.
- ALL STANDARD HEAD-ON PARKING STALLS ARE TO BE 9'x18' MINIMUM.
- ALL ACCESSIBLE PARKING STALLS ARE TO BE 9'X18' MINIMUM.
- ALL PARKING STALLS ARE TO BE DOUBLE STRIPED PER CITY OF ANAHEIM ENGINEERING STANDARD DETAIL 470.
- ALL ACCESSIBLE PARKING STALL SIGNS SHALL CONFORM TO CAMUTCD SIGN R99(CA), R99B, AND R7-8B.

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- STREET CENTERLINE
- EXISTING EASEMENT
- ADA PATH OF TRAVEL

EXISTING EASEMENTS

(A) INGRESS, EGRESS, PUBLIC UTILITY EASEMENT TO PACIFIC BELL. (TO BE VACATED).

(B) PUBLIC UTILITY EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY (TO BE VACATED).

PROPOSED EASEMENTS

(1) EASEMENT FOR EMERGENCY VEHICLE ACCESS PURPOSES TO THE CITY OF ANAHEIM.

(2) EASEMENT FOR DOMESTIC WATERLINE ACCESS AND MAINTENANCE PURPOSES TO THE CITY OF ANAHEIM.

(3) EASEMENT FOR SLOPE ACCESS AND MAINTENANCE PURPOSES TO THE CITY OF ANAHEIM.

N

40 0 20 40 80

SCALE 1" = 40'

LINCOLN AT EUCLID

ANAHEIM, CA

SEPTEMBER 1□ 2019

R:\R309453.01 - Shopoff Anaheim\10 CADD & BIM\10.13 Civil\Production\CUP\C-1 Preliminary Site Plan.dwg Sep 16 2019 8:26am

PRELIMI□ARY SITE PLA□

SHOPOFF REALTY INVESTMENTS

JZMK PARTNERS studio PAD Landscape Architecture

HUITT-ZOLLARS

□□□

		CUT	FILL	NET
RAW EARTHWORK (INCLUDES STREET AND ALLEY UNDERCUT)		4,458	3,760	698 EXPORT
ADJUSTMENTS	REMIEDIAL/OVEREX (4' OVER SITE)	46,255	46,255	
	DEMOLITION (4" OVER SITE)	3,855	3,855	
	TRENCHING/UTILITIES	-	-	
	SUBTOTAL	54,568	53,870	
SHRINKAGE (15%)			8,081	
TOTAL		**59,026**	**65,711**	**-6,685 IMPORT**

SOUTHERN PACIFIC RAILROAD

EUCLID STREET

LOARA STREET

LINCOLN AVENUE

APN 072-110-50

APN 072-110-48 (NOT A PART)

APN 072-110-47 (NOT A PART)

APN 072-110-49 (NOT A PART)

APN 072-110-25 (NOT A PART)

APN 072-110-21

TITLE REPORT PARCEL 3 APN 072-110-19

TITLE REPORT PARCEL 1 APN 034-070-57

TITLE REPORT PARCEL 2 APN 034-070-62

EXISTING COMMERCIAL

UNDERGROUND STORMWATER STORAGE CHAMBERS

EXISTING CURB & GUTTER

EXISTING SIDEWALK

EXISTING MEDIAN CURB

EXISTING R/W

ULTIMATE R/W (TO BE DEDICATED PER PROJECT)

PROPOSED MEDIAN MODIFICATIONS FOR LEFT TURN POCKET

REMOVE AND REPLACE EXISTING CURB & GUTTER

MEDIAN AND STRIPING IMPROVEMENTS (PER SEPARATE PROJECT)

DRYWELL

LINCOLN AT EUCLID

ANAHEIM, CA

SEPTEMBER 1□□2019

R:\R309453.01 – Shopoff Anaheim\10 CADD & BIM\10.13 Civil\Production\CUP\C-2 Preliminary Grading Plan.dwg Sep 16 2019 8:26am

PRELIMI□ARY GRADI□G PLA□

SHOPOFF REALTY INVESTMENTS

JZMK PARTNERS studio PAD

HUITT-ZOLLARS

□□20

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- STREET CENTERLINE
- EXISTING EASEMENT
- SD — PROPOSED PRIVATE STORM DRAIN
- SS — PROPOSED PRIVATE SANITARY SEWER
- DW — PROPOSED PUBLIC DOMESTIC WATER
- DW — PROPOSED PRIVATE DOMESTIC WATER
- FW — PROPOSED PRIVATE FIRE
- PROPOSED PRIVATE FIRE HYDRANT

EXISTING EASEMENTS

(A) INGRESS, EGRESS, PUBLIC UTILITY EASEMENT TO PACIFIC BELL. (TO BE VACATED).

(B) PUBLIC UTILITY EASEMENT TO SOUTHERN CALIFORNIA EDISON COMPANY (TO BE VACATED).

PROPOSED EASEMENTS

(1) EASEMENT FOR EMERGENCY VEHICLE ACCESS PURPOSES TO THE CITY OF ANAHEIM.

(2) EASEMENT FOR WATERLINE ACCESS AND MAINTENANCE PURPOSES TO THE CITY OF ANAHEIM.

(3) EASEMENT FOR SLOPE ACCESS AND MAINTENANCE PURPOSES TO THE CITY OF ANAHEIM.

N

40 0 20 40 80

SCALE 1"= 40'

PRELIMI□ARY □TILITY PLA□

LINCOLN AT EUCLID

ANAHEIM, CA

SEPTEMBER 1□ 2019

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SHOPOFF REALTY INVESTMENTS

JZMK PARTNERS studio PAD HUITT-ZOLLARS

□ □□0

Attachment 3 Soils Information

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 VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: Per the LGC Valley Geotechnical, Inc. soils report Project Number 184014-01 dated July 19, 2019, ground water levels at the site is thought to be approximately 80 to 110 feet below the ground surface. Therefore, groundwater is not considered a concern for on-site storm water infiltration design. 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: Per the LGC Valley Geotechnical, Inc. soils report Project Number 184014-01 dated July 19, 2019, any water infiltration of storm water runoff is not anticipated to adversely impact soil structure interaction, provided that the percolation area setback is a minimum of 10 feet from any building foundations. The report also water infiltration from a proposed storm water system is not anticipated to result in settlement or hydro-collapse to the soils underlying the site. 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: No anticipated to our knowledge of known violation to water rights downstream. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

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: Per the Orange County Soils Map the project site location is categorized as B soils. 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: Per the LGC Valley Geotechnical report dated July 19, 2019 (Project Number 184014-01), infiltration test borings of 0.48, 0.88 and 1.01 inches per hour represent the soils in the northern drywell of the western facility, the southern drywell of the western facility and both dry wells of the middle facility. 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

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Per the LGC Valley Geotechnical, Inc. report dated July 19, 2019 (Project Number 184014-01), based on the California Department of Water Resources, the most recent data indicates a groundwater level of 80 to more than 110 feet below existing ground surface. Downstream beneficial uses will not be affected due to the BMPs designed for flood control, hydromodification and storm water treatment. 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: Per the LGC Valley Geotechnical, Inc. report dated July 19, 2019 (Project Number 184014-01), based on the California Department of Water Resources, the most recent data indicates a groundwater level of 80 to more than 110 feet below existing ground surface. The subject is not located within the Plume Protection Boundary identified by the Orange County Water District and there are no wellhead or septic systems in the vicinity of the site. Therefore, neither of these two factors are considered to be a limitation to infiltration (LGC Valley Geotechnical, Inc.). Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

Infiltration Screening Results (check box corresponding to result):		
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.	N/A
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening	N/A
10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Summarize findings of infeasibility screening	N/A
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	X

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	5.13 (DMA A) 2.51 (DMA B)	acres
3	What type of BMP is proposed?	Pre-treatment, underground storage chambers and drywells for both DMA A & DMA B.		
4	What is the infiltrating surface area of the proposed BMP?	A_{BMP}	3,721 (DMA A) 872 (DMA B)	sq-ft
5	What land use activities are present in the tributary area (list all) DMA A and DMA B will consist of rooftops with roofing material free of copper and zinc, patios, sidewalks, open space (grass, trees and plants), minor streets and parking.			
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): N/A			
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: Per Section VIII.2 of the OC TGD, separation to mounded seasonally high groundwater shall be at least 10 feet for infiltration devices that inject water below the subsurface and surface infiltration BMPs with tributary area and land use activities that are considered to pose a significant risk to groundwater quality.			
10	What is separation from the infiltrating surface to seasonally high groundwater?	SHGWT	±20	ft
11	What is separation from the infiltrating surface to mounded seasonally high groundwater?	Mounded SHGWT	±20	ft

Worksheet I: Summary of Groundwater-related Feasibility Criteria

12	Describe assumptions and methods used for mounding analysis: Mounding analysis will be performed by applying the USGS equation to the data collected by the geotechnical engineer during final design.	
13	Is the site within a plume protection boundary (See Figure VIII.2)?	Y [N] N/A
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: Per the Roux, Inc. Site Specific Study Assessing the Impact of Proposed Infiltration BMPs within 250 feet of a Contaminated Site, project number 3224.0003L002 dated April 4, 2019 (Located in Appendix E of Geotechnical report), found that the concentrations of the contaminants in the on-site soil do not indicate that stormwater will cause adverse impacts to the ground water quality. The Roux, Inc. report also found that during the Phase 1 Site Assessment for APN 072-110-49 (1683 W. Lincoln Avenue) a past-dry cleaning operation was performed.	
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: Per the LGC Valley Geotechnical, Inc. soils report Project Number 184014-01 dated July 19, 2019, groundwater was not encountered to a maximum explored depth of 70 feet below the existing grade within the subject site. Data obtained by the California Department of Water Resources indicated a groundwater levels at the site is thought to be approximately 80 to 110 feet below the ground surface. Therefore, groundwater is not considered a concern for on-site storm water infiltration design.		

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

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER

CASE SUMMARY

REPORT DATE
2/2/2005

HAZARDOUS MATERIAL INCIDENT REPORT FILED WITH OES?

I. REPORTED BY -

CONTACT NAME	INITIALS	ORGANIZATION_NAME	EMAIL ADDRESS	CREATED BY
DENNIS A. WEBSTER	DAW	LA HABRA STUUCO		UNKNOWN

ADDRESS
1631 W. LINCOLN AVE.
ANAHEIM, CA 92803

CONTACT DESCRIPTION

III. SITE LOCATION

FACILITY NAME
LA HABRA STUCCO

FACILITY ID

FACILITY ADDRESS
1631 LINCOLN AVE. W.
ANAHEIM, CA 92803
ORANGE COUNTY

ORIENTATION OF SITE TO STREET

CROSS STREET
LOARA

V. SUBSTANCES RELEASED / CONTAMINANT(S) OF CONCERN

DIESEL

VI. DISCOVERY/ABATEMENT

DATE DISCHARGE BEGAN

DATE DISCOVERED	HOW DISCOVERED	DESCRIPTION
12/21/2004	Tank Closure	

DATE STOPPED	STOP METHOD	DESCRIPTION
	Close and Remove Tank	

VII. SOURCE/CAUSE

SOURCE OF DISCHARGE
Other

CAUSE OF DISCHARGE
Unknown

DISCHARGE DESCRIPTION

VIII. CASE TYPE

CASE TYPE
Soil

IX. REMEDIAL ACTION

REMEDIAL ACTION	BEGIN DATE	END DATE	DESCRIPTION
NA	12/21/2004		

X. GENERAL COMMENTS

XI. CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION REPORTED HEREIN

IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.

XII. REGULATORY USE ONLY

LOCAL AGENCY CASE NUMBER

REGIONAL BOARD CASE NUMBER
083004014T

LOCAL AGENCY

CONTACT NAME	INITIALS	ORGANIZATION_NAME	EMAIL ADDRESS
RALPH MCCAFFREY	RM	ANAHEIM CITY	rmccaffrey@anaheim.net

ADDRESS
201 S. ANAHEIM BLVD. MS 601
ANAHEIM, CA 92805

CONTACT DESCRIPTION
Environmental Services Specialist

PHONE TYPE	PHONE NUMBER	EXTENSION
office	(714)-765-4288	

REGIONAL BOARD

CONTACT NAME	INITIALS	ORGANIZATION_NAME	EMAIL ADDRESS
CARL BERNHARDT	CAB	SANTA ANA RWQCB (REGION 8)	carl.bernhardt@waterboards.ca.gov

ADDRESS
3737 MAIN STREET, SUITE 500
RIVERSIDE, CA 925013339

CONTACT DESCRIPTION

PHONE TYPE	PHONE NUMBER	EXTENSION
MAIN PHONE	(951)-782-4495	
Main Fax	(951)-781-6288	

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DEPARTMENT OF TOXIC SUBSTANCES CONTROL
ENVIROSTOR

WEST LINCOLN ASSEMBLAGE (60002802)

SIGN UP FOR EMAI

1631 AND 1699 WEST LINCOLN AVENUE
ANAHEIM, CA 92801
ORANGE COUNTY
SITE TYPE: VOLUNTARY CLEANUP

PROJECT MANAGER: IRENA EDWAI
SUPERVISOR: MARYAM TASI ABBASI
OFFICE: CLEANUP CYI
CENSUS TRACT: 6059087105
CALENVIROSCREEN PERCENTILE SCORE: 56-60%

Summary | Activities | Site/Facility Docs | Map | Related Sites | CalEnviroScreen

Site Information

CLEANUP STATUS
ACTIVE AS OF 3/7/2019

SITE TYPE: VOLUNTARY CLEANUP
NATIONAL PRIORITIES LIST: NO
ACRES: 5.8 ACRES
APN: 072-110-21, 072-110-50
CLEANUP OVERSIGHT AGENCIES:
DTSC - SITE CLEANUP PROGRAM - LEAD AGENCY

ENVIROSTOR ID: 60002802
SITE CODE: 401869
SPECIAL PROGRAM: VOLUNTARY CLEANUP PROGRAM
FUNDING: SITE PROPONENT
ASSEMBLY DISTRICT: 65
SENATE DISTRICT: 29

Regulatory Profile

PAST USE(S) THAT CAUSED CONTAMINATION
NONE SPECIFIED

POTENTIAL CONTAMINANTS OF CONCERN
NONE SPECIFIED

POTENTIAL MEDIA AFFECTED
NONE SPECIFIED

Site History

The Site consists of two irregular-shaped adjoining parcels situated within a triangular city block bound by West Lincoln Avenue to the south, South Euclid Street to the west, and by a Southern Pacific Railroad (SPRR) easement to the northeast. According to the Orange County Tax Assessor's Office, the parcel situated at 1631 West Lincoln Avenue is identified by Assessor's Parcel Number (APN) 072-110-21, measures 1.97 acres, and is currently occupied by a cement manufacturing company. The parcel at 1699 West Lincoln Avenue is identifie APN 072-110-50, measures 4.03 acres and is currently vacant. Both properties are currently owned by Anastasi Development Company, LLC (Anastasi). Initial development of the Site i evidenced in an aerial photograph taken in 1938. The photograph shows that the Site and surrounding area had been cultivated with orange orchards (or groves) by that time. Aerial photograph of the Site taken in 1963 shows significant development of the Site and surrounding area. The Santa Ana (Interstate 5) Freeway had been constructed by that time, along wi overpass for Euclid Avenue and a curved off-ramp passing through the 1699 West Lincoln Avenue parcel of the subject Site. The off-ramp is supported on what appears to be a raised e embankment, occupying much of the southern portion of the parcel. The remainder of the 1699 West Lincoln Avenue parcel had been cleared of orange trees and appears to be vacant. Within the 1631 West Lincoln Avenue parcel, the industrial building had been greatly expanded and now resembles its current day footprint. The remainder of the triangular block had be developed by what appear to be independent industrial or commercial operations. Freeway off-ramp was replaced between 1994 and 2005. The embankment was removed from the 16 West Lincoln Avenue parcel (along with the paved off-ramp) and the parcel appears to be completely vacant since that time.

In 2005, the City of Anaheim Public Utilities Department (APUD) requested that an investigation be performed in connection with a previously removed 10,000-gallon diesel undergrounc storage tank (UST) at 1631 West Lincoln Avenue. FREY Environmental, Inc. (FREY) of Newport Beach, California completed soil sampling in the vicinity of the former UST, which was subsequently documented in their Subsurface Soil Investigation report (FREY, July 7, 2005). On August 31, 2005 the APUD provided case closure for the former diesel UST citing the investigation activities described above. The Santa Ana Regional Water Quality Control Board (SARWQCB) concurred with the determination for case closure (SARWQCB, 2005).

Subsurface investigation was conducted to assess shallow soil and soil vapor conditions in the areas to be potentially redeveloped for residential use. As reported by EMS, 18 VOCs we detected in soil vapor samples collected from on-Site soil vapor probes. The concentrations of PCE detected in on-Site soil vapor samples ranged from 15 to 680 micrograms per cubic r (ìg/m3).

Commercial property located at 1681/1683 West Lincoln Avenue adjoins the 1699 West Lincoln Avenue parcel to the south. 1681/1683 street addresses were associated with the busine names Abbey Rents Hosp Equipment & Supplies (1970); Krupnicks, Inc (1970); Award Bridal (1995); After Five Tux Shops (1995 - 2010); and APT Enterprises, Inc. (2005-2014). The property is currently operated as a discount furniture retail store. The After Five Tux Shop was identified in several database listings reviewed in the course of the Phase I ESA. A listing South Coast Air Quality Management District (SCAQMD) FINDS database indicated that the After Five Tux Shop received a permit to operate PCE dry cleaning equipment on April 23, 1 Soil vapor samples were collected by EMS on July 2 and 3, 2018. Concentrations of PCE in off-Site soil vapor ranged from 22 to 77,000 ìg/m3, with the highest concentrations encounte beneath the former After Five Tux Shops property located at 1681/1683 West Lincoln Avenue.

In 2019 West Lincoln Assemblage, LLC entered in to a Voluntary Cleaup Agreement with DTSC to investigate and remediate the property for unrestricted use.

UNDERGROUND STORAGE TANK
CASE SUMMARY / CLOSURE RATIONALE

I. AGENCY INFORMATION

Date: Aug. 31, 2005

Agency:	Anaheim Public Utilities	Staff:	Ralph McCaffrey
Address:	201 S. Anaheim Blvd. #601	Title:	Environmental Services Specialist
City/State/Zip:	Anaheim, CA 92805	Phone:	714-765-4288

II. CASE INFORMATION

Site Name:	La Habra Stucco			
Location:	1631 W. Lincoln Ave. Anaheim, CA 92802			
RB Case #	083004014T			
Responsible Parties	Address			Phone Number
La Habra Stucco / Dennis Webster, owner/operator	1631 W. Lincoln Ave. Anaheim, CA 92802			714-774-1186
Tanks	Size In Gallons	Contents	Closed in-place or removed?	Date
1	12,000	Diesel Fuel	Removed	12/21/2004

III. RELEASE AND SITE CHARACTERIZATION INFORMATION

Cause & type of release: Leaking connections at diesel fuel dispenser			
Site characterization complete:	YES	Summary reports dated: March 8, 2005 – UST Removal July 7, 2005 – Subsurface Soil Assessment	
Monitoring wells installed?	NA	Proper screen interval?	NA
Highest depth: NA		Lowest depth: NA	
Flow Direction: NA		Drinking water wells affected?	NO
Most sensitive groundwater use:	Municipal	Groundwater Sub-Basin: Santa Ana Forebay	
Surface water affected?	NO	Report(s) filed: Anaheim Public Utilities Department	
Report(s) on file?	YES		
Property Owner Notified: Yes, property owner is the responsible party.			

TREATMENT AND DISPOSAL OF AFFECTED MATERIAL			
Tank rinseate	150 gallons	Disposed at Demenno Kerdoon, Compton	12/23/2004
UST (fiber-glass)	1 (12,000 gallon capacity)	Disposed at Ecology Auto Parts, Santa Fe Springs, CA	12/22/2004

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SITE CHARACTERIZATION						
CONTAMINANT	SOIL (mg/kg)		Vapor (ppmv)		GROUNDWATER (ug/l)	
	Initial (12/21/04)	Assessment[2] (5/2/05)	Highest	Final	Highest	Final
TPH-gasoline	NA[1]	<0.5	NA	NA	NA	NA
TPH-diesel	670	<10	NA	NA	NA	NA
Benzene	<0.002	<0.005	NA	NA	NA	NA
Toluene	<0.002	<0.005	NA	NA	NA	NA
Ethylbenzene	<0.002	<0.005	NA	NA	NA	NA
Xylenes	<0.002	<0.005	NA	NA	NA	NA
MTBE	<0.005	<0.005	NA	NA	NA	NA

(1) NA = Not analyzed, Not applicable.
(2) No remediation was conducted. Initial contaminant concentrations in soil remain.

IV. CLOSURE RATIONALE

Does completed corrective action protect beneficial uses per the regional board basin plan?	Yes
Does the corrective action protect public health for current land use?	Yes
Should corrective action be reviewed if land use changes?	No
Monitoring or vapor wells decommissioned:	Not Applicable
List of enforcement actions taken	None
List enforcement action rescinded	None
Site management requirements	None

V. COMMENTS AND SUMMARY

This site is owned and operated by La Habra Stucco and is used as a stucco manufacturing and materials storage facility. On December 21, 2004, the 12,000-gallon, diesel fuel UST, and associated fuel dispenser were removed by California Hazardous Services, an environmental management contractor. At the time the UST system was removed, City of Anaheim Fire Department, Environmental Protection Section Inspector, Fred Chun was on site to direct soil sampling. A total of four soil samples were collected – two from beneath the tank, one from under the dispenser, and one from under a pipeline. Diesel fuel was detected in the soil samples collected beneath the former dispenser, pipeline, and the eastern end of the tank. The highest contaminant concentration was found in the soil sample collected beneath the former dispenser at a depth of approximately 3 feet, which had 670 mg/kg diesel fuel (sample D-1).

On February 3, 2005, upon notification of the release and review of the field reports, this Department opened this case to require additional assessment of the potentially affected area. A subsurface soil assessment was conducted by Frey Environmental on May 2, 2005. This assessment included a total

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of four direct push borings to depths of 40 feet each in the vicinity of the former dispenser and UST system. No petroleum hydrocarbons (TPH-d, TPH-g, BTEX, or MTBE) were detected in any of the soil samples taken during Frey's investigation.

Sampling to 40 feet did not encounter groundwater; as such, a groundwater investigation was not performed. Depth to water is estimated at 55 feet below ground surface in this area. The City of Anaheim's nearest active, domestic water well (#18) is approximately 1 mile southwest of the site.

The responsible party has requested site closure. This Department concurs with the request for closure for the following reasons:

1. The suspected source of the contamination – the UST, dispenser, and pipe line have been removed.
2. Petroleum impacted soil at the site was confirmed to be of low concentration and limited extent and should not impact future groundwater resources.
3. The soil contamination at the site appears to have been adequately assessed. Petroleum hydrocarbons were not detected in the samples taken from the soil underlying the former dispenser/UST during the subsequent assessment. No BTEX compounds or MTBE was detected in any of the soil samples submitted for analysis.

REGIONAL BOARD CONCURRENCE

Kenneth R. Williams, Chief of the Pollution Investigation Section of the California Regional Water Quality Control Board, Santa Ana Region, concurred with these findings on August 30, 2005.

VI. AGENCY REPRESENTATIVES

Name: Ralph J. McCaffrey	Title: Environmental Services Specialist Anaheim Public Utilities
Signature: Ralph J McCaffrey	Date: 8/31/2005

Name: Richard Wilson	Title: Environmental Services Manager Anaheim Public Utilities
Signature: Richard Wilson	Date: 8/31/05

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City of Anaheim
PUBLIC UTILITIES DEPARTMENT
Environmental Services

September 15, 2005

Mr. Dennis A. Webster
La Habra Stucco
1631 W. Lincoln Ave.
Anaheim, CA 92802

Subject: No Further Action for Assessment of Diesel Fuel Contaminated Soil at 1631 W. Lincoln Ave., Anaheim, CA
Regional Board Case No. 083004014T

Dear Mr. Webster:

This letter confirms the completion of site investigation and remedial action for the contaminated soil that was found during the underground storage tank facility removal project undertaken in December 2004. With the provision that the information provided to this Department was accurate and representative of existing conditions, it is the position of this office that no further action is required at this time. The site case summary provides additional information.

Please be advised that this letter does not relieve you of any liability under the California Health and Safety Code or Water Code for past, present or future operations at the site. Nor does it relieve you of the responsibility to clean up existing, additional or previously unidentified conditions at the site which cause or threaten to cause pollution or nuisance or otherwise pose a threat to water quality or public health. It is the property owner's responsibility to notify this Department of any changes in report content, future contamination findings, or changes site usage.

If you have any questions, please contact me at (714) 765-4288.

Sincerely,

Ralph J. McCaffrey
Environmental Services Specialist

c: Carl A. Bernhardt, SARWQCB
Ed Rands, Frey Environmental, Inc.

201 S. Anaheim Boulevard, Suite 601
Anaheim, California 92805
TEL (714) 765-5196
FAX (714) 765-4135
www.anaheim.net

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LGC Valley, Inc.
Geotechnical Consulting

July 19, 2019 Project No. 184014-01

Mr. Michael Gregg
SLF-West Lincoln, LLC.
2 Park Plaza, Suite 700
Irvine, California 92614

Subject: ***Planning-Stage Infiltration Study, Proposed Lincoln at Euclid Multi-Family Residential Development, Northeast Corner of West Lincoln Avenue and Euclid Street, Anaheim, California***

Introduction

In accordance with your request and authorization, LGC Valley, Inc. (LGC) has performed a planning-stage infiltration study for the proposed Lincoln at Euclid Multifamily Development, located northeast of the intersection of West Lincoln Avenue and Euclid Street, in the City of Anaheim, California (Figure 1). Our infiltration study was based upon the location and design of the proposed storm water BMP system with dry wells shown on the Preliminary WQMP Exhibit for Lincoln at Euclid, dated July 1, 2019, prepared by Huitt-Zollars, (Huitt-Zollars, 2019).

The purpose of our infiltration study was to: 1) determine the percolation/infiltration rates in the general vicinity of the proposed dry well locations on the site; and 2) to specify the appropriate factors-of-safety from a geotechnical standpoint in order for the design engineer to adequately design the storm water BMP system. This report includes the results of our field exploration, percolation/infiltration testing, geotechnical evaluation, and provides our recommendations with respect to the proposed storm water BMP system at the site. Our infiltration study was conducted in general accordance with the Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Appendices VII and VIII, dated December 20, 2013 (Orange County, 2013).

The locations of the Cone Penetrometer Test (CPT) soundings (CPT-1 through CPT-5) and the infiltration borings (I-6 through I-8) are shown on the attached Infiltration Testing Location Map (Figure 2).The CPT soundings are presented in Appendix B while the infiltration test results are presented in Appendix C. Worksheet H: Factor of Safety and Design Infiltration Rate is presented in Appendix D.

Scope of Work

Our scope of services for preparation of this document included:

- Review of geotechnical reports, geologic maps, and other documents relevant to the site (Appendix A).
- A subsurface investigation consisting of the excavation of five CPT soundings (CPT-1 through CPT-5). The CPT soundings are presented in Appendix B while the approximate locations are depicted on the Infiltration Test Location Map (Figure 2).
- Percolation/infiltration testing of three infiltration test borings (i.e. Borings I-6 through I-8) were performed in general accordance with the Percolation Test Procedure described in Section VII.3.8 of the TGD. The approximate borehole test locations are depicted on the Infiltration Test Location Map (Figure 2).
- Geotechnical analysis and evaluation of the data including the determination of infiltration rates and the appropriate factor-of-safety to use in the design of the dry well infiltration system.
- Preparation of this report presenting our findings, conclusions, opinions, and recommendations with respect to the proposed storm water BMP system at the site.
- Preparation of the County of Orange Worksheet H - Factor of Safety and Design Infiltration Rate Worksheet.

Site Location and Proposed Development

The subject study area consists of five parcels totaling approximately 10.38 acres. The relatively large triangular property located in the northwest portion of the property is currently undeveloped; the remaining properties contain commercial developments. The existing topography of the entire site is generally flat. The site is bounded to the west by an easement and an ascending slope to Euclid Street, to the northeast by the Southern Pacific Railroad easement and tracks, and to the south by existing commercial properties and West Lincoln Avenue.

The proposed development will consist of a 183-unit multifamily development consisting of multi-story town homes, a recreation center with a swimming pool, driveways, guest parking, concrete flatwork, underground utilities, landscaping, and two storm water infiltration facilities. Based on the current Preliminary WQMP Exhibit (Huitt-Zollars, 2019), the site will have two facilities; one in the southwest portion of the site (designated as the western infiltration facility or DMA-A), the other in the southcentral portion (designated as the middle infiltration facility or DMA-B). Each of the facilities will consist of one underground storm water storage vault and two infiltration dry wells (that will be on the order of 40 to 60 feet in depth).

Geologic Conditions

The site is located in area that is mapped as Quaternary-aged young alluvial fan deposits. This unit was found to vary in soil composition across the site. These alluvial fan deposits typically consist of fine-grained silty sand,

silty clay, sandy silt, and clayey silt. Based on the CPT soundings (presented in Appendix B) the upper 8 to 18 feet of the site consists mostly of fine grained soils with minimal sandy soils. Below that, the site consists of an approximate 7 to 14 foot sandy to silty sand zone followed by an approximate 10 to 15 foot thick silty to clayey zone. With the exception of the northern portion of the western storm water infiltration facility to a depth of approximately 53 feet, below this fine grained zone, the material is mainly sand, silty sand and/or sandy silt. The varying amount of fine-grained material (silt and/or clay) within the site appears to affect the tested infiltration rates.

Groundwater

Groundwater was not encountered during our current dry well infiltration study or during the project preliminary geotechnical investigations (LGC, 2018 and 2019) to the maximum depth explored of 70 feet. The California Department of Water Resources monitored the ground water level in a well located approximately 2000 feet southwest of the site. Readings were taken from 1969 through 2003. The most recent data indicates a groundwater level at an approximate elevation ranging from 12 to 22 feet in elevation, or more than 110 feet below existing ground surface. At another site located approximately 300 feet west of the project site (i.e. the Euclid Way Industrial Park), ground water was encountered at a depth of 80 to 85 feet.

Percolation/Infiltration Study

On July 10, 2019, we advanced five CPT soundings to either 60 or 70 feet in depth. Based on the CPT data, we drilled and logged three infiltration test borings in the general vicinity of proposed dry-well locations on July 12, 2019. Since the two dry wells of the middle facility (DMA-B) are planned to be approximately 30 feet apart, we drilled the infiltration boring between the proposed dry well locations. For the western facility, we drilled infiltration borings near each of the two proposed dry well locations. The infiltration test borings were excavated to a depth of 59.2 to 60 feet below the current ground surface. Cuttings from these infiltration borings were logged by our field geologist for the purpose of describing the soil profile which essentially matched the results of the CPT soundings. The CPT sounding (CPT-1 through CPT-5) locations and the infiltration test boring (Borings I-6 through I-8) locations are shown on Figure 2 while the CPT soundings results are presented in Appendix B. It should be noted that Infiltration Borings I-1 through I-5 were excavated during the prior site infiltration when the site storm water BMP design consisted of infiltration basins rather than the current dry-well infiltration design.

After the borings were excavated and prior to presaturation, 2 inches of pea gravel was placed in the bottom of the infiltration test borings. Three-inch diameter perforated PVC pipe was placed in the test hole, and gravel was placed around the outside of the pipe up to a depth of approximately 10 feet below the existing ground surface to minimize caving of the boring sidewalls during the testing. The borings were then pre-soaked by adding water to the level of the proposed dry-well infiltration zone (i.e. to a depth of approximately 10 feet below the existing ground surface).

On July 15, 2019, two geologists from our office conducted the percolation/infiltration testing. Our infiltration/percolation testing was conducted by filling the holes with clear water to a depth of approximately 10 below the ground surface, and measuring the water drop. Per the Percolation Test Method procedures outlined in the Orange County TGD, two initial 25-minute tests were conducted in each infiltration boring in order to classify the material being tested as either “sandy soils” (more than 6 inches of water seeps away in each of the initial 25-minute test periods) or “non-sandy soils” (less than 6-inches of water seeps away in each of the initial two 25-

minute periods). However, in each of the infiltration borings it was quickly noted that the water drop greatly exceeded 6-inches; as a result, two initial 5 or 10-minute tests were conducted in each infiltration boring in order to classify the material being tested as either "sandy soils" or "non-sandy soils". Since more than 6 inches of water seeped away in each of the initial test periods, the material was considered sandy soils and the infiltration test was run for a minimum of one hour or until an essentially steady infiltration rate was obtained. During testing, the borings were refilled as needed, to maintain a water height at or near the top of the proposed dry-well infiltration zone (generally 10 feet below the proposed grades of the project). This resulted in testing intervals of approximately 5 to 10 minutes.

The measurement of the final test period was used to determine the percolation rate for each of the tests. Conversion of the obtained percolation test results to an "infiltration rate" was then performed utilizing the Porchet Method. The logs of the CPT soundings are provided in Appendix B while the infiltration test results are provided in Appendix C.

Infiltration Factor of Safety

Given the known potential for infiltration facilities to fail over time, a mandatory factor of safety is required to be applied (Orange County, 2013). The minimum acceptable factor of safety (FOS) in Orange County is FOS = 2. Per the Orange County TGD, the geotechnical engineer is to evaluate the site conditions based on Table VII.3: Site Suitability Considerations and Table VII.4: Design Related Considerations for Infiltration, in order to come up with an appropriate factor of safety. The factor of safety deemed appropriate for the project conditions is 2.0. Appendix D presents Worksheet H - Factor of Safety and Design Infiltration Rate for each of the proposed storm water infiltration facilities.

Field Percolation/Infiltration Test Results

The results of the percolation testing are summarized in Table 1. The observed infiltration rate column in the table is based on percolation test results in the field that were then converted to infiltration rates using the Porchet Method. The adjusted infiltration rate was calculated by dividing the average observed infiltration rate by the factor of safety as determined in Worksheet H: Factor of Safety and Design Infiltration (Appendix D).

Table 1

Summary of Percolation/Infiltration Testing

Infiltration Test Boring Number	Infiltration Facility Location	Hole Diameter (inches)	Total Depth (feet)	Final Time Interval (minutes)	Observed Infiltration Rate (inch/hour)	Adjusted Infiltration Rate (inch/hour)
I-6	West Facility	8	59.2	10	0.48	0.24
I-7	West Facility	8	60.0	10	0.88	0.44
I-8	Middle Facility	8	60.0	10	1.01	0.50

According to Section VII.2 of the Orange County TGD, infiltration is feasible if the measured infiltration rate (measured infiltration rate = observed infiltration rate in the field/factor of safety) is at least 0.3 inches per minute.

Based upon our field infiltration testing, only the southern dry well location of the western infiltration facility and the middle infiltration facility have infiltration rates that are considered feasible.

Groundwater-Related Infiltration Feasibility

Infiltration facilities cannot be used where they would adversely affect groundwater quality or where depth to groundwater would limit infiltration. Per Appendix VIII of the Orange County TGD, the following factors must be considered when determining feasibility of onsite infiltration:

- Depth to groundwater and mounding potential,
- Presence of groundwater plumes,
- Wellhead protection and septic systems, and
- Contamination risks from land use activities in the area tributary to the BMP

As mentioned above, groundwater at the site is thought to be approximately 80 to more than 110 feet below the ground surface. The potential for groundwater mounding is considered a potential impediment to infiltration in the condition of high groundwater (less than 10 feet below the infiltration surface) or shallow perched groundwater. Given the depth to groundwater at the site, and given that we did not encounter any perched conditions in any of the CPT soundings or borings excavated across the site during our preliminary geotechnical investigation of the site (LGC, 2019) to a depth of 70 feet, groundwater mounding is not considered to be a limiting factor for infiltration at this site.

The subject site is not located within the Plume Protection Boundary identified by the Orange County Water District, as presented on Figure VIII.2 within the TGD. There are no known wellhead or septic systems in the vicinity of the site, therefore, neither of these two factors are considered to be a limitation to infiltration.

According to Appendix VIII, infiltration is prohibited within 250 feet of contaminated sites found in the GeoTracker and EnviroStor databases unless a site specific study demonstrates that infiltration would not adversely impact groundwater conditions (Orange County, 2013). There are two known sites that have at one time been, or presently are considered to be contaminated. The first site is the LUST Cleanup site located on APN 072-110-21 (1631 West Lincoln Avenue). The second area with known contaminants is outside of the project site, on APN 072-110-49 (1683 West Lincoln Avenue). During the Phase 1 Site Assessment for this project, a past dry-cleaning operation was identified on this property (Roux, 2019). Roux Associates, Inc. performed a site specific study assessing the impact of proposed infiltration BMPs within 250 feet of the subject site and concluded that detected concentrations of contaminants in onsite soil samples do not indicate that storm water infiltration will cause adverse impacts to groundwater quality (Appendix E).

Conclusions and Recommendations

Based on our infiltration study the following conclusions and recommendations were noted:

- Based on data presented in this report, it is our opinion that the infiltration rates measured in the infiltration test borings of 0.48, 0.88, and 1.01 inches/hour are representative of the soils in the northern dry well of the western facility, the southern dry well of the western facility, and both of the dry wells of the middle facility, respectively.

- Based upon the results of the infiltration testing and applying the appropriate factor-of-safety (measured infiltration results), only the northern portion of the western facility is considered not feasible for infiltration per the Orange County TGD; as the rate is less than 0.3 inches/hour.
- Groundwater was not encountered to a maximum explored depth of 70 feet below the existing grade within the subject site. Based data from the California Department of Water Resources, the most recent data indicates a groundwater level of 80 to more than 110 feet below existing ground surface. Therefore, groundwater is not considered a concern for on-site storm water infiltration design.
- Given the depth to groundwater at the site and given that we did not encounter any perched conditions in any of subsurface excavations across the site, groundwater mounding is not considered to be a limiting factor for infiltration at this site.
- The subject site is not located within the Plume Protection Boundary identified by the Orange County Water District, as presented on Figure VIII.2 within the TGD. Therefore, this is not considered to be a limitation to infiltration.
- There are no known wellhead or septic systems in the vicinity of the site, therefore, this is not considered to be a limitation to infiltration.
- According to Appendix VIII, infiltration is prohibited within 250 feet of contaminated sites found in the GeoTracker and EnviroStor databases unless a site specific study demonstrates that infiltration would not adversely impact groundwater conditions (Orange County, 2013). There are two known sites that have at one time been, or presently are considered to be contaminated. The first site is the LUST Cleanup site located on APN 072-110-21 (1631 West Lincoln Avenue). The second area with known contaminants is outside of the project site, on APN 072-110-49 (1683 West Lincoln Avenue). During the Phase 1 Site Assessment for this project, a past dry-cleaning operation was identified on this property (Roux, 2019). Roux Associates, Inc. performed a site specific study assessing the impact of proposed infiltration BMPs within 250 feet of the subject site and concluded that detected concentrations of contaminants in onsite soil samples do not indicate that storm water infiltration will cause adverse impacts to groundwater quality (Roux, 2019).
- Any proposed storm water infiltration system should meet the guidelines for proper infiltration with regard to setbacks from buildings, property lines and groundwater levels.
- Any proposed storm water treatment system should be setback a minimum of 10 feet from the property line.
- Any water infiltration of storm water runoff is not anticipated to adversely impact soil structure interaction, provided that the percolation area is setback a minimum of 10 feet from any building or wall foundations. If the percolation area is setback a minimum of 10 feet from any building or wall foundations horizontally or vertically, proposed foundations will not be adversely impacted from expansive soils.
- Based upon the relative density of the on-site soils as encountered during this investigation, any water infiltration from a proposed storm water system is not anticipated to result in settlement or hydro-collapse to the soils underlying the site and therefore will not negatively impact any adjacent structures or improvements.
- The proper use and maintenance of the drainage systems are critical to maintain the useful design life per the guidelines set forth by the drain manufacturer.

Limitations

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The observations made and the in-situ field testing performed are believed representative of the project; however, soil and geologic conditions

revealed by excavation may be different from our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the civil engineer and incorporated into the plans.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control.

Closure

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact us.

Respectfully submitted,
LGC Valley, Inc.



Adam C Rich, PE 85642
Project Engineer



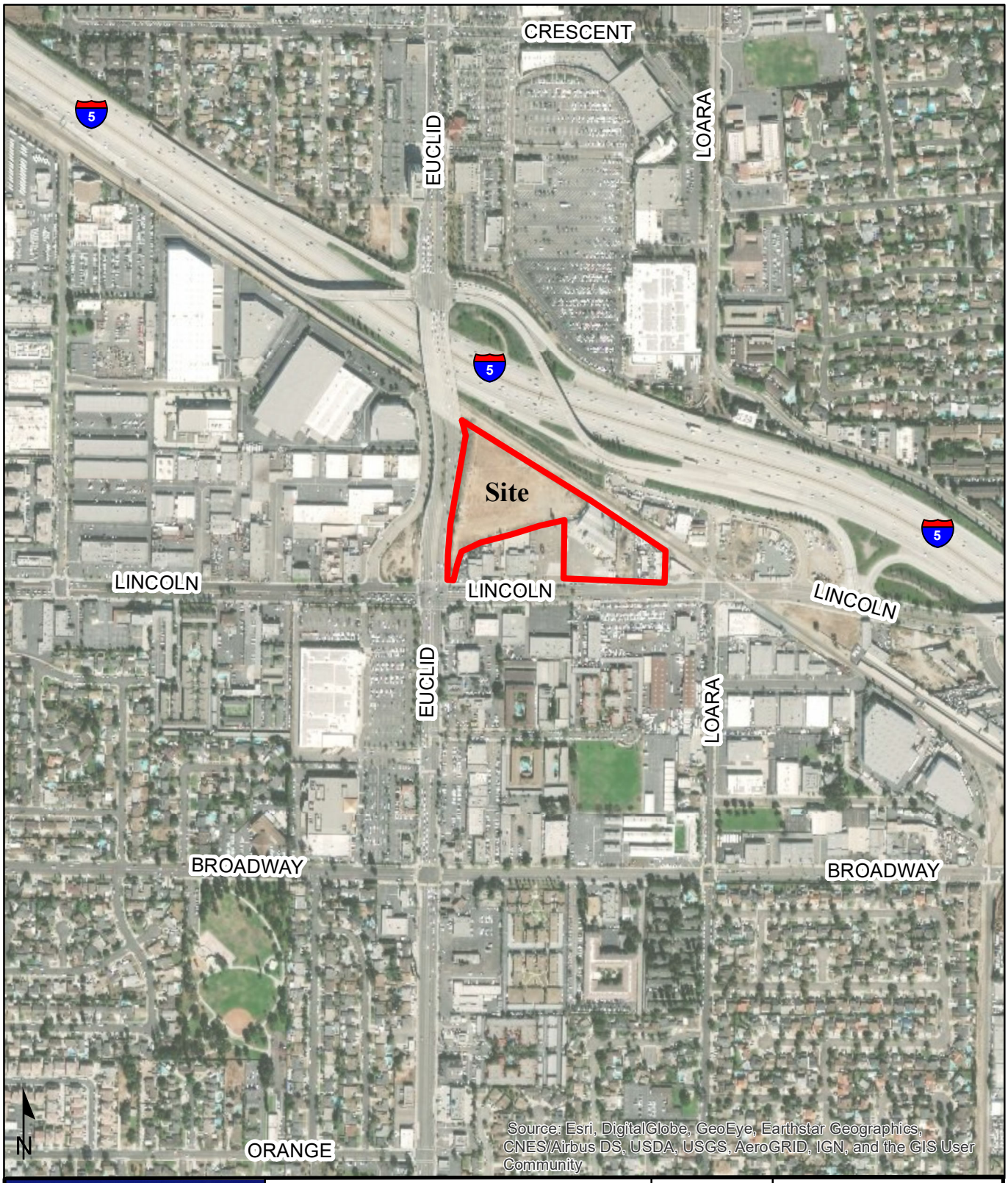


Randall K. Wagner, CEG 1612
Senior Project Geologist



Attachments: Figure 1 - Site Location Map
Figure 2 - Infiltration Testing Map
Appendix A - References
Appendix B - CPT Soundings
Appendix C - Infiltration Test Results
Appendix D - Infiltration Worksheet Sheets H
Appendix E - Site Specific Study Assessing Impact of Infiltration BMPs by Roux Associates, Inc.

Distribution: (1) Addressee (via email)



LGC

Figure 1
Site Location Map
Lincoln at Euclid
Anaheim, California

Project Name	Lincoln at Euclid
Project Number	184014-01
Eng./Geo.	ACR/RKW
Date	July 19, 2019

0 0.17 Miles

Infiltration Testing Map

Lincoln at Euclid
Anaheim, California

LGC Valley, Inc.

Figure 2

PROJECT NAME	Lincoln at Euclid
PROJECT NO.	184014-01
ENG. / GEOL.	ACR/RKW
SCALE	1=80'
DATE	July 19, 2019

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

Legend

TD Test Boring Location

C T Cone Test Location

Property Boundary

Note: Infiltration Borings I-1 through I-5 were excavated in proposed storm water retention basins which will not be constructed. Instead site infiltration will be provided by a dry-well design

EUCLID STREET

SOUTHERN PACIFIC RAILROAD

LINCOLN AVENUE

PROPERTY BOUNDARY

DMA A
5.13

DMA B
1.86

PROPOSED 78" CMP CHAMBER

PROPOSED 72" CMP CHAMBER

PROPOSED DRYWELL

TITLE REPORT PARCEL 9
APN 072-110-50

TITLE REPORT PARCEL 4A
APN 072-110-21

TITLE REPORT PARCEL 3
APN 072-110-19

TITLE REPORT PARCEL 1
APN 034-070-57

TITLE REPORT PARCEL 2
APN 034-070-62

APN 072-110-48
(NOT A PART)

APN 072-110-47
(NOT A PART)

APN 072-110-49
(NOT A PART)

APN 072-110-25
(NOT A PART)

EXISTING COMMERCIAL

this area is to be added to DMA B

Base Map Provided by: Huitt-Zollars Inc., Preliminary WQMP Exhibit, Lincoln at Euclid

APPENDIX A

References

Alton Geoscience, 1996, First Quarter 1996 Groundwater Monitoring Report, Former Texaco Station, 1680 W Lincoln Avenue, Anaheim, California, Texaco Location No. 61-106-0660, 18 pages, dated April 30, 1996.

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Gregg Drilling, 2019, CPT Site Investigation, Shopoff Anaheim Dry Well – 1631 & 1699 West Lincoln Avenue, Anaheim, California, Project No. D1190582SH, dated July 12, 2019.

Huitt-Zollars, 2019, Draft Preliminary WQMP Exhibit, 1 Sheet, dated July 1, 2019.

JZKM Partners, 2019, Schematic Site Plan Updated, Lincoln at Euclid, Anaheim, CA, Project No. 18039, 1 Sheet, dated July 1, 2019.

LGC Valley, Inc. 2018, Preliminary Due-Diligence Geotechnical Review and Investigation, Lincoln Avenue Mixed Use Commercial Property Development Located on the Northeast Corner of Lincoln Avenue and Euclid Street, City of Anaheim, California, Project No. 184014-00, dated June 22, 2018.

LGC Valley, Inc. 2019, Preliminary Geotechnical Investigation and Infiltration Testing for the Proposed Lincoln at Euclid Multifamily Development, Located on the Northeast Corner of Lincoln Avenue and Euclid Street, Assessor's Parcel Numbers 072-110-21 and 072-110-50, City of Anaheim, California, Project No. 184014-01, dated April 4, 2019.

Orange County, 2013, Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Appendices VII and VIII, dated December 20, 2013.

Roux Associates, Inc., 2019, Site Specific Study Assessing Impact of Proposed Infiltration BMPs Within 250 Feet of a Contaminated Site, 1631 and 1699 West Lincoln Avenue, Anaheim, California, Project No. 3224.0003L002, dated April 3, 2019.

Texaco Environmental Services, 1990, Site Assessment Report, Closed Texaco Service Station, 1680 W Lincoln Ave. / Euclid St., Anaheim, California, 69 pages, dated March 26, 1990.

APPENDIX B

CPT Soundings

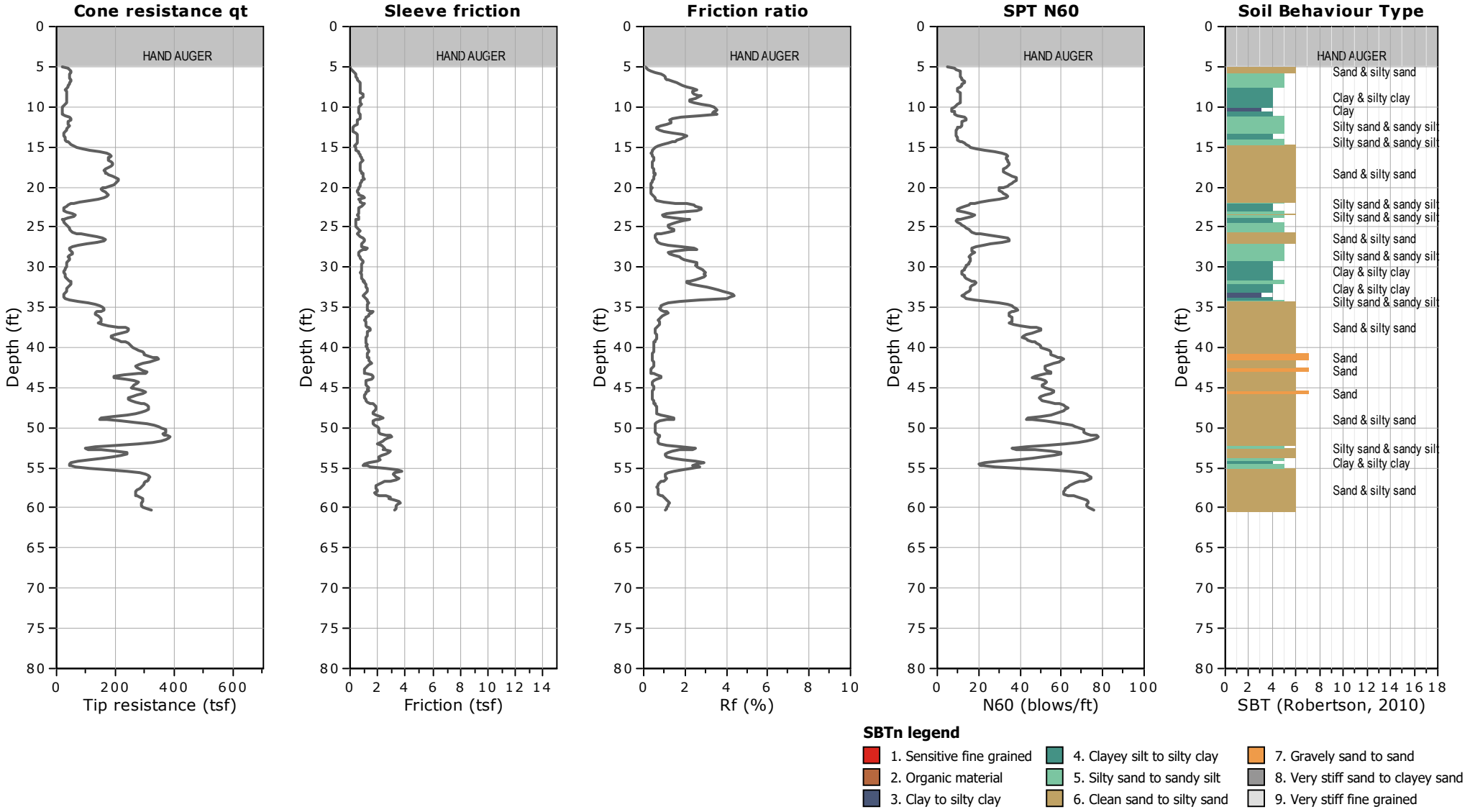
CPT: CPT-1

CLIENT: LGC VALLEY, INC

FIELD REP: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 60.20 ft, Date: 7/10/2019



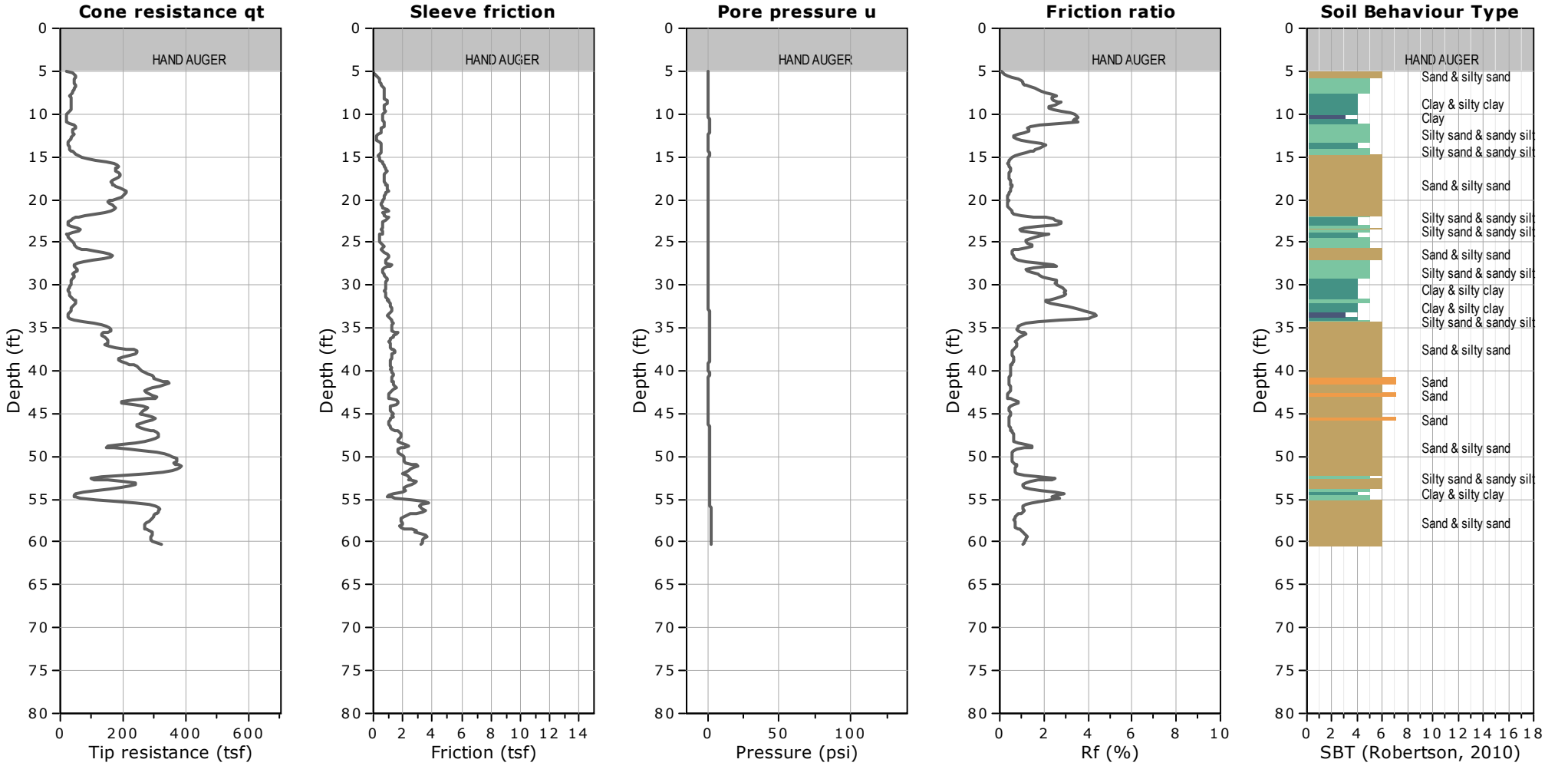
CPT: CPT-1

CLIENT: LGC VALLEY, INC

Field Rep: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 60.20 ft, Date: 7/10/2019



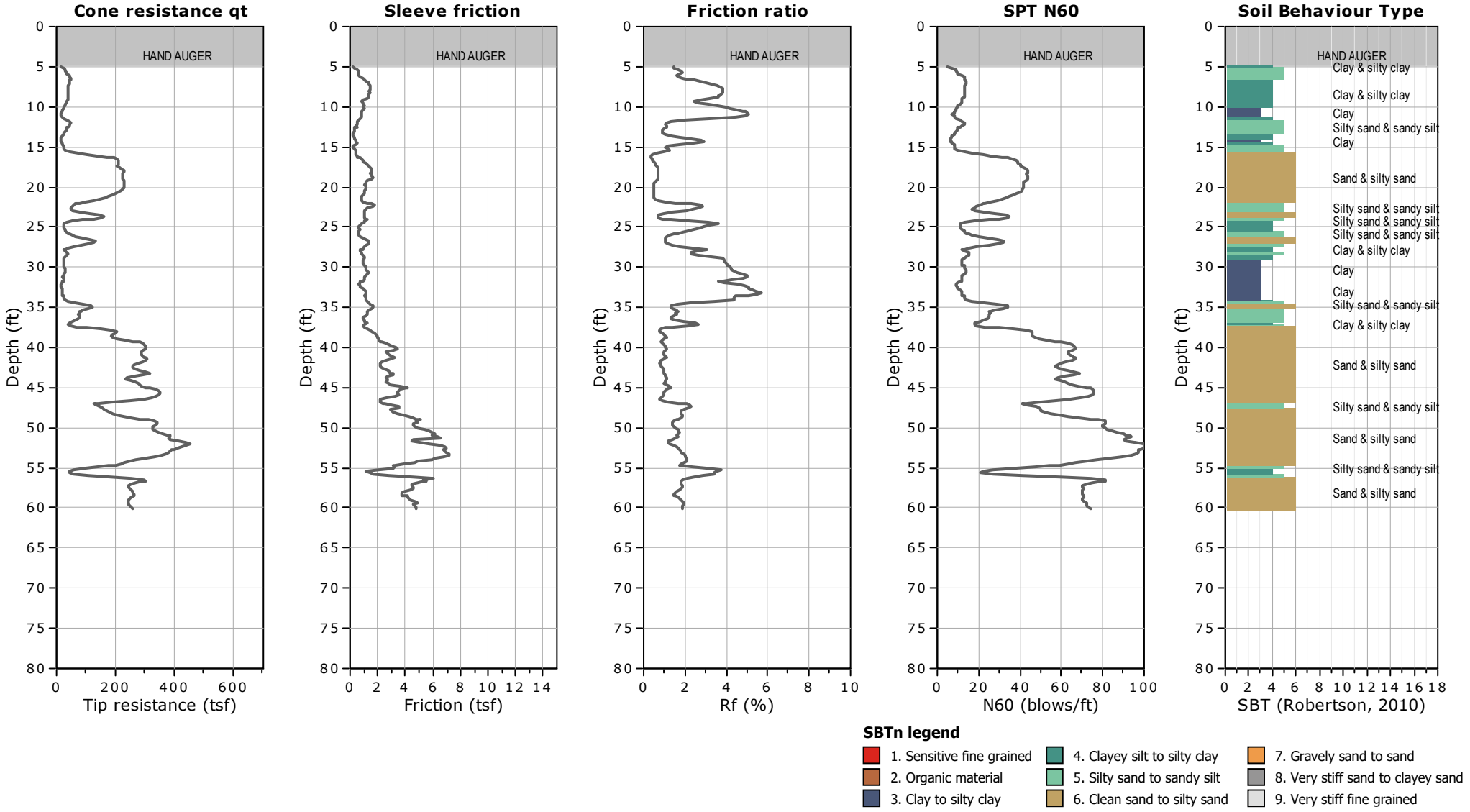
WATER TABLE FOR ESTIMATING PURPOSES ONLY

CLIENT: LGC VALLEY, INC

FIELD REP: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 60.04 ft, Date: 7/10/2019

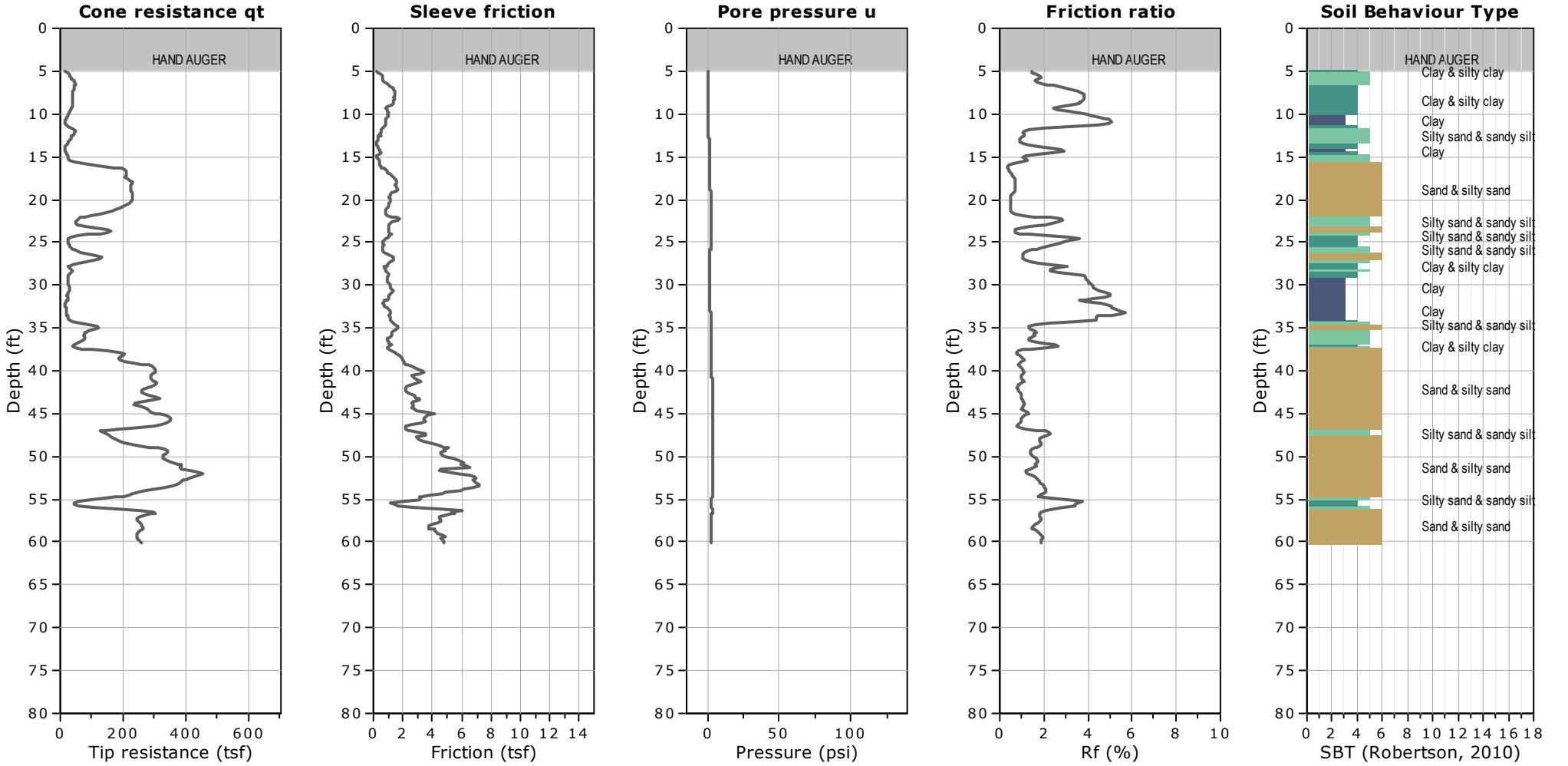


CLIENT: LGC VALLEY, INC

Field Rep: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 60.04 ft, Date: 7/10/2019



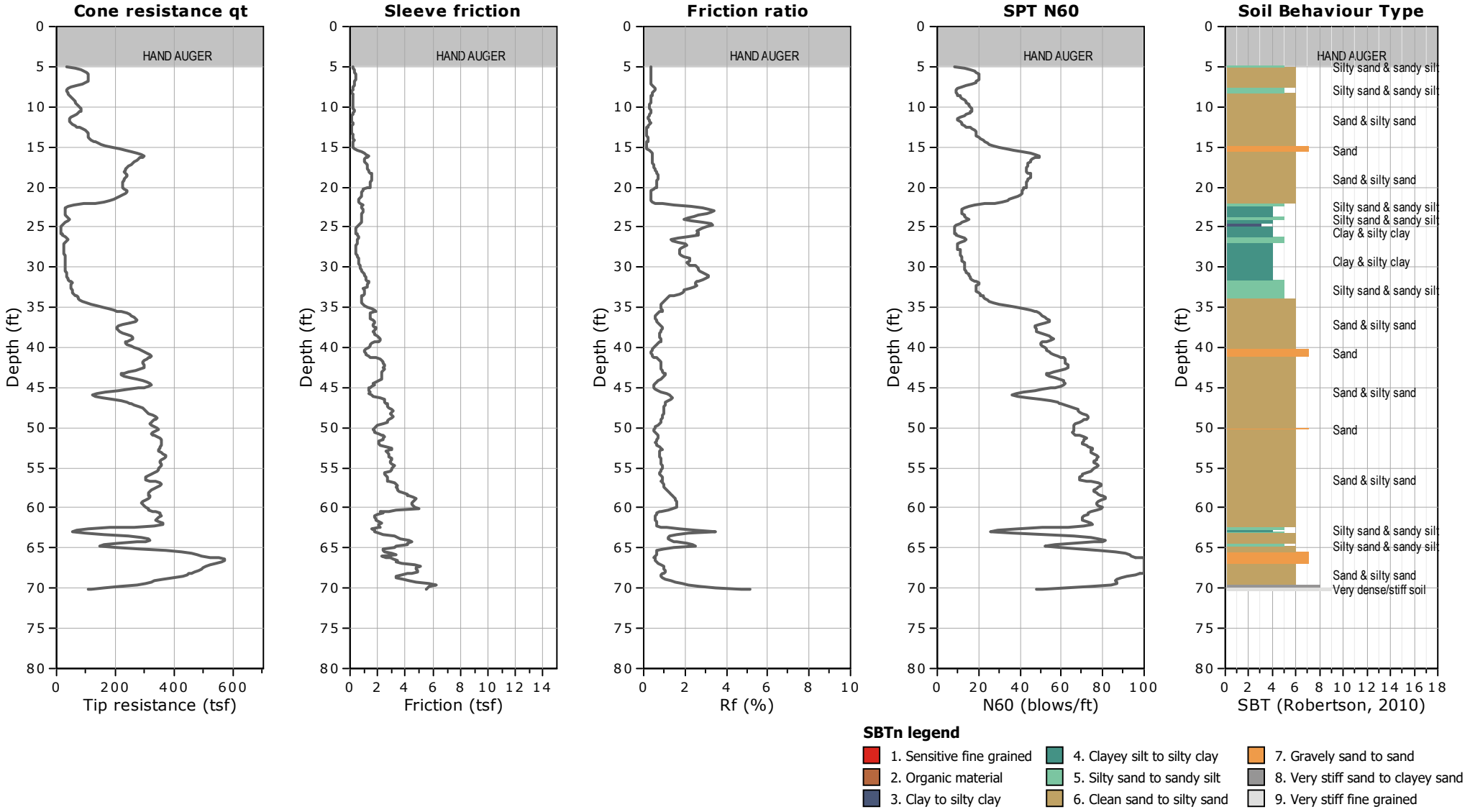
WATER TABLE FOR ESTIMATING PURPOSES ONLY

CLIENT: LGC VALLEY, INC

FIELD REP: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 70.21 ft, Date: 7/10/2019



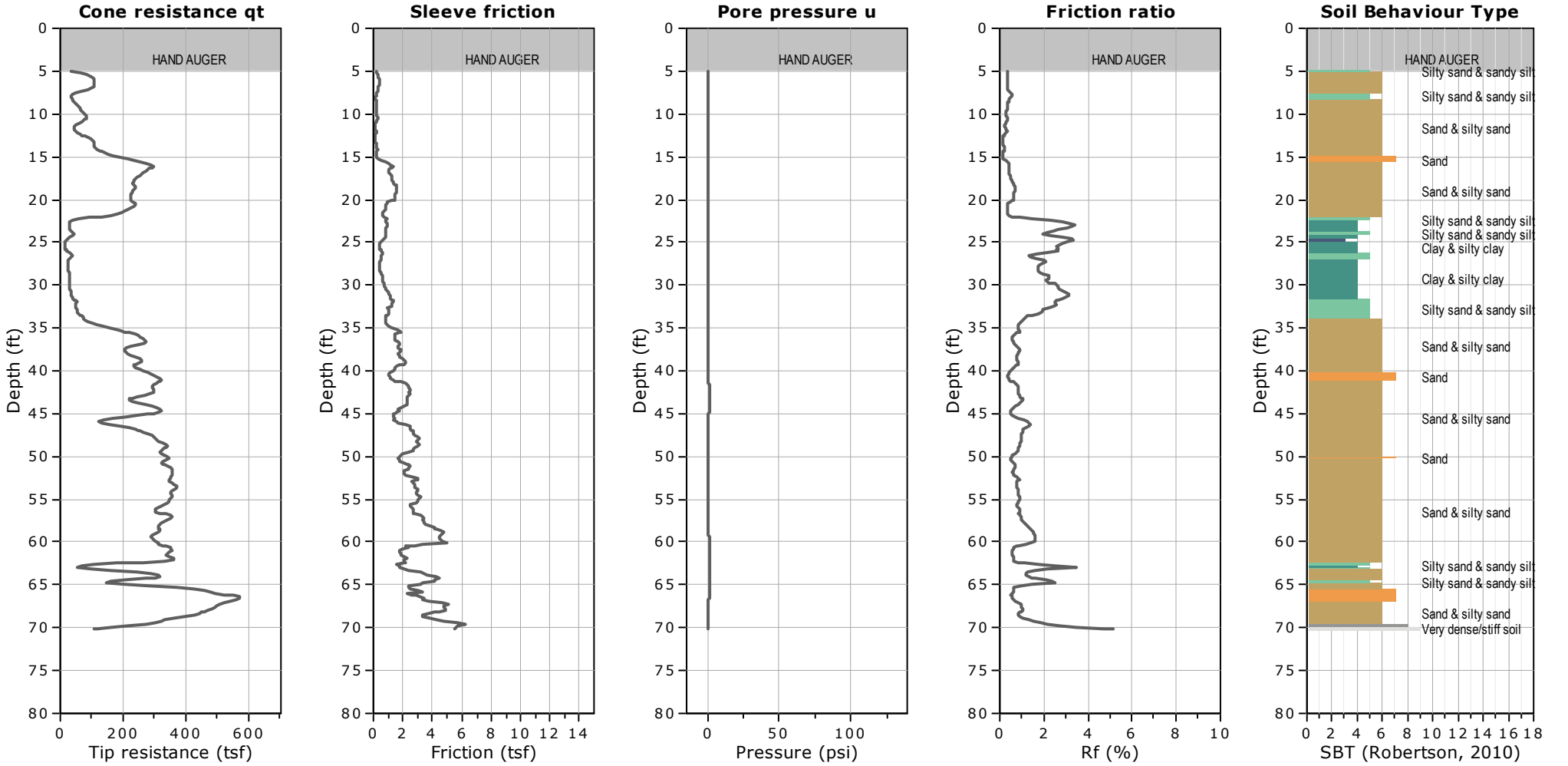
CPT: CPT-3

CLIENT: LGC VALLEY, INC

Field Rep: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 70.21 ft, Date: 7/10/2019



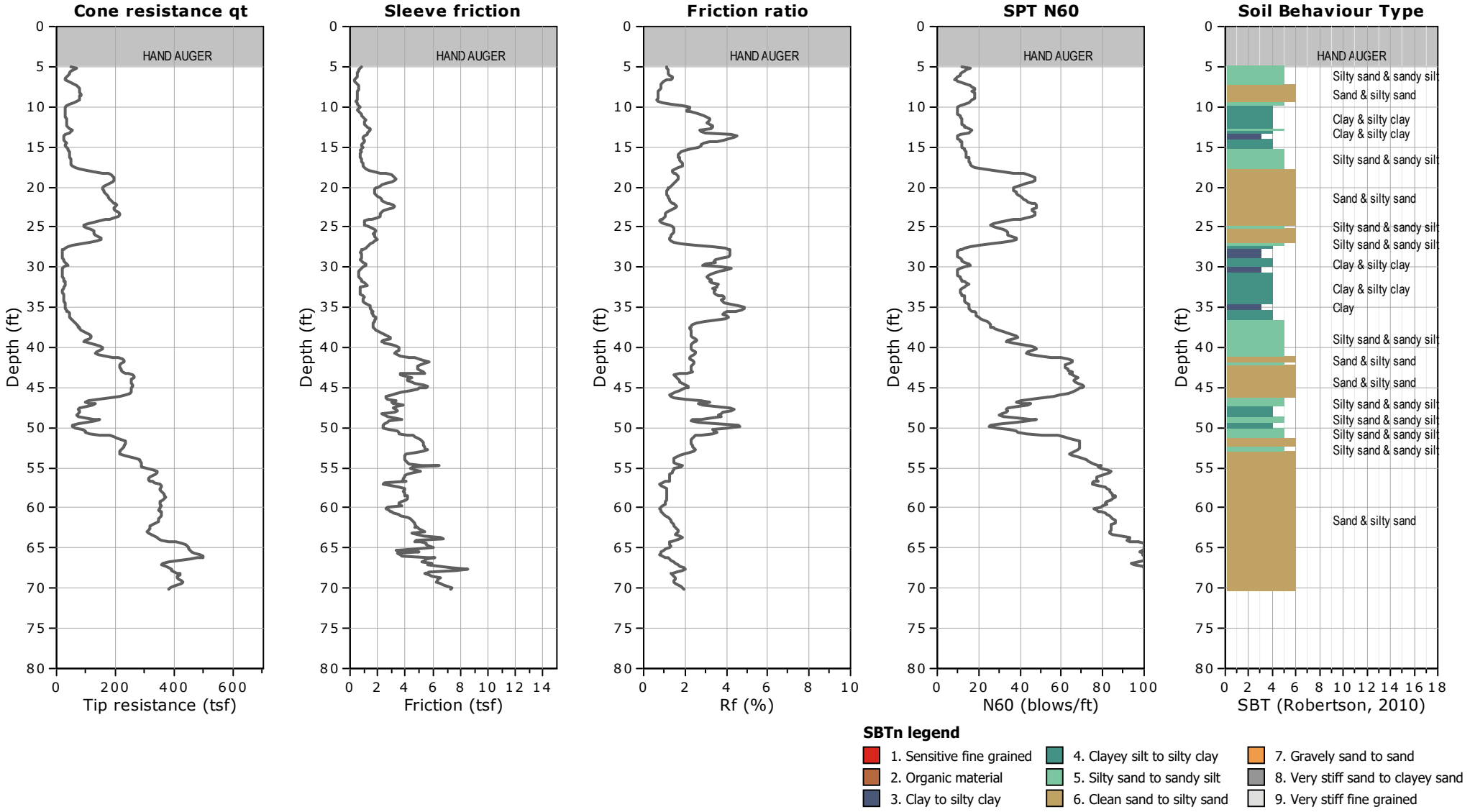
WATER TABLE FOR ESTIMATING PURPOSES ONLY

CLIENT: LGC VALLEY, INC

FIELD REP: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 70.05 ft, Date: 7/10/2019

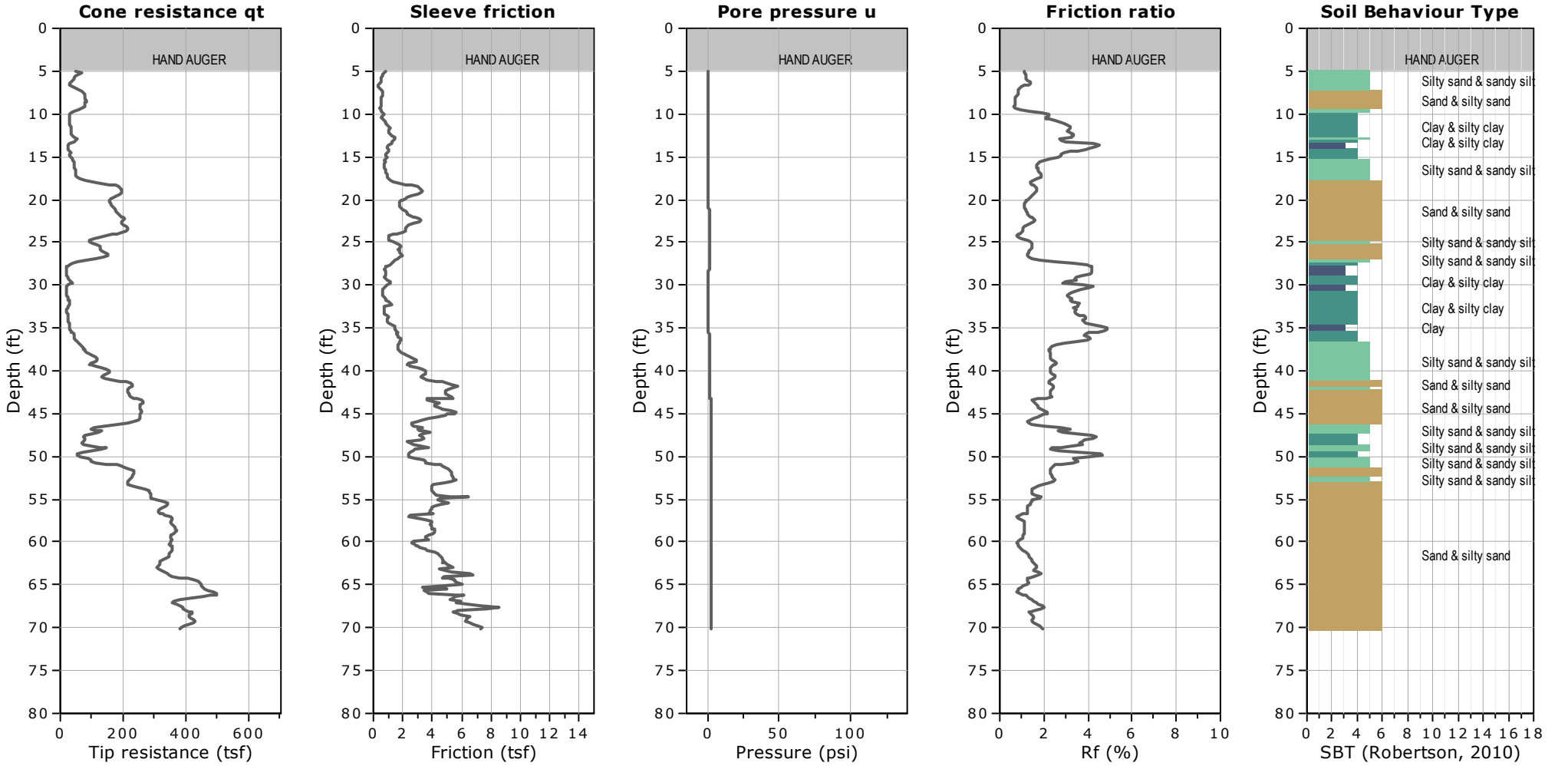


CLIENT: LGC VALLEY, INC

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Field Rep: RANDY

Total depth: 70.05 ft, Date: 7/10/2019



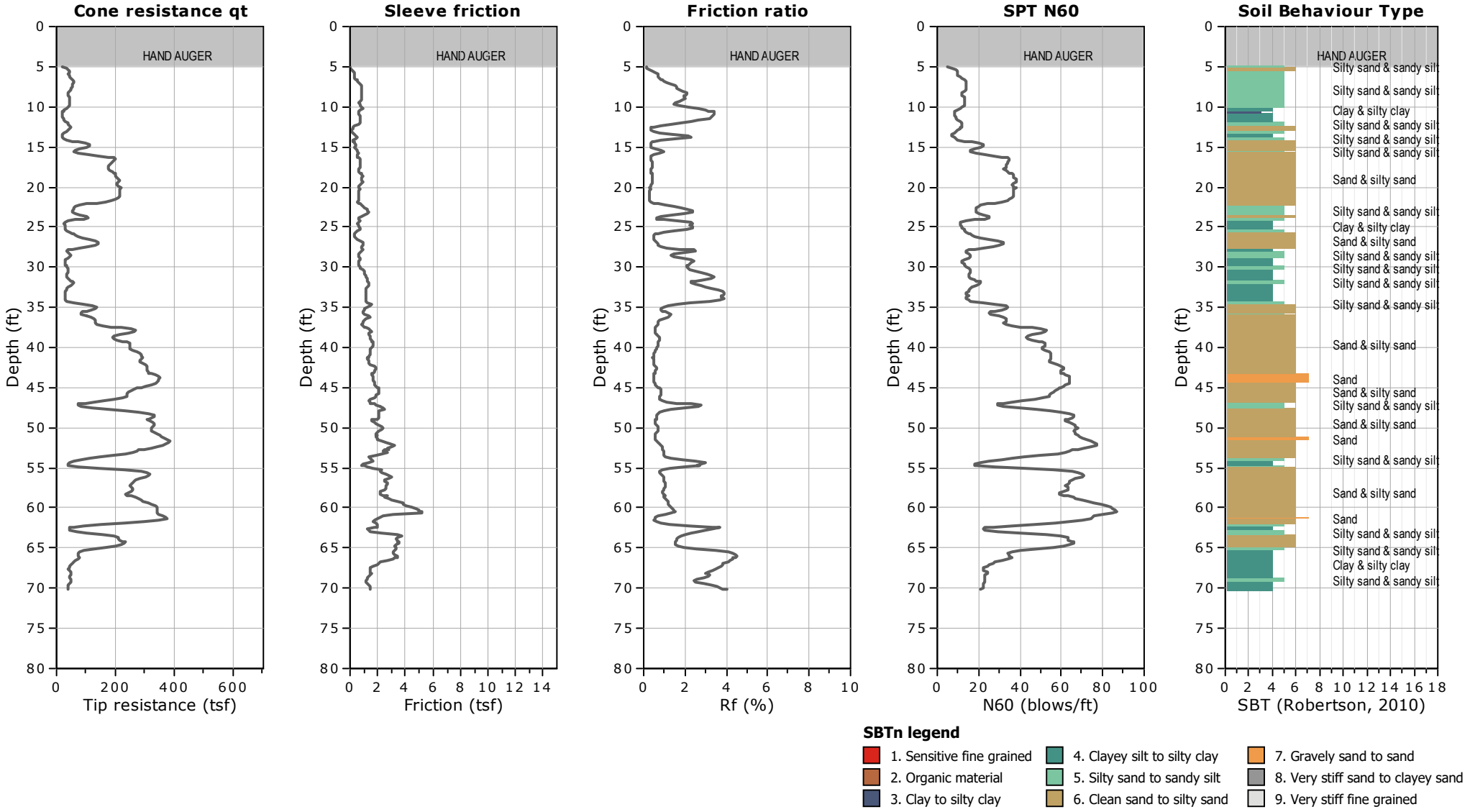
WATER TABLE FOR ESTIMATING PURPOSES ONLY

CLIENT: LGC VALLEY, INC

FIELD REP: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 70.21 ft, Date: 7/10/2019



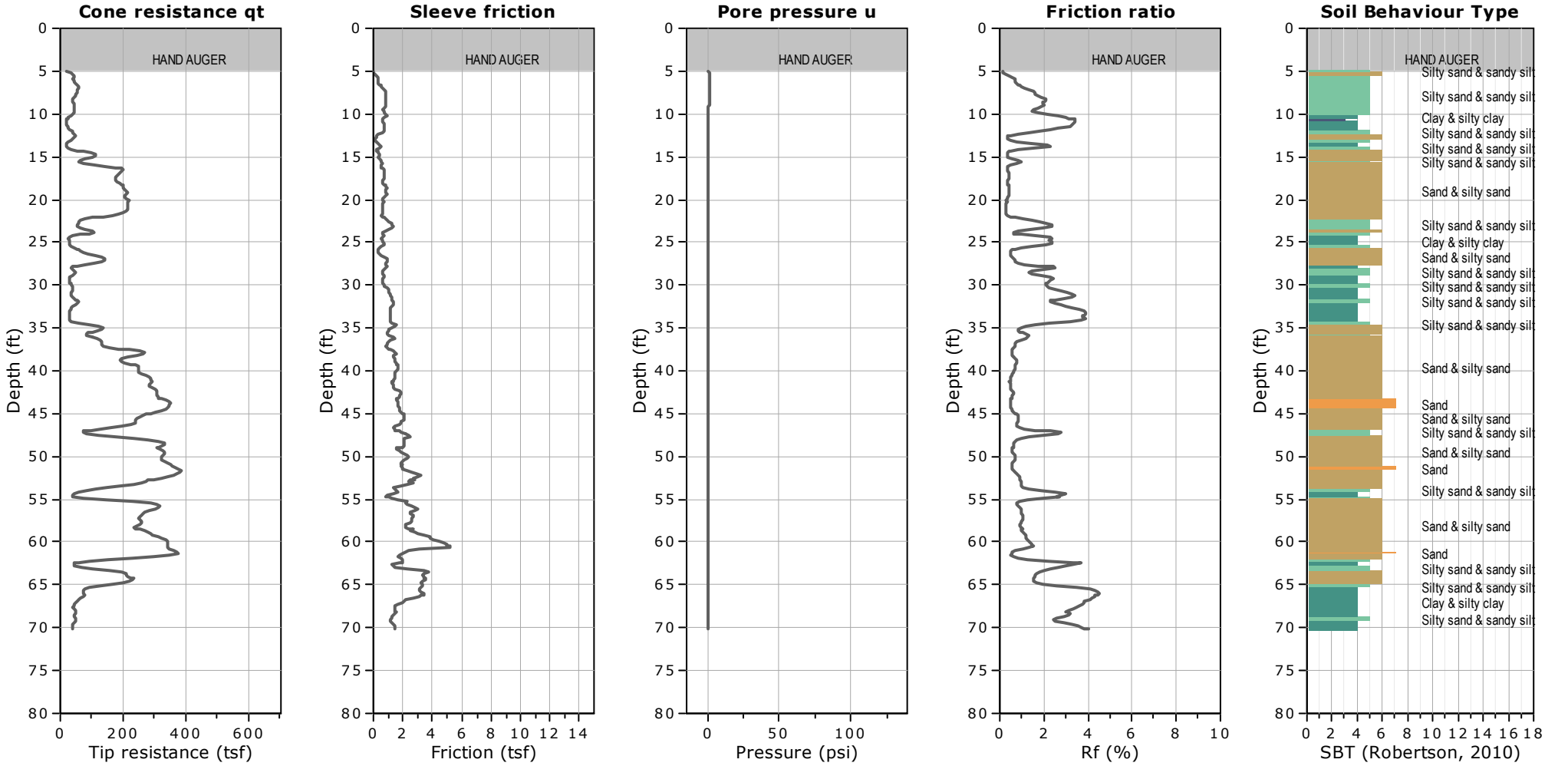
CPT: CPT-5

CLIENT: LGC VALLEY, INC

Field Rep: RANDY

SITE: SHOPOFF ANAHEIM DRY WELL - 1631 & 1699 WEST LINCOLN AVENUE, ANAHEIM, CA

Total depth: 70.21 ft, Date: 7/10/2019



WATER TABLE FOR ESTIMATING PURPOSES ONLY

APPENDIX C

Infiltration Test Results

Project Name:	Lincoln at Euclid Dry Wells	**Test Hole Number:**	I-6
Project Number:	184014-01	**Elevation at Test Hole Top:**	133 Feet
Date Excavated:	7/11/2019	**Geologic Unit:**	Young Alluvial Deposits (Qyf)
Tested by:	BJC/RKW	**Date:** 7/16/2019	**Test Hole Size/Shape:** 8-in/round
Test Hole Depth:	59.2 Feet	**Soil Type:**	See CPT-4 Plot
Test Hole Pre-Soaked on 7/11/2019		2-inches of gravel in bottom	

TEST PERIOD

Time	Δt	H_o	H_f	ΔH	IR
0:00 10:00	10	601.76	537.53	64.23	1.35
11:00 21:00	10	588.55	543.53	45.02	0.95
22:20 32:20	10	587.95	559.74	28.21	0.59
33:15 43:15	10	589.15	563.94	25.21	0.52
44:00 54:00	10	589.75	567.18	22.57	0.47
54:45 1:04:45	10	588.91	566.22	22.69	0.47
1:06:00 1:16:00	10	589.03	565.14	23.89	0.50
1:17:00 1:27:00	10	586.99	566.94	20.05	0.42
1:27:40 1:37:40	10	587.71	566.70	21.01	0.44
1:39:00 1:49:00	10	587.95	565.86	22.09	0.46
1:49:45 1:59:45	10	586.39	562.38	24.01	0.50
2:00:30 2:10:30	10	585.55	562.38	23.17	0.48

$$\boldsymbol{Infiltration\ Rate} = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(23.17\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(10\ min)\ (4\ in+2(\frac{585.55+562.38}{2}\ in))} = \mathbf{0.48\ in/hr}$$

* Δt= Time Interval (min), H_o= Initial Water Level (in), H_f= Final Water Level (in), ΔH= Change in Water Level (in), H_{ave}= Average Head Height Over Time Interval, r= Radius of Test Hole (inches), IR = Infiltration Rate (in/hr)

$$\boldsymbol{Factor\ of\ Safety} = 2 \quad \boldsymbol{Adjusted\ Infiltraton\ Rate} = \frac{0.48\ in/hr}{2} = \mathbf{0.24\ in/hr}$$

Project Name:	Lincoln at Euclid Dry Wells	**Test Hole Number:**	I-7	1 of 2
Project Number:	184014-01	**Elevation at Test Hole Top:**		130.5 Feet
Date Excavated:	7/11/2019	**Geologic Unit:**	Young Alluvial Deposits (Qyf)	
Tested by:	BJC/RKW	**Date:**	7/16/2019 **Test Hole Size/Shape:**	8-in/round
Test Hole Depth:	60 Feet	**Soil Type:**	See CPT-3 Plot	
Test Hole Pre-Soaked on 7/11/2019		2-inches of gravel in bottom		

TEST PERIOD

Time	Δt	H_o	H_f	ΔH	IR
2:51:20 3:01:20	10	604.15	458.90	145.26	3.27
3:02:50 3:07:50	5	610.76	553.73	57.02	2.34
3:08:50 3:13:50	5	604.15	553.13	51.02	2.11
3:14:50 3:19:50	5	595.75	545.33	50.42	2.11
3:21:10 3:26:10	5	592.15	548.33	43.82	1.84
3:27:20 3:32:20	5	593.95	553.13	40.82	1.70
3:33:25 3:38:25	5	593.95	558.54	35.41	1.47
3:39:30 3:44:30	5	591.55	563.94	27.61	1.14
3:45:30 3:50:30	5	592.15	554.33	37.82	1.58
3:51:30 4:01:30	10	591.55	529.12	62.42	1.33
4:03:10 4:13:10	10	597.55	546.53	51.02	1.07
4:14:30 4:24:30	10	590.95	547.13	43.82	0.92

(Contiued on Page 2 of 2)

Project Name:	Lincoln at Euclid Dry Wells	**Test Hole Number:**	I-7	2 of 2
Project Number:	184014-01	**Elevation at Test Hole Top:**		130.5 Feet
Date Excavated:	7/11/2019	**Geologic Unit:**	Young Alluvial Deposits (Qyf)	
Tested by:	BJC/RKW	**Date:**	7/16/2019 **Test Hole Size/Shape:**	8-in/round
Test Hole Depth:	60 Feet	**Soil Type:**	See CPT-3 Plot	
Test Hole Pre-Soaked on 7/11/2019		2-inches of gravel in bottom		

TEST PERIOD

Time	Δt	H_o	H_f	ΔH	IR
4:25:45	10	594.55	548.33	46.22	0.97
4:35:25					
4:37:15	10	592.75	548.93	43.82	0.92
4:47:15					
4:48:30	10	590.95	554.33	36.61	0.76
4:58:40					
4:59:30	10	592.75	550.73	42.02	0.88
5:09:30					

$$\textbf{\textit{Infiltration Rate}} = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(42.02\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(10\ min)\ (4\ in+2(\frac{592.75+550.73}{2}\ in))} = 0.88\ in/hr$$

* Δt= Time Interval (min), H_o= Initial Water Level (in), H_f= Final Water Level (in), ΔH= Change in Water Level (in), H_{ave}= Average Head Height Over Time Interval, r= Radius of Test Hole (inches), IR = Infiltration Rate (in/hr)

$$\textbf{\textit{Factor of Safety}} = 2 \quad \textbf{\textit{Adjusted Infiltraton Rate}} = \frac{0.88\ in/hr}{2} = 0.44\ in/hr$$

Project Name:	Lincoln at Euclid Dry Wells	**Test Hole Number:**	I-8	1 of 2
Project Number:	184014-01	**Elevation at Test Hole Top:**		131.5 Feet
Date Excavated:	7/11/2019	**Geologic Unit:**	Young Alluvial Deposits (Qyf)	
Tested by:	BJC/RKW	**Date:**	7/16/2019 **Test Hole Size/Shape:**	8-in/round
Test Hole Depth:	60 Feet	**Soil Type:**	See CPT-5 Plot	
Test Hole Pre-Soaked on 7/11/2019		2-inches of gravel in bottom		

TEST PERIOD

Time	Δt	H_o	H_f	ΔH	IR
5:51:15 5:56:50	5	599.95	476.30	123.65	5.49
5:57:50 6:02:50	5	599.95	496.71	103.24	4.50
6:04:20 6:09:40	5	599.95	507.52	92.44	3.99
6:11:10 6:16:10	5	599.95	514.72	85.23	3.66
6:18:20 6:23:20	5	599.95	538.73	61.22	2.57
6:24:40 6:29:40	5	599.95	545.33	54.62	2.28
6:30:40 6:35:40	5	599.95	548.93	51.02	2.12
6:36:50 6:41:50	5	599.95	551.93	48.02	1.99
6:43:10 6:48:10	5	599.95	557.94	42.02	1.74
6:49:20 6:56:20	7	599.95	545.93	54.02	1.61
6:58:10 7:03:10	5	599.95	560.34	39.62	1.63
7:29:30 7:34:30	5	599.95	553.73	46.22	1.92

* Note: At 7:03:10 ran out of water and had to refill the water truck before continuing

(Contiued on Page 2 of 2)

Project Name:	Lincoln at Euclid Dry Wells	**Test Hole Number:**	I-8	2 of 2
Project Number:	184014-01	**Elevation at Test Hole Top:**		131.5 Feet
Date Excavated:	7/11/2019	**Geologic Unit:**	Young Alluvial Deposits (Qyf)	
Tested by:	BJC/RKW	**Date:**	7/16/2019 **Test Hole Size/Shape:**	8-in/round
Test Hole Depth:	60 Feet	**Soil Type:**	See CPT-5 Plot	
Test Hole Pre-Soaked on 7/11/2019		2-inches of gravel in bottom		

TEST PERIOD

Time	Δt	H_o	H_f	ΔH	IR
7:36:10 7:46:10	10	599.95	536.33	63.63	1.34
7:48:20 7:58:20	10	599.95	543.29	56.66	1.19
8:00:00 8:10:00	10	599.95	549.89	50.06	1.04
8:11:20 8:21:20	10	599.95	552.29	47.66	0.99
8:22:50 8:32:50	10	599.35	549.29	50.06	1.04
8:34:20 8:44:20	10	601.63	552.65	48.98	1.01

$$\boldsymbol{Infiltration\ Rate} = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{ave})} = \frac{(48.98\ in)\left(60\frac{min}{hr}\right)(4\ in)}{(10\ min)\ (4\ in+2(\frac{601.63+552.65}{2}\ in))} = \mathbf{1.01\ in/hr}$$

* Δt= Time Interval (min), H_o= Initial Water Level (in), H_f= Final Water Level (in), ΔH= Change in Water Level (in), H_{ave}= Average Head Height Over Time Interval, r= Radius of Test Hole (inches), IR = Infiltration Rate (in/hr)

$$\boldsymbol{Factor\ of\ Safety} = 2 \quad \boldsymbol{Adjusted\ Infiltraton\ Rate} = \frac{1.01\ in/hr}{2} = \mathbf{0.50\ in/hr}$$

APPENDIX D

County of Orange

Worksheet H - Factor of Safety and Design Infiltration Rate Worksheet

Worksheet H: Factor of Safety and Design Infiltration Rate Worksheet

For Western DMA-A Infiltration Facility (North Dry Well Location)

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.00
B	Design	Tributary area size	0.25	1	0.25
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy	0.25	1	0.25
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1

Combined Safety Factor, $S_{TOT} = S_A \times S_B$	2.00
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)	0.48 in/hour
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} / K_M$	0.24 in/hour

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

One CPT sounding (CPT-4) and one percolation test were conducted using the Percolation Test Procedure near the location of the proposed northern dry well of the western (DMA-A) infiltration facility. The measured infiltration rate of the percoloation bore hole test was divided by the factor of safety of 2.00 to come up with a Design Infiltration Rate of 0.24 in/hour. Infiltration is not considered feasible at this location.

The description of the percolation test procedures are discussed on page 3 of LGC Valley's report dated July 19, 2019. The locations of the CPT Sounding and Infiltration Test are shown on Figure 2 - Infiltration Test Location Map while the CPT sounding results are presented in Appendix B and the infiltration test results presented in Appendix C of the report Dated July 19, 2019 (LGC, 2019).

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 H: Factor of Safety and Design Infiltration Rate Worksheet

For Western (DMA-A) Infiltration Facility (South Dry Well Location)

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.00
B	Design	Tributary area size	0.25	1	0.25
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy	0.25	1	0.25
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1

Combined Safety Factor, $S_{TOT} = S_A \times S_B$	2.00
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)	0.88 in/hour
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} / K_M$	0.44 in/hour

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

One CPT sounding (CPT-3) and one percolation test were conducted using the Percolation Test Procedure near the location of the proposed southern dry well of the western (DMA-A) infiltration facility. The measured infiltration rate of the percoloation bore hole test was divided by the factor of safety of 2.00 to come up with a Design Infiltration Rate of 0.44 in/hour. Infiltration is considered feasible at this location.

The description of the percolation test procedures are discussed on page 3 of LGC Valley's report dated July 19, 2019. The locations of the CPT Sounding and Infiltration Test are shown on Figure 2 - Infiltration Test Location Map while the CPT sounding results are presented in Appendix B and the infiltration test results presented in Appendix C of the report dated July 19, 2019 (LGC, 2019).

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 H: Factor of Safety and Design Infiltration Rate Worksheet

For Middle (DMA-B) Infiltration Facility (Double Dry Well Location)

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.00
B	Design	Tributary area size	0.25	1	0.25
		Level of pretreatment/ expected sediment loads	0.25	1	0.25
		Redundancy	0.25	1	0.25
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			1

Combined Safety Factor, $S_{TOT} = S_A \times S_B$	2.00
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)	01.01 in/hour
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} / K_M$	0.50 in/hour

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Three CPT soundings (CPT-1, CPT-2, and CPT-5) and one percolation test were conducted using the Percolation Test Procedure in between the location of the two proposed dry wells of the middle (DMA-B) infiltration facility. The measured infiltration rate of the percoloation bore hole test was divided by the factor of safety of 2.00 to come up with a Design Infiltration Rate of 0.50 in/hour. Infiltritration is considered feasible at this location.

The description of the percolation test procedures are discussed on page 3 of LGC Valley's report dated July 19, 2019. The locations of the CPT Soundings and Infiltration Test are shown on Figure 2 - Infiltration Test Location Map while the CPT sounding results are presented in Appendix B and the infiltration test results presented in Appendix C of the report dated July 19, 2019 (LGC, 2019).

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

APPENDIX E

Site Specific Study Assessing Impact of Infiltration BMPs

By Roux Associates, Inc.

April 4, 2019

Mr. James O'Malley
SLF-West Lincoln, LLC
2 Park Plaza, Suite 700
Irvine, CA 92614

Re: Site Specific Study Assessing Impact of Proposed Infiltration BMPs Within 250 Feet of a Contaminated Site
1631 and 1699 West Lincoln Avenue
Anaheim, California
Roux Project No. 3224.0003L002

Dear Mr. O'Malley,

Roux Associates, Inc. (Roux Associates) on behalf of SLF-West Lincoln, LLC (SLF) has prepared this site-specific study (Study) for two parcels located at 1631 and 1699 West Lincoln Avenue in the City of Anaheim, California (Site; Figures 1 and 2). The objective of this Study is to address the prohibition of infiltration within 250 feet of contaminated sites unless a site-specific study such as this demonstrates that the proposed infiltration would not adversely impact groundwater conditions (TGD, 2013[1]).

General Background

The Site consists of two irregular-shaped adjoining parcels situated within a triangular city block. The city block is bound by West Lincoln Avenue to the south, South Euclid Street to the west, and by a Southern Pacific Railroad (SPRR) easement to the northeast (Figure 2). The Site lies at an elevation of approximately 125 feet above mean sea level with local relief sloping gently to the west-southwest. The parcel situated at 1631 West Lincoln Avenue is approximately 2 acres in size and is currently occupied by a cement manufacturing company. The parcel at 1699 West Lincoln Avenue approximately 4 acres in size and is currently vacant. Both properties are currently owned by Anastasi Development Company, LLC (Anastasi). SLF-West Lincoln, LLC proposes to purchase the Site and construct multiple residential units with stormwater infiltration best management practices (BMPs) as shown on Figure 3.

Previous Environmental Investigations

The first known subsurface assessment at the Site was a leaking underground storage tank (LUST) investigation conducted by FREY Environmental, Inc. (FREY) in 2005. The investigation targeted a former 10,000-gallon diesel underground storage tank (UST) at 1631 West Lincoln Avenue and included the collection and analysis of samples from four soil borings

[1] Orange County, 2013, Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Appendices VII and VIII, dated December 20, 2013.

at five-foot intervals in the vicinity of the former UST to depths of 40 feet bgs. Soil samples were analyzed for TPH and fuel-related volatile organic compounds (VOCs).

In July 2018 Environmental Management Strategies (EMS) prepared a Phase I Environmental Site Assessment (ESA) for 1631 and 1699 West Lincoln Avenue on behalf of SLF which was updated and reissued in February 2019. Based on the findings of the Phase I ESA, EMS identified several recognized environmental conditions (RECs) for off-Site adjacent properties, although none were identified within the Site boundary. An off-Site REC of specific concern was past dry-cleaning operations reportedly performed at 1683 West Lincoln Avenue using the chemical tetrachloroethene (PCE).

The second subsurface investigation at the Site was a Phase II investigation performed in June and July 2018 by EMS. During the investigation, soil samples were collected from eight on-Site and 11 off-Site locations at depths of 2 and 5 feet bgs. Soil vapor samples were obtained from each of these locations at a sample depth of 5 feet bgs (two on-Site and four off-Site locations also had soil vapor samples collected at 15 feet bgs). A total of 16 on-Site and 22 off-Site soil samples were analyzed for California Assessment Manual (CAM) metals, total petroleum hydrocarbons (TPH) as gasoline (TPH-g), TPH as diesel (TPH-d), TPH as motor oil (TPH-o), and VOCs. Additionally, soil samples from depths of 2 and 5 feet bgs were analyzed for organochlorine pesticides (OCPs) from three on-Site and one off-Site soil borings. A total of nine on-Site and 13 off-Site soil vapor samples were analyzed for VOCs.

The third and latest subsurface investigation was performed by Roux Associates in January 2019 to fill data gaps from the previous EMS investigation. During this investigation soil and soil vapor samples were collected from three on-Site boring locations. Discrete soil samples were collected from each location at nominal depths of 0.5 and 1.5 bgs. Nested soil vapor probes were installed at each location with sample depths of 5, 15, and 30 feet bgs. A total of six soil samples were analyzed for lead, arsenic, and OCPs and a total of nine soil vapor samples were analyzed for VOCs. Roux Associates prepared a Preliminary Endangerment Assessment Equivalent Report (PEA-E Report) documenting the 2019 investigation and summarizing the previous subsurface and Phase I ESA investigations for the Site.[2]

Subsurface Soil Investigation Summary and Findings

1631 West Lincoln Avenue – A summary of the soil sample analytical results for the three subsurface investigations performed to date at this location is below:

1. FREY 2005 - Analytical results for soil samples collected from borings FB1 through FB4, installed in the area of the previous LUST were reported as not detected. The soil samples were collected at five-foot intervals from five to 40-feet bgs from each boring and analyzed for TPH-g and TPH-d using EPA Method 8015M as well as benzene, toluene, ethylbenzene, xylenes, fuel oxygenates, and ethanol using EPA Method 8260B. Analytical results for each parameter were reported as not detected above laboratory detection limits. Case closure was provided by the oversight agency due to the apparent limited vertical and lateral extent of impacted soil.

[2] Roux Associates, Preliminary Endangerment Assessment Equivalent Report, Lincoln Avenue Assemblage, 1631 & 1699 West Lincoln Avenue, Anaheim, California. April 4, 2019

2. EMS 2018 - Six soil samples were collected from borings SLF-13, SLF-14 and SLF-21 at depths of 2 and 5 feet bgs during a June/July 2018 investigation; were analyzed for TPH-g, TPH-d, TPH-o, VOCs, and CAM metals; and the analytical results were below residential screening levels or expected background concentrations.

3. Roux Associates 2019– Two soil samples were collected from boring SVR-3 at depths of 0.5 and 1.5 feet bgs were analyzed for lead, arsenic, and OCPs. The analytical results were below residential screening levels or expected background concentrations.

Based on the above information soil contamination at 1631 West Lincoln Avenue is not considered a concern.

1699 West Lincoln Avenue – A summary of the soil sample analytical results for the two investigations performed to date at this location is below:

1. EMS 2018 – Ten soil samples from borings SLF-1 through SLF-5 at depths of 2 and 5 feet bgs were analyzed for TPH-g, TPH-d, TPH-o, VOCs, and CAM metals, and the analytical results were below residential screening levels or expected background concentrations. Four soil samples from borings SLF-1and SLF-4 were analyzed for OCPs and the analytical results were all reported as not detected.

2. Roux Associates 2019– Four soil samples collected from borings SVR-1 and SVR-2 at depths of 0.5 and 1.5 feet bgs were analyzed for lead, arsenic, and OCPs. The analytical results were below residential screening levels or expected background concentrations.

Based on the above summary, soil contamination at 1699 West Lincoln Avenue is not considered a concern.

Off-Site Assessment Within 250 Feet of Proposed Infiltration BMPs – A summary of the soil sample analytical results for the investigation performed at off-Site locations within 250 feet of the proposed infiltration BMPs is below:

In June/July 2018 EMS collected 20 soil samples from off-Site borings SLF-6 , SLF-7, SLF-9 through SLF-12, SLF-17, SLF-19, and SLF-20 at depths of 2 and 5 feet bgs and analyzed them for TPH-g, TPH-d, TPH-o, VOCs, and CAM metals. The off-Site soil sample analytical results were below residential screening levels or expected background concentrations. However, at the off-Site property 1683 West Lincoln, soil samples collected from borings SLF-9, SLF-19, and SLF-20 were reported with detections of the VOC tetrachloroethene (PCE) in at least one soil sample from each of the three borings with detections ranging from 6.0 micrograms per kilogram (µg/kg) to 66µg/kg. As mentioned previously, these detections are below residential screening levels, however their presence in soil appears to indicate a nearby source of PCE contamination in the subsurface at this property.

Subsurface Soil Vapor Investigation Summary and Findings

1631 and 1699 West Lincoln Avenue – A summary of the two soil vapor investigations performed at these two on-Site locations is below:

1. EMS 2018 – Soil vapor samples from collected from locations SLF-1 through SLF-5 and SLF-13, SLF-14 and SLF-21 at depths 5 feet bgs and from SLF-13 and SLF-21 from 15 feet bgs were analyzed for VOCs. With the exception of one sample result (PCE at 680 micrograms per cubic meter [µg/m^3]) the analytical results were below converted residential indoor air screening levels.

2. Roux Associates 2019– Soil vapor samples from collected from locations SVR-1 through SVR-3 at depths 5, 15, and 30 feet bgs were analyzed for VOCs. Analytical results for one of the samples collected form 15 feet bgs and two of the samples collected from 30 feet bgs exceeded the converted residential indoor air screening levels.

Although soil vapor concentrations at these two on-Site properties exceed conservative residential cancer risk screening level threshold of 1E-06, they are within the range of acceptability (1E-06 to 1E-04) as established in National Contingency Plan (NCP). Also, it is apparent that the off-Site property located at 1683 West Lincoln Avenue is the source of the soil vapor impact.

Soil Vapor Contamination Within 250 Feet of Proposed Infiltration BMPs – A summary of the soil vapor sample analytical results for the investigation performed at off-Site locations within 250 feet of the proposed infiltration BMPs is below:

In June/July 2018 EMS collected soil vapor samples from locations SLF-6 , SLF-7, SLF-9 through SLF-12, SLF-17, SLF-19, and SLF-20 at depths of 5-feet bgs from each location and additionally from depths of 15 feet bgs from SLF-10, SLF-11, SLF-17, SLF-19, and SLF-20. Each soil vapor sample was analyzed for VOCs. PCE concentrations in eleven of the fourteen samples analyzed exceeded the converted residential indoor air cancer risk screening level for cancer risk.

The detected PCE concentrations were highest in samples collected from locations adjacent to the former dry-cleaning operations reportedly performed at 1683 West Lincoln Avenue and generally decreased as distance from the 1683 property increased, which appears to indicate a source of PCE contamination is present in the subsurface at this property.

Groundwater Conditions

Nearby properties on Geotracker and Envirostor have reported depths to groundwater ranging between approximately 62 and 102 feet below ground surface (bgs). The varying depths of groundwater are likely due to the presence of discontinuous perched aquifers.

According to information from an investigation occurring at a site west of Euclid Avenue and approximately 300 feet west of the Site (Euclid Way Industrial Park), groundwater is present

at depths of approximately 80 to 85 feet bgs and the groundwater flow direction is east-southeast under a relatively flat gradient of approximately 0.001 to 0.002 ft/ft.[3]

Summary

Concentrations of contaminants in soil at on-Site locations and off-Site locations within 250 feet of proposed BMPs are below residential screening levels or expected background concentrations. However, at the off-Site property 1683 West Lincoln, detections of PCE in soil samples ranged from 6.0 µg/kg to 66µg/kg. These detections are below residential screening levels, however their presence in soil appears to indicate a nearby source of PCE contamination in the subsurface at this property.

Estimated cancer risk associated with soil vapor concentrations detected at the two on-Site properties are within the range of acceptability (1E-06 to 1E-04) as established in the NCP but exceed conservative screening level threshold of 1E-06. It is apparent that the off-Site property located at 1683 West Lincoln Avenue is the probable source of the PCE detections in soil vapor.

Nearby properties on Geotracker and Envirostor have reported depths to groundwater ranging between approximately 62 and 102 feet below ground surface (bgs). According to information from a nearby investigation occurring across Euclid Avenue, groundwater is present at depths of approximately 80 to 85 feet bgs and flows to the east-southeast.

Conclusions

- Detected concentrations of contaminants in on-Site soil samples do not indicate that storm water infiltration will cause adverse impacts to groundwater quality.

- Although detected concentrations of PCE in soil vapor exceed the conservative residential screening level cancer risk threshold for indoor air, infiltration of surface water through the relatively low concentrations of PCE in soil vapor are unlikely to cause significant impacts to groundwater.

- There is no evidence of groundwater impacts within 250 feet of the proposed infiltration BMPs.

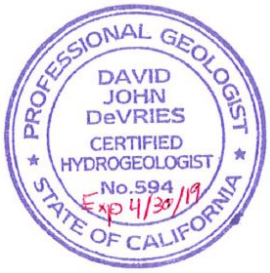
Based on the above conclusions it is unlikely that the proposed stormwater infiltration BMP locations will cause adverse impacts to groundwater quality.

[3] Centec Engineering, Inc. (Centec, 2017), Vapor Intrusion Risk Mitigation and Groundwater Monitoring Report, Euclid Way Industrial Park, 231-307 North Euclid Way. May 30.

Sincerely,

ROUX ASSOCIATES, INC.

David J. DeVries, P.G., C.Hg.	April 4, 2019	
Senior Hydrogeologist	Date	Signature
Chris Rose, P.E.	April 4, 2019	
Senior Engineer	Date	Signature

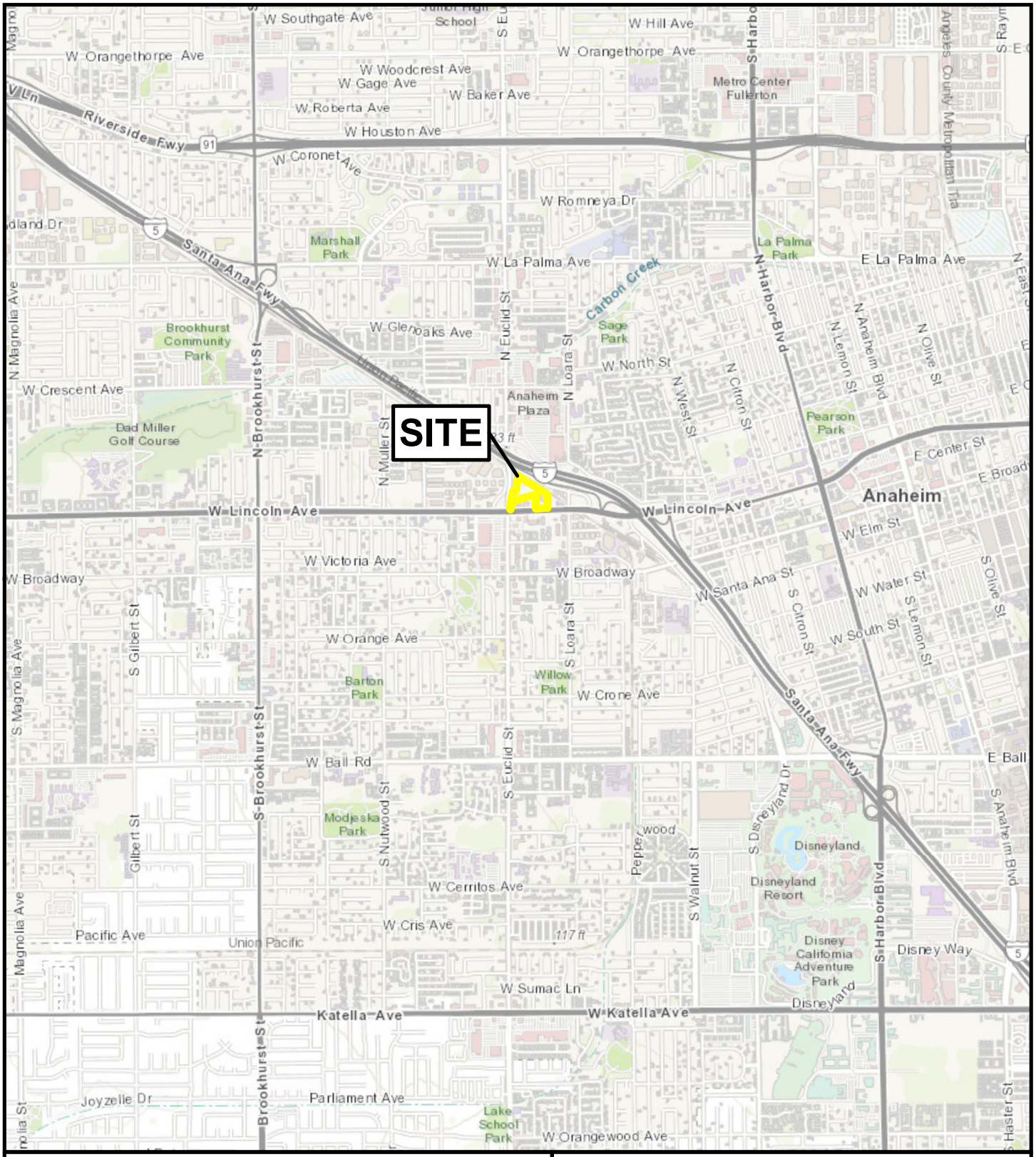


Attachments:

Figure 1 – Site Location Map
Figure 2 – Site Plan
Figure 3 - Proposed Infiltration BMP Locations

FIGURES

1. Site Location Map
2. Site Plan
3. Proposed Infiltration BMP Locations



LOCATION OF DETAIL

CA

N

0.25 0 0.25 0.5 Miles

Title:

SITE LOCATION MAP

1631 AND 1699 WEST LINCOLN AVENUE
ANAHEIM, CALIFORNIA

Prepared For: SLF-West Lincoln, LLC

ROUX

Compiled by: MAE	Date: 1/14/2019	FIGURE
Prepared by: MAE	Scale: 1:35,000	1
Project Mgr: DD	Office: LA	
File No: F(AP)	Project:3224.0003L000	

S:\Los Angeles\Clients\Shopoff\Shopoff Advisors - Anaheim 3224.0003L000\05Workables\Report\figures\GIS\Figure 1 - Site Location Map.mxd



LEGEND

- APPROXIMATELY OUTLINE OF PARCELS CURRENTLY UNDER CONSIDERATION (1631 AND 1699)
- APPROXIMATE OUTLINE OF PREVIOUSLY CONSIDERED PARCELS
- 1695 ADDRESS(ES) ASSOCIATED WITH PARCELS

N

100' 0' 100'

Title:

SITE PLAN

1631 AND 1699 WEST LINCOLN AVENUE
ANAHEIM, CALIFORNIA

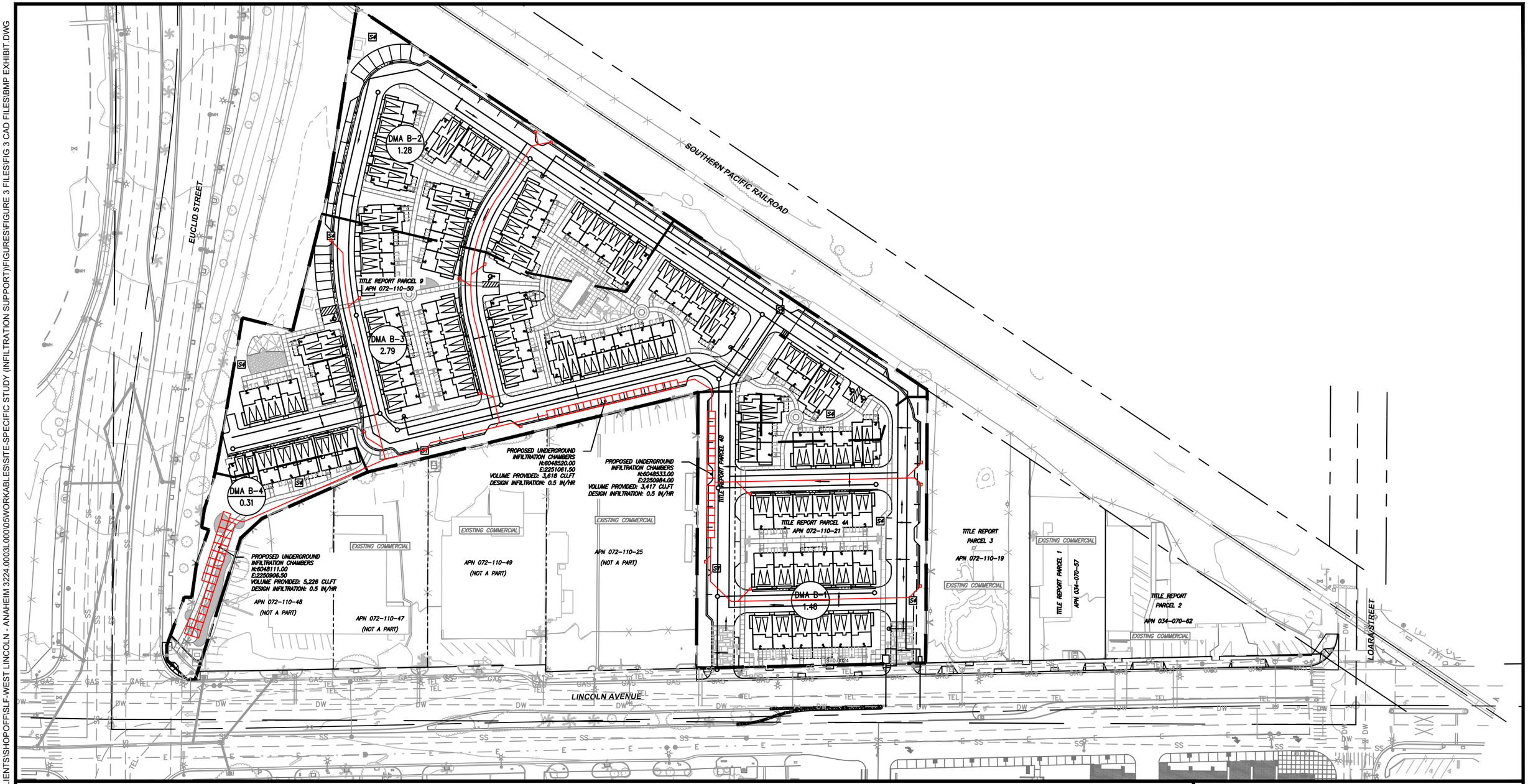
Prepared for:

SLF-WEST LINCOLN, LLC

ROUX

Compiled by: M.A.E.	Date: 15JAN19	FIGURE
Prepared by: A.T.	Scale: 1" = 100'	2
Project Mgr: D.D.	Project: 3224.0003L000	
File: FIGURE2-SITE PLAN.DWG		

S:\LOS ANGELES\CLIENTS\SHOPOFF\SLF-WEST LINCOLN - ANAHEIM 3224.0003L000\05WORKABLES\REPORT\FIGURES\CAD\FIGURE2-SITE PLAN.DWG



LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- STREET CENTERLINE
- SUBAREA BOUNDARY
- FLOW PATH
- STORM DRAIN LINE
- STORM DRAIN INLET
- F-1 XX.XX — SUBAREA DESTINATION / SUBAREA ACREAGE
- FLOW DIRECTION
- S1 — STORM DRAIN MESSAGE AND SIGNAGE
- S3 — TRASH AND WASTE STORAGE
- S4 — EFFICIENT IRRIGATION

N

100' 0 100'

Title:

PROPOSED INFILTRATION BMP LOCATIONS

1631 AND 1699 WEST LINCOLN AVENUE
ANAHEIM, CALIFORNIA

Prepared for:
SLF-WEST LINCOLN, LLC

ROUX

Compiled by: A.T.	Date: 28MAR19	FIGURE
Prepared by: A.T.	Scale: 1" = 100'	3
Project Mgr: D.D.	Project: 3224.0003L000	
File: BMP EXHIBIT.DWG		

\\NY.ROUXINC.COM\SHARED\LOS ANGELES\CLIENTS\SHOPOFF\SLF-WEST LINCOLN - ANAHEIM 3224.0003L000\05WORK\ABLESSITE-SPECIFIC STUDY (INFILTRATION SUPPORT)\FIGURES\FIGURE 3 FILES\FIG 3 CAD FILES\BMP EXHIBIT.DWG

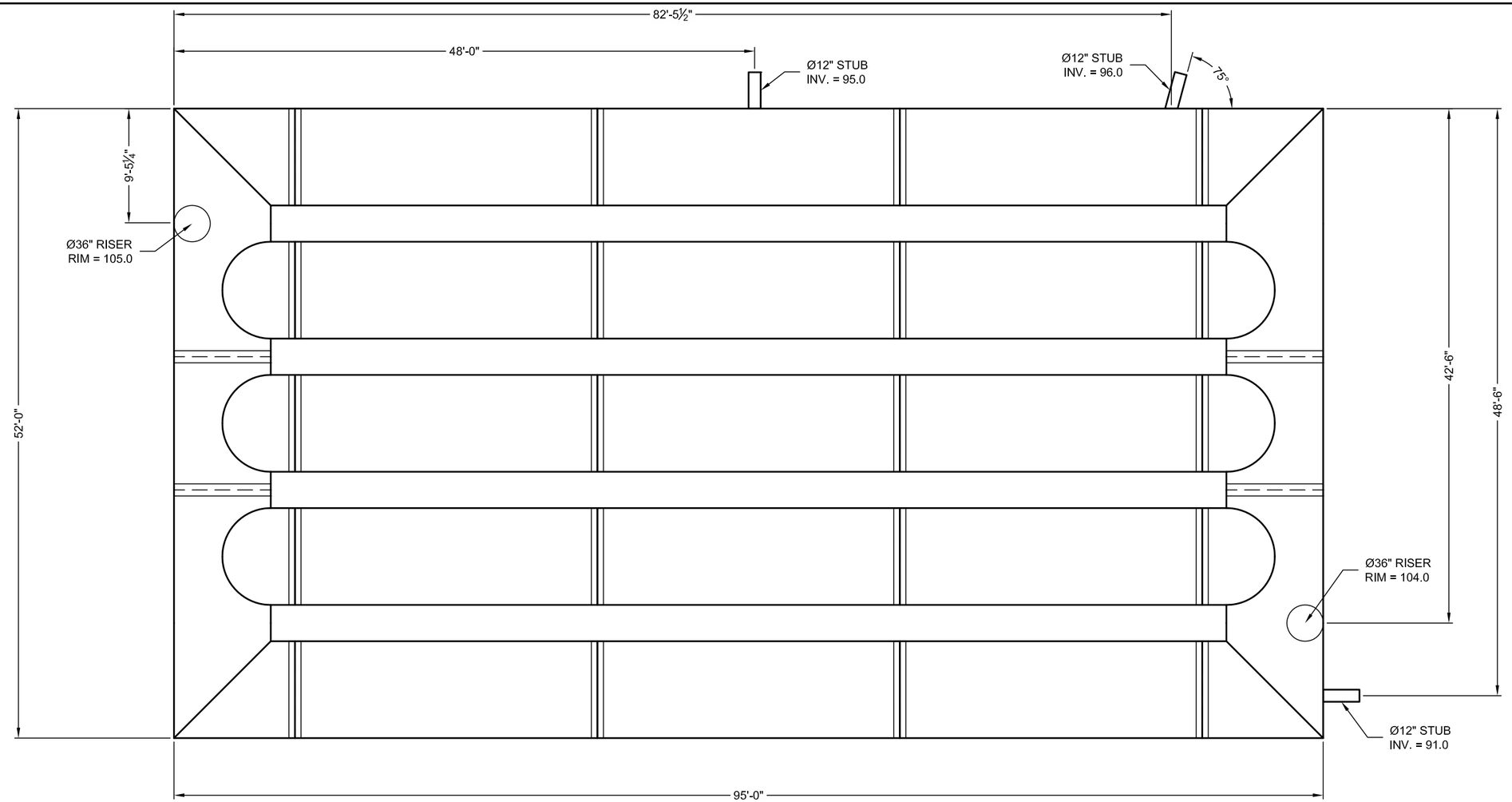
Attachment 4 BMP Design Details

CMP Infiltration Gallery Sizing DMA A By: V.Aguirre date: 10/22/2019

diameter (in)	**120**			cover over rock (ft)	3	ft
Length (ft)	**367**			depth to invert	**13.5**	**ft**
base above (in)	**6**			depth to bottom of rock	**14**	**ft**
base below (in)	**6**			area of chamber (sf)	78.50	sf
base at sides (in)	**12**			total width (ft)	12	ft
base at ends (in)	**12**			total depth (ft)	11	ft
porosity	40%			total length (ft)	369	ft
				total volume for rock and chamber	48,708	sf
volume of chamber (CF)	28,810				1,804	cy
volume of rock (CF)	7,959					
total storage (CF)	**36,769**					

CMP Infiltration Gallery Sizing DMA B date: 10/22/2019

diameter (in)	**72**			cover over rock (ft)	4	ft
Length (ft)	**108**			depth to invert	**12**	**ft**
base above (in)	**24**			depth to bottom of rock	**14**	**ft**
base below (in)	**24**			area of chamber (sf)	28.26	sf
base at sides (in)	**12**			total width (ft)	8	ft
base at ends (in)	**12**			total depth (ft)	10	ft
porosity	40%			total length (ft)	110	ft
				total volume for rock and chamber	8,800	sf
volume of chamber (CF)	3,052				326	cy
volume of rock (CF)	2,299					
total storage (CF)	**5,351**					



THE UNDERSIGNED HEREBY APPROVES THE ATTACHED (4) PAGES INCLUDING THE FOLLOWING:

- **VOLUME =**
- **MAINLINE PIPE GAUGE =**
- **WALL TYPE = SOLID**
- **DIAMETER =**
- **FINISH = ALT2**

CUSTOMER _____ DATE _____

ASSEMBLY

SCALE: 1" = 10'
VOLUME: 25,082 C.F.
LOADING: H20/H25
SYSTEM INV = 91.0

SAMPLE REFERENCE

FINAL DETAIL WILL BE PROVIDED IN FUTURE SUBMITTAL

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 2⅔" x ½" 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.

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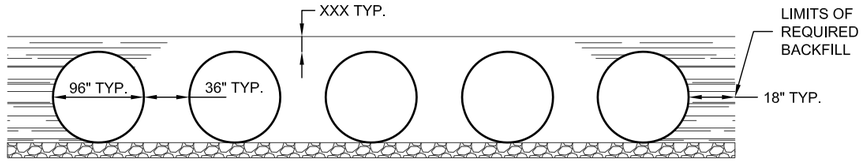
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CONTECH CONTRACT DRAWING
G-112

UNDERGROUND DETENTION SYSTEM - 000000-001
SAMPLE PROJECT
ANYTOWN, USA
SITE DESIGNATION: UDS

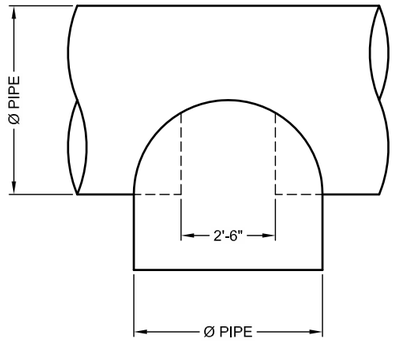
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XXXXX	001	1/13/2014
DESIGNED: XXX		DRAWN: RTF
CHECKED:		APPROVED:
SHEET NO.: C1 OF 4		

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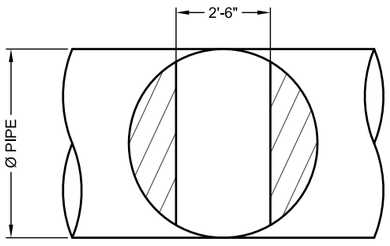


TYPICAL SECTION VIEW

SCALE: N.T.S.



PLAN



FRONT

TYPICAL MANWAY DETAIL

SCALE: N.T.S.

FABRICATION BoM									
FITTING	TYPE	QTY	Ø	CORRUGATION	GAGE	FINISH	WALL TYPE	LENGTH	TOTAL
BAND FASTENER	12" HUGGER		96	w/BAR BOLT & STRAP	16	ALT2			
GASKETS	FLAT		96	12" WIDE					

PROJECT SPECIFIC BILL OF MATERIALS TO BE COMPLETED AT TIME OF CONTRACT DRAWINGS

SAMPLE REFERENCE

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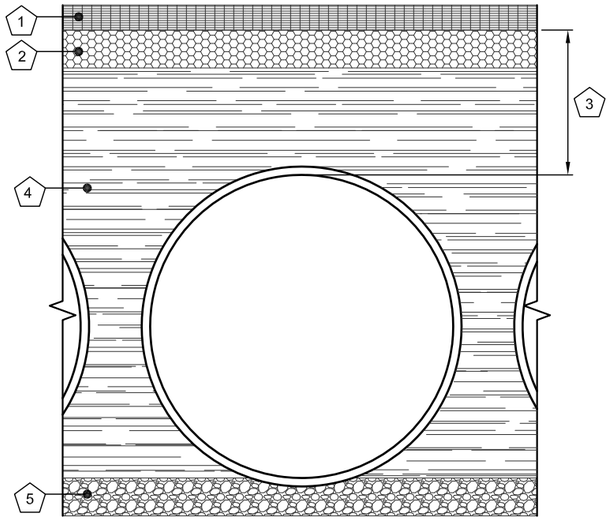
CONTECH CMP DETENTION SYSTEMS

CONTECH CONTRACT DRAWING G-113

UNDERGROUND DETENTION SYSTEM - 000000-001
SAMPLE PROJECT
ANYTOWN, USA
SITE DESIGNATION: UDS

PROJECT No.:	SEQ. No.:	DATE:
XXXXX	001	1/13/2014
DESIGNED: XXX	DRAWN: RTF	
CHECKED:	APPROVED:	
SHEET NO.: C2 OF 4		

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KEY

1. RIGID OR FLEXIBLE PAVEMENT
2. GRANULAR ROAD BASE
3. 12" MIN. FOR DIAMETERS THROUGH 96"
   18" MIN. FOR DIAMETERS FROM 102"
   AND LARGER MEASURED TO TOP OF RIGID
   OR BOTTOM OF FLEXIBLE PAVEMENT.
4. SELECT GRANULAR FILL PER AASHTO M145
   A1, A2 OR A3, OR APPROVED EQUAL.
   PLACED IN 8" LIFTS (COMPACTED TO MIN.
   90% STANDARD DENSITY PER AASHTO T99.)
5. GRANULAR BEDDING, ROUGHLY SHAPED TO
   FIT THE BOTTOM OF PIPE, 4" TO 6" IN DEPTH

FOUNDATION/BEDDING PREPARATION

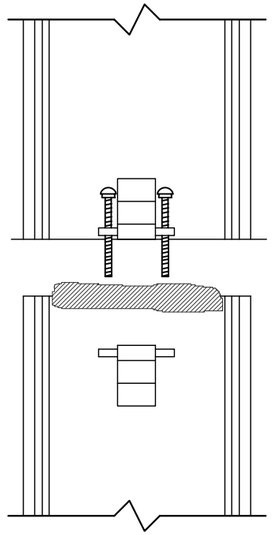
PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, 4" - 6" OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

BACKFILL

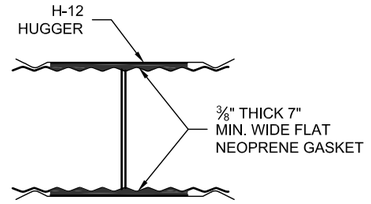
THE BACKFILL SHALL BE AN A1, A2 OR A3 GRANULAR FILL PER AASHTO M145, OR A WELL-GRADED GRANULAR FILL AS APPROVED BY THE SITE ENGINEER (SEE INSTALLATION GUIDELINES). THE MATERIAL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.

1/C3 BACKFILL DETAIL
SCALE: N.T.S.



CONNECTION DETAIL
SINGLE BOLT, BAR AND STRAP



FLAT GASKET

GENERAL NOTES

1. BANDS ARE NORMALLY FURNISHED AS FOLLOWS:
   12" THRU 48", 1-PIECE
   54" THRU 96", 2-PIECE
   102" THRU 144", 3-PIECES
2. BAND FASTENERS ARE ATTACHED WITH SPOT WELDS, RIVETS OR HAND WELDS
3. REROLLED ANNULAR END CORRUGATIONS ARE NORMALLY 2⅔" x ½". DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES

2/C3 H-12 HUGGER BAND DETAIL
SCALE: N.T.S.

SAMPLE REFERENCE
FINAL DETAIL WILL BE PROVIDED IN FUTURE SUBMITTAL

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MARK	DATE	REVISION DESCRIPTION	BY

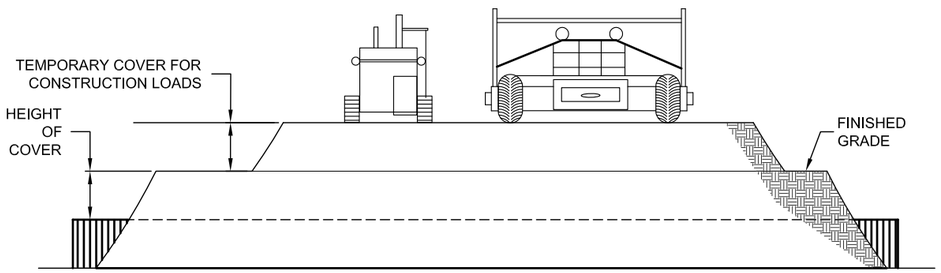
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UNDERGROUND DETENTION SYSTEM - 000000-001
SAMPLE PROJECT
ANYTOWN, USA
SITE DESIGNATION: UDS

PROJECT No.:	SEQ. No.:	DATE:
XXXXX	001	1/13/2014
DESIGNED: XXX	DRAWN: RTF	
CHECKED:	APPROVED:	
SHEET NO.: C3 OF 4		

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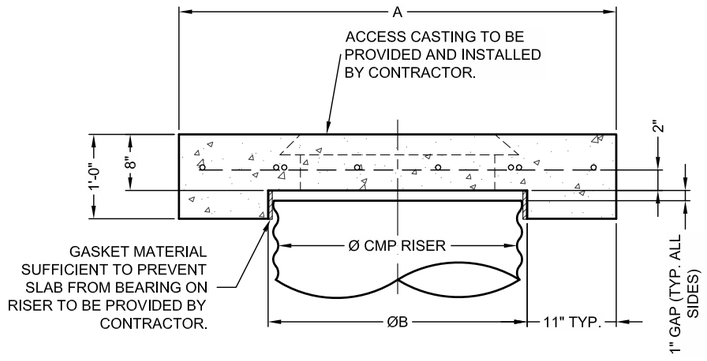
CONSTRUCTION LOADS

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.

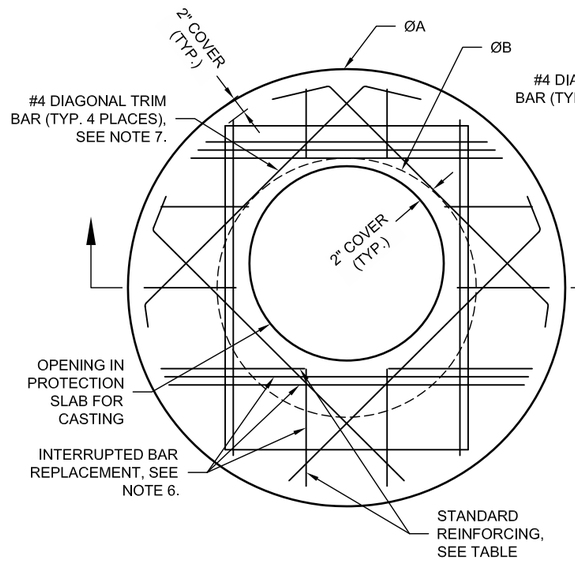
3 / C4 CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.



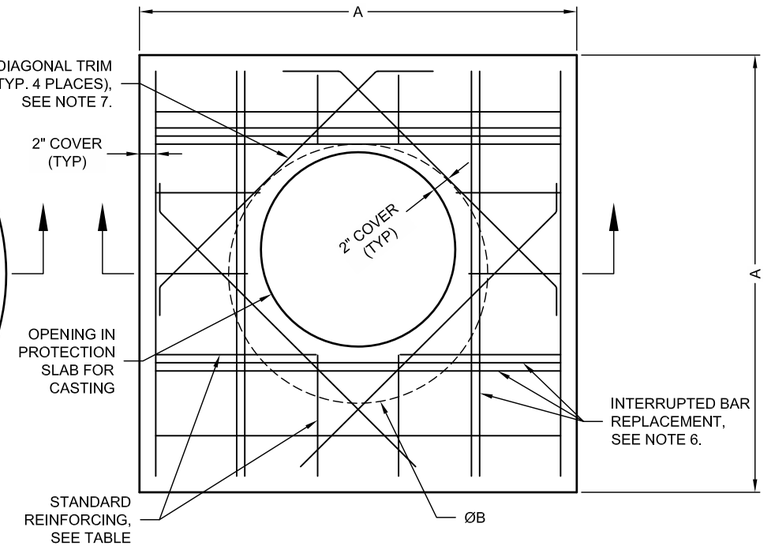
SECTION VIEW

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

4 / C4 MANHOLE CAP DETAIL
SCALE: N.T.S.

SPECIFICATION FOR CORRUGATED STEEL PIPE-ALUMINIZED TYPE 2 STEEL

SCOPE

THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE CORRUGATED STEEL PIPE (CSP) DETAILED IN THE PROJECT PLANS.

MATERIAL

THE ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M274 OR ASTM A929.

PIPE

THE CSP SHALL BE MANUFACTURED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M36 OR ASTM A760. THE PIPE SIZES, GAGES AND CORRUGATIONS SHALL BE AS SHOWN ON THE PROJECT PLANS.

ALL FABRICATION OF THE PRODUCT SHALL OCCUR WITHIN THE UNITED STATES.

HANDLING AND ASSEMBLY

SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF THE NATIONAL CORRUGATED STEEL PIPE ASSOCIATION (NCSPA)

INSTALLATION

SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II OR ASTM A798 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.

SAMPLE REFERENCE

FINAL DETAIL WILL BE PROVIDED IN FUTURE SUBMITTAL

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MARK	DATE	REVISION DESCRIPTION	BY

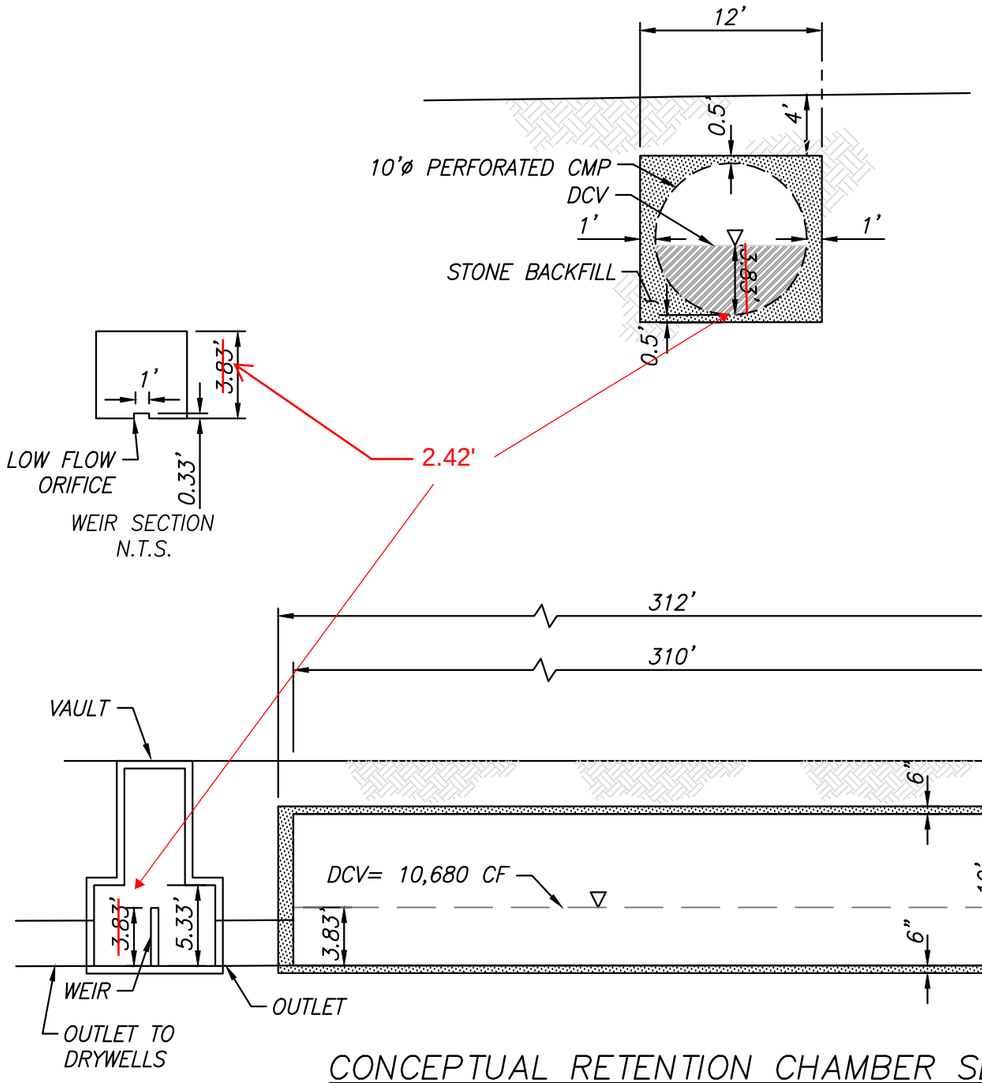
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH CONTRACT DRAWING G-115

UNDERGROUND DETENTION SYSTEM - 000000-001
SAMPLE PROJECT
ANYTOWN, USA
SITE DESIGNATION: UDS

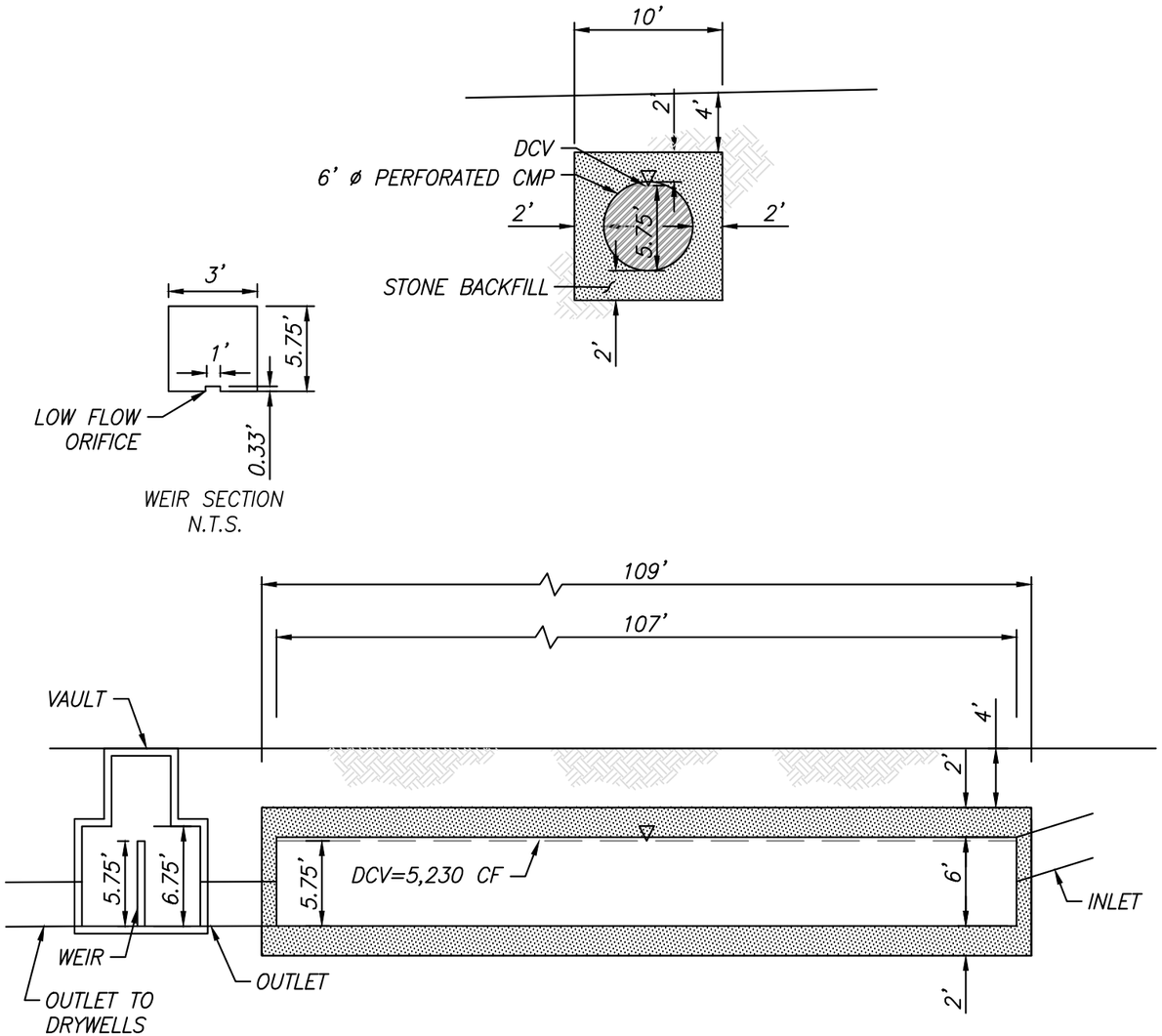
PROJECT No.:	SEQ. No.:	DATE:
XXXXX	001	1/13/2014
DESIGNED:	DRAWN:	
XXX	RTF	
CHECKED:	APPROVED:	
SHEET NO.:		
C4 OF 4		

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CONCEPTUAL RETENTION CHAMBER SECTION
CHAMBER A – DMA A

SCALE: 1"=10'



CONCEPTUAL RETENTION CHAMBER
CHAMBER B– DMA B

SCALE: 1"=10'

SCALE: AS NOTED
DATE:9/9/2019

HUITT-ZOLLARS

HUITT-ZOLLARS, INC. ı 2603 Main Street ı Suite 400 ı Irvine, CA 92614-4250 ı 949.988.5815 phone ı 949.988.5820 fax ı huitt-zollars.com

Conceptual WQMP – Description of Water Quality and Drainage Features

DATE: October 23, 2019

TO: Shawn Azarhoosh, City of Anaheim

April McMillian, Fuscoe

FROM: Remi Candaele, Steven Cook

SUBJECT: Shopoff Property At 1631-1667 W Lincoln Avenue

PROJECT NO.: R309254.01

Mr. Azarhoosh,

Per your request at our meeting dated October 16, 2019, we have prepared this supplemental memorandum to demonstrate that the conceptual drainage and water quality plan meets the requirements set forth by the City. Specifically, the description below shows that the proposed pre-treatment system is of equal performance, and that the drawdown times in both chambers are acceptable.

Drainage Management Area A

All tributary drainage runoff drains to the proposed Underground Chamber #A (120" CMP Pipe) of total storage capacity 36,759 CF. The Underground Chamber #A serves multiple purposes:

1. Retention of the 2-year 24-hour volume from the proposed condition (0.53 AF)
2. Retention of the DCV from the proposed condition (0.245 AF)
3. Pre-treatment, of equivalent performance to City standards, upstream of drywells
4. Mitigation of proposed 10-yr, 25-yr, and 100-yr Q below the respective existing Qs

Items (1) and (2) - Retention of volumes up to the 2-year 24-hour volume is made feasible due to the presence of two (2) drywells (see attached calculations from Torrent Resources). The invert of the overflow weir located in the overflow manhole is set at 5.2 feet (storage of 0.53 AF) above the invert of underground chamber A. See Section C-C on Proposed Hydrology Exhibit. The drywell infiltration rate is 0.0381 cfs per drywell.

*Drawdown time [DCV] = 10,679 [CF] / (0.0381 [CFS] * 2 [# WELLS]) /3,600 [SEC/HR] = 38.9 HRS < 48 HRS*

*Drawdown time [2-YR] = 23,087 [CF] / (0.0381 [CFS] * 2 [# WELLS]) /3,600 [SEC/HR] = 84.2 HRS < 96 HRS*

The achieved drawdown times for the DCV and the 2-year event meet the requirements set forth by the Orange County Technical Guidance Document (OC TGD) (48 hours) and the Orange County Mosquito and Vector Control District (96 hours), respectively.

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During a 100-year event, the drawdown time between the peak (16. 22 HR) and the full release of the detained volume (24.75 HR) is of 8.5 hours.

*Drawdown time [100-YR] = 8.53 HRS + 23,087 [CF] / (0.0381 [CFS] * 2 [# WELLS]) /3,600 [SEC/HR] = 92.7 HRS < 96 HRS*

Item (3) – Per the OC TGD, pre-treatment is required upstream of infiltration-based BMPs. Redundancy in the pre-treatment train is preferred. It is our understanding that a draft version of Pre-Treatment Guidelines is being reviewed by the City prior to being released for implementation on City projects. Our concept to achieve pre-treatment is two-fold:

1. To achieve redundancy in the treatment train, curb inlet baskets will be implemented at all curb inlets to remove larger trash, debris, and other gross solids.
2. The Underground Chamber #A will serve as the settling basin to achieve a minimum 50% removal rate of TSS, as requested by April McMillian during the October 16, 2019 meeting.

A low flow weir vault (See Section D-D on Proposed Hydrology Exhibit) is proposed downstream of Underground Chamber #A and upstream of the two drywells. The height of the weir (2.42 feet) is set at the DCV (0.245 feet) to create a backwater effect in the chamber, reducing velocities. A small orifice allows low flows to eventually drain to the drywells for infiltration.

A minimum 50% removal of TSS is achieved, as follows:

a. Per the Geotechnical Report prepared by LGC Valley (dated April 5, 2019), all test pit logs indicate that the upper approx. 3' are made of undocumented artificial fill on top of young alluvial fan deposits. The Undocumented Artificial Fill is principally made of silty sandy GRAVEL and gravelly silty SAND. Below, the young alluvial fan deposits are made of silty fine SAND. No cohesiveness is assumed in this analysis. To be conservative, the finest sediment that may be found locally was determined to be Silty Fine Sand. (See geotechnical report)
b. The typical Grain Size Distribution for Silty Fine Sand is obtained from the NRCS (NEH Part 654). For base soil, D15 and D50 are of 0.11 mm and 0.265 mm, respectively. (See annotated GSD from NRCS).
c. As the rock base surrounding the CMP of Underground Chamber A starts filling up during a water quality event, we anticipate that velocities will be negligible. Settling during dynamic conditions is not considered in this analysis. Settling during quiescent conditions is to be calculated using Stokes Law.
d. Using standard parameters in Stokes Law, the anticipated settling time for D15 and D50 are of 17.5 minutes and 1.1 minutes, respectively. (See Stokes Law spreadsheet)

As conceptually designed, the pre-treatment system achieves a minimum of 50% removal of TSS.

Item (4) – During storms larger than the 2-year frequency event, excessive runoff is detained within Underground Chamber #A and slowly released through an overflow pipe system that runs through Drainage Management Area B then resurfaces at a curb inlet located at the southwest corner of the entrance to site. Curb flows are released to Lincoln Avenue. The following hydraulic structures are included:

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a. Overflow weir vault (See Section C-C of Proposed Hydrology Exhibit) located past the high point separating DMA and DMA B. The overflow weir vault includes a weir orifice set at the elevation (5.2 feet) of the retained 2-year volume. During a 100-year event, the maximum water height in the chamber is 7.89 feet, which is also the top of internal weir for emergency overflow, should the orifice be clogged.
b. A 24-inch PVC pipe for high flows
c. A standard 14-foot long curb inlet vault that allows the release of flows as gutter flows to Lincoln Avenue. The length of the curb inlet was determined to allow for full release of the unmitigated Q100 for emergency purposes.

At the point of compliance, all peak discharges, including the 2-year event (HCOC), are mitigated to below existing levels from both DMA A and DMA B combined.

At Node 106	**Condition**		
Frequency	Existing	Proposed	Delta
100-year Q (cfs)	19.41	18.31	-5.67%
25-year Q (cfs)	14.72	12.71	-13.65%
10-year Q (cfs)	11.95	9.00	-24.69%
2-year Q (cfs)	5.88	3.24	-44.90%

Drainage Management Area B

All tributary drainage runoff drains to the proposed Underground Chamber #B (72" CMP Pipe) of total storage capacity 5,351 CF. The Underground Chamber #B serves multiple purposes:

1. Retention of the DCV from the proposed condition (0.120 AF)
2. Pre-treatment, of equivalent performance to City standards, upstream of drywells

Item (1) - Retention of the DCV is made feasible due to the presence of one (1) drywells (see attached calculations from Torrent Resources). The drywell infiltration rate is 0.0381 cfs per drywell.

*Drawdown time [DCV] = 5,351 [CF] / (0.0381 [CFS] * 1 [# WELLS]) /3,600 [SEC/HR] = 39.0 HRS < 48 HRS*

The achieved drawdown times for the 85th percentile event meets the requirements set forth by the Orange County Technical Guidance Document (OC TGD) (48 hours).

Note that during events of lower frequency than the 85th percentile event, flows will flow through Underground Chamber B and fill the vault located at the southwest corner of the entrance way along Lincoln Avenue. Excessive flows will resurface and be released through the curb inlet and drain westbound along Lincoln Avenue.

Item (2) – Same concept as for DMA A

Should you have any questions, please contact Remi Candaele or Steven Cook at (949)-988-5815.

LEGEND

SUBAREA DESTINATION – SUBAREA ACREAGE – E-1 / XX.XX

AREA OF DESIGN CAPTURE VOLUME (CONCEPTUAL DETAIL)

HYDRAULIC NODE DESIGNATION 300

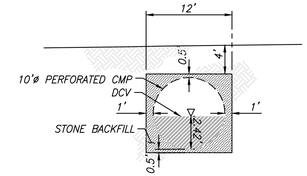
HYDROLOGIC SUBAREA BOUNDARY

LONGEST FLOW PATH

OVERLAND FLOW

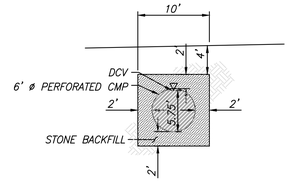
NOTE

HYDROLOGIC COMPUTATIONS AND FLOW MITIGATION ARE BASED ON LOCAL DRAINAGE ONLY,. NO REGIONAL ANALYSIS IS PROVIDED AT THIS STAGE.



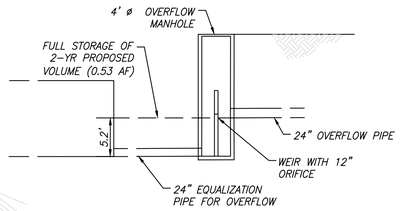
CONCEPTUAL RETENTION CHAMBER SECTION A

SCALE: 1"=10'



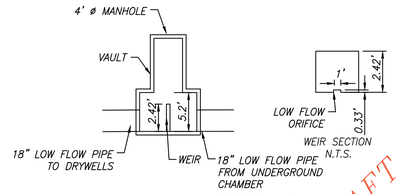
CONCEPTUAL RETENTION CHAMBER SECTION B

SCALE: 1"=10'



SECTION C
CONCEPTUAL OVERFLOW WEIR

N.T.S.

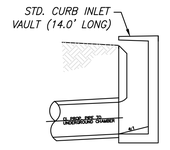


SECTION D
CONCEPTUAL LOW FLOW WEIR

N.T.S

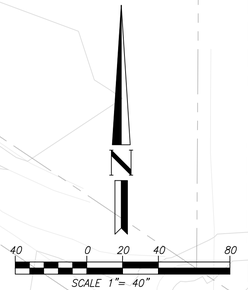
DRAFT

At Node 106	Condition		
Frequency	Existing	Proposed	Delta
100-year Q (cfs)	19.41	18.31	-5.67%
25-year Q (cfs)	14.72	12.71	-13.65%
10-year Q (cfs)	11.95	9.00	-24.69%
2-year Q (cfs)	5.88	3.24	-44.90%



SECTION E
OVERFLOW CURB INLET
(OVERFLOW TO GUTTER)

N.T.S.



LINCOLN AT EUCLID

ANAHEIM, CA

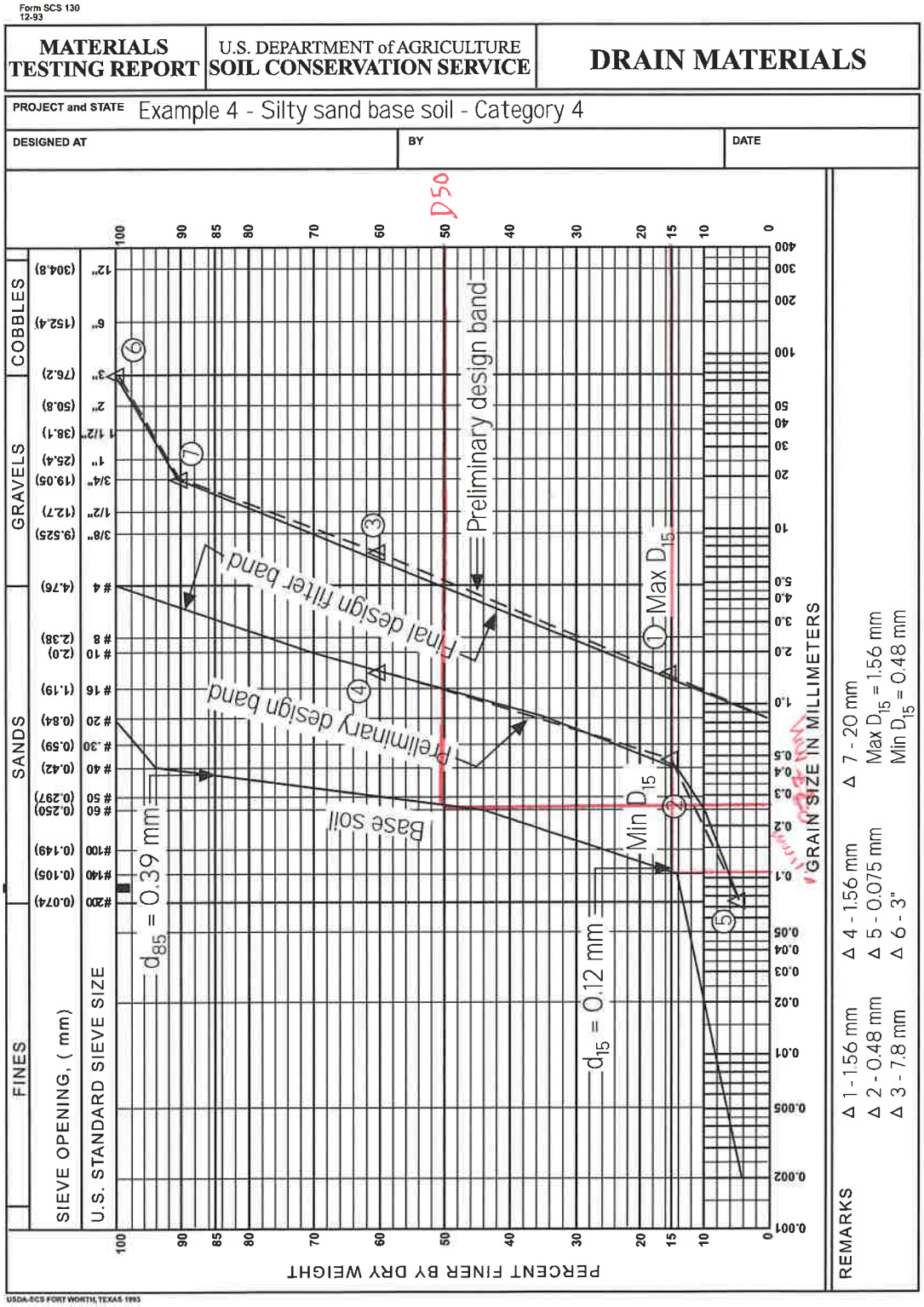
PROPOSED HYDROLOGY EXHIBIT

PREPARED BY: HUITT-ZOLLARS

PREPARED FOR: SHOPOFF REALTY INVESTMENTS

DATE : 08/05/2019

Figure 26–4 Grain size distribution curve for silty sand base soil



Stokes Law - settling rates for perfect spheres

$C=(d_s-d_f)g/18v$ where:

(C=drag coefficient)

$V=CD^2$

(V=settling velocity)

Variable		units	
d_s=sediment density	2.6	g/cm^3	(~2.6 for quartz)
d_f=fluid density	1	g/cm^3	(~1.0 for water)
g=gravitational force	981	cm/s^2	(981 for the Earth)
v=viscosity	0.01	g/cm*s	(0.01 for water)
V=settling velocity	0.07	cm/s	
C=drag coefficient	0.872		
D=particle diameter	0.0265	cm	
DT=drawdown time (6 feet)	17.51	min	

ds	df	g	v	C	D(mm)	D (cm)	V (cm/s)
2.6	1	981	0.01	0.872	0.001	0.0001	0.00009
2.6	1	981	0.01	0.872	0.002	0.0002	0.00035
2.6	1	981	0.01	0.872	0.003	0.0003	0.00078
2.6	1	981	0.01	0.872	0.004	0.0004	0.0014
2.6	1	981	0.01	0.872	0.005	0.0005	0.0022
2.6	1	981	0.01	0.872	0.006	0.0006	0.0031
2.6	1	981	0.01	0.872	0.008	0.0008	0.0056
2.6	1	981	0.01	0.872	0.01	0.001	0.0106
2.6	1	981	0.01	0.872	0.02	0.002	0.0385
2.6	1	981	0.01	0.872	0.03	0.003	0.0838
2.6	1	981	0.01	0.872	0.04	0.004	0.147
2.6	1	981	0.01	0.872	0.05	0.005	0.227
2.6	1	981	0.01	0.872	0.06	0.006	0.324
2.6	1	981	0.01	0.872	0.07	0.007	0.440
2.6	1	981	0.01	0.872	0.08	0.008	0.572
2.6	1	981	0.01	0.872	0.09	0.009	0.722
2.6	1	981	0.01	0.872	0.10	0.010	0.890
2.6	1	981	0.01	0.872	0.14	0.014	1.73
2.6	1	981	0.01	0.872	0.19	0.019	3.18
2.6	1	981	0.01	0.872	0.24	0.024	5.06
2.6	1	981	0.01	0.872	0.29	0.029	7.38
2.6	1	981	0.01	0.872	0.34	0.034	10.1
2.6	1	981	0.01	0.872	0.39	0.039	13.3
2.6	1	981	0.01	0.872	0.44	0.044	17.0
2.6	1	981	0.01	0.872	0.5	0.049	21.0
2.6	1	981	0.01	0.872	0.6	0.059	30.5
2.6	1	981	0.01	0.872	0.7	0.069	41.6
2.6	1	981	0.01	0.872	0.8	0.079	54.6
2.6	1	981	0.01	0.872	0.9	0.089	69.2

Stokes Law - settling rates for perfect spheres

$C=(d_s-d_f)g/18v$ where:

(C=drag coefficient)

$V=CD^2$

(V=settling velocity)

Variable		units	
d_s=sediment density	2.6	g/cm^3	(~2.6 for quartz)
d_f=fluid density	1	g/cm^3	(~1.0 for water)
g=gravitational force	981	cm/s^2	(981 for the Earth)
v=viscosity	0.01	g/cm*s	(0.01 for water)
V=settling velocity	1.10	cm/s	
C=drag coefficient	0.872		
D=particle diameter	0.011	cm	
DT=drawdown time (2.42 feet)	1.12	min	

ds	df	g	v	C	D(mm)	D (cm)	V (cm/s)
2.6	1	981	0.01	0.872	0.001	0.0001	0.00009
2.6	1	981	0.01	0.872	0.002	0.0002	0.00035
2.6	1	981	0.01	0.872	0.003	0.0003	0.00078
2.6	1	981	0.01	0.872	0.004	0.0004	0.0014
2.6	1	981	0.01	0.872	0.005	0.0005	0.0022
2.6	1	981	0.01	0.872	0.006	0.0006	0.0031
2.6	1	981	0.01	0.872	0.008	0.0008	0.0056
2.6	1	981	0.01	0.872	0.01	0.001	0.0106
2.6	1	981	0.01	0.872	0.02	0.002	0.0385
2.6	1	981	0.01	0.872	0.03	0.003	0.0838
2.6	1	981	0.01	0.872	0.04	0.004	0.147
2.6	1	981	0.01	0.872	0.05	0.005	0.227
2.6	1	981	0.01	0.872	0.06	0.006	0.324
2.6	1	981	0.01	0.872	0.07	0.007	0.440
2.6	1	981	0.01	0.872	0.08	0.008	0.572
2.6	1	981	0.01	0.872	0.09	0.009	0.722
2.6	1	981	0.01	0.872	0.10	0.010	0.890
2.6	1	981	0.01	0.872	0.14	0.014	1.73
2.6	1	981	0.01	0.872	0.19	0.019	3.18
2.6	1	981	0.01	0.872	0.24	0.024	5.06
2.6	1	981	0.01	0.872	0.29	0.029	7.38
2.6	1	981	0.01	0.872	0.34	0.034	10.1
2.6	1	981	0.01	0.872	0.39	0.039	13.3
2.6	1	981	0.01	0.872	0.44	0.044	17.0
2.6	1	981	0.01	0.872	0.5	0.049	21.0
2.6	1	981	0.01	0.872	0.6	0.059	30.5
2.6	1	981	0.01	0.872	0.7	0.069	41.6
2.6	1	981	0.01	0.872	0.8	0.079	54.6
2.6	1	981	0.01	0.872	0.9	0.089	69.2

APPENDIX B

Test Pit Logs by LGC
Boring Logs by LGC
Direct Push Logs by FREY Environmental

Boring and Test Pit Logs (continued)

Test Pit Number and Location	Depth and Description
TP-1 Elevation 131 feet Location N 33.834477° E-117.940772°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy CONGLOMERATE; medium gray brown, dry, medium dense; scattered roots and construction debris (concrete, AC, clay pipe); rock fragments generally 2-6" in size @2.5' 2" diameter PVC pipe (abandoned) @3' becomes damp YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @ 5.5' Silty fine SAND; dark gray brown, damp, medium dense; relatively homogeneous Total Depth = 8 Feet No Ground Water Encountered
TP-2 Elevation 129 feet Location N 33.834065° E -117.940871°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Gravelly to cobbly silty fine SAND; medium gray to medium gray brown, dry, medium dense, minor construction debris YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @3' Silty fine SAND; medium gray brown, damp, medium dense; few subrounded to rounded gravels @4' Silty to very silty fine SAND, dark gray brown, damp, medium dense; slightly porous to 5.5', pores generally 1/10th or less in diameter @5' bulk sample obtained Total Depth = 6 Feet No Ground Water Encountered

Boring and Test Pit Logs (continued)

Test Pit Number and Location	Depth and Description
TP-3 Elevation 130 feet Location N 33.833620° E -117.941016°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Gravelly silty fine SAND; medium gray brown, damp, medium dense, scattered rock fragments @2' scattered construction debris (brick, wood, AC) YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @3' Silty fine SAND; dark gray brown, damp, medium dense; moderately porous, up to 1/8 – 1/16"diameter pores Total Depth = 6 Feet No Ground Water Encountered
TP-4 Elevation 131 feet Location N 33.833138° E -117.941105°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Gravelly silty fine SAND; medium gray and orange brown, dry, loose to medium dense @1' Silty to clayey SAND; orange to red brown, with abundant rock fragments up to 6-8" in diameter @2.5' 1-foot diameter concrete chunk @3' slightly gravelly silty fine SAND, medium gray brown, medium dense YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @4.5' Silty fine SAND; dark gray brown, damp, medium dense to dense; very slightly porous to 6' Total Depth = 6.5 Feet No Ground Water Encountered

Boring and Test Pit Logs (continued)

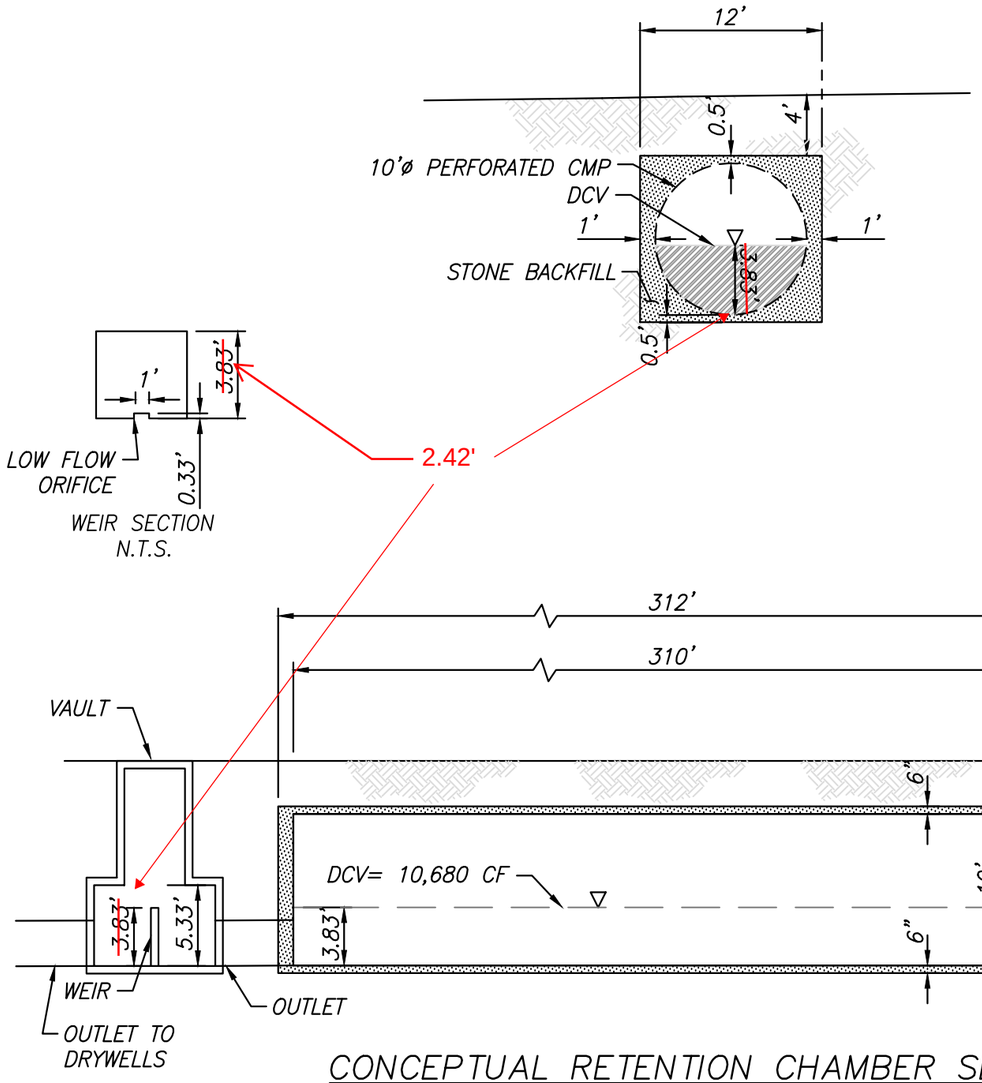
Test Pit Number and Location	Depth and Description
TP-5 Elevation 132 feet Location N 33.833320° E -117.940669°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy to clayey sandy GRAVEL; dark gray and orange brown, dry, medium dense; occasional 6-8" diameter rock fragments; minor construction debris @2' becomes damp; scattered sandy clay chunks @4.5' rebar piece YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @5.5' Silty fine SAND; dark gray brown, damp, medium dense; scattered iron oxide blebs and small black carbon chunks generally 1/16"or less in size; very slightly porous to 6.5' @6.5' slightly silty fine SAND, medium brown, damp, medium dense, to dense; homogeneous Total Depth = 7 Feet No Ground Water Encountered
TP-6 Elevation 130 feet Location N 33.833501° E -117.940050°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy GRAVEL; medium gray, dry, medium dense; scattered concrete chunks up to 6-8", slightly cemented due to concrete chunks and dust YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @1.5' Silty fine SAND; minor medium sand; medium gray brown, dry, dense; slightly porous to 3'; few fine subrounded gravel @3' Silty fine SAND, dark gray brown, damp, medium dense @4.5' becomes medium brown Total Depth = 5 Feet No Ground Water Encountered

Boring and Test Pit Logs (continued)

Test Pit Number and Location	Depth and Description
TP-7 Elevation 130 feet Location N 33.833591° E -117.939608°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy GRAVEL, recycled class II base; medium gray, dry, medium dense @1' becomes damp @2.5' silty fine to medium SAND, minor gravel and cobble sized rock fragments up to 6-8", one 4" thick by 12"x12" concrete chunk YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @3.5' Silty fine SAND; medium to dark gray brown, damp, medium dense to dense, few subrounded fine gravel, homogeneous @5.5' fine SAND, medium brown, damp, dense Total Depth = 6 Feet No Ground Water Encountered
TP-8 Elevation 131 feet Location N 33.833885° E -117.939799°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy GRAVEL; medium gray to medium gray brown, dry, medium dense to dense; moderately cemented; minor construction debris, brick, AC, a bic pen, black plastic Visqueen, PVC pipe pieces, etc. @1' becomes dark gray brown, damp @2' abundant AC and concrete chunks, 4-8" thick chunks, very difficult to excavate YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @4' Silty fine SAND; dark gray brown, damp, medium dense; slightly porous to 5' @6' becomes medium brown silty fine SAND Total Depth = 6.5 Feet No Ground Water Encountered

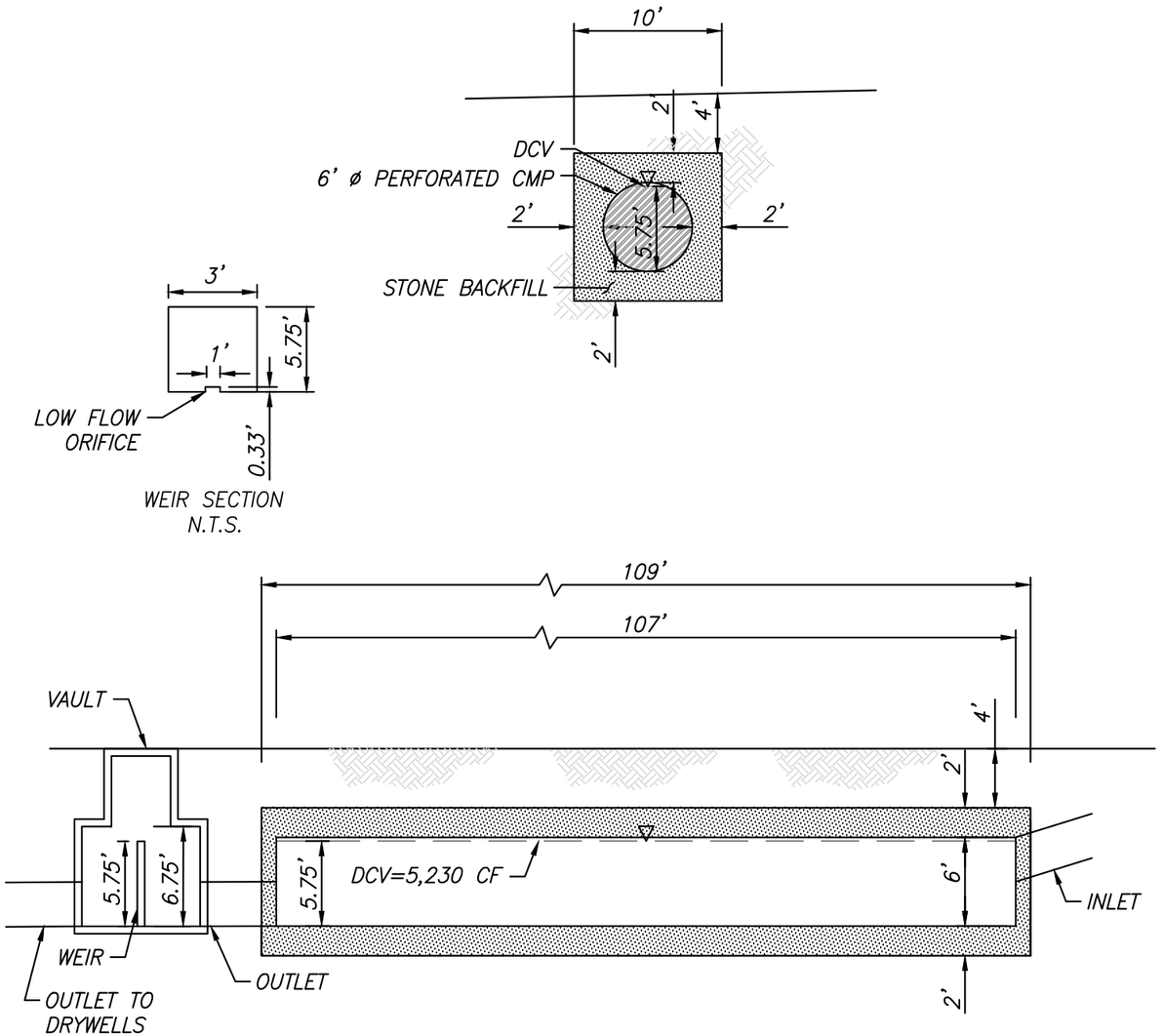
Boring and Test Pit Logs (continued)

Test Pit Number and Location	Depth and Description
TP-9 Elevation 130 feet Location N 33.834030° E -117.940298°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Silty sandy GRAVEL; medium gray, damp, medium dense @0.5' Silty to clayey sandy CONGLOMERATE; orange brown, damp, dense; rock fragments up to 6" @3' becomes a gravelly silty fine SAND, light to medium gray, damp, dense; scattered sandy clay chunks; rock fragments up to 3-4"; bulk sample obtained YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @5.5' silty fine SAND; medium gray brown and dark gray brown, damp, dense; very slightly porous Total Depth = 6.5 Feet No Ground Water Encountered
TP-10 Elevation 129 feet Location N 33.834267° E -117.940364°	UNDOCUMENTED ARTIFICIAL FILL (Afu): @0' Gravelly silty SAND; medium gray brown, dry, medium dense; few rock fragments up to 3-4" in diameter @2.5' abundant concrete chunks, up to 12"x18"x12", one red colored concrete chunk and AC; scattered small rebar and welded wire mesh pieces YOUNG ALLUVIAL FAN DEPOSITS (Qyf): @5' silty fine SAND; medium gray brown, damp, medium dense to dense Total Depth = 5.5 Feet No Ground Water Encountered



CONCEPTUAL RETENTION CHAMBER SECTION
CHAMBER A – DMA A

SCALE: 1"=10'



CONCEPTUAL RETENTION CHAMBER
CHAMBER B– DMA B

SCALE: 1"=10'

SCALE: AS NOTED
DATE:9/9/2019

Proposed Detention Basin -DMA A 120 CMP

Stage-Storage-Discharge Table

Stage (ft)	Surface Area (SQFT)	Storage (AF)	Multiple Outlet Discharge (cfs)
0	4428.00	0.000	0.04
2	4428.00	0.203	0.04
2.42	4428.00	0.246	0.04
5.2	4428.00	0.529	0.04
7	4428.00	0.712	5.11
10	4428.00	1.017	23.64

*Area of chamber only

0.245 DCV (AF)

0.530 2-YR Prop Volume (AF)

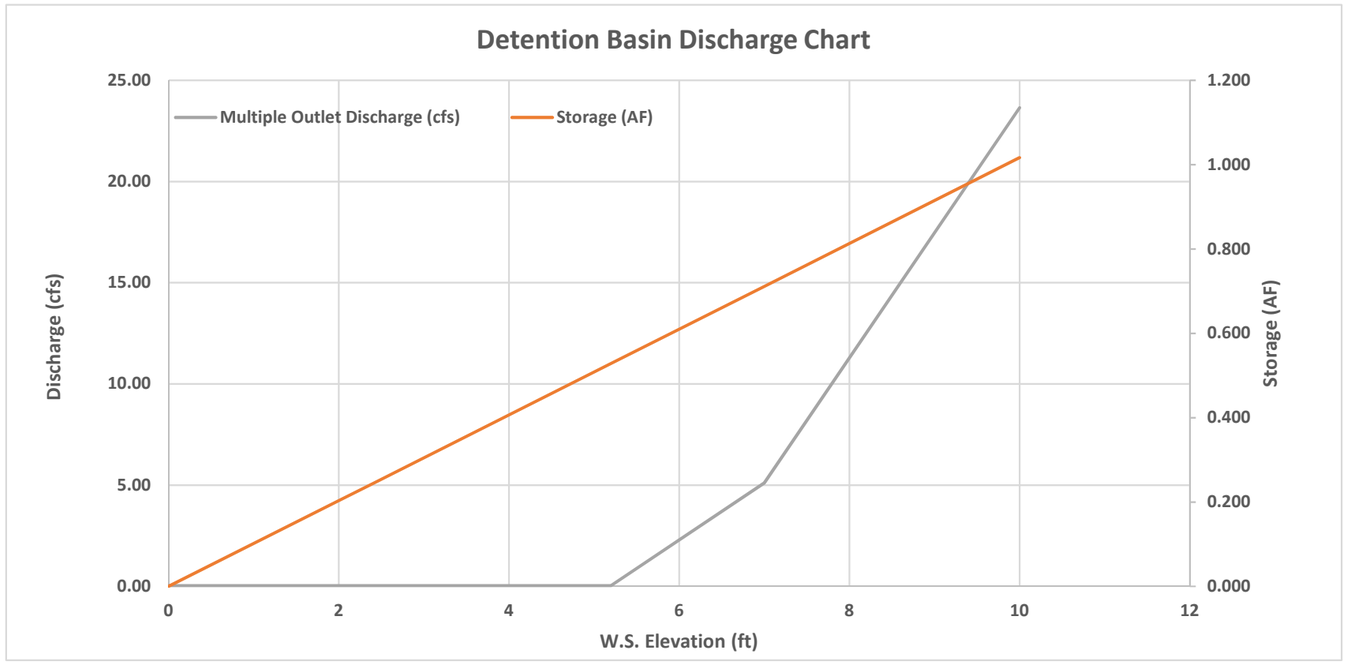
36769 CHAMBER VOLUME (CF)

Upper Basin Parameters

Low Flow Orifice	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Low Flow Orifice #2	
Circular Orifice Invert	5.2
Orifice diameter (in)	12
Coefficient C	0.6
Number orifices	1

Vertical Rectangular Opening	
Invert	8
Width (ft)	1.50
Height (ft)	1.50
Coefficient C	0.6



Proposed Detention Basin - DMA B 72 CMP

Stage-Storage-Discharge Table

Stage (ft)	Surface Area (SQFT)	Storage (AF)	Multiple Outlet Discharge (cfs)
0	880.00	0.000	0.0377
2	880.00	0.040	0.0377
3	880.00	0.061	0.0377
5	880.00	0.101	0.04
6	880.00	0.121	0.04
6.25	880.00	0.126	25.32

*Area of chamber only

0.1200 DCV (AF)

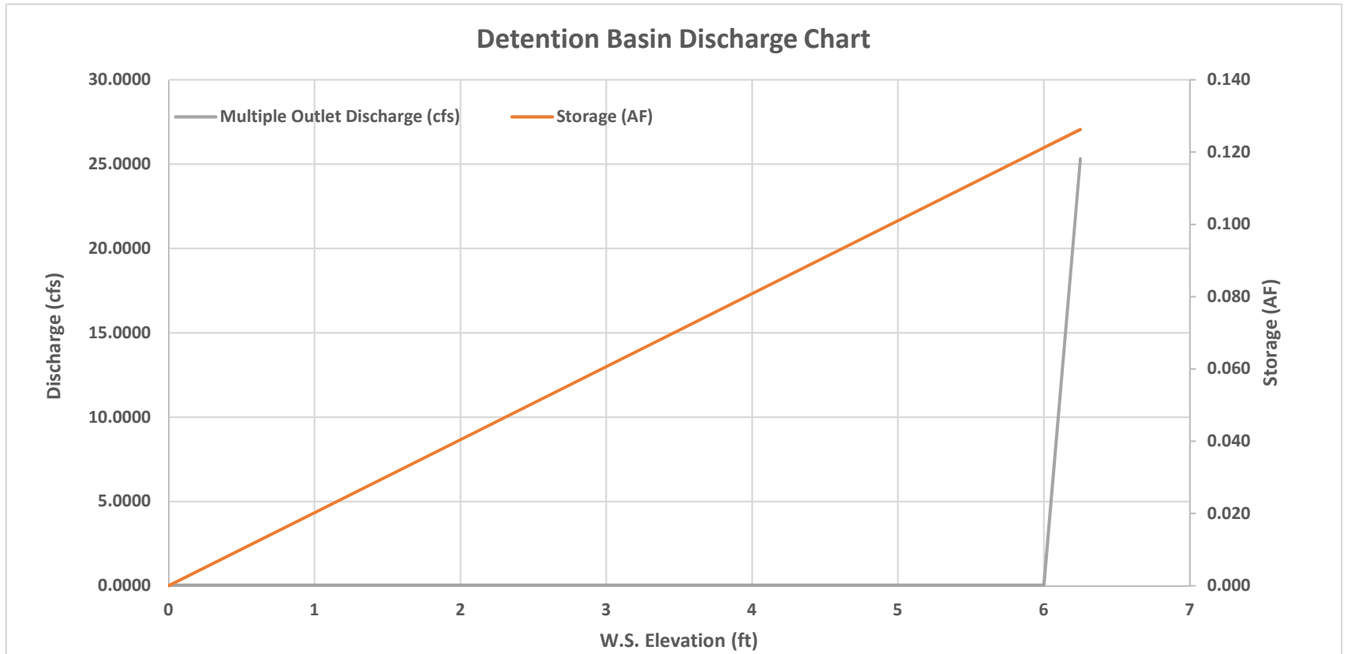
5351 Total Volume (CF)

Upper Basin Parameters

Low Flow Orifice	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Low Flow Orifice #2	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Vertical Rectangular Opening	
Invert	6
Width (ft)	14.00
Height (ft)	0.75
Coefficient C	0.6



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F L O O D R O U T I N G A N A L Y S I S
USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
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Ver. 21.0 Release Date: 06/01/2014 License ID 1202

Analysis prepared by:

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Suite 400
(949)-988-5815

********** DESCRIPTION OF STUDY **********
* SHOPOFF ANAHEIM *
* HYDROGRAPHS & FLOOD ROUTING ANALYSIS - PROPOSED CONDITION DMA A&B *
* 100YR AMCIII RC 10/22/2019 *
****

FILE NAME: SHOP00EX.DAT
TIME/DATE OF STUDY: 16:57 10/23/2019

The Small Area Unit Hydrograph Procedures in Section J
of the Hydrology Manual provides estimates of runoff
hydrograph and runoff volume for watersheds whose time of
concentration is less than 25 minutes. The PROGRAM User
should check the applicability of using the small area unit
hydrograph procedures, and follow the guidelines in
Sections J and K.5 in complex watershed modeling.

```
 ****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE = 1.2
 ----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
 ============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    5.12
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.088
    LOW LOSS FRACTION = 0.164
    TIME OF CONCENTRATION(MIN.) =  8.08
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

 ----------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.86
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.55

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```

==========

24-HOUR STORM
RUNOFF HYDROGRAPH

==========

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.3	10.6	16.0	21.3
14.000	0.6680	1.42	. Q	. V	.	.	.
14.017	0.6699	1.43	. Q	. V	.	.	.
14.033	0.6719	1.43	. Q	. V	.	.	.
14.050	0.6739	1.43	. Q	. V	.	.	.
14.067	0.6758	1.44	. Q	. V	.	.	.
14.083	0.6778	1.44	. Q	. V	.	.	.
14.100	0.6798	1.45	. Q	. V	.	.	.
14.117	0.6818	1.45	. Q	. V	.	.	.
14.133	0.6838	1.46	. Q	. V	.	.	.
14.150	0.6859	1.47	. Q	. V	.	.	.
14.167	0.6879	1.48	. Q	. V	.	.	.
14.183	0.6899	1.49	. Q	. V	.	.	.
14.200	0.6920	1.50	. Q	. V	.	.	.
14.217	0.6941	1.51	. Q	. V	.	.	.
14.233	0.6962	1.52	. Q	. V	.	.	.
14.250	0.6983	1.53	. Q	. V	.	.	.
14.267	0.7004	1.54	. Q	. V	.	.	.
14.283	0.7025	1.54	. Q	. V	.	.	.
14.300	0.7047	1.55	. Q	. V	.	.	.
14.317	0.7068	1.55	. Q	. V	.	.	.
14.333	0.7089	1.56	. Q	. V	.	.	.
14.350	0.7111	1.56	. Q	. V	.	.	.
14.367	0.7132	1.57	. Q	. V	.	.	.
14.383	0.7154	1.57	. Q	. V	.	.	.
14.400	0.7176	1.58	. Q	. V	.	.	.
14.417	0.7198	1.59	. Q	. V	.	.	.
14.433	0.7220	1.60	. Q	. V	.	.	.
14.450	0.7242	1.61	. Q	. V	.	.	.
14.467	0.7264	1.63	. Q	. V	.	.	.
14.483	0.7287	1.64	. Q	. V	.	.	.
14.500	0.7310	1.65	. Q	. V	.	.	.
14.517	0.7332	1.66	. Q	. V	.	.	.
14.533	0.7355	1.67	. Q	. V	.	.	.
14.550	0.7379	1.68	. Q	. V	.	.	.
14.567	0.7402	1.68	. Q	. V	.	.	.
14.583	0.7425	1.69	. Q	. V	.	.	.
14.600	0.7448	1.70	. Q	. V	.	.	.
14.617	0.7472	1.70	. Q	. V	.	.	.
14.633	0.7495	1.71	. Q	. V	.	.	.
14.650	0.7519	1.72	. Q	. V	.	.	.
14.667	0.7543	1.72	. Q	. V	.	.	.
14.683	0.7567	1.74	. Q	. V	.	.	.
14.700	0.7591	1.75	. Q	. V	.	.	.
14.717	0.7615	1.77	. Q	. V	.	.	.
14.733	0.7640	1.78	. Q	. V	.	.	.
14.750	0.7665	1.80	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.3	10.6	16.0	21.3
14.767	0.7690	1.81	Q	V			
14.783	0.7715	1.83	Q	V			
14.800	0.7740	1.84	Q	V			
14.817	0.7766	1.85	Q	V			
14.833	0.7791	1.86	Q	V			
14.850	0.7817	1.87	Q	V			
14.867	0.7843	1.88	Q	V			
14.883	0.7869	1.89	Q	V			
14.900	0.7895	1.90	Q	V			
14.917	0.7921	1.91	Q	V			
14.933	0.7948	1.92	Q	V			
14.950	0.7974	1.94	Q	V			
14.967	0.8001	1.96	Q	V			
14.983	0.8029	1.98	Q	V			
15.000	0.8056	2.00	Q	V			
15.017	0.8084	2.02	Q	V			
15.033	0.8112	2.04	Q	V			
15.050	0.8141	2.07	Q	V			
15.067	0.8169	2.09	Q	V			
15.083	0.8198	2.10	Q	V			
15.100	0.8227	2.12	Q	V			
15.117	0.8257	2.13	Q	V			
15.133	0.8286	2.15	Q	V			
15.150	0.8316	2.16	Q	V			
15.167	0.8346	2.18	Q	V			
15.183	0.8376	2.19	Q	V			
15.200	0.8407	2.21	Q	V			
15.217	0.8438	2.25	Q	V			
15.233	0.8469	2.28	Q	V			
15.250	0.8501	2.32	Q	V			
15.267	0.8534	2.36	Q	V			
15.283	0.8567	2.40	Q	V			
15.300	0.8600	2.44	Q	V			
15.317	0.8635	2.48	Q	V			
15.333	0.8669	2.51	Q	V			
15.350	0.8704	2.52	Q	V			
15.367	0.8739	2.53	Q	V			
15.383	0.8774	2.53	Q	V			
15.400	0.8809	2.54	Q	V			
15.417	0.8844	2.54	Q	V			
15.433	0.8879	2.54	Q	V			
15.450	0.8914	2.55	Q	V			
15.467	0.8949	2.55	Q	V			
15.483	0.8985	2.59	Q	V			
15.500	0.9021	2.63	Q	V			
15.517	0.9057	2.67	Q	V			
15.533	0.9095	2.71	Q	V			
15.550	0.9133	2.75	Q	V			
15.567	0.9171	2.79	Q	V			
15.583	0.9210	2.83	Q	V			

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.3	10.6	16.0	21.3
15.600	0.9250	2.87	Q	V.			
15.617	0.9290	2.92	Q	V			
15.633	0.9331	2.97	Q	V			
15.650	0.9372	3.02	Q	V			
15.667	0.9415	3.07	Q	V			
15.683	0.9458	3.12	Q	V			
15.700	0.9501	3.18	Q	V			
15.717	0.9546	3.23	Q	V			
15.733	0.9591	3.28	Q	V			
15.750	0.9638	3.42	Q	V			
15.767	0.9688	3.62	Q	V			
15.783	0.9741	3.81	Q	V			
15.800	0.9796	4.00	Q	.V			
15.817	0.9854	4.20	Q	.V			
15.833	0.9914	4.39	Q	.V			
15.850	0.9977	4.59	Q	.V			
15.867	1.0043	4.78	Q	.V			
15.883	1.0112	5.00	Q.	.V			
15.900	1.0184	5.24	Q.	.V			
15.917	1.0259	5.48	Q	. V			
15.933	1.0338	5.71	Q	. V			
15.950	1.0420	5.95	.Q	. V			
15.967	1.0505	6.19	.Q	. V			
15.983	1.0594	6.43	. Q	. V			
16.000	1.0686	6.67	. Q	. V			
16.017	1.0792	7.68	. Q	. V			
16.033	1.0922	9.48	. Q	. V			
16.050	1.1077	11.27	. .Q	V			
16.067	1.1258	13.07	. .	Q			
16.083	1.1462	14.86	. .	V Q	.		
16.100	1.1692	16.66	. .	V .Q			
16.117	1.1946	18.45	. .	V . Q			
16.133	1.2225	20.25	. .	V .	Q .		
16.150	1.2518	21.29	. .	V .	Q		
16.167	1.2769	18.23	. .	V . Q			
16.183	1.2991	16.08	. .	V Q			
16.200	1.3183	13.93	. .	Q V .			
16.217	1.3345	11.78	. . Q	V .			
16.233	1.3477	9.62	. Q .	V.			
16.250	1.3580	7.47	. Q	. V.			
16.267	1.3654	5.32	Q.	. V.			
16.283	1.3707	3.87	Q	. V.			
16.300	1.3758	3.68	Q	. V.			
16.317	1.3806	3.52	Q	. V.			
16.333	1.3852	3.35	Q	. V.			
16.350	1.3896	3.19	Q	. V.			
16.367	1.3938	3.02	Q	. V			
16.383	1.3977	2.86	Q	. V			
16.400	1.4014	2.69	Q	. V			
16.417	1.4049	2.57	Q	. V			

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.3	10.6	16.0	21.3
16.433	1.4084	2.54	Q		V		
16.450	1.4119	2.51	Q		V		
16.467	1.4153	2.48	Q		V		
16.483	1.4187	2.46	Q		V		
16.500	1.4221	2.43	Q		V		
16.517	1.4254	2.40	Q		V		
16.533	1.4286	2.37	Q		V		
16.550	1.4319	2.34	Q		V		
16.567	1.4350	2.30	Q		V		
16.583	1.4381	2.25	Q		.V		
16.600	1.4412	2.21	Q		.V		
16.617	1.4442	2.17	Q		.V		
16.633	1.4471	2.12	Q		.V		
16.650	1.4499	2.08	Q		.V		
16.667	1.4527	2.03	Q		.V		
16.683	1.4555	1.99	Q		.V		
16.700	1.4582	1.96	Q		.V		
16.717	1.4609	1.94	Q		.V		
16.733	1.4635	1.91	Q		.V		
16.750	1.4661	1.88	Q		.V		
16.767	1.4686	1.86	Q		.V		
16.783	1.4712	1.83	Q		.V		
16.800	1.4736	1.80	Q		.V		
16.817	1.4761	1.78	Q		.V		
16.833	1.4785	1.76	Q		.V		
16.850	1.4809	1.74	Q		.V		
16.867	1.4833	1.72	Q		.V		
16.883	1.4856	1.70	Q		. V		
16.900	1.4879	1.68	Q		. V		
16.917	1.4902	1.66	Q		. V		
16.933	1.4925	1.64	Q		. V		
16.950	1.4947	1.62	Q		. V		
16.967	1.4969	1.60	Q		. V		
16.983	1.4991	1.59	Q		. V		
17.000	1.5013	1.57	Q		. V		
17.017	1.5034	1.56	Q		. V		
17.033	1.5055	1.54	Q		. V		
17.050	1.5076	1.53	Q		. V		
17.067	1.5097	1.51	Q		. V		
17.083	1.5118	1.50	Q		. V		
17.100	1.5138	1.48	Q		. V		
17.117	1.5158	1.47	Q		. V		
17.133	1.5179	1.46	Q		. V		
17.150	1.5198	1.44	Q		. V		
17.167	1.5218	1.43	Q		. V		
17.183	1.5238	1.42	Q		. V		
17.200	1.5257	1.40	Q		. V		
17.217	1.5276	1.39	Q		. V		
17.233	1.5295	1.38	Q		. V		
17.250	1.5314	1.37	Q		. V		

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.3	10.6	16.0	21.3
17.267	1.5333	1.36	. Q	.	. V	.	
17.283	1.5351	1.35	. Q	.	. V	.	
17.300	1.5370	1.34	. Q	.	. V	.	
17.317	1.5388	1.33	. Q	.	. V	.	
17.333	1.5406	1.32	. Q	.	. V	.	
17.350	1.5424	1.31	. Q	.	. V	.	
17.367	1.5442	1.30	. Q	.	. V	.	
17.383	1.5460	1.29	. Q	.	. V	.	
17.400	1.5477	1.28	. Q	.	. V	.	
17.417	1.5495	1.27	. Q	.	. V	.	
17.433	1.5512	1.26	. Q	.	. V	.	
17.450	1.5530	1.25	. Q	.	. V	.	
17.467	1.5547	1.25	. Q	.	. V	.	
17.483	1.5564	1.24	. Q	.	. V	.	
17.500	1.5581	1.23	. Q	.	. V	.	
17.517	1.5598	1.22	. Q	.	. V	.	
17.533	1.5614	1.21	. Q	.	. V	.	
17.550	1.5631	1.21	. Q	.	. V	.	
17.567	1.5647	1.20	. Q	.	. V	.	
17.583	1.5664	1.19	. Q	.	. V	.	
17.600	1.5680	1.18	. Q	.	. V	.	
17.617	1.5696	1.18	. Q	.	. V	.	
17.633	1.5712	1.17	. Q	.	. V	.	
17.650	1.5729	1.16	. Q	.	. V	.	
17.667	1.5744	1.16	. Q	.	. V	.	
17.683	1.5760	1.15	. Q	.	. V	.	
17.700	1.5776	1.14	. Q	.	. V	.	
17.717	1.5792	1.14	. Q	.	. V	.	
17.733	1.5807	1.13	. Q	.	. V	.	
17.750	1.5823	1.13	. Q	.	. V	.	
17.767	1.5838	1.12	. Q	.	. V	.	
17.783	1.5854	1.11	. Q	.	. V	.	
17.800	1.5869	1.11	. Q	.	. V	.	
17.817	1.5884	1.10	. Q	.	. V	.	
17.833	1.5899	1.10	. Q	.	. V	.	
17.850	1.5914	1.09	. Q	.	. V	.	
17.867	1.5929	1.08	. Q	.	. V	.	
17.883	1.5944	1.08	. Q	.	. V	.	
17.900	1.5959	1.07	. Q	.	. V	.	
17.917	1.5973	1.07	. Q	.	. V	.	
17.933	1.5988	1.06	.Q	.	. V	.	
17.950	1.6003	1.06	.Q	.	. V	.	
17.967	1.6017	1.05	.Q	.	. V	.	
17.983	1.6032	1.05	.Q	.	. V	.	
18.000	1.6046	1.04	.Q	.	. V	.	

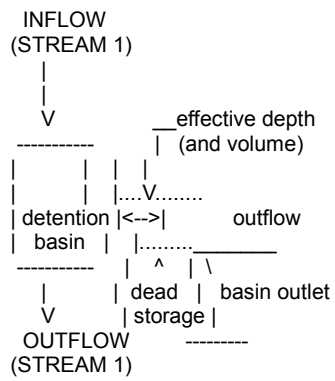
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	455.0
20%	135.0
30%	85.0
40%	65.0
50%	55.0
60%	45.0

70%	30.0
80%	20.0
90%	10.0

****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
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ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.04

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	2.00	0.01	0.203
3	2.42	0.02	0.246
4	5.20	0.03	0.529
5	7.00	5.11	0.712
6	10.00	23.64	1.017

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	1.43	0.04	5.57	1.1	0.566
14.033	0.000	1.43	0.04	5.57	1.1	0.567
14.050	0.000	1.43	0.04	5.58	1.1	0.567
14.067	0.000	1.44	0.04	5.58	1.1	0.568
14.083	0.000	1.44	0.04	5.59	1.1	0.568
14.100	0.000	1.45	0.04	5.59	1.1	0.569
14.117	0.000	1.45	0.04	5.59	1.1	0.569
14.133	0.000	1.46	0.04	5.60	1.1	0.569
14.150	0.000	1.47	0.04	5.60	1.2	0.570
14.167	0.000	1.48	0.04	5.60	1.2	0.570
14.183	0.000	1.49	0.04	5.61	1.2	0.570
14.200	0.000	1.50	0.04	5.61	1.2	0.571
14.217	0.000	1.51	0.04	5.61	1.2	0.571
14.233	0.000	1.52	0.04	5.62	1.2	0.572
14.250	0.000	1.53	0.04	5.62	1.2	0.572
14.267	0.000	1.54	0.04	5.63	1.2	0.572
14.283	0.000	1.54	0.04	5.63	1.2	0.573
14.300	0.000	1.55	0.04	5.63	1.2	0.573
14.317	0.000	1.55	0.04	5.64	1.3	0.573
14.333	0.000	1.56	0.04	5.64	1.3	0.574
14.350	0.000	1.56	0.04	5.64	1.3	0.574
14.367	0.000	1.57	0.04	5.65	1.3	0.574
14.383	0.000	1.57	0.04	5.65	1.3	0.575
14.400	0.000	1.58	0.04	5.65	1.3	0.575
14.417	0.000	1.59	0.04	5.66	1.3	0.575
14.433	0.000	1.60	0.04	5.66	1.3	0.576
14.450	0.000	1.61	0.04	5.66	1.3	0.576
14.467	0.000	1.63	0.04	5.67	1.3	0.576
14.483	0.000	1.64	0.04	5.67	1.4	0.577
14.500	0.000	1.65	0.04	5.67	1.4	0.577
14.517	0.000	1.66	0.04	5.68	1.4	0.577
14.533	0.000	1.67	0.04	5.68	1.4	0.578
14.550	0.000	1.68	0.04	5.68	1.4	0.578
14.567	0.000	1.68	0.04	5.69	1.4	0.578
14.583	0.000	1.69	0.04	5.69	1.4	0.579
14.600	0.000	1.70	0.04	5.69	1.4	0.579
14.617	0.000	1.70	0.04	5.70	1.4	0.579
14.633	0.000	1.71	0.04	5.70	1.4	0.580
14.650	0.000	1.72	0.04	5.70	1.4	0.580
14.667	0.000	1.72	0.04	5.70	1.5	0.580
14.683	0.000	1.74	0.04	5.71	1.5	0.581
14.700	0.000	1.75	0.04	5.71	1.5	0.581
14.717	0.000	1.77	0.04	5.71	1.5	0.581
14.733	0.000	1.78	0.04	5.72	1.5	0.582
14.750	0.000	1.80	0.04	5.72	1.5	0.582
14.767	0.000	1.81	0.04	5.73	1.5	0.582
14.783	0.000	1.83	0.04	5.73	1.5	0.583
14.800	0.000	1.84	0.04	5.73	1.5	0.583
14.817	0.000	1.85	0.04	5.74	1.5	0.584
14.833	0.000	1.86	0.04	5.74	1.6	0.584

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	1.87	0.04	5.74	1.6	0.584
14.867	0.000	1.88	0.04	5.75	1.6	0.585
14.883	0.000	1.89	0.04	5.75	1.6	0.585
14.900	0.000	1.90	0.04	5.75	1.6	0.585
14.917	0.000	1.91	0.04	5.76	1.6	0.586
14.933	0.000	1.92	0.04	5.76	1.6	0.586
14.950	0.000	1.94	0.04	5.77	1.6	0.586
14.967	0.000	1.96	0.04	5.77	1.6	0.587
14.983	0.000	1.98	0.04	5.77	1.6	0.587
15.000	0.000	2.00	0.04	5.78	1.7	0.588
15.017	0.000	2.02	0.04	5.78	1.7	0.588
15.033	0.000	2.04	0.04	5.79	1.7	0.589
15.050	0.000	2.07	0.04	5.79	1.7	0.589
15.067	0.000	2.09	0.04	5.80	1.7	0.590
15.083	0.000	2.10	0.04	5.80	1.7	0.590
15.100	0.000	2.12	0.04	5.80	1.7	0.590
15.117	0.000	2.13	0.04	5.81	1.7	0.591
15.133	0.000	2.15	0.04	5.81	1.8	0.591
15.150	0.000	2.16	0.04	5.82	1.8	0.592
15.167	0.000	2.18	0.04	5.82	1.8	0.592
15.183	0.000	2.19	0.04	5.83	1.8	0.593
15.200	0.000	2.21	0.04	5.83	1.8	0.593
15.217	0.000	2.25	0.04	5.84	1.8	0.594
15.233	0.000	2.28	0.04	5.84	1.8	0.594
15.250	0.000	2.32	0.04	5.85	1.9	0.595
15.267	0.000	2.36	0.04	5.86	1.9	0.596
15.283	0.000	2.40	0.04	5.86	1.9	0.596
15.300	0.000	2.44	0.04	5.87	1.9	0.597
15.317	0.000	2.48	0.04	5.88	1.9	0.598
15.333	0.000	2.51	0.04	5.88	1.9	0.598
15.350	0.000	2.52	0.04	5.89	2.0	0.599
15.367	0.000	2.53	0.04	5.90	2.0	0.600
15.383	0.000	2.53	0.04	5.90	2.0	0.600
15.400	0.000	2.54	0.04	5.91	2.0	0.601
15.417	0.000	2.54	0.04	5.92	2.0	0.602
15.433	0.000	2.54	0.04	5.92	2.1	0.602
15.450	0.000	2.55	0.04	5.93	2.1	0.603
15.467	0.000	2.55	0.04	5.93	2.1	0.604
15.483	0.000	2.59	0.04	5.94	2.1	0.604
15.500	0.000	2.63	0.04	5.95	2.1	0.605
15.517	0.000	2.67	0.04	5.95	2.1	0.605
15.533	0.000	2.71	0.04	5.96	2.2	0.606
15.550	0.000	2.75	0.04	5.97	2.2	0.607
15.567	0.000	2.79	0.04	5.97	2.2	0.608
15.583	0.000	2.83	0.04	5.98	2.2	0.608
15.600	0.000	2.87	0.04	5.99	2.2	0.609
15.617	0.000	2.92	0.04	6.00	2.3	0.610
15.633	0.000	2.97	0.04	6.01	2.3	0.611
15.650	0.000	3.02	0.04	6.01	2.3	0.612
15.667	0.000	3.07	0.04	6.02	2.3	0.613

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	3.12	0.04	6.03	2.4	0.614
15.700	0.000	3.18	0.04	6.04	2.4	0.615
15.717	0.000	3.23	0.04	6.05	2.4	0.616
15.733	0.000	3.28	0.04	6.06	2.5	0.617
15.750	0.000	3.42	0.04	6.08	2.5	0.618
15.767	0.000	3.62	0.04	6.09	2.5	0.620
15.783	0.000	3.81	0.04	6.11	2.6	0.621
15.800	0.000	4.00	0.04	6.13	2.6	0.623
15.817	0.000	4.20	0.04	6.15	2.7	0.625
15.833	0.000	4.39	0.04	6.17	2.7	0.627
15.850	0.000	4.59	0.04	6.19	2.8	0.630
15.867	0.000	4.78	0.04	6.22	2.9	0.632
15.883	0.000	5.00	0.04	6.24	2.9	0.635
15.900	0.000	5.24	0.04	6.27	3.0	0.638
15.917	0.000	5.48	0.04	6.31	3.1	0.641
15.933	0.000	5.71	0.04	6.34	3.2	0.645
15.950	0.000	5.95	0.04	6.37	3.3	0.648
15.967	0.000	6.19	0.04	6.41	3.4	0.652
15.983	0.000	6.43	0.04	6.45	3.5	0.656
16.000	0.000	6.67	0.04	6.49	3.6	0.660
16.017	0.000	7.68	0.04	6.54	3.7	0.666
16.033	0.000	9.48	0.04	6.62	3.9	0.673
16.050	0.000	11.27	0.04	6.71	4.2	0.683
16.067	0.000	13.07	0.04	6.83	4.5	0.695
16.083	0.000	14.86	0.04	6.97	4.8	0.709
16.100	0.000	16.66	0.04	7.12	5.4	0.724
16.117	0.000	18.45	0.04	7.28	6.3	0.741
16.133	0.000	20.25	0.04	7.45	7.4	0.758
16.150	0.000	21.29	0.04	7.63	8.5	0.776
16.167	0.000	18.23	0.04	7.75	9.4	0.788
16.183	0.000	16.08	0.04	7.83	10.0	0.796
16.200	0.000	13.93	0.04	7.88	10.4	0.801
16.217	0.000	11.78	0.04	7.89	10.6	0.803
16.233	0.000	9.62	0.04	7.88	10.6	0.801
16.250	0.000	7.47	0.04	7.84	10.4	0.797
16.267	0.000	5.32	0.04	7.77	10.1	0.791
16.283	0.000	3.87	0.04	7.70	9.6	0.783
16.300	0.000	3.68	0.04	7.62	9.2	0.775
16.317	0.000	3.52	0.04	7.55	8.7	0.768
16.333	0.000	3.35	0.04	7.48	8.3	0.761
16.350	0.000	3.19	0.04	7.42	7.9	0.754
16.367	0.000	3.02	0.04	7.36	7.5	0.748
16.383	0.000	2.86	0.04	7.30	7.1	0.742
16.400	0.000	2.69	0.04	7.24	6.8	0.737
16.417	0.000	2.57	0.04	7.19	6.4	0.731
16.433	0.000	2.54	0.04	7.14	6.1	0.726
16.450	0.000	2.51	0.04	7.09	5.8	0.722
16.467	0.000	2.48	0.04	7.05	5.6	0.717
16.483	0.000	2.46	0.04	7.01	5.3	0.713
16.500	0.000	2.43	0.04	6.98	5.1	0.710

MAX WSE in Chamber A

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	2.40	0.04	6.94	5.0	0.706
16.533	0.000	2.37	0.04	6.91	4.9	0.702
16.550	0.000	2.34	0.04	6.87	4.8	0.699
16.567	0.000	2.30	0.04	6.84	4.7	0.696
16.583	0.000	2.25	0.04	6.81	4.6	0.692
16.600	0.000	2.21	0.04	6.77	4.5	0.689
16.617	0.000	2.17	0.04	6.74	4.4	0.686
16.633	0.000	2.12	0.04	6.71	4.3	0.683
16.650	0.000	2.08	0.04	6.68	4.3	0.680
16.667	0.000	2.03	0.04	6.65	4.2	0.677
16.683	0.000	1.99	0.04	6.62	4.1	0.674
16.700	0.000	1.96	0.04	6.60	4.0	0.671
16.717	0.000	1.94	0.04	6.57	3.9	0.668
16.733	0.000	1.91	0.04	6.54	3.9	0.665
16.750	0.000	1.88	0.04	6.52	3.8	0.663
16.767	0.000	1.86	0.04	6.49	3.7	0.660
16.783	0.000	1.83	0.04	6.46	3.6	0.658
16.800	0.000	1.80	0.04	6.44	3.6	0.655
16.817	0.000	1.78	0.04	6.42	3.5	0.653
16.833	0.000	1.76	0.04	6.39	3.4	0.650
16.850	0.000	1.74	0.04	6.37	3.4	0.648
16.867	0.000	1.72	0.04	6.35	3.3	0.646
16.883	0.000	1.70	0.04	6.33	3.2	0.644
16.900	0.000	1.68	0.04	6.31	3.2	0.641
16.917	0.000	1.66	0.04	6.29	3.1	0.639
16.933	0.000	1.64	0.04	6.27	3.1	0.637
16.950	0.000	1.62	0.04	6.25	3.0	0.635
16.967	0.000	1.60	0.04	6.23	3.0	0.633
16.983	0.000	1.59	0.04	6.21	2.9	0.632
17.000	0.000	1.57	0.04	6.19	2.9	0.630
17.017	0.000	1.56	0.04	6.17	2.8	0.628
17.033	0.000	1.54	0.04	6.16	2.8	0.626
17.050	0.000	1.53	0.04	6.14	2.7	0.625
17.067	0.000	1.51	0.04	6.12	2.7	0.623
17.083	0.000	1.50	0.04	6.11	2.6	0.621
17.100	0.000	1.48	0.04	6.09	2.6	0.620
17.117	0.000	1.47	0.04	6.08	2.5	0.618
17.133	0.000	1.46	0.04	6.06	2.5	0.617
17.150	0.000	1.44	0.04	6.05	2.4	0.615
17.167	0.000	1.43	0.04	6.04	2.4	0.614
17.183	0.000	1.42	0.04	6.02	2.4	0.613
17.200	0.000	1.40	0.04	6.01	2.3	0.611
17.217	0.000	1.39	0.04	6.00	2.3	0.610
17.233	0.000	1.38	0.04	5.98	2.3	0.609
17.250	0.000	1.37	0.04	5.97	2.2	0.607
17.267	0.000	1.36	0.04	5.96	2.2	0.606
17.283	0.000	1.35	0.04	5.95	2.2	0.605
17.300	0.000	1.34	0.04	5.94	2.1	0.604
17.317	0.000	1.33	0.04	5.93	2.1	0.603
17.333	0.000	1.32	0.04	5.92	2.1	0.602

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	1.31	0.04	5.90	2.0	0.601
17.367	0.000	1.30	0.04	5.89	2.0	0.600
17.383	0.000	1.29	0.04	5.88	2.0	0.599
17.400	0.000	1.28	0.04	5.88	2.0	0.598
17.417	0.000	1.27	0.04	5.87	1.9	0.597
17.433	0.000	1.26	0.04	5.86	1.9	0.596
17.450	0.000	1.25	0.04	5.85	1.9	0.595
17.467	0.000	1.25	0.04	5.84	1.8	0.594
17.483	0.000	1.24	0.04	5.83	1.8	0.593
17.500	0.000	1.23	0.04	5.82	1.8	0.592
17.517	0.000	1.22	0.04	5.81	1.8	0.591
17.533	0.000	1.21	0.04	5.81	1.8	0.591
17.550	0.000	1.21	0.04	5.80	1.7	0.590
17.567	0.000	1.20	0.04	5.79	1.7	0.589
17.583	0.000	1.19	0.04	5.78	1.7	0.588
17.600	0.000	1.18	0.04	5.78	1.7	0.588
17.617	0.000	1.18	0.04	5.77	1.7	0.587
17.633	0.000	1.17	0.04	5.76	1.6	0.586
17.650	0.000	1.16	0.04	5.76	1.6	0.586
17.667	0.000	1.16	0.04	5.75	1.6	0.585
17.683	0.000	1.15	0.04	5.74	1.6	0.584
17.700	0.000	1.14	0.04	5.74	1.6	0.584
17.717	0.000	1.14	0.04	5.73	1.5	0.583
17.733	0.000	1.13	0.04	5.73	1.5	0.582
17.750	0.000	1.13	0.04	5.72	1.5	0.582
17.767	0.000	1.12	0.04	5.71	1.5	0.581
17.783	0.000	1.11	0.04	5.71	1.5	0.581
17.800	0.000	1.11	0.04	5.70	1.5	0.580
17.817	0.000	1.10	0.04	5.70	1.4	0.580
17.833	0.000	1.10	0.04	5.69	1.4	0.579
17.850	0.000	1.09	0.04	5.69	1.4	0.579
17.867	0.000	1.08	0.04	5.68	1.4	0.578
17.883	0.000	1.08	0.04	5.68	1.4	0.578
17.900	0.000	1.07	0.04	5.67	1.4	0.577
17.917	0.000	1.07	0.04	5.67	1.4	0.577
17.933	0.000	1.06	0.04	5.67	1.4	0.576
17.950	0.000	1.06	0.04	5.66	1.3	0.576
17.967	0.000	1.05	0.04	5.66	1.3	0.575
17.983	0.000	1.05	0.04	5.65	1.3	0.575
18.000	0.000	1.04	0.04	5.65	1.3	0.575
18.017	0.000	1.04	0.04	5.64	1.3	0.574
18.033	0.000	1.02	0.04	5.64	1.3	0.574
18.050	0.000	1.00	0.04	5.64	1.3	0.573
18.067	0.000	0.97	0.04	5.63	1.3	0.573
18.083	0.000	0.94	0.04	5.63	1.2	0.572
18.100	0.000	0.91	0.04	5.62	1.2	0.572
18.117	0.000	0.88	0.04	5.62	1.2	0.571
18.133	0.000	0.85	0.04	5.61	1.2	0.571
18.150	0.000	0.82	0.04	5.61	1.2	0.570
18.167	0.000	0.79	0.04	5.60	1.2	0.570

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
18.183	0.000	0.79	0.04	5.59	1.2	0.569
18.200	0.000	0.78	0.04	5.59	1.1	0.569
18.217	0.000	0.78	0.04	5.58	1.1	0.568
18.233	0.000	0.78	0.04	5.58	1.1	0.568
18.250	0.000	0.77	0.04	5.57	1.1	0.567
18.267	0.000	0.77	0.04	5.57	1.1	0.567
18.283	0.000	0.76	0.04	5.56	1.1	0.566
18.300	0.000	0.76	0.04	5.56	1.1	0.566
18.317	0.000	0.76	0.04	5.56	1.0	0.565
18.333	0.000	0.75	0.04	5.55	1.0	0.565
18.350	0.000	0.75	0.04	5.55	1.0	0.564
18.367	0.000	0.75	0.04	5.54	1.0	0.564
18.383	0.000	0.74	0.04	5.54	1.0	0.564
18.400	0.000	0.74	0.04	5.54	1.0	0.563
18.417	0.000	0.74	0.04	5.53	1.0	0.563
18.433	0.000	0.73	0.04	5.53	1.0	0.562
18.450	0.000	0.73	0.04	5.52	1.0	0.562
18.467	0.000	0.73	0.04	5.52	0.9	0.562
18.483	0.000	0.72	0.04	5.52	0.9	0.561
18.500	0.000	0.72	0.04	5.51	0.9	0.561
18.517	0.000	0.72	0.04	5.51	0.9	0.561
18.533	0.000	0.71	0.04	5.51	0.9	0.560
18.550	0.000	0.71	0.04	5.50	0.9	0.560
18.567	0.000	0.71	0.04	5.50	0.9	0.560
18.583	0.000	0.70	0.04	5.50	0.9	0.559
18.600	0.000	0.70	0.04	5.50	0.9	0.559
18.617	0.000	0.70	0.04	5.49	0.9	0.559
18.633	0.000	0.70	0.04	5.49	0.9	0.559
18.650	0.000	0.69	0.04	5.49	0.8	0.558
18.667	0.000	0.69	0.04	5.49	0.8	0.558
18.683	0.000	0.69	0.04	5.48	0.8	0.558
18.700	0.000	0.68	0.04	5.48	0.8	0.558
18.717	0.000	0.68	0.04	5.48	0.8	0.557
18.733	0.000	0.68	0.04	5.48	0.8	0.557
18.750	0.000	0.68	0.04	5.47	0.8	0.557
18.767	0.000	0.67	0.04	5.47	0.8	0.557
18.783	0.000	0.67	0.04	5.47	0.8	0.556
18.800	0.000	0.67	0.04	5.47	0.8	0.556
18.817	0.000	0.67	0.04	5.46	0.8	0.556
18.833	0.000	0.66	0.04	5.46	0.8	0.556
18.850	0.000	0.66	0.04	5.46	0.8	0.555
18.867	0.000	0.66	0.04	5.46	0.8	0.555
18.883	0.000	0.66	0.04	5.46	0.8	0.555
18.900	0.000	0.65	0.04	5.45	0.8	0.555
18.917	0.000	0.65	0.04	5.45	0.7	0.555
18.933	0.000	0.65	0.04	5.45	0.7	0.555
18.950	0.000	0.65	0.04	5.45	0.7	0.554
18.967	0.000	0.64	0.04	5.45	0.7	0.554
18.983	0.000	0.64	0.04	5.45	0.7	0.554
19.000	0.000	0.64	0.04	5.44	0.7	0.554

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
19.017	0.000	0.64	0.04	5.44	0.7	0.554
19.033	0.000	0.63	0.04	5.44	0.7	0.553
19.050	0.000	0.63	0.04	5.44	0.7	0.553
19.067	0.000	0.63	0.04	5.44	0.7	0.553
19.083	0.000	0.63	0.04	5.44	0.7	0.553
19.100	0.000	0.63	0.04	5.43	0.7	0.553
19.117	0.000	0.62	0.04	5.43	0.7	0.553
19.133	0.000	0.62	0.04	5.43	0.7	0.553
19.150	0.000	0.62	0.04	5.43	0.7	0.552
19.167	0.000	0.62	0.04	5.43	0.7	0.552
19.183	0.000	0.61	0.04	5.43	0.7	0.552
19.200	0.000	0.61	0.04	5.43	0.7	0.552
19.217	0.000	0.61	0.04	5.42	0.7	0.552
19.233	0.000	0.61	0.04	5.42	0.7	0.552
19.250	0.000	0.61	0.04	5.42	0.7	0.552
19.267	0.000	0.60	0.04	5.42	0.7	0.551
19.283	0.000	0.60	0.04	5.42	0.7	0.551
19.300	0.000	0.60	0.04	5.42	0.7	0.551
19.317	0.000	0.60	0.04	5.42	0.6	0.551
19.333	0.000	0.60	0.04	5.42	0.6	0.551
19.350	0.000	0.59	0.04	5.41	0.6	0.551
19.367	0.000	0.59	0.04	5.41	0.6	0.551
19.383	0.000	0.59	0.04	5.41	0.6	0.551
19.400	0.000	0.59	0.04	5.41	0.6	0.550
19.417	0.000	0.59	0.04	5.41	0.6	0.550
19.433	0.000	0.59	0.04	5.41	0.6	0.550
19.450	0.000	0.58	0.04	5.41	0.6	0.550
19.467	0.000	0.58	0.04	5.41	0.6	0.550
19.483	0.000	0.58	0.04	5.41	0.6	0.550
19.500	0.000	0.58	0.04	5.41	0.6	0.550
19.517	0.000	0.58	0.04	5.40	0.6	0.550
19.533	0.000	0.57	0.04	5.40	0.6	0.550
19.550	0.000	0.57	0.04	5.40	0.6	0.550
19.567	0.000	0.57	0.04	5.40	0.6	0.549
19.583	0.000	0.57	0.04	5.40	0.6	0.549
19.600	0.000	0.57	0.04	5.40	0.6	0.549
19.617	0.000	0.57	0.04	5.40	0.6	0.549
19.633	0.000	0.56	0.04	5.40	0.6	0.549
19.650	0.000	0.56	0.04	5.40	0.6	0.549
19.667	0.000	0.56	0.04	5.40	0.6	0.549
19.683	0.000	0.56	0.04	5.39	0.6	0.549
19.700	0.000	0.56	0.04	5.39	0.6	0.549
19.717	0.000	0.56	0.04	5.39	0.6	0.549
19.733	0.000	0.55	0.04	5.39	0.6	0.549
19.750	0.000	0.55	0.04	5.39	0.6	0.548
19.767	0.000	0.55	0.04	5.39	0.6	0.548
19.783	0.000	0.55	0.04	5.39	0.6	0.548
19.800	0.000	0.55	0.04	5.39	0.6	0.548
19.817	0.000	0.55	0.04	5.39	0.6	0.548
19.833	0.000	0.54	0.04	5.39	0.6	0.548

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
19.850	0.000	0.54	0.04	5.39	0.6	0.548
19.867	0.000	0.54	0.04	5.39	0.6	0.548
19.883	0.000	0.54	0.04	5.39	0.6	0.548
19.900	0.000	0.54	0.04	5.38	0.6	0.548
19.917	0.000	0.54	0.04	5.38	0.6	0.548
19.933	0.000	0.54	0.04	5.38	0.5	0.548
19.950	0.000	0.53	0.04	5.38	0.5	0.548
19.967	0.000	0.53	0.04	5.38	0.5	0.547
19.983	0.000	0.53	0.04	5.38	0.5	0.547
20.000	0.000	0.53	0.04	5.38	0.5	0.547
20.017	0.000	0.53	0.04	5.38	0.5	0.547
20.033	0.000	0.53	0.04	5.38	0.5	0.547
20.050	0.000	0.53	0.04	5.38	0.5	0.547
20.067	0.000	0.52	0.04	5.38	0.5	0.547
20.083	0.000	0.52	0.04	5.38	0.5	0.547
20.100	0.000	0.52	0.04	5.38	0.5	0.547
20.117	0.000	0.52	0.04	5.38	0.5	0.547
20.133	0.000	0.52	0.04	5.37	0.5	0.547
20.150	0.000	0.52	0.04	5.37	0.5	0.547
20.167	0.000	0.52	0.04	5.37	0.5	0.547
20.183	0.000	0.51	0.04	5.37	0.5	0.547
20.200	0.000	0.51	0.04	5.37	0.5	0.547
20.217	0.000	0.51	0.04	5.37	0.5	0.546
20.233	0.000	0.51	0.04	5.37	0.5	0.546
20.250	0.000	0.51	0.04	5.37	0.5	0.546
20.267	0.000	0.51	0.04	5.37	0.5	0.546
20.283	0.000	0.51	0.04	5.37	0.5	0.546
20.300	0.000	0.51	0.04	5.37	0.5	0.546
20.317	0.000	0.50	0.04	5.37	0.5	0.546
20.333	0.000	0.50	0.04	5.37	0.5	0.546
20.350	0.000	0.50	0.04	5.37	0.5	0.546
20.367	0.000	0.50	0.04	5.37	0.5	0.546
20.383	0.000	0.50	0.04	5.37	0.5	0.546
20.400	0.000	0.50	0.04	5.37	0.5	0.546
20.417	0.000	0.50	0.04	5.36	0.5	0.546
20.433	0.000	0.50	0.04	5.36	0.5	0.546
20.450	0.000	0.49	0.04	5.36	0.5	0.546
20.467	0.000	0.49	0.04	5.36	0.5	0.546
20.483	0.000	0.49	0.04	5.36	0.5	0.546
20.500	0.000	0.49	0.04	5.36	0.5	0.545
20.517	0.000	0.49	0.04	5.36	0.5	0.545
20.533	0.000	0.49	0.04	5.36	0.5	0.545
20.550	0.000	0.49	0.04	5.36	0.5	0.545
20.567	0.000	0.49	0.04	5.36	0.5	0.545
20.583	0.000	0.49	0.04	5.36	0.5	0.545
20.600	0.000	0.48	0.04	5.36	0.5	0.545
20.617	0.000	0.48	0.04	5.36	0.5	0.545
20.633	0.000	0.48	0.04	5.36	0.5	0.545
20.650	0.000	0.48	0.04	5.36	0.5	0.545
20.667	0.000	0.48	0.04	5.36	0.5	0.545

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
20.683	0.000	0.48	0.04	5.36	0.5	0.545
20.700	0.000	0.48	0.04	5.36	0.5	0.545
20.717	0.000	0.48	0.04	5.36	0.5	0.545
20.733	0.000	0.48	0.04	5.35	0.5	0.545
20.750	0.000	0.47	0.04	5.35	0.5	0.545
20.767	0.000	0.47	0.04	5.35	0.5	0.545
20.783	0.000	0.47	0.04	5.35	0.5	0.545
20.800	0.000	0.47	0.04	5.35	0.5	0.545
20.817	0.000	0.47	0.04	5.35	0.5	0.545
20.833	0.000	0.47	0.04	5.35	0.5	0.544
20.850	0.000	0.47	0.04	5.35	0.5	0.544
20.867	0.000	0.47	0.04	5.35	0.5	0.544
20.883	0.000	0.47	0.04	5.35	0.5	0.544
20.900	0.000	0.46	0.04	5.35	0.5	0.544
20.917	0.000	0.46	0.04	5.35	0.5	0.544
20.933	0.000	0.46	0.04	5.35	0.5	0.544
20.950	0.000	0.46	0.04	5.35	0.5	0.544
20.967	0.000	0.46	0.04	5.35	0.5	0.544
20.983	0.000	0.46	0.04	5.35	0.5	0.544
21.000	0.000	0.46	0.04	5.35	0.5	0.544
21.017	0.000	0.46	0.04	5.35	0.4	0.544
21.033	0.000	0.46	0.04	5.35	0.4	0.544
21.050	0.000	0.46	0.04	5.35	0.4	0.544
21.067	0.000	0.46	0.04	5.35	0.4	0.544
21.083	0.000	0.45	0.04	5.35	0.4	0.544
21.100	0.000	0.45	0.04	5.35	0.4	0.544
21.117	0.000	0.45	0.04	5.34	0.4	0.544
21.133	0.000	0.45	0.04	5.34	0.4	0.544
21.150	0.000	0.45	0.04	5.34	0.4	0.544
21.167	0.000	0.45	0.04	5.34	0.4	0.544
21.183	0.000	0.45	0.04	5.34	0.4	0.544
21.200	0.000	0.45	0.04	5.34	0.4	0.544
21.217	0.000	0.45	0.04	5.34	0.4	0.543
21.233	0.000	0.45	0.04	5.34	0.4	0.543
21.250	0.000	0.44	0.04	5.34	0.4	0.543
21.267	0.000	0.44	0.04	5.34	0.4	0.543
21.283	0.000	0.44	0.04	5.34	0.4	0.543
21.300	0.000	0.44	0.04	5.34	0.4	0.543
21.317	0.000	0.44	0.04	5.34	0.4	0.543
21.333	0.000	0.44	0.04	5.34	0.4	0.543
21.350	0.000	0.44	0.04	5.34	0.4	0.543
21.367	0.000	0.44	0.04	5.34	0.4	0.543
21.383	0.000	0.44	0.04	5.34	0.4	0.543
21.400	0.000	0.44	0.04	5.34	0.4	0.543
21.417	0.000	0.44	0.04	5.34	0.4	0.543
21.433	0.000	0.44	0.04	5.34	0.4	0.543
21.450	0.000	0.43	0.04	5.34	0.4	0.543
21.467	0.000	0.43	0.04	5.34	0.4	0.543
21.483	0.000	0.43	0.04	5.34	0.4	0.543
21.500	0.000	0.43	0.04	5.34	0.4	0.543

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
21.517	0.000	0.43	0.04	5.34	0.4	0.543
21.533	0.000	0.43	0.04	5.34	0.4	0.543
21.550	0.000	0.43	0.04	5.34	0.4	0.543
21.567	0.000	0.43	0.04	5.33	0.4	0.543
21.583	0.000	0.43	0.04	5.33	0.4	0.543
21.600	0.000	0.43	0.04	5.33	0.4	0.543
21.617	0.000	0.43	0.04	5.33	0.4	0.543
21.633	0.000	0.43	0.04	5.33	0.4	0.543
21.650	0.000	0.42	0.04	5.33	0.4	0.543
21.667	0.000	0.42	0.04	5.33	0.4	0.542
21.683	0.000	0.42	0.04	5.33	0.4	0.542
21.700	0.000	0.42	0.04	5.33	0.4	0.542
21.717	0.000	0.42	0.04	5.33	0.4	0.542
21.733	0.000	0.42	0.04	5.33	0.4	0.542
21.750	0.000	0.42	0.04	5.33	0.4	0.542
21.767	0.000	0.42	0.04	5.33	0.4	0.542
21.783	0.000	0.42	0.04	5.33	0.4	0.542
21.800	0.000	0.42	0.04	5.33	0.4	0.542
21.817	0.000	0.42	0.04	5.33	0.4	0.542
21.833	0.000	0.42	0.04	5.33	0.4	0.542
21.850	0.000	0.41	0.04	5.33	0.4	0.542
21.867	0.000	0.41	0.04	5.33	0.4	0.542
21.883	0.000	0.41	0.04	5.33	0.4	0.542
21.900	0.000	0.41	0.04	5.33	0.4	0.542
21.917	0.000	0.41	0.04	5.33	0.4	0.542
21.933	0.000	0.41	0.04	5.33	0.4	0.542
21.950	0.000	0.41	0.04	5.33	0.4	0.542
21.967	0.000	0.41	0.04	5.33	0.4	0.542
21.983	0.000	0.41	0.04	5.33	0.4	0.542
22.000	0.000	0.41	0.04	5.33	0.4	0.542
22.017	0.000	0.41	0.04	5.33	0.4	0.542
22.033	0.000	0.41	0.04	5.33	0.4	0.542
22.050	0.000	0.41	0.04	5.33	0.4	0.542
22.067	0.000	0.41	0.04	5.33	0.4	0.542
22.083	0.000	0.40	0.04	5.33	0.4	0.542
22.100	0.000	0.40	0.04	5.32	0.4	0.542
22.117	0.000	0.40	0.04	5.32	0.4	0.542
22.133	0.000	0.40	0.04	5.32	0.4	0.542
22.150	0.000	0.40	0.04	5.32	0.4	0.542
22.167	0.000	0.40	0.04	5.32	0.4	0.542
22.183	0.000	0.40	0.04	5.32	0.4	0.542
22.200	0.000	0.40	0.04	5.32	0.4	0.542
22.216	0.000	0.40	0.04	5.32	0.4	0.541
22.233	0.000	0.40	0.04	5.32	0.4	0.541
22.250	0.000	0.40	0.04	5.32	0.4	0.541
22.266	0.000	0.40	0.04	5.32	0.4	0.541
22.283	0.000	0.40	0.04	5.32	0.4	0.541
22.300	0.000	0.40	0.04	5.32	0.4	0.541
22.316	0.000	0.40	0.04	5.32	0.4	0.541
22.333	0.000	0.39	0.04	5.32	0.4	0.541

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
22.350	0.000	0.39	0.04	5.32	0.4	0.541
22.366	0.000	0.39	0.04	5.32	0.4	0.541
22.383	0.000	0.39	0.04	5.32	0.4	0.541
22.400	0.000	0.39	0.04	5.32	0.4	0.541
22.416	0.000	0.39	0.04	5.32	0.4	0.541
22.433	0.000	0.39	0.04	5.32	0.4	0.541
22.450	0.000	0.39	0.04	5.32	0.4	0.541
22.466	0.000	0.39	0.04	5.32	0.4	0.541
22.483	0.000	0.39	0.04	5.32	0.4	0.541
22.500	0.000	0.39	0.04	5.32	0.4	0.541
22.516	0.000	0.39	0.04	5.32	0.4	0.541
22.533	0.000	0.39	0.04	5.32	0.4	0.541
22.550	0.000	0.39	0.04	5.32	0.4	0.541
22.566	0.000	0.39	0.04	5.32	0.4	0.541
22.583	0.000	0.38	0.04	5.32	0.4	0.541
22.600	0.000	0.38	0.04	5.32	0.4	0.541
22.616	0.000	0.38	0.04	5.32	0.4	0.541
22.633	0.000	0.38	0.04	5.32	0.4	0.541
22.650	0.000	0.38	0.04	5.32	0.4	0.541
22.666	0.000	0.38	0.04	5.32	0.4	0.541
22.683	0.000	0.38	0.04	5.32	0.4	0.541
22.700	0.000	0.38	0.04	5.32	0.4	0.541
22.716	0.000	0.38	0.04	5.31	0.4	0.541
22.733	0.000	0.38	0.04	5.31	0.4	0.541
22.750	0.000	0.38	0.04	5.31	0.4	0.541
22.766	0.000	0.38	0.04	5.31	0.4	0.541
22.783	0.000	0.38	0.04	5.31	0.4	0.541
22.800	0.000	0.38	0.04	5.31	0.4	0.541
22.816	0.000	0.38	0.04	5.31	0.4	0.541
22.833	0.000	0.38	0.04	5.31	0.4	0.541
22.850	0.000	0.38	0.04	5.31	0.4	0.540
22.866	0.000	0.37	0.04	5.31	0.4	0.540
22.883	0.000	0.37	0.04	5.31	0.4	0.540
22.900	0.000	0.37	0.04	5.31	0.4	0.540
22.916	0.000	0.37	0.04	5.31	0.3	0.540
22.933	0.000	0.37	0.04	5.31	0.3	0.540
22.950	0.000	0.37	0.04	5.31	0.3	0.540
22.966	0.000	0.37	0.04	5.31	0.3	0.540
22.983	0.000	0.37	0.04	5.31	0.3	0.540
23.000	0.000	0.37	0.04	5.31	0.3	0.540
23.016	0.000	0.37	0.04	5.31	0.3	0.540
23.033	0.000	0.37	0.04	5.31	0.3	0.540
23.050	0.000	0.37	0.04	5.31	0.3	0.540
23.066	0.000	0.37	0.04	5.31	0.3	0.540
23.083	0.000	0.37	0.04	5.31	0.3	0.540
23.100	0.000	0.37	0.04	5.31	0.3	0.540
23.116	0.000	0.37	0.04	5.31	0.3	0.540
23.133	0.000	0.37	0.04	5.31	0.3	0.540
23.150	0.000	0.36	0.04	5.31	0.3	0.540
23.166	0.000	0.36	0.04	5.31	0.3	0.540

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
23.183	0.000	0.36	0.04	5.31	0.3	0.540
23.200	0.000	0.36	0.04	5.31	0.3	0.540
23.216	0.000	0.36	0.04	5.31	0.3	0.540
23.233	0.000	0.36	0.04	5.31	0.3	0.540
23.250	0.000	0.36	0.04	5.31	0.3	0.540
23.266	0.000	0.36	0.04	5.31	0.3	0.540
23.283	0.000	0.36	0.04	5.31	0.3	0.540
23.300	0.000	0.36	0.04	5.31	0.3	0.540
23.316	0.000	0.36	0.04	5.31	0.3	0.540
23.333	0.000	0.36	0.04	5.31	0.3	0.540
23.350	0.000	0.36	0.04	5.31	0.3	0.540
23.366	0.000	0.36	0.04	5.31	0.3	0.540
23.383	0.000	0.36	0.04	5.31	0.3	0.540
23.400	0.000	0.36	0.04	5.31	0.3	0.540
23.416	0.000	0.36	0.04	5.31	0.3	0.540
23.433	0.000	0.36	0.04	5.31	0.3	0.540
23.450	0.000	0.36	0.04	5.31	0.3	0.540
23.466	0.000	0.35	0.04	5.31	0.3	0.540
23.483	0.000	0.35	0.04	5.30	0.3	0.540
23.500	0.000	0.35	0.04	5.30	0.3	0.540
23.516	0.000	0.35	0.04	5.30	0.3	0.540
23.533	0.000	0.35	0.04	5.30	0.3	0.540
23.550	0.000	0.35	0.04	5.30	0.3	0.540
23.566	0.000	0.35	0.04	5.30	0.3	0.540
23.583	0.000	0.35	0.04	5.30	0.3	0.540
23.600	0.000	0.35	0.04	5.30	0.3	0.540
23.616	0.000	0.35	0.04	5.30	0.3	0.540
23.633	0.000	0.35	0.04	5.30	0.3	0.539
23.650	0.000	0.35	0.04	5.30	0.3	0.539
23.666	0.000	0.35	0.04	5.30	0.3	0.539
23.683	0.000	0.35	0.04	5.30	0.3	0.539
23.700	0.000	0.35	0.04	5.30	0.3	0.539
23.716	0.000	0.35	0.04	5.30	0.3	0.539
23.733	0.000	0.35	0.04	5.30	0.3	0.539
23.750	0.000	0.35	0.04	5.30	0.3	0.539
23.766	0.000	0.35	0.04	5.30	0.3	0.539
23.783	0.000	0.35	0.04	5.30	0.3	0.539
23.800	0.000	0.35	0.04	5.30	0.3	0.539
23.816	0.000	0.34	0.04	5.30	0.3	0.539
23.833	0.000	0.34	0.04	5.30	0.3	0.539
23.850	0.000	0.34	0.04	5.30	0.3	0.539
23.866	0.000	0.34	0.04	5.30	0.3	0.539
23.883	0.000	0.34	0.04	5.30	0.3	0.539
23.900	0.000	0.34	0.04	5.30	0.3	0.539
23.916	0.000	0.34	0.04	5.30	0.3	0.539
23.933	0.000	0.34	0.04	5.30	0.3	0.539
23.950	0.000	0.34	0.04	5.30	0.3	0.539
23.966	0.000	0.34	0.04	5.30	0.3	0.539
23.983	0.000	0.34	0.04	5.30	0.3	0.539
24.000	0.000	0.34	0.04	5.30	0.3	0.539

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
24.016	0.000	0.34	0.04	5.30	0.3	0.539
24.033	0.000	0.34	0.04	5.30	0.3	0.539
24.050	0.000	0.34	0.04	5.30	0.3	0.539
24.066	0.000	0.34	0.04	5.30	0.3	0.539
24.083	0.000	0.34	0.04	5.30	0.3	0.539
24.100	0.000	0.31	0.04	5.30	0.3	0.539
24.116	0.000	0.27	0.04	5.30	0.3	0.539
24.133	0.000	0.22	0.04	5.29	0.3	0.539
24.150	0.000	0.18	0.04	5.29	0.3	0.538
24.166	0.000	0.14	0.04	5.29	0.3	0.538
24.183	0.000	0.10	0.04	5.29	0.3	0.538
24.200	0.000	0.06	0.04	5.28	0.3	0.538
24.216	0.000	0.00	0.04	5.28	0.3	0.537
24.233	0.000	0.00	0.04	5.28	0.3	0.537
24.250	0.000	0.00	0.04	5.27	0.2	0.536
24.266	0.000	0.00	0.04	5.27	0.2	0.536
24.283	0.000	0.00	0.04	5.26	0.2	0.536
24.300	0.000	0.00	0.04	5.26	0.2	0.535
24.316	0.000	0.00	0.04	5.26	0.2	0.535
24.333	0.000	0.00	0.04	5.25	0.2	0.535
24.350	0.000	0.00	0.04	5.25	0.2	0.534
24.366	0.000	0.00	0.04	5.25	0.2	0.534
24.383	0.000	0.00	0.04	5.25	0.2	0.534
24.400	0.000	0.00	0.04	5.24	0.2	0.533
24.416	0.000	0.00	0.04	5.24	0.2	0.533
24.433	0.000	0.00	0.04	5.24	0.1	0.533
24.450	0.000	0.00	0.04	5.24	0.1	0.533
24.466	0.000	0.00	0.04	5.23	0.1	0.532
24.483	0.000	0.00	0.04	5.23	0.1	0.532
24.500	0.000	0.00	0.04	5.23	0.1	0.532
24.516	0.000	0.00	0.04	5.23	0.1	0.532
24.533	0.000	0.00	0.04	5.23	0.1	0.532
24.550	0.000	0.00	0.04	5.22	0.1	0.531
24.566	0.000	0.00	0.04	5.22	0.1	0.531
24.583	0.000	0.00	0.04	5.22	0.1	0.531
24.600	0.000	0.00	0.04	5.22	0.1	0.531
24.616	0.000	0.00	0.04	5.22	0.1	0.531
24.633	0.000	0.00	0.04	5.21	0.1	0.530
24.650	0.000	0.00	0.04	5.21	0.1	0.530
24.666	0.000	0.00	0.04	5.21	0.1	0.530
24.683	0.000	0.00	0.04	5.21	0.1	0.530
24.700	0.000	0.00	0.04	5.21	0.1	0.530
24.716	0.000	0.00	0.04	5.21	0.1	0.530
24.733	0.000	0.00	0.04	5.21	0.1	0.530
24.750	0.000	0.00	0.04	5.21	0.0	0.530
24.766	0.000	0.00	0.04	5.20	0.0	0.529
24.783	0.000	0.00	0.04	5.20	0.0	0.529
24.800	0.000	0.00	0.04	5.20	0.0	0.529
24.816	0.000	0.00	0.04	5.20	0.0	0.529
24.833	0.000	0.00	0.04	5.20	0.0	0.529

Detained Volume has been fully released.

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
24.850	0.000	0.00	0.04	5.20	0.0	0.529
24.866	0.000	0.00	0.04	5.20	0.0	0.529
24.883	0.000	0.00	0.04	5.20	0.0	0.529
24.900	0.000	0.00	0.04	5.20	0.0	0.529
24.916	0.000	0.00	0.04	5.19	0.0	0.528
24.933	0.000	0.00	0.04	5.19	0.0	0.528
24.950	0.000	0.00	0.04	5.19	0.0	0.528
24.966	0.000	0.00	0.04	5.19	0.0	0.528
24.983	0.000	0.00	0.04	5.19	0.0	0.528
25.000	0.000	0.00	0.04	5.19	0.0	0.528
25.016	0.000	0.00	0.04	5.19	0.0	0.528
25.033	0.000	0.00	0.04	5.19	0.0	0.528
25.050	0.000	0.00	0.04	5.19	0.0	0.528
25.066	0.000	0.00	0.04	5.19	0.0	0.528
25.083	0.000	0.00	0.04	5.18	0.0	0.527
25.100	0.000	0.00	0.04	5.18	0.0	0.527
25.116	0.000	0.00	0.04	5.18	0.0	0.527
25.133	0.000	0.00	0.04	5.18	0.0	0.527
25.150	0.000	0.00	0.04	5.18	0.0	0.527
25.166	0.000	0.00	0.04	5.18	0.0	0.527
25.183	0.000	0.00	0.04	5.18	0.0	0.527
25.200	0.000	0.00	0.04	5.18	0.0	0.527
25.216	0.000	0.00	0.04	5.18	0.0	0.527
25.233	0.000	0.00	0.04	5.18	0.0	0.527
25.250	0.000	0.00	0.04	5.18	0.0	0.526
25.266	0.000	0.00	0.04	5.17	0.0	0.526
25.283	0.000	0.00	0.04	5.17	0.0	0.526
25.300	0.000	0.00	0.04	5.17	0.0	0.526
25.316	0.000	0.00	0.04	5.17	0.0	0.526
25.333	0.000	0.00	0.04	5.17	0.0	0.526
25.350	0.000	0.00	0.04	5.17	0.0	0.526
25.366	0.000	0.00	0.04	5.17	0.0	0.526
25.383	0.000	0.00	0.04	5.17	0.0	0.526
25.400	0.000	0.00	0.04	5.17	0.0	0.526
25.416	0.000	0.00	0.04	5.17	0.0	0.525
25.433	0.000	0.00	0.04	5.16	0.0	0.525
25.450	0.000	0.00	0.04	5.16	0.0	0.525
25.466	0.000	0.00	0.04	5.16	0.0	0.525
25.483	0.000	0.00	0.04	5.16	0.0	0.525
25.500	0.000	0.00	0.04	5.16	0.0	0.525
25.516	0.000	0.00	0.04	5.16	0.0	0.525
25.533	0.000	0.00	0.04	5.16	0.0	0.525
25.550	0.000	0.00	0.04	5.16	0.0	0.525
25.566	0.000	0.00	0.04	5.16	0.0	0.525
25.583	0.000	0.00	0.04	5.16	0.0	0.524
25.600	0.000	0.00	0.04	5.15	0.0	0.524
25.616	0.000	0.00	0.04	5.15	0.0	0.524
25.633	0.000	0.00	0.04	5.15	0.0	0.524
25.650	0.000	0.00	0.04	5.15	0.0	0.524
25.666	0.000	0.00	0.04	5.15	0.0	0.524

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
25.683	0.000	0.00	0.04	5.15	0.0	0.524
25.700	0.000	0.00	0.04	5.15	0.0	0.524
25.716	0.000	0.00	0.04	5.15	0.0	0.524
25.733	0.000	0.00	0.04	5.15	0.0	0.524
25.750	0.000	0.00	0.04	5.15	0.0	0.523
25.766	0.000	0.00	0.04	5.14	0.0	0.523
25.783	0.000	0.00	0.04	5.14	0.0	0.523
25.800	0.000	0.00	0.04	5.14	0.0	0.523
25.816	0.000	0.00	0.04	5.14	0.0	0.523
25.833	0.000	0.00	0.04	5.14	0.0	0.523
25.850	0.000	0.00	0.04	5.14	0.0	0.523
25.866	0.000	0.00	0.04	5.14	0.0	0.523
25.883	0.000	0.00	0.04	5.14	0.0	0.523
25.900	0.000	0.00	0.04	5.14	0.0	0.523
25.916	0.000	0.00	0.04	5.14	0.0	0.522
25.933	0.000	0.00	0.04	5.13	0.0	0.522
25.950	0.000	0.00	0.04	5.13	0.0	0.522
25.966	0.000	0.00	0.04	5.13	0.0	0.522
25.983	0.000	0.00	0.04	5.13	0.0	0.522
26.000	0.000	0.00	0.04	5.13	0.0	0.522
26.016	0.000	0.00	0.04	5.13	0.0	0.522
26.033	0.000	0.00	0.04	5.13	0.0	0.522
26.050	0.000	0.00	0.04	5.13	0.0	0.522
26.066	0.000	0.00	0.04	5.13	0.0	0.522
26.083	0.000	0.00	0.04	5.13	0.0	0.521
26.100	0.000	0.00	0.04	5.12	0.0	0.521
26.116	0.000	0.00	0.04	5.12	0.0	0.521
26.133	0.000	0.00	0.04	5.12	0.0	0.521
26.150	0.000	0.00	0.04	5.12	0.0	0.521
26.166	0.000	0.00	0.04	5.12	0.0	0.521
26.183	0.000	0.00	0.04	5.12	0.0	0.521
26.200	0.000	0.00	0.04	5.12	0.0	0.521
26.216	0.000	0.00	0.04	5.12	0.0	0.521
26.233	0.000	0.00	0.04	5.12	0.0	0.521
26.250	0.000	0.00	0.04	5.12	0.0	0.520
26.266	0.000	0.00	0.04	5.12	0.0	0.520
26.283	0.000	0.00	0.04	5.11	0.0	0.520
26.300	0.000	0.00	0.04	5.11	0.0	0.520
26.316	0.000	0.00	0.04	5.11	0.0	0.520
26.333	0.000	0.00	0.04	5.11	0.0	0.520
26.350	0.000	0.00	0.04	5.11	0.0	0.520
26.366	0.000	0.00	0.04	5.11	0.0	0.520
26.383	0.000	0.00	0.04	5.11	0.0	0.520
26.400	0.000	0.00	0.04	5.11	0.0	0.520
26.416	0.000	0.00	0.04	5.11	0.0	0.519
26.433	0.000	0.00	0.04	5.11	0.0	0.519
26.450	0.000	0.00	0.04	5.10	0.0	0.519
26.466	0.000	0.00	0.04	5.10	0.0	0.519
26.483	0.000	0.00	0.04	5.10	0.0	0.519
26.500	0.000	0.00	0.04	5.10	0.0	0.519

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
26.516	0.000	0.00	0.04	5.10	0.0	0.519
26.533	0.000	0.00	0.04	5.10	0.0	0.519
26.550	0.000	0.00	0.04	5.10	0.0	0.519
26.566	0.000	0.00	0.04	5.10	0.0	0.519
26.583	0.000	0.00	0.04	5.10	0.0	0.518
26.600	0.000	0.00	0.04	5.10	0.0	0.518
26.616	0.000	0.00	0.04	5.09	0.0	0.518
26.633	0.000	0.00	0.04	5.09	0.0	0.518
26.650	0.000	0.00	0.04	5.09	0.0	0.518
26.666	0.000	0.00	0.04	5.09	0.0	0.518
26.683	0.000	0.00	0.04	5.09	0.0	0.518
26.700	0.000	0.00	0.04	5.09	0.0	0.518
26.716	0.000	0.00	0.04	5.09	0.0	0.518
26.733	0.000	0.00	0.04	5.09	0.0	0.518
26.750	0.000	0.00	0.04	5.09	0.0	0.517
26.766	0.000	0.00	0.04	5.09	0.0	0.517
26.783	0.000	0.00	0.04	5.08	0.0	0.517
26.800	0.000	0.00	0.04	5.08	0.0	0.517
26.816	0.000	0.00	0.04	5.08	0.0	0.517
26.833	0.000	0.00	0.04	5.08	0.0	0.517
26.850	0.000	0.00	0.04	5.08	0.0	0.517
26.866	0.000	0.00	0.04	5.08	0.0	0.517
26.883	0.000	0.00	0.04	5.08	0.0	0.517
26.900	0.000	0.00	0.04	5.08	0.0	0.517
26.916	0.000	0.00	0.04	5.08	0.0	0.516
26.933	0.000	0.00	0.04	5.08	0.0	0.516
26.950	0.000	0.00	0.04	5.07	0.0	0.516
26.966	0.000	0.00	0.04	5.07	0.0	0.516
26.983	0.000	0.00	0.04	5.07	0.0	0.516
27.000	0.000	0.00	0.04	5.07	0.0	0.516
27.016	0.000	0.00	0.04	5.07	0.0	0.516
27.033	0.000	0.00	0.04	5.07	0.0	0.516
27.050	0.000	0.00	0.04	5.07	0.0	0.516
27.066	0.000	0.00	0.04	5.07	0.0	0.516
27.083	0.000	0.00	0.04	5.07	0.0	0.515
27.100	0.000	0.00	0.04	5.07	0.0	0.515
27.116	0.000	0.00	0.04	5.07	0.0	0.515
27.133	0.000	0.00	0.04	5.06	0.0	0.515
27.150	0.000	0.00	0.04	5.06	0.0	0.515
27.166	0.000	0.00	0.04	5.06	0.0	0.515
27.183	0.000	0.00	0.04	5.06	0.0	0.515
27.200	0.000	0.00	0.04	5.06	0.0	0.515
27.216	0.000	0.00	0.04	5.06	0.0	0.515
27.233	0.000	0.00	0.04	5.06	0.0	0.515
27.250	0.000	0.00	0.04	5.06	0.0	0.514
27.266	0.000	0.00	0.04	5.06	0.0	0.514
27.283	0.000	0.00	0.04	5.06	0.0	0.514
27.300	0.000	0.00	0.04	5.05	0.0	0.514
27.316	0.000	0.00	0.04	5.05	0.0	0.514
27.333	0.000	0.00	0.04	5.05	0.0	0.514

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
27.350	0.000	0.00	0.04	5.05	0.0	0.514
27.366	0.000	0.00	0.04	5.05	0.0	0.514
27.383	0.000	0.00	0.04	5.05	0.0	0.514
27.400	0.000	0.00	0.04	5.05	0.0	0.514
27.416	0.000	0.00	0.04	5.05	0.0	0.513
27.433	0.000	0.00	0.04	5.05	0.0	0.513
27.450	0.000	0.00	0.04	5.05	0.0	0.513
27.466	0.000	0.00	0.04	5.04	0.0	0.513
27.483	0.000	0.00	0.04	5.04	0.0	0.513
27.500	0.000	0.00	0.04	5.04	0.0	0.513
27.516	0.000	0.00	0.04	5.04	0.0	0.513
27.533	0.000	0.00	0.04	5.04	0.0	0.513
27.550	0.000	0.00	0.04	5.04	0.0	0.513
27.566	0.000	0.00	0.04	5.04	0.0	0.513
27.583	0.000	0.00	0.04	5.04	0.0	0.512
27.600	0.000	0.00	0.04	5.04	0.0	0.512
27.616	0.000	0.00	0.04	5.04	0.0	0.512
27.633	0.000	0.00	0.04	5.03	0.0	0.512
27.650	0.000	0.00	0.04	5.03	0.0	0.512
27.666	0.000	0.00	0.04	5.03	0.0	0.512
27.683	0.000	0.00	0.04	5.03	0.0	0.512
27.700	0.000	0.00	0.04	5.03	0.0	0.512
27.716	0.000	0.00	0.04	5.03	0.0	0.512
27.733	0.000	0.00	0.04	5.03	0.0	0.512
27.750	0.000	0.00	0.04	5.03	0.0	0.511
27.766	0.000	0.00	0.04	5.03	0.0	0.511
27.783	0.000	0.00	0.04	5.03	0.0	0.511
27.800	0.000	0.00	0.04	5.02	0.0	0.511
27.816	0.000	0.00	0.04	5.02	0.0	0.511
27.833	0.000	0.00	0.04	5.02	0.0	0.511
27.850	0.000	0.00	0.04	5.02	0.0	0.511
27.866	0.000	0.00	0.04	5.02	0.0	0.511
27.883	0.000	0.00	0.04	5.02	0.0	0.511
27.900	0.000	0.00	0.04	5.02	0.0	0.511
27.916	0.000	0.00	0.04	5.02	0.0	0.510
27.933	0.000	0.00	0.04	5.02	0.0	0.510
27.950	0.000	0.00	0.04	5.02	0.0	0.510
27.966	0.000	0.00	0.04	5.02	0.0	0.510
27.983	0.000	0.00	0.04	5.01	0.0	0.510
28.000	0.000	0.00	0.04	5.01	0.0	0.510
28.016	0.000	0.00	0.04	5.01	0.0	0.510
28.033	0.000	0.00	0.04	5.01	0.0	0.510
28.050	0.000	0.00	0.04	5.01	0.0	0.510
28.066	0.000	0.00	0.04	5.01	0.0	0.510
28.083	0.000	0.00	0.04	5.01	0.0	0.509
28.100	0.000	0.00	0.04	5.01	0.0	0.509
28.116	0.000	0.00	0.04	5.01	0.0	0.509
28.133	0.000	0.00	0.04	5.01	0.0	0.509
28.150	0.000	0.00	0.04	5.00	0.0	0.509
28.166	0.000	0.00	0.04	5.00	0.0	0.509

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
28.183	0.000	0.00	0.04	5.00	0.0	0.509
28.200	0.000	0.00	0.04	5.00	0.0	0.509
28.216	0.000	0.00	0.04	5.00	0.0	0.509
28.233	0.000	0.00	0.04	5.00	0.0	0.509
28.250	0.000	0.00	0.04	5.00	0.0	0.508
28.266	0.000	0.00	0.04	5.00	0.0	0.508
28.283	0.000	0.00	0.04	5.00	0.0	0.508
28.300	0.000	0.00	0.04	5.00	0.0	0.508
28.316	0.000	0.00	0.04	4.99	0.0	0.508
28.333	0.000	0.00	0.04	4.99	0.0	0.508
28.350	0.000	0.00	0.04	4.99	0.0	0.508
28.366	0.000	0.00	0.04	4.99	0.0	0.508
28.383	0.000	0.00	0.04	4.99	0.0	0.508
28.400	0.000	0.00	0.04	4.99	0.0	0.508
28.416	0.000	0.00	0.04	4.99	0.0	0.507
28.433	0.000	0.00	0.04	4.99	0.0	0.507
28.450	0.000	0.00	0.04	4.99	0.0	0.507
28.466	0.000	0.00	0.04	4.99	0.0	0.507
28.483	0.000	0.00	0.04	4.98	0.0	0.507
28.500	0.000	0.00	0.04	4.98	0.0	0.507
28.516	0.000	0.00	0.04	4.98	0.0	0.507
28.533	0.000	0.00	0.04	4.98	0.0	0.507
28.550	0.000	0.00	0.04	4.98	0.0	0.507
28.566	0.000	0.00	0.04	4.98	0.0	0.507
28.583	0.000	0.00	0.04	4.98	0.0	0.506
28.600	0.000	0.00	0.04	4.98	0.0	0.506
28.616	0.000	0.00	0.04	4.98	0.0	0.506
28.633	0.000	0.00	0.04	4.98	0.0	0.506
28.650	0.000	0.00	0.04	4.98	0.0	0.506
28.666	0.000	0.00	0.04	4.97	0.0	0.506
28.683	0.000	0.00	0.04	4.97	0.0	0.506
28.700	0.000	0.00	0.04	4.97	0.0	0.506
28.716	0.000	0.00	0.04	4.97	0.0	0.506
28.733	0.000	0.00	0.04	4.97	0.0	0.506
28.750	0.000	0.00	0.04	4.97	0.0	0.506
28.766	0.000	0.00	0.04	4.97	0.0	0.505
28.783	0.000	0.00	0.04	4.97	0.0	0.505
28.800	0.000	0.00	0.04	4.97	0.0	0.505
28.816	0.000	0.00	0.04	4.97	0.0	0.505
28.833	0.000	0.00	0.04	4.96	0.0	0.505
28.850	0.000	0.00	0.04	4.96	0.0	0.505
28.866	0.000	0.00	0.04	4.96	0.0	0.505
28.883	0.000	0.00	0.04	4.96	0.0	0.505
28.900	0.000	0.00	0.04	4.96	0.0	0.505
28.916	0.000	0.00	0.04	4.96	0.0	0.505
28.933	0.000	0.00	0.04	4.96	0.0	0.504
28.950	0.000	0.00	0.04	4.96	0.0	0.504
28.966	0.000	0.00	0.04	4.96	0.0	0.504
28.983	0.000	0.00	0.04	4.96	0.0	0.504
29.000	0.000	0.00	0.04	4.95	0.0	0.504

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
29.016	0.000	0.00	0.04	4.95	0.0	0.504
29.033	0.000	0.00	0.04	4.95	0.0	0.504
29.050	0.000	0.00	0.04	4.95	0.0	0.504
29.066	0.000	0.00	0.04	4.95	0.0	0.504
29.083	0.000	0.00	0.04	4.95	0.0	0.504
29.100	0.000	0.00	0.04	4.95	0.0	0.503
29.116	0.000	0.00	0.04	4.95	0.0	0.503
29.133	0.000	0.00	0.04	4.95	0.0	0.503
29.150	0.000	0.00	0.04	4.95	0.0	0.503
29.166	0.000	0.00	0.04	4.94	0.0	0.503
29.183	0.000	0.00	0.04	4.94	0.0	0.503
29.200	0.000	0.00	0.04	4.94	0.0	0.503
29.216	0.000	0.00	0.04	4.94	0.0	0.503
29.233	0.000	0.00	0.04	4.94	0.0	0.503
29.250	0.000	0.00	0.04	4.94	0.0	0.503
29.266	0.000	0.00	0.04	4.94	0.0	0.502
29.283	0.000	0.00	0.04	4.94	0.0	0.502
29.300	0.000	0.00	0.04	4.94	0.0	0.502
29.316	0.000	0.00	0.04	4.94	0.0	0.502
29.333	0.000	0.00	0.04	4.94	0.0	0.502
29.350	0.000	0.00	0.04	4.93	0.0	0.502
29.366	0.000	0.00	0.04	4.93	0.0	0.502
29.383	0.000	0.00	0.04	4.93	0.0	0.502
29.400	0.000	0.00	0.04	4.93	0.0	0.502
29.416	0.000	0.00	0.04	4.93	0.0	0.502
29.433	0.000	0.00	0.04	4.93	0.0	0.501
29.450	0.000	0.00	0.04	4.93	0.0	0.501
29.466	0.000	0.00	0.04	4.93	0.0	0.501
29.483	0.000	0.00	0.04	4.93	0.0	0.501
29.500	0.000	0.00	0.04	4.93	0.0	0.501
29.516	0.000	0.00	0.04	4.92	0.0	0.501
29.533	0.000	0.00	0.04	4.92	0.0	0.501
29.550	0.000	0.00	0.04	4.92	0.0	0.501
29.566	0.000	0.00	0.04	4.92	0.0	0.501
29.583	0.000	0.00	0.04	4.92	0.0	0.501
29.600	0.000	0.00	0.04	4.92	0.0	0.500
29.616	0.000	0.00	0.04	4.92	0.0	0.500
29.633	0.000	0.00	0.04	4.92	0.0	0.500
29.650	0.000	0.00	0.04	4.92	0.0	0.500
29.666	0.000	0.00	0.04	4.92	0.0	0.500
29.683	0.000	0.00	0.04	4.91	0.0	0.500
29.700	0.000	0.00	0.04	4.91	0.0	0.500
29.716	0.000	0.00	0.04	4.91	0.0	0.500
29.733	0.000	0.00	0.04	4.91	0.0	0.500
29.750	0.000	0.00	0.04	4.91	0.0	0.500
29.766	0.000	0.00	0.04	4.91	0.0	0.499
29.783	0.000	0.00	0.04	4.91	0.0	0.499
29.800	0.000	0.00	0.04	4.91	0.0	0.499
29.816	0.000	0.00	0.04	4.91	0.0	0.499
29.833	0.000	0.00	0.04	4.91	0.0	0.499

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
29.850	0.000	0.00	0.04	4.90	0.0	0.499
29.866	0.000	0.00	0.04	4.90	0.0	0.499
29.883	0.000	0.00	0.04	4.90	0.0	0.499
29.900	0.000	0.00	0.04	4.90	0.0	0.499
29.916	0.000	0.00	0.04	4.90	0.0	0.499
29.933	0.000	0.00	0.04	4.90	0.0	0.498
29.950	0.000	0.00	0.04	4.90	0.0	0.498
29.966	0.000	0.00	0.04	4.90	0.0	0.498
29.983	0.000	0.00	0.04	4.90	0.0	0.498
30.000	0.000	0.00	0.04	4.90	0.0	0.498
30.016	0.000	0.00	0.04	4.90	0.0	0.498
30.033	0.000	0.00	0.04	4.89	0.0	0.498
30.050	0.000	0.00	0.04	4.89	0.0	0.498
30.066	0.000	0.00	0.04	4.89	0.0	0.498
30.083	0.000	0.00	0.04	4.89	0.0	0.498
30.100	0.000	0.00	0.04	4.89	0.0	0.497
30.116	0.000	0.00	0.04	4.89	0.0	0.497
30.133	0.000	0.00	0.04	4.89	0.0	0.497
30.150	0.000	0.00	0.04	4.89	0.0	0.497
30.166	0.000	0.00	0.04	4.89	0.0	0.497
30.183	0.000	0.00	0.04	4.89	0.0	0.497
30.200	0.000	0.00	0.04	4.88	0.0	0.497
30.216	0.000	0.00	0.04	4.88	0.0	0.497
30.233	0.000	0.00	0.04	4.88	0.0	0.497
30.250	0.000	0.00	0.04	4.88	0.0	0.497
30.266	0.000	0.00	0.04	4.88	0.0	0.496
30.283	0.000	0.00	0.04	4.88	0.0	0.496
30.300	0.000	0.00	0.04	4.88	0.0	0.496
30.316	0.000	0.00	0.04	4.88	0.0	0.496
30.333	0.000	0.00	0.04	4.88	0.0	0.496
30.350	0.000	0.00	0.04	4.88	0.0	0.496
30.366	0.000	0.00	0.04	4.87	0.0	0.496
30.383	0.000	0.00	0.04	4.87	0.0	0.496
30.400	0.000	0.00	0.04	4.87	0.0	0.496
30.416	0.000	0.00	0.04	4.87	0.0	0.496
30.433	0.000	0.00	0.04	4.87	0.0	0.496
30.450	0.000	0.00	0.04	4.87	0.0	0.495
30.466	0.000	0.00	0.04	4.87	0.0	0.495
30.483	0.000	0.00	0.04	4.87	0.0	0.495
30.500	0.000	0.00	0.04	4.87	0.0	0.495
30.516	0.000	0.00	0.04	4.87	0.0	0.495
30.533	0.000	0.00	0.04	4.87	0.0	0.495
30.550	0.000	0.00	0.04	4.86	0.0	0.495
30.566	0.000	0.00	0.04	4.86	0.0	0.495
30.583	0.000	0.00	0.04	4.86	0.0	0.495
30.600	0.000	0.00	0.04	4.86	0.0	0.495
30.616	0.000	0.00	0.04	4.86	0.0	0.494
30.633	0.000	0.00	0.04	4.86	0.0	0.494
30.650	0.000	0.00	0.04	4.86	0.0	0.494
30.666	0.000	0.00	0.04	4.86	0.0	0.494

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
30.683	0.000	0.00	0.04	4.86	0.0	0.494
30.700	0.000	0.00	0.04	4.86	0.0	0.494
30.716	0.000	0.00	0.04	4.85	0.0	0.494
30.733	0.000	0.00	0.04	4.85	0.0	0.494
30.750	0.000	0.00	0.04	4.85	0.0	0.494
30.766	0.000	0.00	0.04	4.85	0.0	0.494
30.783	0.000	0.00	0.04	4.85	0.0	0.493
30.800	0.000	0.00	0.04	4.85	0.0	0.493
30.816	0.000	0.00	0.04	4.85	0.0	0.493
30.833	0.000	0.00	0.04	4.85	0.0	0.493
30.850	0.000	0.00	0.04	4.85	0.0	0.493
30.866	0.000	0.00	0.04	4.85	0.0	0.493
30.883	0.000	0.00	0.04	4.84	0.0	0.493
30.900	0.000	0.00	0.04	4.84	0.0	0.493
30.916	0.000	0.00	0.04	4.84	0.0	0.493
30.933	0.000	0.00	0.04	4.84	0.0	0.493
30.950	0.000	0.00	0.04	4.84	0.0	0.492
30.966	0.000	0.00	0.04	4.84	0.0	0.492
30.983	0.000	0.00	0.04	4.84	0.0	0.492
31.000	0.000	0.00	0.04	4.84	0.0	0.492
31.016	0.000	0.00	0.04	4.84	0.0	0.492
31.033	0.000	0.00	0.04	4.84	0.0	0.492
31.050	0.000	0.00	0.04	4.84	0.0	0.492
31.066	0.000	0.00	0.04	4.83	0.0	0.492
31.083	0.000	0.00	0.04	4.83	0.0	0.492
31.100	0.000	0.00	0.04	4.83	0.0	0.492
31.116	0.000	0.00	0.04	4.83	0.0	0.491
31.133	0.000	0.00	0.04	4.83	0.0	0.491
31.150	0.000	0.00	0.04	4.83	0.0	0.491
31.166	0.000	0.00	0.04	4.83	0.0	0.491
31.183	0.000	0.00	0.04	4.83	0.0	0.491
31.200	0.000	0.00	0.04	4.83	0.0	0.491
31.216	0.000	0.00	0.04	4.83	0.0	0.491
31.233	0.000	0.00	0.04	4.82	0.0	0.491
31.250	0.000	0.00	0.04	4.82	0.0	0.491
31.266	0.000	0.00	0.04	4.82	0.0	0.491
31.283	0.000	0.00	0.04	4.82	0.0	0.490
31.300	0.000	0.00	0.04	4.82	0.0	0.490
31.316	0.000	0.00	0.04	4.82	0.0	0.490
31.333	0.000	0.00	0.04	4.82	0.0	0.490
31.350	0.000	0.00	0.04	4.82	0.0	0.490
31.366	0.000	0.00	0.04	4.82	0.0	0.490
31.383	0.000	0.00	0.04	4.82	0.0	0.490
31.400	0.000	0.00	0.04	4.81	0.0	0.490
31.416	0.000	0.00	0.04	4.81	0.0	0.490
31.433	0.000	0.00	0.04	4.81	0.0	0.490
31.450	0.000	0.00	0.04	4.81	0.0	0.489
31.466	0.000	0.00	0.04	4.81	0.0	0.489
31.483	0.000	0.00	0.04	4.81	0.0	0.489
31.500	0.000	0.00	0.04	4.81	0.0	0.489

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
31.516	0.000	0.00	0.04	4.81	0.0	0.489
31.533	0.000	0.00	0.04	4.81	0.0	0.489
31.550	0.000	0.00	0.04	4.81	0.0	0.489
31.566	0.000	0.00	0.04	4.81	0.0	0.489
31.583	0.000	0.00	0.04	4.80	0.0	0.489
31.600	0.000	0.00	0.04	4.80	0.0	0.489
31.616	0.000	0.00	0.04	4.80	0.0	0.489
31.633	0.000	0.00	0.04	4.80	0.0	0.488
31.650	0.000	0.00	0.04	4.80	0.0	0.488
31.666	0.000	0.00	0.04	4.80	0.0	0.488
31.683	0.000	0.00	0.04	4.80	0.0	0.488
31.700	0.000	0.00	0.04	4.80	0.0	0.488
31.716	0.000	0.00	0.04	4.80	0.0	0.488
31.733	0.000	0.00	0.04	4.80	0.0	0.488
31.750	0.000	0.00	0.04	4.79	0.0	0.488
31.766	0.000	0.00	0.04	4.79	0.0	0.488
31.783	0.000	0.00	0.04	4.79	0.0	0.488
31.800	0.000	0.00	0.04	4.79	0.0	0.487
31.816	0.000	0.00	0.04	4.79	0.0	0.487
31.833	0.000	0.00	0.04	4.79	0.0	0.487
31.850	0.000	0.00	0.04	4.79	0.0	0.487
31.866	0.000	0.00	0.04	4.79	0.0	0.487
31.883	0.000	0.00	0.04	4.79	0.0	0.487
31.900	0.000	0.00	0.04	4.79	0.0	0.487
31.916	0.000	0.00	0.04	4.78	0.0	0.487
31.933	0.000	0.00	0.04	4.78	0.0	0.487
31.950	0.000	0.00	0.04	4.78	0.0	0.487
31.966	0.000	0.00	0.04	4.78	0.0	0.486
31.983	0.000	0.00	0.04	4.78	0.0	0.486
32.000	0.000	0.00	0.04	4.78	0.0	0.486
32.016	0.000	0.00	0.04	4.78	0.0	0.486
32.033	0.000	0.00	0.04	4.78	0.0	0.486
32.050	0.000	0.00	0.04	4.78	0.0	0.486
32.066	0.000	0.00	0.04	4.78	0.0	0.486
32.083	0.000	0.00	0.04	4.78	0.0	0.486
32.100	0.000	0.00	0.04	4.77	0.0	0.486
32.116	0.000	0.00	0.04	4.77	0.0	0.486
32.133	0.000	0.00	0.04	4.77	0.0	0.485
32.150	0.000	0.00	0.04	4.77	0.0	0.485
32.166	0.000	0.00	0.04	4.77	0.0	0.485
32.183	0.000	0.00	0.04	4.77	0.0	0.485
32.200	0.000	0.00	0.04	4.77	0.0	0.485
32.216	0.000	0.00	0.04	4.77	0.0	0.485
32.233	0.000	0.00	0.04	4.77	0.0	0.485
32.250	0.000	0.00	0.04	4.77	0.0	0.485
32.266	0.000	0.00	0.04	4.76	0.0	0.485
32.283	0.000	0.00	0.04	4.76	0.0	0.485
32.300	0.000	0.00	0.04	4.76	0.0	0.484
32.316	0.000	0.00	0.04	4.76	0.0	0.484
32.333	0.000	0.00	0.04	4.76	0.0	0.484

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
32.350	0.000	0.00	0.04	4.76	0.0	0.484
32.366	0.000	0.00	0.04	4.76	0.0	0.484
32.383	0.000	0.00	0.04	4.76	0.0	0.484
32.400	0.000	0.00	0.04	4.76	0.0	0.484
32.416	0.000	0.00	0.04	4.76	0.0	0.484
32.433	0.000	0.00	0.04	4.75	0.0	0.484
32.450	0.000	0.00	0.04	4.75	0.0	0.484
32.466	0.000	0.00	0.04	4.75	0.0	0.483
32.483	0.000	0.00	0.04	4.75	0.0	0.483
32.500	0.000	0.00	0.04	4.75	0.0	0.483
32.516	0.000	0.00	0.04	4.75	0.0	0.483
32.533	0.000	0.00	0.04	4.75	0.0	0.483
32.550	0.000	0.00	0.04	4.75	0.0	0.483
32.566	0.000	0.00	0.04	4.75	0.0	0.483
32.583	0.000	0.00	0.04	4.75	0.0	0.483
32.600	0.000	0.00	0.04	4.75	0.0	0.483
32.616	0.000	0.00	0.04	4.74	0.0	0.483
32.633	0.000	0.00	0.04	4.74	0.0	0.483
32.650	0.000	0.00	0.04	4.74	0.0	0.482
32.666	0.000	0.00	0.04	4.74	0.0	0.482
32.683	0.000	0.00	0.04	4.74	0.0	0.482
32.700	0.000	0.00	0.04	4.74	0.0	0.482
32.716	0.000	0.00	0.04	4.74	0.0	0.482
32.733	0.000	0.00	0.04	4.74	0.0	0.482
32.750	0.000	0.00	0.04	4.74	0.0	0.482
32.766	0.000	0.00	0.04	4.74	0.0	0.482
32.783	0.000	0.00	0.04	4.73	0.0	0.482
32.800	0.000	0.00	0.04	4.73	0.0	0.482
32.816	0.000	0.00	0.04	4.73	0.0	0.481
32.833	0.000	0.00	0.04	4.73	0.0	0.481
32.850	0.000	0.00	0.04	4.73	0.0	0.481
32.866	0.000	0.00	0.04	4.73	0.0	0.481
32.883	0.000	0.00	0.04	4.73	0.0	0.481
32.900	0.000	0.00	0.04	4.73	0.0	0.481
32.916	0.000	0.00	0.04	4.73	0.0	0.481
32.933	0.000	0.00	0.04	4.73	0.0	0.481
32.950	0.000	0.00	0.04	4.73	0.0	0.481
32.966	0.000	0.00	0.04	4.72	0.0	0.481
32.983	0.000	0.00	0.04	4.72	0.0	0.480
33.000	0.000	0.00	0.04	4.72	0.0	0.480
33.016	0.000	0.00	0.04	4.72	0.0	0.480
33.033	0.000	0.00	0.04	4.72	0.0	0.480
33.050	0.000	0.00	0.04	4.72	0.0	0.480
33.066	0.000	0.00	0.04	4.72	0.0	0.480
33.083	0.000	0.00	0.04	4.72	0.0	0.480
33.100	0.000	0.00	0.04	4.72	0.0	0.480
33.116	0.000	0.00	0.04	4.72	0.0	0.480
33.133	0.000	0.00	0.04	4.71	0.0	0.480
33.150	0.000	0.00	0.04	4.71	0.0	0.479
33.166	0.000	0.00	0.04	4.71	0.0	0.479

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
33.183	0.000	0.00	0.04	4.71	0.0	0.479
33.200	0.000	0.00	0.04	4.71	0.0	0.479
33.216	0.000	0.00	0.04	4.71	0.0	0.479
33.233	0.000	0.00	0.04	4.71	0.0	0.479
33.250	0.000	0.00	0.04	4.71	0.0	0.479
33.266	0.000	0.00	0.04	4.71	0.0	0.479
33.283	0.000	0.00	0.04	4.71	0.0	0.479
33.300	0.000	0.00	0.04	4.70	0.0	0.479
33.316	0.000	0.00	0.04	4.70	0.0	0.479
33.333	0.000	0.00	0.04	4.70	0.0	0.478
33.350	0.000	0.00	0.04	4.70	0.0	0.478
33.366	0.000	0.00	0.04	4.70	0.0	0.478
33.383	0.000	0.00	0.04	4.70	0.0	0.478
33.400	0.000	0.00	0.04	4.70	0.0	0.478
33.416	0.000	0.00	0.04	4.70	0.0	0.478
33.433	0.000	0.00	0.04	4.70	0.0	0.478
33.450	0.000	0.00	0.04	4.70	0.0	0.478
33.466	0.000	0.00	0.04	4.70	0.0	0.478
33.483	0.000	0.00	0.04	4.69	0.0	0.478
33.500	0.000	0.00	0.04	4.69	0.0	0.477
33.516	0.000	0.00	0.04	4.69	0.0	0.477
33.533	0.000	0.00	0.04	4.69	0.0	0.477
33.550	0.000	0.00	0.04	4.69	0.0	0.477
33.566	0.000	0.00	0.04	4.69	0.0	0.477
33.583	0.000	0.00	0.04	4.69	0.0	0.477
33.600	0.000	0.00	0.04	4.69	0.0	0.477
33.616	0.000	0.00	0.04	4.69	0.0	0.477
33.633	0.000	0.00	0.04	4.69	0.0	0.477
33.650	0.000	0.00	0.04	4.68	0.0	0.477
33.666	0.000	0.00	0.04	4.68	0.0	0.476
33.683	0.000	0.00	0.04	4.68	0.0	0.476
33.700	0.000	0.00	0.04	4.68	0.0	0.476
33.716	0.000	0.00	0.04	4.68	0.0	0.476
33.733	0.000	0.00	0.04	4.68	0.0	0.476
33.750	0.000	0.00	0.04	4.68	0.0	0.476
33.766	0.000	0.00	0.04	4.68	0.0	0.476
33.783	0.000	0.00	0.04	4.68	0.0	0.476
33.800	0.000	0.00	0.04	4.68	0.0	0.476
33.816	0.000	0.00	0.04	4.68	0.0	0.476
33.833	0.000	0.00	0.04	4.67	0.0	0.475
33.850	0.000	0.00	0.04	4.67	0.0	0.475
33.866	0.000	0.00	0.04	4.67	0.0	0.475
33.883	0.000	0.00	0.04	4.67	0.0	0.475
33.900	0.000	0.00	0.04	4.67	0.0	0.475
33.916	0.000	0.00	0.04	4.67	0.0	0.475
33.933	0.000	0.00	0.04	4.67	0.0	0.475
33.950	0.000	0.00	0.04	4.67	0.0	0.475
33.966	0.000	0.00	0.04	4.67	0.0	0.475
33.983	0.000	0.00	0.04	4.67	0.0	0.475
34.000	0.000	0.00	0.04	4.66	0.0	0.474

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
34.016	0.000	0.00	0.04	4.66	0.0	0.474
34.033	0.000	0.00	0.04	4.66	0.0	0.474
34.050	0.000	0.00	0.04	4.66	0.0	0.474
34.066	0.000	0.00	0.04	4.66	0.0	0.474
34.083	0.000	0.00	0.04	4.66	0.0	0.474
34.100	0.000	0.00	0.04	4.66	0.0	0.474
34.116	0.000	0.00	0.04	4.66	0.0	0.474
34.133	0.000	0.00	0.04	4.66	0.0	0.474
34.150	0.000	0.00	0.04	4.66	0.0	0.474
34.166	0.000	0.00	0.04	4.65	0.0	0.474
34.183	0.000	0.00	0.04	4.65	0.0	0.473
34.200	0.000	0.00	0.04	4.65	0.0	0.473
34.216	0.000	0.00	0.04	4.65	0.0	0.473
34.233	0.000	0.00	0.04	4.65	0.0	0.473
34.250	0.000	0.00	0.04	4.65	0.0	0.473
34.266	0.000	0.00	0.04	4.65	0.0	0.473
34.283	0.000	0.00	0.04	4.65	0.0	0.473
34.300	0.000	0.00	0.04	4.65	0.0	0.473
34.316	0.000	0.00	0.04	4.65	0.0	0.473
34.333	0.000	0.00	0.04	4.65	0.0	0.473
34.350	0.000	0.00	0.04	4.64	0.0	0.472
34.366	0.000	0.00	0.04	4.64	0.0	0.472
34.383	0.000	0.00	0.04	4.64	0.0	0.472
34.400	0.000	0.00	0.04	4.64	0.0	0.472
34.416	0.000	0.00	0.04	4.64	0.0	0.472
34.433	0.000	0.00	0.04	4.64	0.0	0.472
34.450	0.000	0.00	0.04	4.64	0.0	0.472
34.466	0.000	0.00	0.04	4.64	0.0	0.472
34.483	0.000	0.00	0.04	4.64	0.0	0.472
34.500	0.000	0.00	0.04	4.64	0.0	0.472
34.516	0.000	0.00	0.04	4.63	0.0	0.471
34.533	0.000	0.00	0.04	4.63	0.0	0.471
34.550	0.000	0.00	0.04	4.63	0.0	0.471
34.566	0.000	0.00	0.04	4.63	0.0	0.471
34.583	0.000	0.00	0.04	4.63	0.0	0.471
34.600	0.000	0.00	0.04	4.63	0.0	0.471
34.616	0.000	0.00	0.04	4.63	0.0	0.471
34.633	0.000	0.00	0.04	4.63	0.0	0.471
34.650	0.000	0.00	0.04	4.63	0.0	0.471
34.666	0.000	0.00	0.04	4.63	0.0	0.471
34.683	0.000	0.00	0.04	4.63	0.0	0.470
34.700	0.000	0.00	0.04	4.62	0.0	0.470
34.716	0.000	0.00	0.04	4.62	0.0	0.470
34.733	0.000	0.00	0.04	4.62	0.0	0.470
34.750	0.000	0.00	0.04	4.62	0.0	0.470
34.766	0.000	0.00	0.04	4.62	0.0	0.470
34.783	0.000	0.00	0.04	4.62	0.0	0.470
34.800	0.000	0.00	0.04	4.62	0.0	0.470
34.816	0.000	0.00	0.04	4.62	0.0	0.470
34.833	0.000	0.00	0.04	4.62	0.0	0.470

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
34.850	0.000	0.00	0.04	4.62	0.0	0.470
34.866	0.000	0.00	0.04	4.61	0.0	0.469
34.883	0.000	0.00	0.04	4.61	0.0	0.469
34.900	0.000	0.00	0.04	4.61	0.0	0.469
34.916	0.000	0.00	0.04	4.61	0.0	0.469
34.933	0.000	0.00	0.04	4.61	0.0	0.469
34.950	0.000	0.00	0.04	4.61	0.0	0.469
34.966	0.000	0.00	0.04	4.61	0.0	0.469
34.983	0.000	0.00	0.04	4.61	0.0	0.469
35.000	0.000	0.00	0.04	4.61	0.0	0.469
35.016	0.000	0.00	0.04	4.61	0.0	0.469
35.033	0.000	0.00	0.04	4.61	0.0	0.468
35.050	0.000	0.00	0.04	4.60	0.0	0.468
35.066	0.000	0.00	0.04	4.60	0.0	0.468
35.083	0.000	0.00	0.04	4.60	0.0	0.468
35.100	0.000	0.00	0.04	4.60	0.0	0.468
35.116	0.000	0.00	0.04	4.60	0.0	0.468
35.133	0.000	0.00	0.04	4.60	0.0	0.468
35.150	0.000	0.00	0.04	4.60	0.0	0.468
35.166	0.000	0.00	0.04	4.60	0.0	0.468
35.183	0.000	0.00	0.04	4.60	0.0	0.468
35.200	0.000	0.00	0.04	4.60	0.0	0.467
35.216	0.000	0.00	0.04	4.59	0.0	0.467
35.233	0.000	0.00	0.04	4.59	0.0	0.467
35.250	0.000	0.00	0.04	4.59	0.0	0.467
35.266	0.000	0.00	0.04	4.59	0.0	0.467
35.283	0.000	0.00	0.04	4.59	0.0	0.467
35.300	0.000	0.00	0.04	4.59	0.0	0.467
35.316	0.000	0.00	0.04	4.59	0.0	0.467
35.333	0.000	0.00	0.04	4.59	0.0	0.467
35.350	0.000	0.00	0.04	4.59	0.0	0.467
35.366	0.000	0.00	0.04	4.59	0.0	0.467
35.383	0.000	0.00	0.04	4.59	0.0	0.466
35.400	0.000	0.00	0.04	4.58	0.0	0.466
35.416	0.000	0.00	0.04	4.58	0.0	0.466
35.433	0.000	0.00	0.04	4.58	0.0	0.466
35.450	0.000	0.00	0.04	4.58	0.0	0.466
35.466	0.000	0.00	0.04	4.58	0.0	0.466
35.483	0.000	0.00	0.04	4.58	0.0	0.466
35.500	0.000	0.00	0.04	4.58	0.0	0.466
35.516	0.000	0.00	0.04	4.58	0.0	0.466
35.533	0.000	0.00	0.04	4.58	0.0	0.466
35.550	0.000	0.00	0.04	4.58	0.0	0.465
35.566	0.000	0.00	0.04	4.57	0.0	0.465
35.583	0.000	0.00	0.04	4.57	0.0	0.465
35.600	0.000	0.00	0.04	4.57	0.0	0.465
35.616	0.000	0.00	0.04	4.57	0.0	0.465
35.633	0.000	0.00	0.04	4.57	0.0	0.465
35.650	0.000	0.00	0.04	4.57	0.0	0.465
35.666	0.000	0.00	0.04	4.57	0.0	0.465

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
35.683	0.000	0.00	0.04	4.57	0.0	0.465
35.700	0.000	0.00	0.04	4.57	0.0	0.465
35.716	0.000	0.00	0.04	4.57	0.0	0.464
35.733	0.000	0.00	0.04	4.57	0.0	0.464
35.750	0.000	0.00	0.04	4.56	0.0	0.464
35.766	0.000	0.00	0.04	4.56	0.0	0.464
35.783	0.000	0.00	0.04	4.56	0.0	0.464
35.800	0.000	0.00	0.04	4.56	0.0	0.464
35.816	0.000	0.00	0.04	4.56	0.0	0.464
35.833	0.000	0.00	0.04	4.56	0.0	0.464
35.850	0.000	0.00	0.04	4.56	0.0	0.464
35.866	0.000	0.00	0.04	4.56	0.0	0.464
35.883	0.000	0.00	0.04	4.56	0.0	0.463
35.900	0.000	0.00	0.04	4.56	0.0	0.463
35.916	0.000	0.00	0.04	4.55	0.0	0.463
35.933	0.000	0.00	0.04	4.55	0.0	0.463
35.950	0.000	0.00	0.04	4.55	0.0	0.463
35.966	0.000	0.00	0.04	4.55	0.0	0.463
35.983	0.000	0.00	0.04	4.55	0.0	0.463
36.000	0.000	0.00	0.04	4.55	0.0	0.463
36.016	0.000	0.00	0.04	4.55	0.0	0.463
36.033	0.000	0.00	0.04	4.55	0.0	0.463
36.050	0.000	0.00	0.04	4.55	0.0	0.463
36.066	0.000	0.00	0.04	4.55	0.0	0.462
36.083	0.000	0.00	0.04	4.55	0.0	0.462
36.100	0.000	0.00	0.04	4.54	0.0	0.462
36.116	0.000	0.00	0.04	4.54	0.0	0.462
36.133	0.000	0.00	0.04	4.54	0.0	0.462
36.150	0.000	0.00	0.04	4.54	0.0	0.462
36.166	0.000	0.00	0.04	4.54	0.0	0.462
36.183	0.000	0.00	0.04	4.54	0.0	0.462
36.200	0.000	0.00	0.04	4.54	0.0	0.462
36.216	0.000	0.00	0.04	4.54	0.0	0.462
36.233	0.000	0.00	0.04	4.54	0.0	0.461
36.250	0.000	0.00	0.04	4.54	0.0	0.461
36.266	0.000	0.00	0.04	4.53	0.0	0.461
36.283	0.000	0.00	0.04	4.53	0.0	0.461
36.300	0.000	0.00	0.04	4.53	0.0	0.461
36.316	0.000	0.00	0.04	4.53	0.0	0.461
36.333	0.000	0.00	0.04	4.53	0.0	0.461
36.350	0.000	0.00	0.04	4.53	0.0	0.461
36.366	0.000	0.00	0.04	4.53	0.0	0.461
36.383	0.000	0.00	0.04	4.53	0.0	0.461
36.400	0.000	0.00	0.04	4.53	0.0	0.460
36.416	0.000	0.00	0.04	4.53	0.0	0.460
36.433	0.000	0.00	0.04	4.53	0.0	0.460
36.450	0.000	0.00	0.04	4.52	0.0	0.460
36.466	0.000	0.00	0.04	4.52	0.0	0.460
36.483	0.000	0.00	0.04	4.52	0.0	0.460
36.500	0.000	0.00	0.04	4.52	0.0	0.460

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
36.516	0.000	0.00	0.04	4.52	0.0	0.460
36.533	0.000	0.00	0.04	4.52	0.0	0.460
36.550	0.000	0.00	0.04	4.52	0.0	0.460
36.566	0.000	0.00	0.04	4.52	0.0	0.460
36.583	0.000	0.00	0.04	4.52	0.0	0.459
36.600	0.000	0.00	0.04	4.52	0.0	0.459
36.616	0.000	0.00	0.04	4.51	0.0	0.459
36.633	0.000	0.00	0.04	4.51	0.0	0.459
36.650	0.000	0.00	0.04	4.51	0.0	0.459
36.666	0.000	0.00	0.04	4.51	0.0	0.459
36.683	0.000	0.00	0.04	4.51	0.0	0.459
36.700	0.000	0.00	0.04	4.51	0.0	0.459
36.716	0.000	0.00	0.04	4.51	0.0	0.459
36.733	0.000	0.00	0.04	4.51	0.0	0.459
36.750	0.000	0.00	0.04	4.51	0.0	0.458
36.766	0.000	0.00	0.04	4.51	0.0	0.458
36.783	0.000	0.00	0.04	4.51	0.0	0.458
36.800	0.000	0.00	0.04	4.50	0.0	0.458
36.816	0.000	0.00	0.04	4.50	0.0	0.458
36.833	0.000	0.00	0.04	4.50	0.0	0.458
36.850	0.000	0.00	0.04	4.50	0.0	0.458
36.866	0.000	0.00	0.04	4.50	0.0	0.458
36.883	0.000	0.00	0.04	4.50	0.0	0.458
36.900	0.000	0.00	0.04	4.50	0.0	0.458
36.916	0.000	0.00	0.04	4.50	0.0	0.457
36.933	0.000	0.00	0.04	4.50	0.0	0.457
36.950	0.000	0.00	0.04	4.50	0.0	0.457
36.966	0.000	0.00	0.04	4.49	0.0	0.457
36.983	0.000	0.00	0.04	4.49	0.0	0.457
37.000	0.000	0.00	0.04	4.49	0.0	0.457
37.016	0.000	0.00	0.04	4.49	0.0	0.457
37.033	0.000	0.00	0.04	4.49	0.0	0.457
37.050	0.000	0.00	0.04	4.49	0.0	0.457
37.066	0.000	0.00	0.04	4.49	0.0	0.457
37.083	0.000	0.00	0.04	4.49	0.0	0.457
37.100	0.000	0.00	0.04	4.49	0.0	0.456
37.116	0.000	0.00	0.04	4.49	0.0	0.456
37.133	0.000	0.00	0.04	4.49	0.0	0.456
37.150	0.000	0.00	0.04	4.48	0.0	0.456
37.166	0.000	0.00	0.04	4.48	0.0	0.456
37.183	0.000	0.00	0.04	4.48	0.0	0.456
37.200	0.000	0.00	0.04	4.48	0.0	0.456
37.216	0.000	0.00	0.04	4.48	0.0	0.456
37.233	0.000	0.00	0.04	4.48	0.0	0.456
37.250	0.000	0.00	0.04	4.48	0.0	0.456
37.266	0.000	0.00	0.04	4.48	0.0	0.455
37.283	0.000	0.00	0.04	4.48	0.0	0.455
37.300	0.000	0.00	0.04	4.48	0.0	0.455
37.316	0.000	0.00	0.04	4.47	0.0	0.455
37.333	0.000	0.00	0.04	4.47	0.0	0.455

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
37.350	0.000	0.00	0.04	4.47	0.0	0.455
37.366	0.000	0.00	0.04	4.47	0.0	0.455
37.383	0.000	0.00	0.04	4.47	0.0	0.455
37.400	0.000	0.00	0.04	4.47	0.0	0.455
37.416	0.000	0.00	0.04	4.47	0.0	0.455
37.433	0.000	0.00	0.04	4.47	0.0	0.454
37.450	0.000	0.00	0.04	4.47	0.0	0.454
37.466	0.000	0.00	0.04	4.47	0.0	0.454
37.483	0.000	0.00	0.04	4.47	0.0	0.454
37.500	0.000	0.00	0.04	4.46	0.0	0.454
37.516	0.000	0.00	0.04	4.46	0.0	0.454
37.533	0.000	0.00	0.04	4.46	0.0	0.454
37.550	0.000	0.00	0.04	4.46	0.0	0.454
37.566	0.000	0.00	0.04	4.46	0.0	0.454
37.583	0.000	0.00	0.04	4.46	0.0	0.454
37.600	0.000	0.00	0.04	4.46	0.0	0.454
37.616	0.000	0.00	0.04	4.46	0.0	0.453
37.633	0.000	0.00	0.04	4.46	0.0	0.453
37.650	0.000	0.00	0.04	4.46	0.0	0.453
37.666	0.000	0.00	0.04	4.45	0.0	0.453
37.683	0.000	0.00	0.04	4.45	0.0	0.453
37.700	0.000	0.00	0.04	4.45	0.0	0.453
37.716	0.000	0.00	0.04	4.45	0.0	0.453
37.733	0.000	0.00	0.04	4.45	0.0	0.453
37.750	0.000	0.00	0.04	4.45	0.0	0.453
37.766	0.000	0.00	0.04	4.45	0.0	0.453
37.783	0.000	0.00	0.04	4.45	0.0	0.452
37.800	0.000	0.00	0.04	4.45	0.0	0.452
37.816	0.000	0.00	0.04	4.45	0.0	0.452
37.833	0.000	0.00	0.04	4.45	0.0	0.452
37.850	0.000	0.00	0.04	4.44	0.0	0.452
37.866	0.000	0.00	0.04	4.44	0.0	0.452
37.883	0.000	0.00	0.04	4.44	0.0	0.452
37.900	0.000	0.00	0.04	4.44	0.0	0.452
37.916	0.000	0.00	0.04	4.44	0.0	0.452
37.933	0.000	0.00	0.04	4.44	0.0	0.452
37.950	0.000	0.00	0.04	4.44	0.0	0.452
37.966	0.000	0.00	0.04	4.44	0.0	0.451
37.983	0.000	0.00	0.04	4.44	0.0	0.451
38.000	0.000	0.00	0.04	4.44	0.0	0.451
38.016	0.000	0.00	0.04	4.43	0.0	0.451
38.033	0.000	0.00	0.04	4.43	0.0	0.451
38.050	0.000	0.00	0.04	4.43	0.0	0.451
38.066	0.000	0.00	0.04	4.43	0.0	0.451
38.083	0.000	0.00	0.04	4.43	0.0	0.451
38.100	0.000	0.00	0.04	4.43	0.0	0.451
38.116	0.000	0.00	0.04	4.43	0.0	0.451
38.133	0.000	0.00	0.04	4.43	0.0	0.450
38.150	0.000	0.00	0.04	4.43	0.0	0.450
38.166	0.000	0.00	0.04	4.43	0.0	0.450

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
38.183	0.000	0.00	0.04	4.43	0.0	0.450
38.200	0.000	0.00	0.04	4.42	0.0	0.450
38.216	0.000	0.00	0.04	4.42	0.0	0.450
38.233	0.000	0.00	0.04	4.42	0.0	0.450
38.250	0.000	0.00	0.04	4.42	0.0	0.450
38.266	0.000	0.00	0.04	4.42	0.0	0.450
38.283	0.000	0.00	0.04	4.42	0.0	0.450
38.300	0.000	0.00	0.04	4.42	0.0	0.449
38.316	0.000	0.00	0.04	4.42	0.0	0.449
38.333	0.000	0.00	0.04	4.42	0.0	0.449
38.350	0.000	0.00	0.04	4.42	0.0	0.449
38.366	0.000	0.00	0.04	4.42	0.0	0.449
38.383	0.000	0.00	0.04	4.41	0.0	0.449
38.400	0.000	0.00	0.04	4.41	0.0	0.449
38.416	0.000	0.00	0.04	4.41	0.0	0.449
38.433	0.000	0.00	0.04	4.41	0.0	0.449
38.450	0.000	0.00	0.04	4.41	0.0	0.449
38.466	0.000	0.00	0.04	4.41	0.0	0.449
38.483	0.000	0.00	0.04	4.41	0.0	0.448
38.500	0.000	0.00	0.04	4.41	0.0	0.448
38.516	0.000	0.00	0.04	4.41	0.0	0.448
38.533	0.000	0.00	0.04	4.41	0.0	0.448
38.550	0.000	0.00	0.04	4.40	0.0	0.448
38.566	0.000	0.00	0.04	4.40	0.0	0.448
38.583	0.000	0.00	0.04	4.40	0.0	0.448
38.600	0.000	0.00	0.04	4.40	0.0	0.448
38.616	0.000	0.00	0.04	4.40	0.0	0.448
38.633	0.000	0.00	0.04	4.40	0.0	0.448
38.650	0.000	0.00	0.04	4.40	0.0	0.447
38.666	0.000	0.00	0.04	4.40	0.0	0.447
38.683	0.000	0.00	0.04	4.40	0.0	0.447
38.700	0.000	0.00	0.04	4.40	0.0	0.447
38.716	0.000	0.00	0.04	4.40	0.0	0.447
38.733	0.000	0.00	0.04	4.39	0.0	0.447
38.750	0.000	0.00	0.04	4.39	0.0	0.447
38.766	0.000	0.00	0.04	4.39	0.0	0.447
38.783	0.000	0.00	0.04	4.39	0.0	0.447
38.800	0.000	0.00	0.04	4.39	0.0	0.447
38.816	0.000	0.00	0.04	4.39	0.0	0.446
38.833	0.000	0.00	0.04	4.39	0.0	0.446
38.850	0.000	0.00	0.04	4.39	0.0	0.446
38.866	0.000	0.00	0.04	4.39	0.0	0.446
38.883	0.000	0.00	0.04	4.39	0.0	0.446
38.900	0.000	0.00	0.04	4.38	0.0	0.446
38.916	0.000	0.00	0.04	4.38	0.0	0.446
38.933	0.000	0.00	0.04	4.38	0.0	0.446
38.950	0.000	0.00	0.04	4.38	0.0	0.446
38.966	0.000	0.00	0.04	4.38	0.0	0.446
38.983	0.000	0.00	0.04	4.38	0.0	0.446
39.000	0.000	0.00	0.04	4.38	0.0	0.445

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
39.016	0.000	0.00	0.04	4.38	0.0	0.445
39.033	0.000	0.00	0.04	4.38	0.0	0.445
39.050	0.000	0.00	0.04	4.38	0.0	0.445
39.066	0.000	0.00	0.04	4.38	0.0	0.445
39.083	0.000	0.00	0.04	4.37	0.0	0.445
39.100	0.000	0.00	0.04	4.37	0.0	0.445
39.116	0.000	0.00	0.04	4.37	0.0	0.445
39.133	0.000	0.00	0.04	4.37	0.0	0.445
39.150	0.000	0.00	0.04	4.37	0.0	0.445
39.166	0.000	0.00	0.04	4.37	0.0	0.444
39.183	0.000	0.00	0.04	4.37	0.0	0.444
39.200	0.000	0.00	0.04	4.37	0.0	0.444
39.216	0.000	0.00	0.04	4.37	0.0	0.444
39.233	0.000	0.00	0.04	4.37	0.0	0.444
39.250	0.000	0.00	0.04	4.37	0.0	0.444
39.266	0.000	0.00	0.04	4.36	0.0	0.444
39.283	0.000	0.00	0.04	4.36	0.0	0.444
39.300	0.000	0.00	0.04	4.36	0.0	0.444
39.316	0.000	0.00	0.04	4.36	0.0	0.444
39.333	0.000	0.00	0.04	4.36	0.0	0.444
39.350	0.000	0.00	0.04	4.36	0.0	0.443
39.366	0.000	0.00	0.04	4.36	0.0	0.443
39.383	0.000	0.00	0.04	4.36	0.0	0.443
39.400	0.000	0.00	0.04	4.36	0.0	0.443
39.416	0.000	0.00	0.04	4.36	0.0	0.443
39.433	0.000	0.00	0.04	4.35	0.0	0.443
39.450	0.000	0.00	0.04	4.35	0.0	0.443
39.466	0.000	0.00	0.04	4.35	0.0	0.443
39.483	0.000	0.00	0.04	4.35	0.0	0.443
39.500	0.000	0.00	0.04	4.35	0.0	0.443
39.516	0.000	0.00	0.04	4.35	0.0	0.442
39.533	0.000	0.00	0.04	4.35	0.0	0.442
39.550	0.000	0.00	0.04	4.35	0.0	0.442
39.566	0.000	0.00	0.04	4.35	0.0	0.442
39.583	0.000	0.00	0.04	4.35	0.0	0.442
39.600	0.000	0.00	0.04	4.35	0.0	0.442
39.616	0.000	0.00	0.04	4.34	0.0	0.442
39.633	0.000	0.00	0.04	4.34	0.0	0.442
39.650	0.000	0.00	0.04	4.34	0.0	0.442
39.666	0.000	0.00	0.04	4.34	0.0	0.442
39.683	0.000	0.00	0.04	4.34	0.0	0.442
39.700	0.000	0.00	0.04	4.34	0.0	0.441
39.716	0.000	0.00	0.04	4.34	0.0	0.441
39.733	0.000	0.00	0.04	4.34	0.0	0.441
39.750	0.000	0.00	0.04	4.34	0.0	0.441
39.766	0.000	0.00	0.04	4.34	0.0	0.441
39.783	0.000	0.00	0.04	4.33	0.0	0.441
39.800	0.000	0.00	0.04	4.33	0.0	0.441
39.816	0.000	0.00	0.04	4.33	0.0	0.441
39.833	0.000	0.00	0.04	4.33	0.0	0.441

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
39.850	0.000	0.00	0.04	4.33	0.0	0.441
39.866	0.000	0.00	0.04	4.33	0.0	0.440
39.883	0.000	0.00	0.04	4.33	0.0	0.440
39.900	0.000	0.00	0.04	4.33	0.0	0.440
39.916	0.000	0.00	0.04	4.33	0.0	0.440
39.933	0.000	0.00	0.04	4.33	0.0	0.440
39.950	0.000	0.00	0.04	4.33	0.0	0.440
39.966	0.000	0.00	0.04	4.32	0.0	0.440
39.983	0.000	0.00	0.04	4.32	0.0	0.440
40.000	0.000	0.00	0.04	4.32	0.0	0.440

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 1.856 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 1.396 AF
LOSS VOLUME = 0.460 AF

****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
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MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 468.00 MANNINGS FACTOR = 0.013
UPSTREAM ELEVATION(FT) = 130.00
DOWNSTREAM ELEVATION(FT) = 127.60
PIPE DIAMETER(FT) = 2.00

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.000	1.05	2.85	1.03	0.000
14.017	1.07	2.86	1.04	0.000
14.033	1.08	2.87	1.05	0.000
14.050	1.09	2.88	1.07	0.000
14.067	1.10	2.89	1.08	0.000
14.083	1.11	2.89	1.09	0.000
14.100	1.12	2.90	1.10	0.000
14.117	1.14	2.91	1.11	0.000
14.133	1.15	2.92	1.12	0.000
14.150	1.16	2.92	1.14	0.000
14.167	1.17	2.93	1.15	0.000
14.183	1.18	2.94	1.16	0.000
14.200	1.19	2.95	1.17	0.000
14.217	1.20	2.95	1.18	0.000
14.233	1.21	2.96	1.19	0.000
14.250	1.22	2.97	1.20	0.000
14.267	1.23	2.97	1.21	0.000
14.283	1.24	2.98	1.22	0.000
14.300	1.25	2.99	1.23	0.000
14.317	1.26	3.00	1.24	0.000
14.333	1.27	3.00	1.25	0.000
14.350	1.28	3.01	1.26	0.000
14.367	1.29	3.02	1.27	0.000
14.383	1.30	3.02	1.28	0.000
14.400	1.30	3.03	1.29	0.000
14.417	1.31	3.03	1.30	0.000
14.433	1.32	3.04	1.31	0.000
14.450	1.33	3.05	1.32	0.000
14.467	1.34	3.05	1.32	0.000
14.483	1.35	3.06	1.33	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.500	1.36	3.07	1.34	0.000
14.517	1.37	3.07	1.35	0.000
14.533	1.38	3.08	1.36	0.000
14.550	1.39	3.09	1.37	0.000
14.567	1.40	3.09	1.38	0.000
14.583	1.41	3.10	1.39	0.000
14.600	1.42	3.11	1.40	0.000
14.617	1.43	3.11	1.41	0.000
14.633	1.43	3.12	1.42	0.000
14.650	1.44	3.13	1.43	0.000
14.667	1.45	3.13	1.44	0.000
14.683	1.46	3.14	1.45	0.000
14.700	1.47	3.14	1.46	0.000
14.717	1.48	3.15	1.46	0.000
14.733	1.49	3.16	1.47	0.000
14.750	1.50	3.16	1.48	0.000
14.767	1.51	3.17	1.49	0.000
14.783	1.52	3.18	1.50	0.000
14.800	1.53	3.19	1.51	0.000
14.817	1.54	3.19	1.52	0.000
14.833	1.55	3.20	1.53	0.000
14.850	1.56	3.21	1.54	0.000
14.867	1.57	3.21	1.55	0.000
14.883	1.58	3.22	1.57	0.000
14.900	1.59	3.23	1.58	0.000
14.917	1.60	3.24	1.59	0.000
14.933	1.61	3.24	1.60	0.000
14.950	1.62	3.25	1.61	0.000
14.967	1.63	3.26	1.62	0.000
14.983	1.64	3.26	1.63	0.000
15.000	1.66	3.27	1.64	0.000
15.017	1.67	3.27	1.65	0.000
15.033	1.68	3.28	1.66	0.000
15.050	1.69	3.29	1.67	0.000
15.067	1.71	3.29	1.68	0.000
15.083	1.72	3.30	1.70	0.000
15.100	1.73	3.31	1.71	0.000
15.117	1.74	3.32	1.72	0.000
15.133	1.76	3.32	1.74	0.000
15.150	1.77	3.33	1.75	0.000
15.167	1.78	3.34	1.76	0.000
15.183	1.80	3.35	1.78	0.000
15.200	1.81	3.35	1.79	0.000
15.217	1.83	3.36	1.80	0.000
15.233	1.84	3.37	1.82	0.000
15.250	1.86	3.38	1.83	0.000
15.267	1.87	3.39	1.85	0.000
15.283	1.89	3.40	1.86	0.000
15.300	1.91	3.41	1.88	0.000
15.317	1.93	3.42	1.90	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
15.333	1.95	3.43	1.92	0.000
15.350	1.97	3.44	1.94	0.000
15.367	1.99	3.45	1.96	0.000
15.383	2.01	3.46	1.98	0.000
15.400	2.02	3.47	2.00	0.000
15.417	2.04	3.48	2.01	0.000
15.433	2.06	3.49	2.03	0.000
15.450	2.08	3.50	2.05	0.000
15.467	2.09	3.50	2.07	0.000
15.483	2.11	3.51	2.08	0.000
15.500	2.13	3.52	2.10	0.000
15.517	2.14	3.53	2.12	0.000
15.533	2.16	3.54	2.13	0.000
15.550	2.18	3.55	2.15	0.000
15.567	2.20	3.56	2.17	0.000
15.583	2.22	3.58	2.19	0.000
15.600	2.25	3.59	2.21	0.000
15.617	2.27	3.60	2.24	0.000
15.633	2.29	3.61	2.26	0.000
15.650	2.32	3.63	2.28	0.000
15.667	2.34	3.64	2.31	0.000
15.683	2.37	3.65	2.33	0.000
15.700	2.40	3.67	2.36	0.000
15.717	2.43	3.69	2.39	0.000
15.733	2.46	3.70	2.42	0.000
15.750	2.49	3.71	2.45	0.000
15.767	2.53	3.73	2.47	0.000
15.783	2.57	3.74	2.50	0.000
15.800	2.62	3.76	2.54	0.000
15.817	2.67	3.79	2.59	0.000
15.833	2.73	3.81	2.64	0.000
15.850	2.80	3.84	2.70	0.000
15.867	2.86	3.87	2.76	0.000
15.883	2.94	3.90	2.83	0.000
15.900	3.02	3.93	2.91	0.000
15.917	3.11	3.97	3.03	0.000
15.933	3.20	4.00	3.08	0.000
15.950	3.29	4.04	3.17	0.000
15.967	3.40	4.07	3.26	0.000
15.983	3.51	4.11	3.36	0.000
16.000	3.62	4.15	3.46	0.000
16.017	3.75	4.19	3.58	0.000
16.033	3.93	4.25	3.71	0.000
16.050	4.17	4.33	3.88	0.000
16.067	4.47	4.42	4.10	0.000
16.083	4.82	4.53	4.39	0.000
16.100	5.42	4.65	4.76	0.000
16.117	6.34	4.84	5.24	0.000
16.133	7.38	5.02	6.14	0.000
16.150	8.45	5.21	7.16	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
16.167	9.36	5.34	8.35	0.000
16.183	9.98	5.41	9.25	0.000
16.200	10.38	5.45	9.89	0.000
16.217	10.58	5.47	10.31	0.000
16.233	10.58	5.47	10.55	0.000
16.250	10.42	5.46	10.58	0.000
16.267	10.09	5.42	10.44	0.000
16.283	9.65	5.38	10.15	0.000
16.300	9.17	5.32	9.73	0.000
16.317	8.72	5.26	9.23	0.000
16.333	8.29	5.19	8.78	0.000
16.350	7.89	5.12	8.34	0.000
16.367	7.50	5.04	7.93	0.000
16.383	7.13	4.98	7.53	0.000
16.400	6.78	4.92	7.19	0.000
16.417	6.44	4.86	6.86	0.000
16.433	6.13	4.80	6.52	0.000
16.450	5.83	4.74	6.18	0.000
16.467	5.56	4.68	5.89	0.000
16.483	5.31	4.63	5.63	0.000
16.500	5.12	4.59	5.38	0.000
16.517	4.99	4.56	5.17	0.000
16.533	4.89	4.54	5.03	0.000
16.550	4.80	4.52	4.93	0.000
16.567	4.70	4.49	4.82	0.000
16.583	4.61	4.46	4.72	0.000
16.600	4.52	4.43	4.63	0.000
16.617	4.43	4.41	4.54	0.000
16.633	4.34	4.38	4.45	0.000
16.650	4.26	4.35	4.36	0.000
16.667	4.17	4.33	4.28	0.000
16.683	4.09	4.30	4.19	0.000
16.700	4.01	4.28	4.11	0.000
16.717	3.93	4.25	4.03	0.000
16.733	3.85	4.23	3.95	0.000
16.750	3.78	4.20	3.88	0.000
16.767	3.71	4.18	3.80	0.000
16.783	3.63	4.15	3.73	0.000
16.800	3.57	4.13	3.66	0.000
16.817	3.50	4.11	3.59	0.000
16.833	3.43	4.09	3.52	0.000
16.850	3.37	4.06	3.46	0.000
16.867	3.30	4.04	3.39	0.000
16.883	3.24	4.02	3.33	0.000
16.900	3.18	4.00	3.27	0.000
16.917	3.12	3.97	3.20	0.000
16.933	3.07	3.95	3.14	0.000
16.950	3.01	3.93	3.09	0.000
16.967	2.96	3.91	3.03	0.000
16.983	2.91	3.88	2.98	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.000	2.85	3.86	2.95	0.000
17.017	2.80	3.84	2.88	0.000
17.033	2.76	3.82	2.82	0.000
17.050	2.71	3.80	2.77	0.000
17.067	2.66	3.78	2.73	0.000
17.083	2.62	3.76	2.68	0.000
17.100	2.57	3.75	2.64	0.000
17.117	2.53	3.73	2.59	0.000
17.133	2.49	3.71	2.55	0.000
17.150	2.45	3.69	2.51	0.000
17.167	2.41	3.68	2.47	0.000
17.183	2.37	3.66	2.43	0.000
17.200	2.33	3.63	2.39	0.000
17.217	2.30	3.61	2.35	0.000
17.233	2.26	3.60	2.31	0.000
17.250	2.23	3.58	2.28	0.000
17.267	2.19	3.56	2.24	0.000
17.283	2.16	3.54	2.21	0.000
17.300	2.13	3.52	2.17	0.000
17.317	2.10	3.51	2.14	0.000
17.333	2.07	3.49	2.11	0.000
17.350	2.04	3.47	2.08	0.000
17.367	2.01	3.46	2.05	0.000
17.383	1.98	3.44	2.02	0.000
17.400	1.95	3.43	1.99	0.000
17.417	1.92	3.41	1.97	0.000
17.433	1.90	3.40	1.94	0.000
17.450	1.87	3.39	1.91	0.000
17.467	1.85	3.37	1.89	0.000
17.483	1.82	3.36	1.86	0.000
17.500	1.80	3.35	1.84	0.000
17.517	1.78	3.33	1.81	0.000
17.533	1.75	3.32	1.79	0.000
17.550	1.73	3.31	1.77	0.000
17.567	1.71	3.30	1.75	0.000
17.583	1.69	3.29	1.73	0.000
17.600	1.67	3.28	1.70	0.000
17.617	1.65	3.27	1.68	0.000
17.633	1.63	3.25	1.66	0.000
17.650	1.61	3.24	1.64	0.000
17.667	1.59	3.23	1.63	0.000
17.683	1.58	3.22	1.61	0.000
17.700	1.56	3.21	1.59	0.000
17.717	1.54	3.19	1.57	0.000
17.733	1.52	3.18	1.55	0.000
17.750	1.51	3.17	1.53	0.000
17.767	1.49	3.16	1.52	0.000
17.783	1.48	3.15	1.50	0.000
17.800	1.46	3.14	1.49	0.000
17.817	1.45	3.13	1.47	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.833	1.43	3.12	1.46	0.000
17.850	1.42	3.11	1.44	0.000
17.867	1.40	3.10	1.43	0.000
17.883	1.39	3.09	1.41	0.000
17.900	1.38	3.08	1.40	0.000
17.917	1.36	3.07	1.39	0.000
17.933	1.35	3.06	1.37	0.000
17.950	1.34	3.05	1.36	0.000
17.967	1.33	3.04	1.35	0.000
17.983	1.31	3.04	1.34	0.000
18.000	1.30	3.03	1.32	0.000

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 ****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE = 1.2
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  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
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  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.51
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.060
    LOW LOSS FRACTION = 0.125
    TIME OF CONCENTRATION(MIN.) =  9.23
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

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    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.94
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.23

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24-HOUR STORM
RUNOFF HYDROGRAPH

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HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.9	7.3	9.7
14.000	0.3419	0.73	. Q	. V	.	.	.
14.017	0.3429	0.73	. Q	. V	.	.	.
14.033	0.3439	0.73	. Q	. V	.	.	.
14.050	0.3449	0.73	. Q	. V	.	.	.
14.067	0.3459	0.74	. Q	. V	.	.	.
14.083	0.3470	0.74	. Q	. V	.	.	.
14.100	0.3480	0.74	. Q	. V	.	.	.
14.117	0.3490	0.74	. Q	. V	.	.	.
14.133	0.3500	0.75	. Q	. V	.	.	.
14.150	0.3511	0.75	. Q	. V	.	.	.
14.167	0.3521	0.75	. Q	. V	.	.	.
14.183	0.3531	0.76	. Q	. V	.	.	.
14.200	0.3542	0.76	. Q	. V	.	.	.
14.217	0.3552	0.77	. Q	. V	.	.	.
14.233	0.3563	0.77	. Q	. V	.	.	.
14.250	0.3574	0.78	. Q	. V	.	.	.
14.267	0.3585	0.78	. Q	. V	.	.	.
14.283	0.3595	0.79	. Q	. V	.	.	.
14.300	0.3606	0.79	. Q	. V	.	.	.
14.317	0.3617	0.80	. Q	. V	.	.	.
14.333	0.3628	0.80	. Q	. V	.	.	.
14.350	0.3639	0.80	. Q	. V	.	.	.
14.367	0.3650	0.81	. Q	. V	.	.	.
14.383	0.3662	0.81	. Q	. V	.	.	.
14.400	0.3673	0.81	. Q	. V	.	.	.
14.417	0.3684	0.81	. Q	. V	.	.	.
14.433	0.3695	0.82	. Q	. V	.	.	.
14.450	0.3707	0.82	. Q	. V	.	.	.
14.467	0.3718	0.82	. Q	. V	.	.	.
14.483	0.3729	0.83	. Q	. V	.	.	.
14.500	0.3741	0.83	. Q	. V	.	.	.
14.517	0.3752	0.84	. Q	. V	.	.	.
14.533	0.3764	0.85	. Q	. V	.	.	.
14.550	0.3776	0.85	. Q	. V	.	.	.
14.567	0.3788	0.86	. Q	. V	.	.	.
14.583	0.3799	0.87	. Q	. V	.	.	.
14.600	0.3811	0.87	. Q	. V	.	.	.
14.617	0.3824	0.88	. Q	. V	.	.	.
14.633	0.3836	0.88	. Q	. V	.	.	.
14.650	0.3848	0.89	. Q	. V	.	.	.
14.667	0.3860	0.89	. Q	. V	.	.	.
14.683	0.3872	0.89	. Q	. V	.	.	.
14.700	0.3885	0.90	. Q	. V	.	.	.
14.717	0.3897	0.90	. Q	. V	.	.	.
14.733	0.3910	0.90	. Q	. V	.	.	.
14.750	0.3922	0.91	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.9	7.3	9.7
14.767	0.3935	0.91	. Q .	V .	.	.	
14.783	0.3947	0.92	. Q .	V .	.	.	
14.800	0.3960	0.93	. Q .	V .	.	.	
14.817	0.3973	0.94	. Q .	V .	.	.	
14.833	0.3986	0.95	. Q .	V .	.	.	
14.850	0.3999	0.96	. Q .	V .	.	.	
14.867	0.4013	0.97	. Q .	V .	.	.	
14.883	0.4026	0.97	. Q .	V .	.	.	
14.900	0.4040	0.98	. Q .	V .	.	.	
14.917	0.4053	0.99	. Q .	V .	.	.	
14.933	0.4067	1.00	. Q .	V .	.	.	
14.950	0.4081	1.01	. Q .	V .	.	.	
14.967	0.4095	1.02	. Q .	V .	.	.	
14.983	0.4109	1.02	. Q .	V .	.	.	
15.000	0.4123	1.03	. Q .	V .	.	.	
15.017	0.4137	1.03	. Q .	V .	.	.	
15.033	0.4152	1.04	. Q .	V .	.	.	
15.050	0.4166	1.05	. Q .	V .	.	.	
15.067	0.4181	1.05	. Q .	V .	.	.	
15.083	0.4195	1.06	. Q .	V .	.	.	
15.100	0.4210	1.07	. Q .	V .	.	.	
15.117	0.4225	1.09	. Q .	V .	.	.	
15.133	0.4240	1.10	. Q .	V .	.	.	
15.150	0.4256	1.12	. Q .	V .	.	.	
15.167	0.4271	1.13	. Q .	V .	.	.	
15.183	0.4287	1.15	. Q .	V .	.	.	
15.200	0.4303	1.16	. Q .	V .	.	.	
15.217	0.4319	1.18	. Q .	V .	.	.	
15.233	0.4336	1.20	. Q .	V .	.	.	
15.250	0.4352	1.21	. Q .	V .	.	.	
15.267	0.4369	1.22	. Q .	V .	.	.	
15.283	0.4386	1.23	. Q .	V .	.	.	
15.300	0.4403	1.24	. Q .	V .	.	.	
15.317	0.4420	1.25	. Q .	V .	.	.	
15.333	0.4438	1.26	. Q .	V .	.	.	
15.350	0.4455	1.27	. Q .	V .	.	.	
15.367	0.4473	1.28	. Q .	V .	.	.	
15.383	0.4490	1.29	. Q .	V.	.	.	
15.400	0.4508	1.30	. Q .	V.	.	.	
15.417	0.4526	1.30	. Q .	V.	.	.	
15.433	0.4544	1.31	. Q .	V.	.	.	
15.450	0.4562	1.32	. Q .	V.	.	.	
15.467	0.4580	1.32	. Q .	V.	.	.	
15.483	0.4599	1.33	. Q .	V.	.	.	
15.500	0.4617	1.34	. Q .	V.	.	.	
15.517	0.4636	1.34	. Q .	V.	.	.	
15.533	0.4654	1.35	. Q .	V.	.	.	
15.550	0.4673	1.36	. Q .	V.	.	.	
15.567	0.4692	1.38	. Q .	V.	.	.	
15.583	0.4711	1.40	. Q .	V.	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.9	7.3	9.7
15.600	0.4731	1.42	. Q .	V	.	.	
15.617	0.4751	1.44	. Q .	V	.	.	
15.633	0.4771	1.46	. Q .	V	.	.	
15.650	0.4791	1.48	. Q .	V	.	.	
15.667	0.4812	1.50	. Q .	V	.	.	
15.683	0.4833	1.52	. Q .	V	.	.	
15.700	0.4854	1.55	. Q .	V	.	.	
15.717	0.4876	1.62	. Q .	V	.	.	
15.733	0.4900	1.69	. Q .	V	.	.	
15.750	0.4924	1.77	. Q .	V	.	.	
15.767	0.4949	1.85	. Q .	V	.	.	
15.783	0.4976	1.92	. Q .	.V	.	.	
15.800	0.5003	2.00	. Q .	.V	.	.	
15.817	0.5032	2.08	. Q .	.V	.	.	
15.833	0.5062	2.15	. Q .	.V	.	.	
15.850	0.5093	2.23	. Q.	.V	.	.	
15.867	0.5125	2.32	. Q.	.V	.	.	
15.883	0.5158	2.42	. Q.	.V	.	.	
15.900	0.5192	2.51	. Q	.V	.	.	
15.917	0.5228	2.61	. Q	. V	.	.	
15.933	0.5265	2.70	. .Q	. V	.	.	
15.950	0.5304	2.79	. .Q	. V	.	.	
15.967	0.5344	2.89	. .Q	. V	.	.	
15.983	0.5385	2.98	. . Q	. V	.	.	
16.000	0.5427	3.08	. . Q	. V	.	.	
16.017	0.5475	3.48	. . Q	. V	.	.	
16.033	0.5533	4.19	. . Q	. V	.	.	
16.050	0.5601	4.91	. . Q	V	.	.	
16.067	0.5678	5.62	. . .	QV	.	.	
16.083	0.5765	6.33	. . .	V Q	.	.	
16.100	0.5862	7.04	. . .	V Q.	.	.	
16.117	0.5969	7.76	. . .	V .Q	.	.	
16.133	0.6086	8.47	. . .	V . Q	.	.	
16.150	0.6212	9.18	. . .	V .	Q .	.	
16.167	0.6346	9.70	. . .	V .	Q	.	
16.183	0.6464	8.62	. . .	V . Q	.	.	
16.200	0.6571	7.76	. . .	V . Q	.	.	
16.217	0.6666	6.91	. . .	Q .	.	.	
16.233	0.6750	6.05	. . . Q	V .	.	.	
16.250	0.6821	5.20	. . .Q	V .	.	.	
16.267	0.6881	4.34	. . Q	.	V.	.	
16.283	0.6929	3.49	. . Q	.	V.	.	
16.300	0.6965	2.63	. Q	.	V.	.	
16.317	0.6992	1.90	. Q .	.	V.	.	
16.333	0.7016	1.76	. Q .	.	V.	.	
16.350	0.7039	1.70	. Q .	.	V.	.	
16.367	0.7062	1.65	. Q .	.	V.	.	
16.383	0.7084	1.59	. Q .	.	V	.	
16.400	0.7105	1.54	. Q .	.	V	.	
16.417	0.7126	1.48	. Q .	.	V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.9	7.3	9.7
16.433	0.7145	1.43	. Q	.	. V	.	
16.450	0.7164	1.37	. Q	.	. V	.	
16.467	0.7182	1.32	. Q	.	. V	.	
16.483	0.7200	1.29	. Q	.	. V	.	
16.500	0.7218	1.27	. Q	.	. V	.	
16.517	0.7235	1.25	. Q	.	. V	.	
16.533	0.7252	1.23	. Q	.	. V	.	
16.550	0.7269	1.21	. Q	.	. V	.	
16.567	0.7285	1.19	. Q	.	. V	.	
16.583	0.7301	1.17	. Q	.	. V	.	
16.600	0.7317	1.15	. Q	.	. V	.	
16.617	0.7333	1.13	. Q	.	. V	.	
16.633	0.7348	1.11	. Q	.	. V	.	
16.650	0.7363	1.09	. Q	.	. V	.	
16.667	0.7378	1.08	. Q	.	. V	.	
16.683	0.7392	1.06	. Q	.	. V	.	
16.700	0.7407	1.04	. Q	.	. V	.	
16.717	0.7421	1.02	. Q	.	. V	.	
16.733	0.7435	1.00	. Q	.	. V	.	
16.750	0.7448	0.98	. Q	.	. V	.	
16.767	0.7461	0.97	. Q	.	. V	.	
16.783	0.7475	0.95	. Q	.	. V	.	
16.800	0.7487	0.94	. Q	.	. V	.	
16.817	0.7500	0.93	. Q	.	. V	.	
16.833	0.7513	0.92	. Q	.	. V	.	
16.850	0.7525	0.90	. Q	.	. V	.	
16.867	0.7538	0.89	. Q	.	. V	.	
16.883	0.7550	0.88	. Q	.	. V	.	
16.900	0.7562	0.87	. Q	.	. V	.	
16.917	0.7574	0.86	. Q	.	. V	.	
16.933	0.7585	0.85	. Q	.	. V	.	
16.950	0.7597	0.84	. Q	.	. V	.	
16.967	0.7608	0.83	. Q	.	. V	.	
16.983	0.7620	0.82	. Q	.	. V	.	
17.000	0.7631	0.82	. Q	.	. V	.	
17.017	0.7642	0.81	. Q	.	. V	.	
17.033	0.7653	0.80	. Q	.	. V	.	
17.050	0.7664	0.79	. Q	.	. V	.	
17.067	0.7675	0.78	. Q	.	. V	.	
17.083	0.7685	0.77	. Q	.	. V	.	
17.100	0.7696	0.77	. Q	.	. V	.	
17.117	0.7707	0.76	. Q	.	. V	.	
17.133	0.7717	0.75	. Q	.	. V	.	
17.150	0.7727	0.75	. Q	.	. V	.	
17.167	0.7737	0.74	. Q	.	. V	.	
17.183	0.7747	0.73	. Q	.	. V	.	
17.200	0.7758	0.73	. Q	.	. V	.	
17.217	0.7767	0.72	. Q	.	. V	.	
17.233	0.7777	0.71	. Q	.	. V	.	
17.250	0.7787	0.71	. Q	.	. V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.4	4.9	7.3	9.7
17.267	0.7797	0.70	. Q	.	.	. V	.
17.283	0.7806	0.70	. Q	.	.	. V	.
17.300	0.7816	0.69	. Q	.	.	. V	.
17.317	0.7825	0.69	. Q	.	.	. V	.
17.333	0.7835	0.68	. Q	.	.	. V	.
17.350	0.7844	0.68	. Q	.	.	. V	.
17.367	0.7853	0.67	. Q	.	.	. V	.
17.383	0.7862	0.67	. Q	.	.	. V	.
17.400	0.7871	0.66	. Q	.	.	. V	.
17.417	0.7881	0.66	. Q	.	.	. V	.
17.433	0.7889	0.65	. Q	.	.	. V	.
17.450	0.7898	0.65	. Q	.	.	. V	.
17.467	0.7907	0.64	. Q	.	.	. V	.
17.483	0.7916	0.64	. Q	.	.	. V	.
17.500	0.7925	0.64	. Q	.	.	. V	.
17.517	0.7934	0.63	. Q	.	.	. V	.
17.533	0.7942	0.63	. Q	.	.	. V	.
17.550	0.7951	0.62	. Q	.	.	. V	.
17.567	0.7959	0.62	. Q	.	.	. V	.
17.583	0.7968	0.62	. Q	.	.	. V	.
17.600	0.7976	0.61	. Q	.	.	. V	.
17.617	0.7985	0.61	. Q	.	.	. V	.
17.633	0.7993	0.60	. Q	.	.	. V	.
17.650	0.8001	0.60	. Q	.	.	. V	.
17.667	0.8009	0.60	. Q	.	.	. V	.
17.683	0.8018	0.59	. Q	.	.	. V	.
17.700	0.8026	0.59	. Q	.	.	. V	.
17.717	0.8034	0.59	. Q	.	.	. V	.
17.733	0.8042	0.58	. Q	.	.	. V	.
17.750	0.8050	0.58	. Q	.	.	. V	.
17.767	0.8058	0.58	. Q	.	.	. V	.
17.783	0.8066	0.57	. Q	.	.	. V	.
17.800	0.8074	0.57	. Q	.	.	. V	.
17.817	0.8081	0.57	. Q	.	.	. V	.
17.833	0.8089	0.57	. Q	.	.	. V	.
17.850	0.8097	0.56	. Q	.	.	. V	.
17.867	0.8105	0.56	. Q	.	.	. V	.
17.883	0.8112	0.56	. Q	.	.	. V	.
17.900	0.8120	0.55	. Q	.	.	. V	.
17.917	0.8127	0.55	. Q	.	.	. V	.
17.933	0.8135	0.55	. Q	.	.	. V	.
17.950	0.8143	0.55	. Q	.	.	. V	.
17.967	0.8150	0.54	. Q	.	.	. V	.
17.983	0.8157	0.54	. Q	.	.	. V	.
18.000	0.8165	0.54	. Q	.	.	. V	.

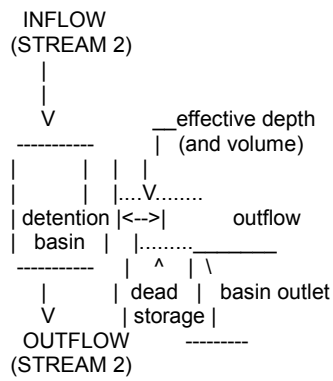
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	565.0
20%	155.0
30%	95.0
40%	75.0
50%	65.0
60%	50.0

70%	40.0
80%	25.0
90%	10.0

****
FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 2
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.04

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	2.00	0.01	0.040
3	3.00	0.02	0.061
4	5.00	0.04	0.101
5	6.25	25.32	0.126

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	0.73	0.04	5.03	0.7	0.102
14.033	0.000	0.73	0.04	5.03	0.7	0.102
14.050	0.000	0.73	0.04	5.03	0.7	0.102
14.067	0.000	0.74	0.04	5.03	0.7	0.102
14.083	0.000	0.74	0.04	5.03	0.7	0.102
14.100	0.000	0.74	0.04	5.03	0.7	0.102
14.117	0.000	0.74	0.04	5.03	0.7	0.102
14.133	0.000	0.75	0.04	5.03	0.7	0.102
14.150	0.000	0.75	0.04	5.03	0.7	0.102
14.167	0.000	0.75	0.04	5.03	0.7	0.102
14.183	0.000	0.76	0.04	5.03	0.7	0.102
14.200	0.000	0.76	0.04	5.03	0.7	0.102
14.217	0.000	0.77	0.04	5.03	0.7	0.102
14.233	0.000	0.77	0.04	5.03	0.7	0.102
14.250	0.000	0.78	0.04	5.03	0.7	0.102
14.267	0.000	0.78	0.04	5.03	0.7	0.102
14.283	0.000	0.79	0.04	5.03	0.7	0.102
14.300	0.000	0.79	0.04	5.04	0.7	0.102
14.317	0.000	0.80	0.04	5.04	0.8	0.102
14.333	0.000	0.80	0.04	5.04	0.8	0.102
14.350	0.000	0.80	0.04	5.04	0.8	0.102
14.367	0.000	0.81	0.04	5.04	0.8	0.102
14.383	0.000	0.81	0.04	5.04	0.8	0.102
14.400	0.000	0.81	0.04	5.04	0.8	0.102
14.417	0.000	0.81	0.04	5.04	0.8	0.102
14.433	0.000	0.82	0.04	5.04	0.8	0.102
14.450	0.000	0.82	0.04	5.04	0.8	0.102
14.467	0.000	0.82	0.04	5.04	0.8	0.102
14.483	0.000	0.83	0.04	5.04	0.8	0.102
14.500	0.000	0.83	0.04	5.04	0.8	0.102
14.517	0.000	0.84	0.04	5.04	0.8	0.102
14.533	0.000	0.85	0.04	5.04	0.8	0.102
14.550	0.000	0.85	0.04	5.04	0.8	0.102
14.567	0.000	0.86	0.04	5.04	0.8	0.102
14.583	0.000	0.87	0.04	5.04	0.8	0.102
14.600	0.000	0.87	0.04	5.04	0.8	0.102
14.617	0.000	0.88	0.04	5.04	0.8	0.102
14.633	0.000	0.88	0.04	5.04	0.8	0.102
14.650	0.000	0.89	0.04	5.04	0.8	0.102
14.667	0.000	0.89	0.04	5.04	0.8	0.102
14.683	0.000	0.89	0.04	5.04	0.9	0.102
14.700	0.000	0.90	0.04	5.04	0.9	0.102
14.717	0.000	0.90	0.04	5.04	0.9	0.102
14.733	0.000	0.90	0.04	5.04	0.9	0.102
14.750	0.000	0.91	0.04	5.04	0.9	0.102
14.767	0.000	0.91	0.04	5.04	0.9	0.102
14.783	0.000	0.92	0.04	5.04	0.9	0.102
14.800	0.000	0.93	0.04	5.04	0.9	0.102
14.817	0.000	0.94	0.04	5.04	0.9	0.102
14.833	0.000	0.95	0.04	5.04	0.9	0.102

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	0.96	0.04	5.04	0.9	0.102
14.867	0.000	0.97	0.04	5.04	0.9	0.102
14.883	0.000	0.97	0.04	5.04	0.9	0.102
14.900	0.000	0.98	0.04	5.04	0.9	0.102
14.917	0.000	0.99	0.04	5.05	0.9	0.102
14.933	0.000	1.00	0.04	5.05	1.0	0.102
14.950	0.000	1.01	0.04	5.05	1.0	0.102
14.967	0.000	1.02	0.04	5.05	1.0	0.102
14.983	0.000	1.02	0.04	5.05	1.0	0.102
15.000	0.000	1.03	0.04	5.05	1.0	0.102
15.017	0.000	1.03	0.04	5.05	1.0	0.102
15.033	0.000	1.04	0.04	5.05	1.0	0.102
15.050	0.000	1.05	0.04	5.05	1.0	0.102
15.067	0.000	1.05	0.04	5.05	1.0	0.102
15.083	0.000	1.06	0.04	5.05	1.0	0.102
15.100	0.000	1.07	0.04	5.05	1.0	0.102
15.117	0.000	1.09	0.04	5.05	1.0	0.102
15.133	0.000	1.10	0.04	5.05	1.1	0.102
15.150	0.000	1.12	0.04	5.05	1.1	0.102
15.167	0.000	1.13	0.04	5.05	1.1	0.102
15.183	0.000	1.15	0.04	5.05	1.1	0.102
15.200	0.000	1.16	0.04	5.05	1.1	0.102
15.217	0.000	1.18	0.04	5.05	1.1	0.102
15.233	0.000	1.20	0.04	5.05	1.1	0.102
15.250	0.000	1.21	0.04	5.06	1.2	0.102
15.267	0.000	1.22	0.04	5.06	1.2	0.102
15.283	0.000	1.23	0.04	5.06	1.2	0.102
15.300	0.000	1.24	0.04	5.06	1.2	0.102
15.317	0.000	1.25	0.04	5.06	1.2	0.102
15.333	0.000	1.26	0.04	5.06	1.2	0.102
15.350	0.000	1.27	0.04	5.06	1.2	0.102
15.367	0.000	1.28	0.04	5.06	1.2	0.102
15.383	0.000	1.29	0.04	5.06	1.2	0.102
15.400	0.000	1.30	0.04	5.06	1.2	0.102
15.417	0.000	1.30	0.04	5.06	1.3	0.102
15.433	0.000	1.31	0.04	5.06	1.3	0.102
15.450	0.000	1.32	0.04	5.06	1.3	0.102
15.467	0.000	1.32	0.04	5.06	1.3	0.102
15.483	0.000	1.33	0.04	5.06	1.3	0.102
15.500	0.000	1.34	0.04	5.06	1.3	0.102
15.517	0.000	1.34	0.04	5.06	1.3	0.102
15.533	0.000	1.35	0.04	5.06	1.3	0.102
15.550	0.000	1.36	0.04	5.06	1.3	0.102
15.567	0.000	1.38	0.04	5.06	1.3	0.102
15.583	0.000	1.40	0.04	5.07	1.3	0.102
15.600	0.000	1.42	0.04	5.07	1.4	0.102
15.617	0.000	1.44	0.04	5.07	1.4	0.102
15.633	0.000	1.46	0.04	5.07	1.4	0.102
15.650	0.000	1.48	0.04	5.07	1.4	0.102
15.667	0.000	1.50	0.04	5.07	1.4	0.102

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	1.52	0.04	5.07	1.5	0.102
15.700	0.000	1.55	0.04	5.07	1.5	0.102
15.717	0.000	1.62	0.04	5.08	1.5	0.103
15.733	0.000	1.69	0.04	5.08	1.6	0.103
15.750	0.000	1.77	0.04	5.08	1.7	0.103
15.767	0.000	1.85	0.04	5.09	1.8	0.103
15.783	0.000	1.92	0.04	5.09	1.8	0.103
15.800	0.000	2.00	0.04	5.09	1.9	0.103
15.817	0.000	2.08	0.04	5.10	2.0	0.103
15.833	0.000	2.15	0.04	5.10	2.1	0.103
15.850	0.000	2.23	0.04	5.11	2.1	0.103
15.867	0.000	2.32	0.04	5.11	2.2	0.103
15.883	0.000	2.42	0.04	5.11	2.3	0.103
15.900	0.000	2.51	0.04	5.12	2.4	0.103
15.917	0.000	2.61	0.04	5.12	2.5	0.103
15.933	0.000	2.70	0.04	5.13	2.6	0.104
15.950	0.000	2.79	0.04	5.13	2.7	0.104
15.967	0.000	2.89	0.04	5.14	2.8	0.104
15.983	0.000	2.98	0.04	5.14	2.9	0.104
16.000	0.000	3.08	0.04	5.15	3.0	0.104
16.017	0.000	3.48	0.04	5.16	3.2	0.104
16.033	0.000	4.19	0.04	5.20	3.7	0.105
16.050	0.000	4.91	0.04	5.23	4.4	0.106
16.067	0.000	5.62	0.04	5.27	5.1	0.106
16.083	0.000	6.33	0.04	5.30	5.8	0.107
16.100	0.000	7.04	0.04	5.34	6.5	0.108
16.117	0.000	7.76	0.04	5.37	7.2	0.108
16.133	0.000	8.47	0.04	5.41	7.9	0.109
16.150	0.000	9.18	0.04	5.44	8.6	0.110
16.167	0.000	9.70	0.04	5.47	9.3	0.110
16.183	0.000	8.62	0.04	5.43	9.1	0.110
16.200	0.000	7.76	0.04	5.39	8.3	0.109
16.217	0.000	6.91	0.04	5.35	7.5	0.108
16.233	0.000	6.05	0.04	5.30	6.6	0.107
16.250	0.000	5.20	0.04	5.26	5.8	0.106
16.267	0.000	4.34	0.04	5.22	4.9	0.105
16.283	0.000	3.49	0.04	5.18	4.1	0.105
16.300	0.000	2.63	0.04	5.14	3.2	0.104
16.317	0.000	1.90	0.04	5.10	2.4	0.103
16.333	0.000	1.76	0.04	5.09	1.9	0.103
16.350	0.000	1.70	0.04	5.08	1.7	0.103
16.367	0.000	1.65	0.04	5.08	1.7	0.103
16.383	0.000	1.59	0.04	5.08	1.6	0.103
16.400	0.000	1.54	0.04	5.07	1.5	0.102
16.417	0.000	1.48	0.04	5.07	1.5	0.102
16.433	0.000	1.43	0.04	5.07	1.4	0.102
16.450	0.000	1.37	0.04	5.06	1.4	0.102
16.467	0.000	1.32	0.04	5.06	1.3	0.102
16.483	0.000	1.29	0.04	5.06	1.3	0.102
16.500	0.000	1.27	0.04	5.06	1.2	0.102

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	1.25	0.04	5.06	1.2	0.102
16.533	0.000	1.23	0.04	5.06	1.2	0.102
16.550	0.000	1.21	0.04	5.06	1.2	0.102
16.567	0.000	1.19	0.04	5.06	1.2	0.102
16.583	0.000	1.17	0.04	5.05	1.1	0.102
16.600	0.000	1.15	0.04	5.05	1.1	0.102
16.617	0.000	1.13	0.04	5.05	1.1	0.102
16.633	0.000	1.11	0.04	5.05	1.1	0.102
16.650	0.000	1.09	0.04	5.05	1.1	0.102
16.667	0.000	1.08	0.04	5.05	1.0	0.102
16.683	0.000	1.06	0.04	5.05	1.0	0.102
16.700	0.000	1.04	0.04	5.05	1.0	0.102
16.717	0.000	1.02	0.04	5.05	1.0	0.102
16.733	0.000	1.00	0.04	5.05	1.0	0.102
16.750	0.000	0.98	0.04	5.04	1.0	0.102
16.767	0.000	0.97	0.04	5.04	0.9	0.102
16.783	0.000	0.95	0.04	5.04	0.9	0.102
16.800	0.000	0.94	0.04	5.04	0.9	0.102
16.817	0.000	0.93	0.04	5.04	0.9	0.102
16.833	0.000	0.92	0.04	5.04	0.9	0.102
16.850	0.000	0.90	0.04	5.04	0.9	0.102
16.867	0.000	0.89	0.04	5.04	0.9	0.102
16.883	0.000	0.88	0.04	5.04	0.9	0.102
16.900	0.000	0.87	0.04	5.04	0.8	0.102
16.917	0.000	0.86	0.04	5.04	0.8	0.102
16.933	0.000	0.85	0.04	5.04	0.8	0.102
16.950	0.000	0.84	0.04	5.04	0.8	0.102
16.967	0.000	0.83	0.04	5.04	0.8	0.102
16.983	0.000	0.82	0.04	5.04	0.8	0.102
17.000	0.000	0.82	0.04	5.04	0.8	0.102
17.017	0.000	0.81	0.04	5.04	0.8	0.102
17.033	0.000	0.80	0.04	5.04	0.8	0.102
17.050	0.000	0.79	0.04	5.04	0.8	0.102
17.067	0.000	0.78	0.04	5.03	0.7	0.102
17.083	0.000	0.77	0.04	5.03	0.7	0.102
17.100	0.000	0.77	0.04	5.03	0.7	0.102
17.117	0.000	0.76	0.04	5.03	0.7	0.102
17.133	0.000	0.75	0.04	5.03	0.7	0.102
17.150	0.000	0.75	0.04	5.03	0.7	0.102
17.167	0.000	0.74	0.04	5.03	0.7	0.102
17.183	0.000	0.73	0.04	5.03	0.7	0.102
17.200	0.000	0.73	0.04	5.03	0.7	0.102
17.217	0.000	0.72	0.04	5.03	0.7	0.102
17.233	0.000	0.71	0.04	5.03	0.7	0.102
17.250	0.000	0.71	0.04	5.03	0.7	0.102
17.267	0.000	0.70	0.04	5.03	0.7	0.102
17.283	0.000	0.70	0.04	5.03	0.7	0.102
17.300	0.000	0.69	0.04	5.03	0.7	0.102
17.317	0.000	0.69	0.04	5.03	0.7	0.102
17.333	0.000	0.68	0.04	5.03	0.6	0.102

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	0.68	0.04	5.03	0.6	0.102
17.367	0.000	0.67	0.04	5.03	0.6	0.102
17.383	0.000	0.67	0.04	5.03	0.6	0.102
17.400	0.000	0.66	0.04	5.03	0.6	0.102
17.417	0.000	0.66	0.04	5.03	0.6	0.102
17.433	0.000	0.65	0.04	5.03	0.6	0.102
17.450	0.000	0.65	0.04	5.03	0.6	0.102
17.467	0.000	0.64	0.04	5.03	0.6	0.102
17.483	0.000	0.64	0.04	5.03	0.6	0.102
17.500	0.000	0.64	0.04	5.03	0.6	0.102
17.517	0.000	0.63	0.04	5.03	0.6	0.102
17.533	0.000	0.63	0.04	5.03	0.6	0.102
17.550	0.000	0.62	0.04	5.03	0.6	0.102
17.567	0.000	0.62	0.04	5.03	0.6	0.102
17.583	0.000	0.62	0.04	5.03	0.6	0.102
17.600	0.000	0.61	0.04	5.03	0.6	0.102
17.617	0.000	0.61	0.04	5.03	0.6	0.102
17.633	0.000	0.60	0.04	5.03	0.6	0.102
17.650	0.000	0.60	0.04	5.03	0.6	0.102
17.667	0.000	0.60	0.04	5.03	0.6	0.102
17.683	0.000	0.59	0.04	5.03	0.6	0.102
17.700	0.000	0.59	0.04	5.03	0.6	0.102
17.717	0.000	0.59	0.04	5.03	0.5	0.102
17.733	0.000	0.58	0.04	5.02	0.5	0.101
17.750	0.000	0.58	0.04	5.02	0.5	0.101
17.767	0.000	0.58	0.04	5.02	0.5	0.101
17.783	0.000	0.57	0.04	5.02	0.5	0.101
17.800	0.000	0.57	0.04	5.02	0.5	0.101
17.817	0.000	0.57	0.04	5.02	0.5	0.101
17.833	0.000	0.57	0.04	5.02	0.5	0.101
17.850	0.000	0.56	0.04	5.02	0.5	0.101
17.867	0.000	0.56	0.04	5.02	0.5	0.101
17.883	0.000	0.56	0.04	5.02	0.5	0.101
17.900	0.000	0.55	0.04	5.02	0.5	0.101
17.917	0.000	0.55	0.04	5.02	0.5	0.101
17.933	0.000	0.55	0.04	5.02	0.5	0.101
17.950	0.000	0.55	0.04	5.02	0.5	0.101
17.967	0.000	0.54	0.04	5.02	0.5	0.101
17.983	0.000	0.54	0.04	5.02	0.5	0.101
18.000	0.000	0.54	0.04	5.02	0.5	0.101

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.945 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.792 AF
LOSS VOLUME = 0.153 AF

****
FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 7

>>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
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 ****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE = 5.1
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  >>>>>MODEL CHANNEL ROUTING OF STREAM #1 BY THE TRANSLATION METHOD<<<<<
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       THE TRANSLATION MODEL NEGLECTS ALL STORAGE ATTENUATION EFFECTS,
       AND MOVES THE STREAM 1 RUNOFF HYDROGRAPH FORWARD IN TIME.

       ASSUMED REGULAR CHANNEL INFORMATION:
         BASEWIDTH(FT) =   26.00     CHANNEL Z = 10.00
         UPSTREAM ELEVATION(FT) =     131.70
         DOWNSTREAM ELEVATION(FT) =     128.00
         CHANNEL LENGTH(FT) =     755.00     MANNING'S FACTOR = 0.015
         CONSTANT LOSS RATE(CFS) =    0.00

       MEAN-FLOW RATE NORMAL-DEPTH FLOW VELOCITIES(FPS) ARE AS FOLLOWS:
                          (FLOW RATE (CFS)) [FLOW VELOCITY (FPS)]
         AVERAGED PEAK  5-MINUTE: (       17.8).......[  2.48]
         AVERAGED PEAK 15-MINUTE: (       14.9).......[  2.39]
         AVERAGED PEAK 30-MINUTE: (       11.6).......[  2.18]
         AVERAGED PEAK  1-HOUR:   (        8.5).......[  1.92]
         AVERAGED PEAK  3-HOUR:   (        4.9).......[  1.57]
         AVERAGED PEAK  6-HOUR:   (        3.2).......[  1.42]
         AVERAGED PEAK 24-HOUR:   (        1.0).......[  1.02]
       USER-SPECIFIED CHANNEL AVERAGE FLOW VELOCITY(FPS) =   3.540
       HYDROGRAPH TRANSLATION TIME
       = (CHANNEL LENGTH)/(AVERAGE FLOW  VELOCITY)
       = (    755.00)/(  3.540) =   0.059 HRS

       TRANSLATION METHOD CHANNEL ROUTING RESULTS:
                                 OUTFLOW LESS
        MODEL       INFLOW     ROUTED     LOSS
         TIME     (STREAM 1)    FLOW     (STREAM 1)
        (HRS)       (CFS)      (CFS)      (CFS)
        14.000        1.71       1.65       1.65
        14.017        1.73       1.67       1.67
        14.033        1.74       1.69       1.69
        14.050        1.76       1.70       1.70
        14.067        1.77       1.72       1.72
        14.083        1.79       1.74       1.74
        14.100        1.80       1.75       1.75
        14.117        1.82       1.77       1.77
        14.133        1.83       1.78       1.78
        14.150        1.84       1.79       1.79
        14.167        1.86       1.81       1.81
        14.183        1.87       1.82       1.82
        14.200        1.89       1.84       1.84
        14.217        1.90       1.85       1.85
        14.233        1.92       1.86       1.86
```

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
14.250	1.93	1.88	1.88
14.267	1.95	1.89	1.89
14.283	1.96	1.91	1.91
14.300	1.98	1.92	1.92
14.317	1.99	1.94	1.94
14.333	2.01	1.95	1.95
14.350	2.02	1.97	1.97
14.367	2.03	1.99	1.99
14.383	2.04	2.00	2.00
14.400	2.06	2.01	2.01
14.417	2.07	2.03	2.03
14.433	2.08	2.04	2.04
14.450	2.09	2.05	2.05
14.467	2.10	2.06	2.06
14.483	2.12	2.07	2.07
14.500	2.13	2.09	2.09
14.517	2.15	2.10	2.10
14.533	2.16	2.11	2.11
14.550	2.18	2.12	2.12
14.567	2.20	2.14	2.14
14.583	2.21	2.16	2.16
14.600	2.23	2.17	2.17
14.617	2.24	2.19	2.19
14.633	2.26	2.20	2.20
14.650	2.27	2.22	2.22
14.667	2.28	2.23	2.23
14.683	2.30	2.25	2.25
14.700	2.31	2.26	2.26
14.717	2.32	2.28	2.28
14.733	2.34	2.29	2.29
14.750	2.35	2.30	2.30
14.767	2.36	2.32	2.32
14.783	2.38	2.33	2.33
14.800	2.39	2.34	2.34
14.817	2.41	2.35	2.35
14.833	2.43	2.37	2.37
14.850	2.45	2.38	2.38
14.867	2.47	2.40	2.40
14.883	2.49	2.42	2.42
14.900	2.51	2.44	2.44
14.917	2.53	2.46	2.46
14.933	2.55	2.48	2.48
14.950	2.57	2.50	2.50
14.967	2.59	2.52	2.52
14.983	2.60	2.54	2.54
15.000	2.62	2.56	2.56
15.017	2.64	2.58	2.58
15.033	2.65	2.59	2.59
15.050	2.67	2.61	2.61
15.067	2.69	2.63	2.63

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.083	2.71	2.64	2.64
15.100	2.73	2.66	2.66
15.117	2.76	2.68	2.68
15.133	2.79	2.70	2.70
15.150	2.82	2.72	2.72
15.167	2.84	2.74	2.74
15.183	2.87	2.77	2.77
15.200	2.90	2.80	2.80
15.217	2.93	2.83	2.83
15.233	2.96	2.86	2.86
15.250	2.99	2.89	2.89
15.267	3.02	2.92	2.92
15.283	3.04	2.94	2.94
15.300	3.07	2.97	2.97
15.317	3.10	3.00	3.00
15.333	3.13	3.03	3.03
15.350	3.16	3.05	3.05
15.367	3.19	3.08	3.08
15.383	3.22	3.11	3.11
15.400	3.24	3.14	3.14
15.417	3.27	3.17	3.17
15.433	3.30	3.20	3.20
15.450	3.32	3.23	3.23
15.467	3.34	3.26	3.26
15.483	3.37	3.28	3.28
15.500	3.39	3.31	3.31
15.517	3.41	3.33	3.33
15.533	3.44	3.36	3.36
15.550	3.47	3.38	3.38
15.567	3.50	3.40	3.40
15.583	3.54	3.43	3.43
15.600	3.58	3.45	3.45
15.617	3.62	3.48	3.48
15.633	3.66	3.52	3.52
15.650	3.71	3.56	3.56
15.667	3.75	3.60	3.60
15.683	3.80	3.64	3.64
15.700	3.85	3.68	3.68
15.717	3.92	3.73	3.73
15.733	4.02	3.77	3.77
15.750	4.12	3.82	3.82
15.767	4.22	3.88	3.88
15.783	4.33	3.96	3.96
15.800	4.45	4.06	4.06
15.817	4.57	4.17	4.17
15.833	4.70	4.27	4.27
15.850	4.84	4.38	4.38
15.867	4.98	4.50	4.50
15.883	5.14	4.63	4.63
15.900	5.31	4.76	4.76

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.917	5.53	4.90	4.90
15.933	5.67	5.05	5.05
15.950	5.85	5.22	5.22
15.967	6.04	5.41	5.41
15.983	6.23	5.59	5.59
16.000	6.43	5.75	5.75
16.017	6.77	5.94	5.94
16.033	7.40	6.13	6.13
16.050	8.24	6.32	6.32
16.067	9.17	6.58	6.58
16.083	10.17	7.05	7.05
16.100	11.25	7.77	7.77
16.117	12.45	8.66	8.66
16.133	14.06	9.62	9.62
16.150	15.79	10.65	10.65
16.167	17.61	11.78	11.78
16.183	18.39	13.16	13.16
16.200	18.21	14.83	14.83
16.217	17.79	16.60	16.60
16.233	17.18	17.96	17.96
16.250	16.36	18.31	18.31
16.267	15.36	18.03	18.03
16.283	14.21	17.52	17.52
16.300	12.93	16.81	16.81
16.317	11.64	15.91	15.91
16.333	10.67	14.85	14.85
16.350	10.07	13.64	13.64
16.367	9.58	12.36	12.36
16.383	9.13	11.21	11.21
16.400	8.72	10.40	10.40
16.417	8.34	9.85	9.85
16.433	7.95	9.38	9.38
16.450	7.55	8.95	8.95
16.467	7.21	8.55	8.55
16.483	6.90	8.17	8.17
16.500	6.63	7.77	7.77
16.517	6.40	7.40	7.40
16.533	6.24	7.07	7.07
16.550	6.11	6.78	6.78
16.567	5.98	6.53	6.53
16.583	5.86	6.33	6.33
16.600	5.75	6.18	6.18
16.617	5.64	6.06	6.06
16.633	5.54	5.93	5.93
16.650	5.43	5.82	5.82
16.667	5.33	5.70	5.70
16.683	5.23	5.60	5.60
16.700	5.13	5.49	5.49
16.717	5.03	5.38	5.38
16.733	4.93	5.28	5.28

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
16.750	4.83	5.18	5.18
16.767	4.74	5.08	5.08
16.783	4.65	4.98	4.98
16.800	4.56	4.89	4.89
16.817	4.48	4.79	4.79
16.833	4.41	4.70	4.70
16.850	4.33	4.61	4.61
16.867	4.25	4.53	4.53
16.883	4.18	4.45	4.45
16.900	4.11	4.37	4.37
16.917	4.03	4.29	4.29
16.933	3.96	4.22	4.22
16.950	3.89	4.15	4.15
16.967	3.83	4.07	4.07
16.983	3.77	4.00	4.00
17.000	3.73	3.93	3.93
17.017	3.65	3.86	3.86
17.033	3.59	3.80	3.80
17.050	3.53	3.75	3.75
17.067	3.48	3.70	3.70
17.083	3.42	3.63	3.63
17.100	3.37	3.56	3.56
17.117	3.32	3.51	3.51
17.133	3.27	3.45	3.45
17.150	3.22	3.40	3.40
17.167	3.17	3.35	3.35
17.183	3.13	3.30	3.30
17.200	3.08	3.25	3.25
17.217	3.03	3.20	3.20
17.233	2.99	3.15	3.15
17.250	2.95	3.11	3.11
17.267	2.91	3.06	3.06
17.283	2.87	3.01	3.01
17.300	2.83	2.97	2.97
17.317	2.79	2.93	2.93
17.333	2.76	2.89	2.89
17.350	2.72	2.85	2.85
17.367	2.69	2.81	2.81
17.383	2.65	2.78	2.78
17.400	2.62	2.74	2.74
17.417	2.59	2.70	2.70
17.433	2.55	2.67	2.67
17.450	2.52	2.64	2.64
17.467	2.49	2.60	2.60
17.483	2.47	2.57	2.57
17.500	2.44	2.54	2.54
17.517	2.41	2.51	2.51
17.533	2.38	2.48	2.48
17.550	2.35	2.45	2.45
17.567	2.33	2.42	2.42

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
17.583	2.30	2.40	2.40
17.600	2.28	2.37	2.37
17.617	2.26	2.34	2.34
17.633	2.23	2.32	2.32
17.650	2.21	2.29	2.29
17.667	2.19	2.27	2.27
17.683	2.16	2.24	2.24
17.700	2.14	2.22	2.22
17.717	2.12	2.20	2.20
17.733	2.10	2.18	2.18
17.750	2.08	2.15	2.15
17.767	2.06	2.13	2.13
17.783	2.04	2.11	2.11
17.800	2.02	2.09	2.09
17.817	2.00	2.07	2.07
17.833	1.98	2.05	2.05
17.850	1.97	2.03	2.03
17.867	1.95	2.01	2.01
17.883	1.93	1.99	1.99
17.900	1.92	1.98	1.98
17.917	1.90	1.96	1.96
17.933	1.88	1.94	1.94
17.950	1.87	1.92	1.92
17.967	1.85	1.91	1.91
17.983	1.84	1.89	1.89
18.000	1.82	1.88	1.88

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PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 2.187 AF
OUTFLOW VOLUME = 2.187 AF
LOSS VOLUME = 0.000 AF

****
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<
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STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
14.000	0.2375	1.65	QV	.	.	.	.
14.017	0.2398	1.67	QV	.	.	.	.
14.033	0.2421	1.69	QV	.	.	.	.
14.050	0.2444	1.70	QV	.	.	.	.
14.067	0.2468	1.72	QV	.	.	.	.
14.083	0.2492	1.74	QV	.	.	.	.
14.100	0.2516	1.75	QV	.	.	.	.
14.117	0.2540	1.77	QV	.	.	.	.
14.133	0.2565	1.78	QV	.	.	.	.
14.150	0.2590	1.79	QV	.	.	.	.
14.167	0.2614	1.81	QV	.	.	.	.
14.183	0.2640	1.82	QV	.	.	.	.
14.200	0.2665	1.84	QV	.	.	.	.
14.217	0.2690	1.85	QV	.	.	.	.
14.233	0.2716	1.86	QV	.	.	.	.
14.250	0.2742	1.88	Q V	.	.	.	.
14.267	0.2768	1.89	Q V	.	.	.	.
14.283	0.2794	1.91	Q V	.	.	.	.
14.300	0.2821	1.92	Q V	.	.	.	.
14.317	0.2847	1.94	Q V	.	.	.	.
14.333	0.2874	1.95	Q V	.	.	.	.
14.350	0.2901	1.97	Q V	.	.	.	.
14.367	0.2929	1.99	Q V	.	.	.	.
14.383	0.2956	2.00	Q V	.	.	.	.
14.400	0.2984	2.01	QV	.	.	.	.
14.417	0.3012	2.03	QV	.	.	.	.
14.433	0.3040	2.04	QV	.	.	.	.
14.450	0.3068	2.05	QV	.	.	.	.
14.467	0.3097	2.06	QV	.	.	.	.
14.483	0.3125	2.07	QV	.	.	.	.
14.500	0.3154	2.09	QV	.	.	.	.
14.517	0.3183	2.10	QV	.	.	.	.
14.533	0.3212	2.11	QV	.	.	.	.
14.550	0.3241	2.12	QV	.	.	.	.
14.567	0.3271	2.14	QV	.	.	.	.
14.583	0.3300	2.16	Q V	.	.	.	.
14.600	0.3330	2.17	Q V	.	.	.	.
14.617	0.3360	2.19	Q V	.	.	.	.
14.633	0.3391	2.20	Q V	.	.	.	.
14.650	0.3421	2.22	Q V	.	.	.	.
14.667	0.3452	2.23	Q V	.	.	.	.
14.683	0.3483	2.25	Q V	.	.	.	.
14.700	0.3514	2.26	Q V	.	.	.	.
14.717	0.3546	2.28	Q V	.	.	.	.
14.733	0.3577	2.29	Q V	.	.	.	.
14.750	0.3609	2.30	Q V	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
14.767	0.3641	2.32	. Q V	.	.	.	.
14.783	0.3673	2.33	. Q V	.	.	.	.
14.800	0.3705	2.34	. Q V	.	.	.	.
14.817	0.3738	2.35	. Q V	.	.	.	.
14.833	0.3770	2.37	. Q V	.	.	.	.
14.850	0.3803	2.38	. Q V	.	.	.	.
14.867	0.3836	2.40	. Q V	.	.	.	.
14.883	0.3869	2.42	. Q V	.	.	.	.
14.900	0.3903	2.44	. Q V	.	.	.	.
14.917	0.3937	2.46	. Q V	.	.	.	.
14.933	0.3971	2.48	. Q V	.	.	.	.
14.950	0.4006	2.50	. Q V	.	.	.	.
14.967	0.4040	2.52	. Q V	.	.	.	.
14.983	0.4075	2.54	. Q V	.	.	.	.
15.000	0.4111	2.56	. Q V	.	.	.	.
15.017	0.4146	2.58	. Q V	.	.	.	.
15.033	0.4182	2.59	. Q V	.	.	.	.
15.050	0.4218	2.61	. Q V	.	.	.	.
15.067	0.4254	2.63	. Q V	.	.	.	.
15.083	0.4290	2.64	. Q V	.	.	.	.
15.100	0.4327	2.66	. Q V	.	.	.	.
15.117	0.4364	2.68	. Q V	.	.	.	.
15.133	0.4401	2.70	. Q V	.	.	.	.
15.150	0.4439	2.72	. Q V	.	.	.	.
15.167	0.4477	2.74	. Q V	.	.	.	.
15.183	0.4515	2.77	. Q V	.	.	.	.
15.200	0.4553	2.80	. Q V	.	.	.	.
15.217	0.4592	2.83	. Q V	.	.	.	.
15.233	0.4632	2.86	. Q V	.	.	.	.
15.250	0.4671	2.89	. Q V	.	.	.	.
15.267	0.4712	2.92	. Q V	.	.	.	.
15.283	0.4752	2.94	. Q V	.	.	.	.
15.300	0.4793	2.97	. Q V	.	.	.	.
15.317	0.4834	3.00	. Q V	.	.	.	.
15.333	0.4876	3.03	. Q V	.	.	.	.
15.350	0.4918	3.05	. Q V	.	.	.	.
15.367	0.4961	3.08	. Q V.	.	.	.	.
15.383	0.5003	3.11	. Q V.	.	.	.	.
15.400	0.5047	3.14	. Q V.	.	.	.	.
15.417	0.5090	3.17	. Q V.	.	.	.	.
15.433	0.5134	3.20	. Q V.	.	.	.	.
15.450	0.5179	3.23	. Q V.	.	.	.	.
15.467	0.5224	3.26	. Q V.	.	.	.	.
15.483	0.5269	3.28	. Q V.	.	.	.	.
15.500	0.5315	3.31	. Q V.	.	.	.	.
15.517	0.5360	3.33	. Q V.	.	.	.	.
15.533	0.5407	3.36	. Q V.	.	.	.	.
15.550	0.5453	3.38	. Q V.	.	.	.	.
15.567	0.5500	3.40	. Q V	.	.	.	.
15.583	0.5547	3.43	. Q V	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
15.600	0.5595	3.45	. Q V	.	.	.	
15.617	0.5643	3.48	. Q V	.	.	.	
15.633	0.5691	3.52	. Q V	.	.	.	
15.650	0.5740	3.56	. Q V	.	.	.	
15.667	0.5790	3.60	. Q V	.	.	.	
15.683	0.5840	3.64	. Q V	.	.	.	
15.700	0.5891	3.68	. Q V	.	.	.	
15.717	0.5942	3.73	. Q V	.	.	.	
15.733	0.5994	3.77	. Q V	.	.	.	
15.750	0.6046	3.82	. Q .V	.	.	.	
15.767	0.6100	3.88	. Q .V	.	.	.	
15.783	0.6155	3.96	. Q .V	.	.	.	
15.800	0.6210	4.06	. Q .V	.	.	.	
15.817	0.6268	4.17	. Q .V	.	.	.	
15.833	0.6327	4.27	. Q .V	.	.	.	
15.850	0.6387	4.38	. Q .V	.	.	.	
15.867	0.6449	4.50	. Q.V	.	.	.	
15.883	0.6513	4.63	. Q.V	.	.	.	
15.900	0.6578	4.76	. Q. V	.	.	.	
15.917	0.6646	4.90	. Q. V	.	.	.	
15.933	0.6716	5.05	. Q V	.	.	.	
15.950	0.6787	5.22	. Q V	.	.	.	
15.967	0.6862	5.41	. Q V	.	.	.	
15.983	0.6939	5.59	. .QV	.	.	.	
16.000	0.7018	5.75	. .QV	.	.	.	
16.017	0.7100	5.94	. .QV	.	.	.	
16.033	0.7184	6.13	. . QV	.	.	.	
16.050	0.7271	6.32	. . QV	.	.	.	
16.067	0.7362	6.58	. . Q	.	.	.	
16.083	0.7459	7.05	. . VQ	.	.	.	
16.100	0.7566	7.77	. . V Q	.	.	.	
16.117	0.7686	8.66	. . V Q	.	.	.	
16.133	0.7818	9.62	. . V Q.	.	.	.	
16.150	0.7965	10.65	. . V .Q	.	.	.	
16.167	0.8127	11.78	. . V . Q	.	.	.	
16.183	0.8308	13.16	. . V . Q	.	.	.	
16.200	0.8513	14.83	. . V . Q.	.	.	.	
16.217	0.8741	16.60	. . V . . Q	.	.	.	
16.233	0.8989	17.96	. . V . . Q	.	.	.	
16.250	0.9241	18.31	. . V . . Q	.	.	.	
16.267	0.9489	18.03	. . V . . Q	.	.	.	
16.283	0.9731	17.52	. . V . . Q	.	.	.	
16.300	0.9962	16.81	. . V . . Q	.	.	.	
16.317	1.0181	15.91	. . V . .Q	.	.	.	
16.333	1.0386	14.85	. . V . Q.	.	.	.	
16.350	1.0574	13.64	. . V. Q	.	.	.	
16.367	1.0744	12.36	. . V. Q	.	.	.	
16.383	1.0898	11.21	. . V. Q	.	.	.	
16.400	1.1041	10.40	. . Q	.	.	.	
16.417	1.1177	9.85	. . QV	.	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
16.433	1.1306	9.38	. . Q V	.	.		
16.450	1.1430	8.95	. . Q V	.	.		
16.467	1.1547	8.55	. . Q .V	.	.		
16.483	1.1660	8.17	. . Q .V	.	.		
16.500	1.1767	7.77	. . Q .V	.	.		
16.517	1.1869	7.40	. . Q .V	.	.		
16.533	1.1966	7.07	. . Q .V	.	.		
16.550	1.2060	6.78	. . Q . V	.	.		
16.567	1.2150	6.53	. . Q . V	.	.		
16.583	1.2237	6.33	. . Q . V	.	.		
16.600	1.2322	6.18	. . Q . V	.	.		
16.617	1.2405	6.06	. . Q . V	.	.		
16.633	1.2487	5.93	. .Q . V	.	.		
16.650	1.2567	5.82	. .Q . V	.	.		
16.667	1.2646	5.70	. .Q . V	.	.		
16.683	1.2723	5.60	. .Q . V	.	.		
16.700	1.2798	5.49	. Q . V	.	.		
16.717	1.2873	5.38	. Q . V	.	.		
16.733	1.2945	5.28	. Q . V	.	.		
16.750	1.3017	5.18	. Q . V	.	.		
16.767	1.3087	5.08	. Q . V	.	.		
16.783	1.3155	4.98	. Q. . V	.	.		
16.800	1.3223	4.89	. Q. . V	.	.		
16.817	1.3289	4.79	. Q. . V	.	.		
16.833	1.3353	4.70	. Q. . V	.	.		
16.850	1.3417	4.61	. Q. . V	.	.		
16.867	1.3479	4.53	. Q. . V	.	.		
16.883	1.3540	4.45	. Q . . V	.	.		
16.900	1.3601	4.37	. Q . . V	.	.		
16.917	1.3660	4.29	. Q . . V	.	.		
16.933	1.3718	4.22	. Q . . V	.	.		
16.950	1.3775	4.15	. Q . . V	.	.		
16.967	1.3831	4.07	. Q . . V	.	.		
16.983	1.3886	4.00	. Q . . V	.	.		
17.000	1.3940	3.93	. Q . . V	.	.		
17.017	1.3994	3.86	. Q . . V	.	.		
17.033	1.4046	3.80	. Q . . V	.	.		
17.050	1.4098	3.75	. Q . . V	.	.		
17.067	1.4149	3.70	. Q . . V	.	.		
17.083	1.4198	3.63	. Q . . V	.	.		
17.100	1.4248	3.56	. Q . . V	.	.		
17.117	1.4296	3.51	. Q . . V	.	.		
17.133	1.4343	3.45	. Q . . V	.	.		
17.150	1.4390	3.40	. Q . . V	.	.		
17.167	1.4436	3.35	. Q . . V	.	.		
17.183	1.4482	3.30	. Q . . V	.	.		
17.200	1.4527	3.25	. Q . . V	.	.		
17.217	1.4571	3.20	. Q . . V	.	.		
17.233	1.4614	3.15	. Q . . V	.	.		
17.250	1.4657	3.11	. Q . . V	.	.		

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
17.267	1.4699	3.06	. Q	.	. V	.	.
17.283	1.4740	3.01	. Q	.	. V	.	.
17.300	1.4781	2.97	. Q	.	. V	.	.
17.317	1.4822	2.93	. Q	.	. V	.	.
17.333	1.4861	2.89	. Q	.	. V	.	.
17.350	1.4901	2.85	. Q	.	. V	.	.
17.367	1.4940	2.81	. Q	.	. V	.	.
17.383	1.4978	2.78	. Q	.	. V	.	.
17.400	1.5015	2.74	. Q	.	. V	.	.
17.417	1.5053	2.70	. Q	.	. V	.	.
17.433	1.5090	2.67	. Q	.	. V	.	.
17.450	1.5126	2.64	. Q	.	. V	.	.
17.467	1.5162	2.60	. Q	.	. V	.	.
17.483	1.5197	2.57	. Q	.	. V	.	.
17.500	1.5232	2.54	. Q	.	. V	.	.
17.517	1.5267	2.51	. Q	.	. V	.	.
17.533	1.5301	2.48	. Q	.	. V	.	.
17.550	1.5335	2.45	. Q	.	. V	.	.
17.567	1.5368	2.42	. Q	.	. V	.	.
17.583	1.5401	2.40	. Q	.	. V	.	.
17.600	1.5434	2.37	. Q	.	. V	.	.
17.617	1.5466	2.34	. Q	.	. V	.	.
17.633	1.5498	2.32	. Q	.	. V	.	.
17.650	1.5530	2.29	. Q	.	. V	.	.
17.667	1.5561	2.27	. Q	.	. V	.	.
17.683	1.5592	2.24	. Q	.	. V	.	.
17.700	1.5622	2.22	. Q	.	. V	.	.
17.717	1.5653	2.20	. Q	.	. V	.	.
17.733	1.5683	2.18	. Q	.	. V	.	.
17.750	1.5712	2.15	. Q	.	. V	.	.
17.767	1.5741	2.13	. Q	.	. V	.	.
17.783	1.5771	2.11	. Q	.	. V	.	.
17.800	1.5799	2.09	. Q	.	. V	.	.
17.817	1.5828	2.07	. Q	.	. V	.	.
17.833	1.5856	2.05	. Q	.	. V	.	.
17.850	1.5884	2.03	. Q	.	. V.	.	.
17.867	1.5912	2.01	. Q	.	. V.	.	.
17.883	1.5939	1.99	. Q	.	. V.	.	.
17.900	1.5966	1.98	. Q	.	. V.	.	.
17.917	1.5993	1.96	. Q	.	. V.	.	.
17.933	1.6020	1.94	. Q	.	. V.	.	.
17.950	1.6047	1.92	. Q	.	. V.	.	.
17.967	1.6073	1.91	. Q	.	. V.	.	.
17.983	1.6099	1.89	. Q	.	. V.	.	.
18.000	1.6125	1.88	. Q	.	. V.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	415.0
30%	215.0
40%	130.0
50%	95.0
60%	70.0

70%	55.0
80%	45.0
90%	30.0

==========

END OF FLOODSCx ROUTING ANALYSIS

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**

INF-5: Drywell

Also known as:

- *Soakaway Pits*
- *Infiltration Sumps*
- *Rock Sumps*
- *Underground Injection Controls*



Drywell
Source: K&A Enterprises

Drywells are similar to infiltration trenches in their design and function, but generally have a greater depth to footprint area ratio and can be installed at relatively large depths. A drywell is a subsurface storage facility designed to temporarily store and infiltrate runoff, primarily from rooftops or other impervious areas with low pollutant loading. A drywell may be either a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment. Drywells can be used to reduce the volume of runoff from roofs and other relatively clean surfaces. While roofs are generally not a significant source of stormwater pollutants, they can be a major contributor of runoff volumes. Therefore, drywells can indirectly enhance water quality by reducing the water quality design volume that must be treated by other, downstream stormwater management facilities. *Note: A drywell is considered a "Class V Injection Wells" under the federal Underground Injection Control (UIC) Program regulated in California by U.S. EPA Region 9. A UIC permit may be required (for details see http://www.epa.gov/region9/water/groundwater/uic-classv.html).*

Feasibility Screening Considerations

- Drywells shall pass infiltration infeasibility screening criteria (**TGD Section 2.4.2.4**) to be considered for use.
- Dry wells provide a more direct pathway for stormwater to groundwater, therefore pose a greater risk to groundwater quality than surface infiltration systems.

Opportunity Criteria

- Drywells may be used to infiltrate roof runoff, either directly or from the overflow from a cistern.
- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Space available for pretreatment (biotreatment or treatment control BMP as described below).
- The drywell must be located in native soil; over-excavated by at least one foot in depth and replaced uniformly without compaction.
- 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.

OC-Specific Design Criteria and Considerations

☐ Must comply with local, state, and federal UIC regulations; a permit may be required.

☐ Minimum set-backs from foundations and slopes should be observed

- ☐ Infiltration should not cause geotechnical concerns related to slope stability, liquefaction, or erosion.
- ☐ Minimum separation to mounded seasonally high groundwater of 10 feet shall be observed.
- ☐ Drywells should not receive untreated stormwater runoff, except rooftop runoff. Pretreatment of runoff from other surfaces is necessary to prevent premature failure that results from clogging with fine sediment, and to prevent potential groundwater contamination due to nutrients, salts, and hydrocarbons.
- ☐ Design infiltration rate should be determined with an infiltration test at each drywell location.
- ☐ Drywell should be encased by 1 foot of coarse (3/4" to 2 ½"), round river rock on sides and bottom of facility.
- ☐ Maximum facility depth is 25 feet with the approval of a geotechnical professional; preferred depth less than 10 feet does not require geotechnical approval.
- ☐ If inlet is an underground pipe, a fine mesh screen should be installed to prevent coarse solids from entering drywell.
- ☐ An overflow route must be installed for flows that overtop facility.

Sizing Criteria for Drywells

Drywell sizing is highly site-specific. Sizing calculations shall demonstrate via the methods described in **Appendix III** or via project-specific methods that the system captures and fully discharges the DCV within 48 hours following the end of precipitation, or captures and infiltrates 80 percent of average annual runoff volume.

Configuration for Use in a Treatment Train

- Drywells may be preceded in a treatment train by HSCs in the drainage area, which would reduce the required volume of the drywell.
- Drywells treating any areas other than roof tops must be preceded by a robust biotreatment or conventional treatment capable of addressing all potentially generated pollutants.
- Drywells may be used in conjunction with other infiltration BMPs to increase the infiltration capacity of the entire treatment train system.

Additional References for Design Guidance

- Stormwater Management in Western Washington (Volume III: Hydrologic Analysis and Flow Control Design BMPs) **http://www.ecy.wa.gov/pubs/0510031.pdf**
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **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**
- City of Portland Stormwater Management Manual (Drywell, page 2-87) **http://www.portlandonline.com/bes/index.cfm?c=47954&a=202883**
- San Diego County LID Handbook Appendix 4 (Factsheet 25): **http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf**
- City of Santa Barbara Storm Water BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

Bill De Jong

From: Randy Wagner <rwagner@lgcvalley.com>
Sent: Wednesday, September 11, 2019 10:47 AM
To: Bill De Jong
Subject: RE: Lincoln at Euclid Dry Well Infiltration Testing

Bill,

Based on my research of environmental reports containing groundwater data and groundwater data from the State of California in the general vicinity of the site, the groundwater elevation at the Anaheim site is in the 100 to 110 foot-range. The 80 to 85 foot depth we listed in our report was from a site just west of the site and the groundwater depth was based on measurements in the mid 1980's. The more recent groundwater depths in the general vicinity ranged from 95 feet (measured as of 2/21/2019 at a site about a 1/2 mile south of the site) to 100 feet in 2005, 109 feet in 2006, and 110 feet in the early 2010's at sites on the south side of the intersection of Lincoln and Euclid and further to the southwest (less than a ¼ to 1/2 mile away).

Here's a link to the State of California water date library:

http://wdl.water.ca.gov/waterdatalibrary/index.cfm

Hope this helps,

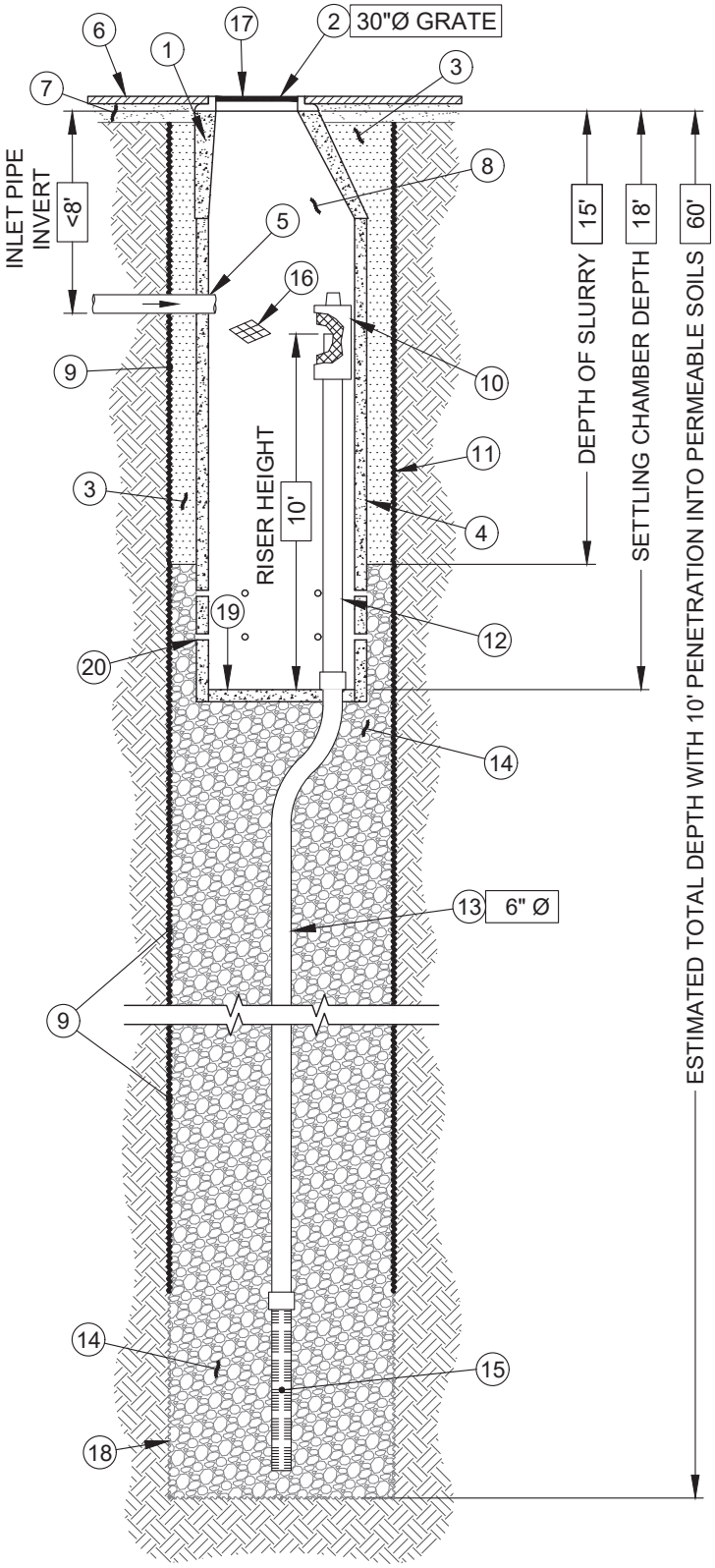
Randy Wagner
LGC Valley, Inc.

The MaxWell® IV

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

Shopoff 2 DMA A

Anaheim, CA



ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **STABILIZED BACKFILL** - TWO-SACK SLURRY MIX.
4. **PRE-CAST LINER -** 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE.**
5. **INLET PIPE (BY OTHERS).** SEE SEPARATE PLAN FOR INVERT ELEVATIONS.
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL**, IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE** - MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN. 6' Ø DRILLED SHAFT.**
19. **BASE SEAL** - CONCRETE SLURRY.
20. **6 PERFORATIONS MINIMUM PER FOOT, 2 ROWS MINIMUM.**

AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
CA Lic. 886759, C-42, C-57, HAZ.
Also licensed in the following states: MT, NM, NV, OR, TX, UT, and WA.

U.S. Patent No. 4,923,330 - ™ Trademark 1974, 1990, 2004

DETAIL :	IV-6-SS-CA	REVISED BY:	BDJ		
DRAWN ON:	05-14-19	REVISED DATE:	09-11-19	SCALE:	N.T.S

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September 11, 2019
Huitt-Zollars - Irvine
Attn: Steven Cook
Re: Maxwell® IV Drainage System USBR Equation Calculations for **Shopoff 2 / DMA A - Anaheim, CA**

Given:		
Measured Ks	0.88	in/hr
Safety Factor	2.0	
Mitigated Volume	12,650	ft^3
Required Drawdown Time	48	hours
Min. Depth to Infiltration	10	ft
Depth to Groundwater	100	ft
Rock Porosity	40	%

Design:		
Design Ks	0.44	in/hr
Actual Depth to Infiltration	15	ft
Actual Drywell Bottom Depth	60	ft
Groundwater Depth	100	ft

Ks (in/hr): saturated hydraulic conductivity
h (inches): height of water in well
Tu (inches): distance between the water surface and the water table or impervious strata

Drywell Radius, r:	36	inches	= *From Design Detail*
Total Depth, H:	540	inches	= *Drywell Bottom Depth - Depth to Infiltration*
Tu:	1020	inches	= *Groundwater Depth - Depth to Infiltration*
USBR Condition =	II		*Condition I: Tu>3h; Condition II: h<Tu<3h*

Condition II USBR Equation

$$Ks = \frac{Q}{2\pi H^2}\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]$$

Solving for Q results in:

$$Q = \frac{(Ks)2\pi H^2}{\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]}$$

Note: Temperature factors are not included as they have minimal impact on final calculation.

Determine flowrate, Q, for drywell infiltration.

$$Q = \frac{(Ks)2\pi H^2}{\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]} = \frac{0.44 \times 2 \times \pi \times (540)^2}{\left[\frac{\ln(540 \div 36)}{1/6 + 1/3 \times (540 \div 1020)^{-1}}\right]} = \frac{806157.8}{\left[\frac{2.7081}{0.79630}\right]} = 237048.96 \text{ in}^3/\text{hr}$$

Q = 237049 in^3/hr x (1 ft^3)/(1,728 in^3) x (1 hr)/(3,600 sec)
Q = 0.0381 ft^3/sec

Volume of disposal based on various time frames are included below.

48 hours: 0.0381 CFS x 48 hours x $\frac{3600 \text{ sec}}{1 \text{ hr}}$ = 6,585 cubic feet of retained water disposed of.
47 hours: 0.0381 CFS x 47 hours x $\frac{3600 \text{ sec}}{1 \text{ hr}}$ = 6,448 cubic feet of retained water disposed of.

2 drywell(s) are required to drawdown mitigated volume in 48 hours.
Actual drawdown time for 2 drywell(s) is 47 hours.

Chamber diameter = 4 feet. Drywell rock shaft diameter = 6 feet.
Volume provided in each drywell with chamber depth of 18 feet.

18 *ft* x 12.566 ft^2 + 42 *ft* x 28.274 ft^2 x 40 % = 701 ft^3

Based on the total mitigated volume of 12650 CF, the actual drawdown time is 47 hours. The storage provided in the drywells is 1402 CF therefore the remaining storage requirement is 11248 CF.

Bill De Jong, PE
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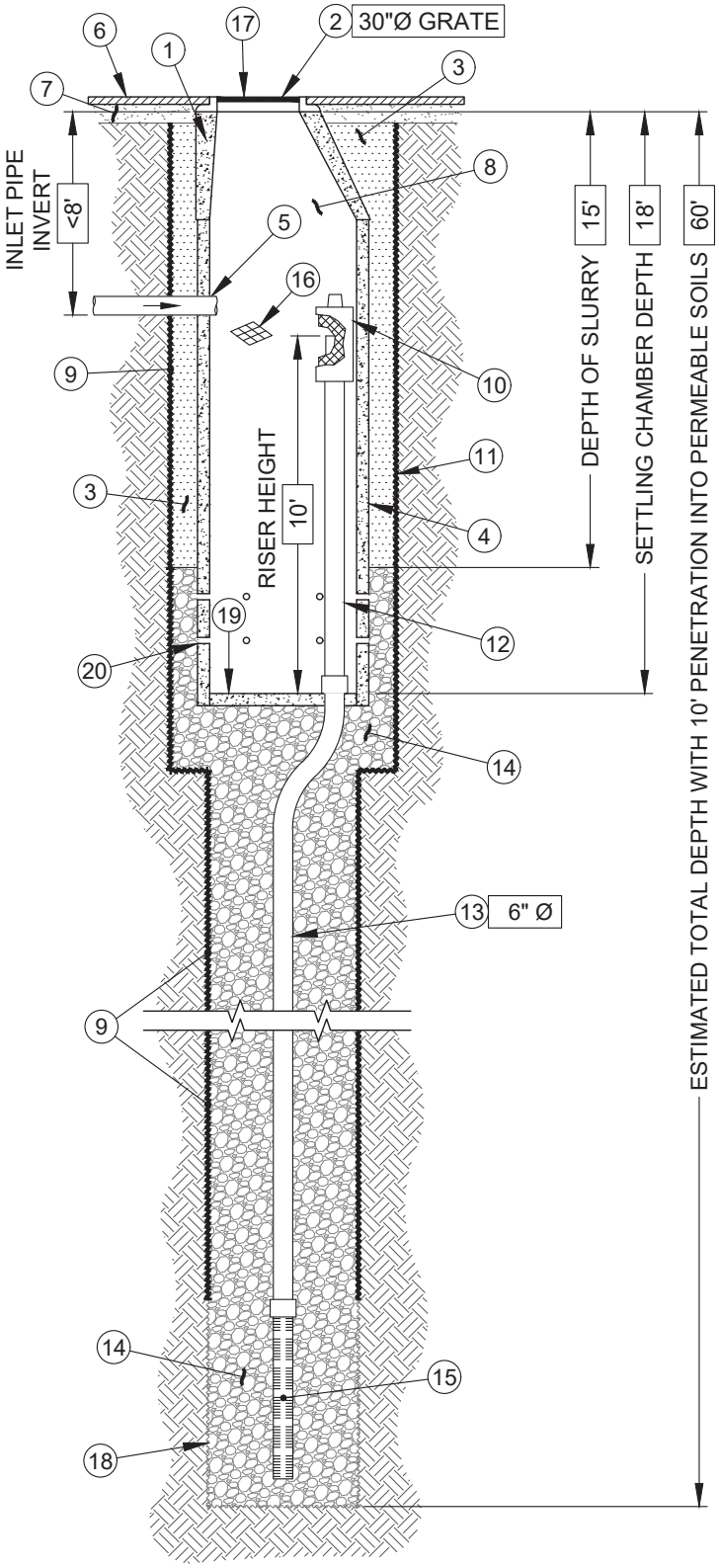
Torrent Resources (CA) Incorporated
9950 Alder Avenue
Bloomington, CA 92316
Phone 909-829-0740
CA Lic. 886759 A, C-42
An Evolution of McGuckin Drilling

The MaxWell® IV

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

Shopoff 2 DMA B

Anaheim, CA



AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
CA Lic. 886759, C-42, C-57, HAZ.
Also licensed in the following states: MT, NM, NV, OR, TX, UT, and WA.

U.S. Patent No. 4,923,330 - ™ Trademark 1974, 1990, 2004

ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **STABILIZED BACKFILL** - TWO-SACK SLURRY MIX.
4. **PRE-CAST LINER -** 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE.**
5. **INLET PIPE (BY OTHERS).** SEE SEPARATE PLAN FOR INVERT ELEVATIONS.
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL**, IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE** - MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN 4' Ø DRILLED SHAFT.**
19. **BASE SEAL** - CONCRETE SLURRY.
20. **6 PERFORATIONS MINIMUM PER FOOT, 2 ROWS MINIMUM.**

Manufactured and Installed by

TORRENT® RESOURCES

An evolution of McGuckin Drilling
www.torrentresources.com
CALIFORNIA 909-829-0740
ARIZONA 602-268-0785

DETAIL : IV-4-SS-CA	REVISED BY: BDJ	
DRAWN ON: 05-14-19	REVISED DATE: 09-11-19	SCALE: N.T.S

September 11, 2019
Huitt-Zollars - Irvine
Attn: Steven Cook
Re: Maxwell® IV Drainage System USBR Equation Calculations for **Shopoff 2 / DMA B - Anaheim, CA**

Given:		
Measured Ks	1	in/hr
Safety Factor	2.0	
Mitigated Volume	5,300	ft^3
Required Drawdown Time	48	hours
Min. Depth to Infiltration	10	ft
Depth to Groundwater	100	ft
Rock Porosity	40	%

Design:		
Design Ks	0.5	in/hr
Actual Depth to Infiltration	15	ft
Actual Drywell Bottom Depth	60	ft
Groundwater Depth	100	ft

Ks (in/hr): saturated hydraulic conductivity
h (inches): height of water in well
Tu (inches): distance between the water surface and the water table or impervious strata

Drywell Radius, r:	24	inches	= *From Design Detail*
Total Depth, H:	540	inches	= *Drywell Bottom Depth - Depth to Infiltration*
Tu:	1020	inches	= *Groundwater Depth - Depth to Infiltration*
USBR Condition =	II		*Condition I: Tu>3h; Condition II: h<Tu<3h*

Condition II USBR Equation

$$Ks = \frac{Q}{2\pi H^2}\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]$$

Solving for Q results in:

$$Q = \frac{(Ks)2\pi H^2}{\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]}$$

Note: Temperature factors are not included as they have minimal impact on final calculation.

Determine flowrate, Q, for drywell infiltration.

$$Q = \frac{(Ks)2\pi H^2}{\left[\frac{\ln\left(\frac{H}{r}\right)}{\frac{1}{6}+\frac{1}{3}\left(\frac{H}{Tu}\right)^{-1}}\right]} = \frac{0.5 \times 2 \times \pi \times (540)^2}{\left[\frac{\ln(540 \div 24)}{1/6 + 1/3 \times (540 \div 1020)^{-1}}\right]} = \frac{916088.4}{\left[\frac{3.1135}{0.79630}\right]} = 234293.95 \text{ in}^3/\text{hr}$$

Q = 234294 in^3/hr x (1 ft^3)/(1,728 in^3) x (1 hr)/(3,600 sec)
Q = 0.0377 ft^3/sec

Volume of disposal based on various time frames are included below.

48 hours: 0.0377 CFS x 48 hours x $\frac{3600 \text{ sec}}{1 \text{ hr}}$ = 6,508 cubic feet of retained water disposed of.
40 hours: 0.0377 CFS x 40 hours x $\frac{3600 \text{ sec}}{1 \text{ hr}}$ = 5,423 cubic feet of retained water disposed of.

1 drywell(s) are required to drawdown mitigated volume in 48 hours.
Actual drawdown time for 1 drywell(s) is 40 hours.

Chamber diameter = 4 feet. Drywell rock shaft diameter = 4 feet.
Volume provided in each drywell with chamber depth of 18 feet.

18 *ft* x 12.566 ft^2 + 42 *ft* x 12.566 ft^2 x 40 % = 437 ft^3

Based on the total mitigated volume of 5300 CF, the actual drawdown time is only 40 hours. Using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs, the DCV fraction , X1, is 0.98. Taking the DCV multiplied by 0.98 = 5194 CF. The storage provided in the drywells is 437 CF therefore the remaining storage requirement is 4757 CF.

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Bloomington, CA 92316
Phone 909-829-0740
CA Lic. 886759 A, C-42
An Evolution of McGuckin Drilling

Attachment 5 Hydromodification

PRELIMINARY MAP
SUBJECT TO FURTHER REVISION

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

Earth (Unstable)
Earth (Stabilized)
Stabilized

Tidel Influence

<= Mean High Water Line (4.28')

Water Body

Basin
Lake
Reservoir

Other Lands

Airport/Military

Los Angeles County

Channel in Retarding Basin

PROJECT LOCATION

Anaheim Bay-Huntington Harbor Watershed

Santa River Watershed

Newport Bay-Newport Coastal Streams Watershed

Humble Reservoir
Orange County
Valencia Reservoir
Fullerton Reservoir
Loftus Diversion Channel Desilting Basin
Brea Creek Reservoir
Fullerton Reservoir
Fullerton Reservoir
Fullerton Reservoir
Hillcrest Park Reservoir
Fullerton Airport
Placentia Retarding Basin
La Jolla Recharge Basin
Miller Retarding Basin
Kraemer Basin
Raymond Retarding Basin
Gilbert Retarding Basin
Crescent Retarding Basin
Cypress Retarding Basin
Rossmoor Retarding Basin
Los Alamitos Naval Air Station
Los Alamitos Retarding Basin
Seal Beach Naval Weapons Station

0 8,000 16,000 Feet

G-216

TITLE
SUSCEPTIBILITY ANALYIS
SAN GABRIEL-COYOTE CREEK

JOB
ORANGE COUNTY WATERSHED MASTER PLANNING
ORANGE CO. CA

SCALE	1" = 8000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

1

P:\9526E\6-GIS\Mxds\SuceptiabilityMaps_20100505\9526E_SanGabrielCoyoteCreekSusceptibility_20100430.mxd

LEGEND

SUBAREA DESTINATION – SUBAREA ACREAGE – E-1 / XX.XX

AREA OF DESIGN CAPTURE VOLUME (CONCEPTUAL DETAIL)

HYDRAULIC NODE DESIGNATION 300

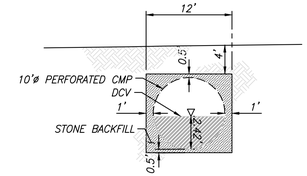
HYDROLOGIC SUBAREA BOUNDARY

LONGEST FLOW PATH

OVERLAND FLOW

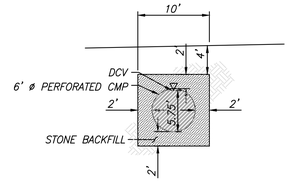
NOTE

HYDROLOGIC COMPUTATIONS AND FLOW MITIGATION ARE BASED ON LOCAL DRAINAGE ONLY,. NO REGIONAL ANALYSIS IS PROVIDED AT THIS STAGE.



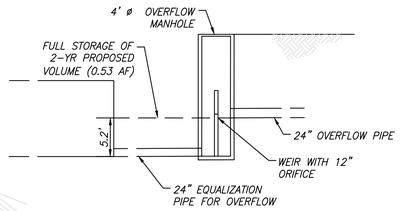
CONCEPTUAL RETENTION CHAMBER SECTION A

SCALE: 1"=10'



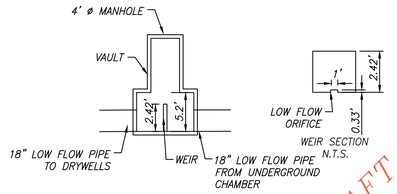
CONCEPTUAL RETENTION CHAMBER SECTION B

SCALE: 1"=10'



SECTION C
CONCEPTUAL OVERFLOW WEIR

N.T.S.

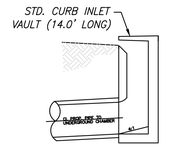


SECTION D
CONCEPTUAL LOW FLOW WEIR

N.T.S

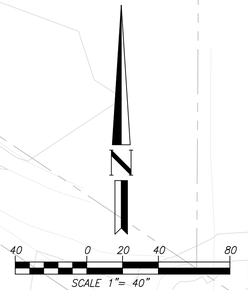
DRAFT

At Node 106	Condition		
Frequency	Existing	Proposed	Delta
100-year Q (cfs)	19.41	18.31	-5.67%
25-year Q (cfs)	14.72	12.71	-13.65%
10-year Q (cfs)	11.95	9.00	-24.69%
2-year Q (cfs)	5.88	3.24	-44.90%



SECTION E
OVERFLOW CURB INLET
(OVERFLOW TO GUTTER)

N.T.S.



LINCOLN AT EUCLID

ANAHEIM, CA

PROPOSED HYDROLOGY EXHIBIT

PREPARED BY: HUITT-ZOLLARS

PREPARED FOR: SHOPOFF REALTY INVESTMENTS

DATE : 08/05/2019

```
**************************************************************************
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         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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          Ver. 21.0  Release Date: 06/01/2014  License ID 1202

                    Analysis prepared by:

                      Huitt-Zollars, Inc.
                    2603 Main Street, Irvine CA.
                          Suite 400
                        (949)-988-5815

 ************************* DESCRIPTION OF STUDY *************************
* SHOPOFF ANAHEIM                                                      *
* RATIONAL METHOD - EXISTING CONDITION DMA A                           *
* 2YR AMC I RC 10/22/2019                                              *
 **************************************************************************

  FILE NAME: ANAEX2DA.DAT
  TIME/DATE OF STUDY: 18:23 10/22/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
               --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   197.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.30  DOWNSTREAM(FEET) =    133.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.240
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.422
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
```

```
 "BARREN"                B       0.68      0.30     1.000    72   11.24
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.69
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      0.69

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    133.60  DOWNSTREAM(FEET) =    130.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   691.00   CHANNEL SLOPE =  0.0052
 GIVEN CHANNEL BASE(FEET) =    5.00   CHANNEL FREEBOARD(FEET) =  1.0
 "Z" FACTOR =  10.000   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   1.29
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                B       4.24      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.14
 AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =  10.08
 Tc(MIN.) =   21.32
 SUBAREA AREA(ACRES) =     4.24       SUBAREA RUNOFF(CFS) =    2.61
 EFFECTIVE AREA(ACRES) =      4.92     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.9         PEAK FLOW RATE(CFS) =       3.03
 GIVEN CHANNEL BASE(FEET) =    5.00   CHANNEL FREEBOARD(FEET) =  1.0
 "Z" FACTOR =  10.000   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   1.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   1.29
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     888.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        4.9  TC(MIN.) =     21.32
 EFFECTIVE AREA(ACRES) =      4.92  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       3.03
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                    Analysis prepared by:

                      Huitt-Zollars, Inc.
                    2603 Main Street, Irvine CA.
                          Suite 400
                        (949)-988-5815

 ************************* DESCRIPTION OF STUDY *************************
* SHOPOFF ANAHEIM                                                       *
* RATIONAL METHOD - EXISTING CONDITION DMA B                            *
* 2YR AMC I RC 10/22/2019                                               *
 **************************************************************************

  FILE NAME: ANAEX2DB.DAT
  TIME/DATE OF STUDY: 18:27 10/22/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
               --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   202.00
  ELEVATION DATA: UPSTREAM(FEET) =    135.90  DOWNSTREAM(FEET) =    131.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.568
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.128
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                B       0.95      0.30      0.100    36    5.57
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.79
 TOTAL AREA(ACRES) =      0.95   PEAK FLOW RATE(CFS) =      1.79

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    131.90  DOWNSTREAM(FEET) =    131.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   196.00   CHANNEL SLOPE =  0.0026
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.900
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.600
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       0.88      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.42
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.91
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.58
 Tc(MIN.) =    9.15
 SUBAREA AREA(ACRES) =     0.88       SUBAREA RUNOFF(CFS) =    1.24
 EFFECTIVE AREA(ACRES) =      1.83     AREA-AVERAGED Fm(INCH/HR) =   0.03
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       2.59

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.95
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     398.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   261.00
 ELEVATION DATA: UPSTREAM(FEET) =    132.90  DOWNSTREAM(FEET) =    132.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.111
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.200
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B       0.63      0.30      1.000    72   15.11
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.51
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.51

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

```
 FLOW PROCESS FROM NODE    211.00 TO NODE    203.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    132.00  DOWNSTREAM(FEET) =    130.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =  0.0044
 CHANNEL BASE(FEET) =   26.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.51
 FLOW VELOCITY(FEET/SEC.) =   0.70   FLOW DEPTH(FEET) =   0.03
 TRAVEL TIME(MIN.) =   5.94   Tc(MIN.) =   21.05
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    203.00 =     511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q     Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        0.51   21.05    0.992  0.30( 0.30) 1.00       0.6     210.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    203.00 =     511.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q     Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        2.59    9.15    1.600  0.30( 0.03) 0.10       1.8     200.00
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     398.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q     Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        3.00    9.15    1.600  0.30( 0.07) 0.22       2.1     200.00
    2        2.09   21.05    0.992  0.30( 0.10) 0.33       2.5     210.00
   TOTAL AREA(ACRES) =         2.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        3.00  Tc(MIN.) =    9.148
 EFFECTIVE AREA(ACRES) =      2.10  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =        2.5
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    203.00 =     511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    130.90  DOWNSTREAM(FEET) =    128.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   568.00   CHANNEL SLOPE =  0.0051
 CHANNEL BASE(FEET) =   26.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.00
 FLOW VELOCITY(FEET/SEC.) =   1.29   FLOW DEPTH(FEET) =   0.09
 TRAVEL TIME(MIN.) =   7.35   Tc(MIN.) =   16.50
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    106.00 =    1079.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   21.32   RAINFALL INTENSITY(INCH/HR) =  0.98
 EFFECTIVE AREA(ACRES) =     4.92
 TOTAL AREA(ACRES) =     4.92        PEAK FLOW RATE(CFS) =      3.03
 AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =   0.30
 AREA-AVERAGED Ap =  1.00
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q     Tc  Intensity  Fp(Fm)    Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1       3.03   21.32    0.985  0.30( 0.30) 1.00       4.9     210.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    106.00 =    1079.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      Q     Tc  Intensity  Fp(Fm)    Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1       3.00   16.50    1.141  0.30( 0.07) 0.22       2.1     200.00
    2       2.09   28.97    0.826  0.30( 0.10) 0.33       2.5     210.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    106.00 =    1079.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q     Tc  Intensity  Fp(Fm)    Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1       5.88   16.50    1.141  0.30( 0.22) 0.72       5.9     200.00
    2       5.68   21.32    0.985  0.30( 0.23) 0.77       7.2     210.00
    3       4.42   28.97    0.826  0.30( 0.23) 0.78       7.4     210.00
   TOTAL AREA(ACRES) =        7.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.88  Tc(MIN.) =   16.499
 EFFECTIVE AREA(ACRES) =      5.91  AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.77
 TOTAL AREA(ACRES) =       7.4
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    106.00 =    1079.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       7.4  TC(MIN.) =     16.50
 EFFECTIVE AREA(ACRES) =      5.91  AREA-AVERAGED Fm(INCH/HR)=  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.721
 PEAK FLOW RATE(CFS)   =       5.88

 ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.88	16.50	1.141	0.30(0.22)	0.72	5.9	200.00
2	5.68	21.32	0.985	0.30(0.23)	0.77	7.2	210.00
3	4.42	28.97	0.826	0.30(0.23)	0.78	7.4	210.00

END OF RATIONAL METHOD ANALYSIS

****

F L O O D R O U T I N G A N A L Y S I S
USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
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********** DESCRIPTION OF STUDY **********
* SHOPOFF ANAHEIM - UNMITIGATED CONDITION *
* HYDROGRAPHS & FLOOD ROUTING ANALYSIS - PROPOSED CONDITION DMA A&B *
* 2YR AMC I RC 10/22/2019 *
****

FILE NAME: SHOU2AB.DAT
TIME/DATE OF STUDY: 17:02 11/01/2019

The Small Area Unit Hydrograph Procedures in Section J
of the Hydrology Manual provides estimates of runoff
hydrograph and runoff volume for watersheds whose time of
concentration is less than 25 minutes. The PROGRAM User
should check the applicability of using the small area unit
hydrograph procedures, and follow the guidelines in
Sections J and K.5 in complex watershed modeling.

```
****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE = 1.2
----------------------------------------------------------------------------
 >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

 (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =    5.12
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.088
   LOW LOSS FRACTION = 0.372
   TIME OF CONCENTRATION(MIN.) =  8.58
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) =   2
     5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
    30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
     1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
     3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
     6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
    24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

----------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.53
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.34

----------------------------------------------------------------------------
```

24-HOUR STORM
RUNOFF HYDROGRAPH

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
14.000	0.1818	0.38	. Q	. V	.	.	.
14.017	0.1823	0.38	. Q	. V	.	.	.
14.033	0.1828	0.38	. Q	. V	.	.	.
14.050	0.1834	0.39	. Q	. V	.	.	.
14.067	0.1839	0.39	. Q	. V	.	.	.
14.083	0.1844	0.39	. Q	. V	.	.	.
14.100	0.1850	0.40	. Q	. V	.	.	.
14.117	0.1855	0.40	. Q	. V	.	.	.
14.133	0.1861	0.41	. Q	. V	.	.	.
14.150	0.1867	0.41	. Q	. V	.	.	.
14.167	0.1872	0.41	. Q	. V	.	.	.
14.183	0.1878	0.41	. Q	. V	.	.	.
14.200	0.1884	0.41	. Q	. V	.	.	.
14.217	0.1889	0.42	. Q	. V	.	.	.
14.233	0.1895	0.42	. Q	. V	.	.	.
14.250	0.1901	0.42	. Q	. V	.	.	.
14.267	0.1907	0.42	. Q	. V	.	.	.
14.283	0.1913	0.42	. Q	. V	.	.	.
14.300	0.1918	0.42	. Q	. V	.	.	.
14.317	0.1924	0.43	. Q	. V	.	.	.
14.333	0.1930	0.43	. Q	. V	.	.	.
14.350	0.1936	0.43	. Q	. V	.	.	.
14.367	0.1942	0.43	. Q	. V	.	.	.
14.383	0.1948	0.44	. Q	. V	.	.	.
14.400	0.1954	0.44	. Q	. V	.	.	.
14.417	0.1960	0.44	. Q	. V	.	.	.
14.433	0.1966	0.45	. Q	. V	.	.	.
14.450	0.1972	0.45	. Q	. V	.	.	.
14.467	0.1979	0.45	. Q	. V	.	.	.
14.483	0.1985	0.45	. Q	. V	.	.	.
14.500	0.1991	0.45	. Q	. V	.	.	.
14.517	0.1997	0.45	. Q	. V	.	.	.
14.533	0.2004	0.46	. Q	. V	.	.	.
14.550	0.2010	0.46	. Q	. V	.	.	.
14.567	0.2016	0.46	. Q	. V	.	.	.
14.583	0.2023	0.46	. Q	. V	.	.	.
14.600	0.2029	0.46	. Q	. V	.	.	.
14.617	0.2035	0.47	. Q	. V	.	.	.
14.633	0.2042	0.47	. Q	. V	.	.	.
14.650	0.2049	0.48	. Q	. V	.	.	.
14.667	0.2055	0.48	. Q	. V	.	.	.
14.683	0.2062	0.48	. Q	. V	.	.	.
14.700	0.2069	0.49	. Q	. V	.	.	.
14.717	0.2075	0.49	. Q	. V	.	.	.
14.733	0.2082	0.49	. Q	. V	.	.	.
14.750	0.2089	0.50	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
14.767	0.2096	0.50	. Q	. V	.	.	.
14.783	0.2103	0.50	. Q	. V	.	.	.
14.800	0.2110	0.50	. Q	. V	.	.	.
14.817	0.2117	0.51	. Q	. V	.	.	.
14.833	0.2124	0.51	. Q	. V	.	.	.
14.850	0.2131	0.51	. Q	. V	.	.	.
14.867	0.2138	0.51	. Q	. V	.	.	.
14.883	0.2145	0.52	. Q	. V	.	.	.
14.900	0.2152	0.52	. Q	. V	.	.	.
14.917	0.2159	0.53	. Q	. V	.	.	.
14.933	0.2167	0.53	. Q	. V	.	.	.
14.950	0.2174	0.54	. Q	. V	.	.	.
14.967	0.2181	0.54	. Q	. V	.	.	.
14.983	0.2189	0.55	. Q	. V	.	.	.
15.000	0.2197	0.55	. Q	. V	.	.	.
15.017	0.2204	0.56	. Q	. V	.	.	.
15.033	0.2212	0.56	. Q	. V	.	.	.
15.050	0.2220	0.56	. Q	. V	.	.	.
15.067	0.2228	0.57	. Q	. V	.	.	.
15.083	0.2236	0.57	. Q	. V	.	.	.
15.100	0.2243	0.57	. Q	. V	.	.	.
15.117	0.2251	0.58	. Q	. V	.	.	.
15.133	0.2259	0.58	. Q	. V	.	.	.
15.150	0.2267	0.58	. Q	. V	.	.	.
15.167	0.2276	0.59	. Q	. V	.	.	.
15.183	0.2284	0.60	. Q	. V	.	.	.
15.200	0.2292	0.61	. Q	. V	.	.	.
15.217	0.2301	0.62	. Q	. V	.	.	.
15.233	0.2309	0.62	. Q	. V	.	.	.
15.250	0.2318	0.63	. Q	. V	.	.	.
15.267	0.2327	0.64	. Q	. V	.	.	.
15.283	0.2336	0.65	. Q	. V	.	.	.
15.300	0.2345	0.66	. Q	. V	.	.	.
15.317	0.2354	0.66	. Q	. V	.	.	.
15.333	0.2363	0.67	. Q	. V	.	.	.
15.350	0.2372	0.67	. Q	. V	.	.	.
15.367	0.2382	0.68	. Q	. V	.	.	.
15.383	0.2391	0.69	. Q	. V	.	.	.
15.400	0.2401	0.69	. Q	. V	.	.	.
15.417	0.2410	0.70	. Q	. V	.	.	.
15.433	0.2420	0.70	. Q	. V	.	.	.
15.450	0.2430	0.71	. Q	. V	.	.	.
15.467	0.2440	0.71	. Q	. V	.	.	.
15.483	0.2450	0.72	. Q	. V	.	.	.
15.500	0.2459	0.72	. Q	. V	.	.	.
15.517	0.2469	0.72	. Q	. V	.	.	.
15.533	0.2479	0.73	. Q	. V	.	.	.
15.550	0.2490	0.73	. Q	. V	.	.	.
15.567	0.2500	0.74	. Q	. V	.	.	.
15.583	0.2510	0.74	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
15.600	0.2520	0.76	Q	V			
15.617	0.2531	0.78	Q	V			
15.633	0.2542	0.79	Q	V			
15.650	0.2553	0.81	Q	V			
15.667	0.2565	0.83	Q	V			
15.683	0.2576	0.85	Q	V			
15.700	0.2588	0.86	Q	V			
15.717	0.2600	0.88	Q	V			
15.733	0.2613	0.93	Q	V			
15.750	0.2627	1.00	Q	V			
15.767	0.2642	1.07	Q	V			
15.783	0.2657	1.13	Q	V			
15.800	0.2674	1.20	Q	V			
15.817	0.2691	1.27	Q	V			
15.833	0.2710	1.34	Q	V			
15.850	0.2729	1.41	Q	V			
15.867	0.2749	1.48	Q	V			
15.883	0.2771	1.56	Q	V			
15.900	0.2793	1.64	Q	V			
15.917	0.2817	1.71	Q	V			
15.933	0.2842	1.79	Q	V			
15.950	0.2868	1.87	Q	V			
15.967	0.2894	1.95	Q	V			
15.983	0.2922	2.03	Q	V			
16.000	0.2952	2.11	Q	V			
16.017	0.2985	2.45	Q	V			
16.033	0.3027	3.04	Q	V			
16.050	0.3077	3.64	Q	V			
16.067	0.3136	4.23	Q				
16.083	0.3202	4.83	V	Q			
16.100	0.3277	5.42	V	Q			
16.117	0.3360	6.02	V	Q			
16.133	0.3451	6.61	V	Q			
16.150	0.3551	7.26	V	Q			
16.167	0.3642	6.60	V	Q			
16.183	0.3723	5.88	V	Q			
16.200	0.3794	5.17	Q				
16.217	0.3855	4.45	Q	V			
16.233	0.3907	3.73	Q	V			
16.250	0.3948	3.02	Q	V			
16.267	0.3980	2.30	Q	V			
16.283	0.4002	1.59	Q	V			
16.300	0.4017	1.10	Q	V			
16.317	0.4031	1.04	Q	V			
16.333	0.4045	0.99	Q	V			
16.350	0.4058	0.93	Q	V			
16.367	0.4070	0.88	Q	V			
16.383	0.4081	0.83	Q	V			
16.400	0.4092	0.77	Q	V			
16.417	0.4102	0.72	Q	V			

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
16.433	0.4111	0.67	. Q	.	. V	.	
16.450	0.4120	0.65	. Q	.	. V	.	
16.467	0.4129	0.64	. Q	.	. .V	.	
16.483	0.4138	0.64	. Q	.	. .V	.	
16.500	0.4146	0.64	. Q	.	. .V	.	
16.517	0.4155	0.63	. Q	.	. .V	.	
16.533	0.4164	0.63	. Q	.	. .V	.	
16.550	0.4172	0.62	. Q	.	. .V	.	
16.567	0.4181	0.62	. Q	.	. .V	.	
16.583	0.4189	0.61	. Q	.	. .V	.	
16.600	0.4198	0.60	. Q	.	. .V	.	
16.617	0.4206	0.59	. Q	.	. .V	.	
16.633	0.4214	0.58	. Q	.	. .V	.	
16.650	0.4222	0.58	. Q	.	. .V	.	
16.667	0.4230	0.57	. Q	.	. .V	.	
16.683	0.4237	0.56	. Q	.	. .V	.	
16.700	0.4245	0.55	. Q	.	. .V	.	
16.717	0.4252	0.54	. Q	.	. .V	.	
16.733	0.4259	0.53	. Q	.	. .V	.	
16.750	0.4267	0.52	. Q	.	. . V	.	
16.767	0.4274	0.52	. Q	.	. . V	.	
16.783	0.4281	0.51	. Q	.	. . V	.	
16.800	0.4288	0.50	. Q	.	. . V	.	
16.817	0.4294	0.50	. Q	.	. . V	.	
16.833	0.4301	0.49	. Q	.	. . V	.	
16.850	0.4308	0.48	. Q	.	. . V	.	
16.867	0.4314	0.48	. Q	.	. . V	.	
16.883	0.4321	0.47	. Q	.	. . V	.	
16.900	0.4327	0.47	. Q	.	. . V	.	
16.917	0.4334	0.46	. Q	.	. . V	.	
16.933	0.4340	0.46	. Q	.	. . V	.	
16.950	0.4346	0.45	. Q	.	. . V	.	
16.967	0.4352	0.45	. Q	.	. . V	.	
16.983	0.4358	0.44	. Q	.	. . V	.	
17.000	0.4364	0.44	. Q	.	. . V	.	
17.017	0.4370	0.43	. Q	.	. . V	.	
17.033	0.4376	0.42	. Q	.	. . V	.	
17.050	0.4382	0.42	. Q	.	. . V	.	
17.067	0.4387	0.41	. Q	.	. . V	.	
17.083	0.4393	0.41	. Q	.	. . V	.	
17.100	0.4399	0.40	. Q	.	. . V	.	
17.117	0.4404	0.40	. Q	.	. . V	.	
17.133	0.4410	0.39	. Q	.	. . V	.	
17.150	0.4415	0.39	. Q	.	. . V	.	
17.167	0.4420	0.38	. Q	.	. . V	.	
17.183	0.4425	0.38	. Q	.	. . V	.	
17.200	0.4431	0.38	. Q	.	. . V	.	
17.217	0.4436	0.37	. Q	.	. . V	.	
17.233	0.4441	0.37	. Q	.	. . V	.	
17.250	0.4446	0.37	. Q	.	. . V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
17.267	0.4451	0.36	. Q	.	.	V	.
17.283	0.4456	0.36	.Q	.	.	V	.
17.300	0.4461	0.36	.Q	.	.	V	.
17.317	0.4466	0.36	.Q	.	.	V	.
17.333	0.4471	0.35	.Q	.	.	V	.
17.350	0.4475	0.35	.Q	.	.	V	.
17.367	0.4480	0.35	.Q	.	.	V	.
17.383	0.4485	0.35	.Q	.	.	V	.
17.400	0.4490	0.34	.Q	.	.	V	.
17.417	0.4494	0.34	.Q	.	.	V	.
17.433	0.4499	0.34	.Q	.	.	V	.
17.450	0.4504	0.34	.Q	.	.	V	.
17.467	0.4508	0.33	.Q	.	.	V	.
17.483	0.4513	0.33	.Q	.	.	V	.
17.500	0.4517	0.33	.Q	.	.	V	.
17.517	0.4522	0.33	.Q	.	.	V	.
17.533	0.4526	0.32	.Q	.	.	V	.
17.550	0.4531	0.32	.Q	.	.	V	.
17.567	0.4535	0.32	.Q	.	.	V	.
17.583	0.4540	0.32	.Q	.	.	V	.
17.600	0.4544	0.32	.Q	.	.	V	.
17.617	0.4548	0.31	.Q	.	.	V	.
17.633	0.4553	0.31	.Q	.	.	V	.
17.650	0.4557	0.31	.Q	.	.	V	.
17.667	0.4561	0.31	.Q	.	.	V	.
17.683	0.4565	0.31	.Q	.	.	V	.
17.700	0.4569	0.31	.Q	.	.	V	.
17.717	0.4574	0.30	.Q	.	.	V	.
17.733	0.4578	0.30	.Q	.	.	V	.
17.750	0.4582	0.30	.Q	.	.	V	.
17.767	0.4586	0.30	.Q	.	.	V	.
17.783	0.4590	0.30	.Q	.	.	V	.
17.800	0.4594	0.30	.Q	.	.	V	.
17.817	0.4598	0.29	.Q	.	.	V	.
17.833	0.4602	0.29	.Q	.	.	V	.
17.850	0.4606	0.29	.Q	.	.	V	.
17.867	0.4610	0.29	.Q	.	.	V	.
17.883	0.4614	0.29	.Q	.	.	V	.
17.900	0.4618	0.29	.Q	.	.	V	.
17.917	0.4622	0.28	.Q	.	.	V	.
17.933	0.4626	0.28	.Q	.	.	V	.
17.950	0.4630	0.28	.Q	.	.	V	.
17.967	0.4634	0.28	.Q	.	.	V	.
17.983	0.4638	0.28	.Q	.	.	V	.
18.000	0.4641	0.28	.Q	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	265.0
20%	130.0
30%	80.0
40%	70.0
50%	60.0
60%	45.0

70%	35.0
80%	25.0
90%	15.0

****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
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MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 468.00 MANNINGS FACTOR = 0.013
UPSTREAM ELEVATION(FT) = 130.00
DOWNSTREAM ELEVATION(FT) = 127.60
PIPE DIAMETER(FT) = 2.00

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.000	0.38	1.24	0.38	0.000
14.017	0.38	1.25	0.38	0.000
14.033	0.38	1.27	0.38	0.000
14.050	0.39	1.28	0.38	0.000
14.067	0.39	1.29	0.38	0.000
14.083	0.39	1.30	0.38	0.000
14.100	0.40	1.32	0.38	0.000
14.117	0.40	1.33	0.40	0.000
14.133	0.41	1.34	0.41	0.000
14.150	0.41	1.36	0.41	0.000
14.167	0.41	1.36	0.42	0.000
14.183	0.41	1.37	0.43	0.000
14.200	0.41	1.37	0.42	0.000
14.217	0.42	1.37	0.43	0.000
14.233	0.42	1.38	0.43	0.000
14.250	0.42	1.38	0.42	0.000
14.267	0.42	1.39	0.42	0.000
14.283	0.42	1.39	0.42	0.000
14.300	0.42	1.40	0.42	0.000
14.317	0.43	1.41	0.42	0.000
14.333	0.43	1.42	0.42	0.000
14.350	0.43	1.43	0.43	0.000
14.367	0.43	1.44	0.43	0.000
14.383	0.44	1.45	0.43	0.000
14.400	0.44	1.46	0.44	0.000
14.417	0.44	1.47	0.44	0.000
14.433	0.45	1.47	0.45	0.000
14.450	0.45	1.48	0.45	0.000
14.467	0.45	1.49	0.45	0.000
14.483	0.45	1.49	0.45	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.500	0.45	1.50	0.46	0.000
14.517	0.45	1.50	0.46	0.000
14.533	0.46	1.51	0.46	0.000
14.550	0.46	1.51	0.46	0.000
14.567	0.46	1.52	0.46	0.000
14.583	0.46	1.53	0.46	0.000
14.600	0.46	1.54	0.46	0.000
14.617	0.47	1.55	0.46	0.000
14.633	0.47	1.56	0.47	0.000
14.650	0.48	1.58	0.47	0.000
14.667	0.48	1.59	0.47	0.000
14.683	0.48	1.60	0.48	0.000
14.700	0.49	1.61	0.49	0.000
14.717	0.49	1.63	0.50	0.000
14.733	0.49	1.64	0.50	0.000
14.750	0.50	1.64	0.50	0.000
14.767	0.50	1.65	0.50	0.000
14.783	0.50	1.66	0.51	0.000
14.800	0.50	1.66	0.50	0.000
14.817	0.51	1.67	0.51	0.000
14.833	0.51	1.68	0.51	0.000
14.850	0.51	1.69	0.51	0.000
14.867	0.51	1.70	0.51	0.000
14.883	0.52	1.71	0.51	0.000
14.900	0.52	1.73	0.52	0.000
14.917	0.53	1.75	0.52	0.000
14.933	0.53	1.77	0.52	0.000
14.950	0.54	1.78	0.54	0.000
14.967	0.54	1.80	0.54	0.000
14.983	0.55	1.82	0.55	0.000
15.000	0.55	1.83	0.55	0.000
15.017	0.56	1.85	0.56	0.000
15.033	0.56	1.86	0.56	0.000
15.050	0.56	1.87	0.57	0.000
15.067	0.57	1.88	0.58	0.000
15.083	0.57	1.89	0.57	0.000
15.100	0.57	1.90	0.57	0.000
15.117	0.58	1.91	0.58	0.000
15.133	0.58	1.92	0.58	0.000
15.150	0.58	1.93	0.58	0.000
15.167	0.59	1.96	0.59	0.000
15.183	0.60	1.99	0.59	0.000
15.200	0.61	2.01	0.59	0.000
15.217	0.62	2.04	0.61	0.000
15.233	0.62	2.07	0.64	0.000
15.250	0.63	2.09	0.63	0.000
15.267	0.64	2.12	0.64	0.000
15.283	0.65	2.15	0.65	0.000
15.300	0.66	2.17	0.66	0.000
15.317	0.66	2.19	0.66	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
15.333	0.67	2.21	0.67	0.000
15.350	0.67	2.23	0.68	0.000
15.367	0.68	2.25	0.68	0.000
15.383	0.69	2.27	0.69	0.000
15.400	0.69	2.29	0.69	0.000
15.417	0.70	2.31	0.70	0.000
15.433	0.70	2.33	0.70	0.000
15.450	0.71	2.35	0.71	0.000
15.467	0.71	2.36	0.72	0.000
15.483	0.72	2.37	0.72	0.000
15.500	0.72	2.39	0.72	0.000
15.517	0.72	2.40	0.72	0.000
15.533	0.73	2.41	0.73	0.000
15.550	0.73	2.43	0.73	0.000
15.567	0.74	2.44	0.74	0.000
15.583	0.74	2.46	0.74	0.000
15.600	0.76	2.52	0.74	0.000
15.617	0.78	2.57	0.75	0.000
15.633	0.79	2.63	0.77	0.000
15.650	0.81	2.68	0.81	0.000
15.667	0.83	2.69	0.86	0.000
15.683	0.85	2.71	0.87	0.000
15.700	0.86	2.72	0.82	0.000
15.717	0.88	2.73	0.84	0.000
15.733	0.93	2.77	0.86	0.000
15.750	1.00	2.81	0.88	0.000
15.767	1.07	2.86	0.92	0.000
15.783	1.13	2.91	0.99	0.000
15.800	1.20	2.96	1.06	0.000
15.817	1.27	3.00	1.14	0.000
15.833	1.34	3.05	1.21	0.000
15.850	1.41	3.10	1.28	0.000
15.867	1.48	3.15	1.35	0.000
15.883	1.56	3.20	1.42	0.000
15.900	1.64	3.26	1.50	0.000
15.917	1.71	3.30	1.58	0.000
15.933	1.79	3.34	1.67	0.000
15.950	1.87	3.39	1.74	0.000
15.967	1.95	3.43	1.82	0.000
15.983	2.03	3.47	1.90	0.000
16.000	2.11	3.51	1.99	0.000
16.017	2.45	3.70	2.07	0.000
16.033	3.04	3.94	2.15	0.000
16.050	3.64	4.15	2.70	0.000
16.067	4.23	4.35	3.70	0.000
16.083	4.83	4.53	4.06	0.000
16.100	5.42	4.65	4.70	0.000
16.117	6.02	4.78	5.24	0.000
16.133	6.61	4.89	5.88	0.000
16.150	7.26	5.00	6.50	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
16.167	6.60	4.89	7.11	0.000
16.183	5.88	4.75	6.75	0.000
16.200	5.17	4.60	6.02	0.000
16.217	4.45	4.41	5.35	0.000
16.233	3.73	4.19	4.63	0.000
16.250	3.02	3.93	3.93	0.000
16.267	2.30	3.62	3.27	0.000
16.283	1.59	3.22	2.97	0.000
16.300	1.10	2.89	1.94	0.000
16.317	1.04	2.84	1.28	0.000
16.333	0.99	2.81	0.99	0.000
16.350	0.93	2.77	1.04	0.000
16.367	0.88	2.73	0.99	0.000
16.383	0.83	2.69	0.94	0.000
16.400	0.77	2.56	0.89	0.000
16.417	0.72	2.38	0.84	0.000
16.433	0.67	2.21	0.74	0.000
16.450	0.65	2.15	0.73	0.000
16.467	0.64	2.13	0.56	0.000
16.483	0.64	2.12	0.51	0.000
16.500	0.64	2.11	0.60	0.000
16.517	0.63	2.09	0.63	0.000
16.533	0.63	2.08	0.63	0.000
16.550	0.62	2.06	0.62	0.000
16.567	0.62	2.05	0.62	0.000
16.583	0.61	2.03	0.61	0.000
16.600	0.60	2.00	0.61	0.000
16.617	0.59	1.97	0.61	0.000
16.633	0.58	1.94	0.60	0.000
16.650	0.58	1.90	0.58	0.000
16.667	0.57	1.87	0.57	0.000
16.683	0.56	1.84	0.57	0.000
16.700	0.55	1.81	0.57	0.000
16.717	0.54	1.78	0.54	0.000
16.733	0.53	1.75	0.53	0.000
16.750	0.52	1.73	0.52	0.000
16.767	0.52	1.71	0.51	0.000
16.783	0.51	1.68	0.50	0.000
16.800	0.50	1.66	0.50	0.000
16.817	0.50	1.64	0.50	0.000
16.833	0.49	1.62	0.49	0.000
16.850	0.48	1.60	0.48	0.000
16.867	0.48	1.57	0.48	0.000
16.883	0.47	1.56	0.47	0.000
16.900	0.47	1.54	0.46	0.000
16.917	0.46	1.52	0.46	0.000
16.933	0.46	1.51	0.45	0.000
16.950	0.45	1.49	0.45	0.000
16.967	0.45	1.48	0.47	0.000
16.983	0.44	1.46	0.44	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.000	0.44	1.44	0.44	0.000
17.017	0.43	1.43	0.43	0.000
17.033	0.42	1.41	0.43	0.000
17.050	0.42	1.39	0.42	0.000
17.067	0.41	1.37	0.42	0.000
17.083	0.41	1.35	0.41	0.000
17.100	0.40	1.33	0.40	0.000
17.117	0.40	1.32	0.40	0.000
17.133	0.39	1.30	0.39	0.000
17.150	0.39	1.28	0.39	0.000
17.167	0.38	1.27	0.38	0.000
17.183	0.38	1.26	0.38	0.000
17.200	0.38	1.25	0.37	0.000
17.217	0.37	1.24	0.37	0.000
17.233	0.37	1.23	0.39	0.000
17.250	0.37	1.22	0.35	0.000
17.267	0.36	1.21	0.36	0.000
17.283	0.36	1.20	0.36	0.000
17.300	0.36	1.19	0.36	0.000
17.317	0.36	1.18	0.36	0.000
17.333	0.35	1.17	0.35	0.000
17.350	0.35	1.16	0.35	0.000
17.367	0.35	1.15	0.35	0.000
17.383	0.35	1.14	0.34	0.000
17.400	0.34	1.14	0.34	0.000
17.417	0.34	1.13	0.34	0.000
17.433	0.34	1.12	0.34	0.000
17.450	0.34	1.11	0.34	0.000
17.467	0.33	1.10	0.33	0.000
17.483	0.33	1.10	0.33	0.000
17.500	0.33	1.09	0.33	0.000
17.517	0.33	1.08	0.33	0.000
17.533	0.32	1.08	0.32	0.000
17.550	0.32	1.07	0.33	0.000
17.567	0.32	1.06	0.33	0.000
17.583	0.32	1.05	0.32	0.000
17.600	0.32	1.05	0.32	0.000
17.617	0.31	1.04	0.31	0.000
17.633	0.31	1.04	0.31	0.000
17.650	0.31	1.03	0.31	0.000
17.667	0.31	1.02	0.31	0.000
17.683	0.31	1.02	0.31	0.000
17.700	0.31	1.01	0.30	0.000
17.717	0.30	1.00	0.30	0.000
17.733	0.30	1.00	0.30	0.000
17.750	0.30	0.99	0.30	0.000
17.767	0.30	0.99	0.30	0.000
17.783	0.30	0.98	0.30	0.000
17.800	0.30	0.98	0.29	0.000
17.817	0.29	0.97	0.29	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.833	0.29	0.97	0.29	0.000
17.850	0.29	0.96	0.29	0.000
17.867	0.29	0.96	0.29	0.000
17.883	0.29	0.95	0.29	0.000
17.900	0.29	0.95	0.29	0.000
17.917	0.28	0.94	0.28	0.000
17.933	0.28	0.94	0.29	0.000
17.950	0.28	0.93	0.29	0.000
17.967	0.28	0.93	0.28	0.000
17.983	0.28	0.92	0.28	0.000
18.000	0.28	0.92	0.28	0.000

```
 ****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE = 1.2
 ----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
 ============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.51
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.060
    LOW LOSS FRACTION = 0.288
    TIME OF CONCENTRATION(MIN.) =  9.37
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

 ----------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.29
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.14

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==========

24-HOUR STORM
RUNOFF HYDROGRAPH

==========

HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
14.000	0.1005	0.21	. Q	. V	.	.	.
14.017	0.1008	0.21	. Q	. V	.	.	.
14.033	0.1011	0.21	. Q	. V	.	.	.
14.050	0.1014	0.21	. Q	. V	.	.	.
14.067	0.1017	0.21	. Q	. V	.	.	.
14.083	0.1020	0.21	. Q	. V	.	.	.
14.100	0.1022	0.22	. Q	. V	.	.	.
14.117	0.1025	0.22	. Q	. V	.	.	.
14.133	0.1028	0.22	. Q	. V	.	.	.
14.150	0.1031	0.22	. Q	. V	.	.	.
14.167	0.1035	0.22	. Q	. V	.	.	.
14.183	0.1038	0.22	. Q	. V	.	.	.
14.200	0.1041	0.23	. Q	. V	.	.	.
14.217	0.1044	0.23	. Q	. V	.	.	.
14.233	0.1047	0.23	. Q	. V	.	.	.
14.250	0.1050	0.23	. Q	. V	.	.	.
14.267	0.1053	0.23	. Q	. V	.	.	.
14.283	0.1057	0.24	. Q	. V	.	.	.
14.300	0.1060	0.24	. Q	. V	.	.	.
14.317	0.1063	0.24	. Q	. V	.	.	.
14.333	0.1066	0.24	. Q	. V	.	.	.
14.350	0.1070	0.24	. Q	. V	.	.	.
14.367	0.1073	0.24	. Q	. V	.	.	.
14.383	0.1076	0.24	. Q	. V	.	.	.
14.400	0.1080	0.24	. Q	. V	.	.	.
14.417	0.1083	0.24	. Q	. V	.	.	.
14.433	0.1086	0.24	. Q	. V	.	.	.
14.450	0.1090	0.24	. Q	. V	.	.	.
14.467	0.1093	0.25	. Q	. V	.	.	.
14.483	0.1097	0.25	. Q	. V	.	.	.
14.500	0.1100	0.25	. Q	. V	.	.	.
14.517	0.1103	0.25	. Q	. V	.	.	.
14.533	0.1107	0.25	. Q	. V	.	.	.
14.550	0.1110	0.26	. Q	. V	.	.	.
14.567	0.1114	0.26	. Q	. V	.	.	.
14.583	0.1118	0.26	. Q	. V	.	.	.
14.600	0.1121	0.26	. Q	. V	.	.	.
14.617	0.1125	0.26	. Q	. V	.	.	.
14.633	0.1128	0.26	. Q	. V	.	.	.
14.650	0.1132	0.26	. Q	. V	.	.	.
14.667	0.1136	0.27	. Q	. V	.	.	.
14.683	0.1139	0.27	. Q	. V	.	.	.
14.700	0.1143	0.27	. Q	. V	.	.	.
14.717	0.1147	0.27	. Q	. V	.	.	.
14.733	0.1151	0.27	. Q	. V	.	.	.
14.750	0.1154	0.27	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
14.767	0.1158	0.27	Q	V			
14.783	0.1162	0.28	Q	V			
14.800	0.1166	0.28	Q	V			
14.817	0.1169	0.28	Q	V			
14.833	0.1173	0.28	Q	V			
14.850	0.1177	0.29	Q	V			
14.867	0.1181	0.29	Q	V			
14.883	0.1185	0.29	Q	V			
14.900	0.1189	0.29	Q	V			
14.917	0.1193	0.30	Q	V			
14.933	0.1197	0.30	Q	V			
14.950	0.1202	0.30	Q	V			
14.967	0.1206	0.30	Q	V			
14.983	0.1210	0.30	Q	V			
15.000	0.1214	0.30	Q	V			
15.017	0.1218	0.30	Q	V			
15.033	0.1222	0.31	Q	V			
15.050	0.1227	0.31	Q	V			
15.067	0.1231	0.31	Q	V			
15.083	0.1235	0.31	Q	V			
15.100	0.1240	0.32	Q	V			
15.117	0.1244	0.32	Q	V			
15.133	0.1249	0.33	Q	V			
15.150	0.1253	0.33	Q	V			
15.167	0.1258	0.34	Q	V			
15.183	0.1262	0.34	Q	V			
15.200	0.1267	0.34	Q	V			
15.217	0.1272	0.35	Q	V			
15.233	0.1277	0.35	Q	V			
15.250	0.1282	0.36	Q	V			
15.267	0.1287	0.36	Q	V			
15.283	0.1292	0.36	Q	V			
15.300	0.1297	0.37	Q	V			
15.317	0.1302	0.37	Q	V			
15.333	0.1307	0.37	Q	V			
15.350	0.1312	0.38	Q	V			
15.367	0.1317	0.38	Q	V			
15.383	0.1323	0.38	Q	V			
15.400	0.1328	0.39	Q	V			
15.417	0.1333	0.39	Q	V			
15.433	0.1339	0.39	Q	V			
15.450	0.1344	0.39	Q	V			
15.467	0.1349	0.39	Q	V			
15.483	0.1355	0.39	Q	V			
15.500	0.1360	0.39	Q	V			
15.517	0.1366	0.40	Q	V			
15.533	0.1371	0.40	Q	V			
15.550	0.1377	0.40	Q	V			
15.567	0.1382	0.41	Q	V			
15.583	0.1388	0.42	Q	V			

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
15.600	0.1394	0.42	. Q .	V.	.	.	
15.617	0.1400	0.43	. Q .	V.	.	.	
15.633	0.1406	0.44	. Q .	V.	.	.	
15.650	0.1412	0.45	. Q .	V.	.	.	
15.667	0.1418	0.45	. Q .	V.	.	.	
15.683	0.1425	0.46	. Q .	V.	.	.	
15.700	0.1431	0.47	. Q .	V.	.	.	
15.717	0.1438	0.50	. Q .	V.	.	.	
15.733	0.1445	0.53	. Q .	V.	.	.	
15.750	0.1453	0.56	. Q .	V	.	.	
15.767	0.1461	0.59	. Q .	V	.	.	
15.783	0.1470	0.62	. Q .	V	.	.	
15.800	0.1478	0.65	. Q .	V	.	.	
15.817	0.1488	0.68	. Q .	V	.	.	
15.833	0.1497	0.70	. Q .	V	.	.	
15.850	0.1508	0.73	. Q .	V	.	.	
15.867	0.1518	0.77	. Q .	V	.	.	
15.883	0.1529	0.80	. Q.	.V	.	.	
15.900	0.1541	0.83	. Q.	.V	.	.	
15.917	0.1553	0.87	. Q	.V	.	.	
15.933	0.1565	0.90	. Q	.V	.	.	
15.950	0.1578	0.94	. Q	.V	.	.	
15.967	0.1591	0.97	. .Q	.V	.	.	
15.983	0.1605	1.00	. .Q	. V	.	.	
16.000	0.1619	1.04	. . Q	. V	.	.	
16.017	0.1636	1.18	. . Q	. V	.	.	
16.033	0.1656	1.44	. . Q	. V	.	.	
16.050	0.1679	1.69	. . Q.	V	.	.	
16.067	0.1706	1.94	. . . QV	.	.		
16.083	0.1736	2.20	. . . V Q	.	.		
16.100	0.1770	2.45	. . . V Q .	.			
16.117	0.1807	2.70	. . . V .Q	.			
16.133	0.1848	2.96	. . . V . Q	.			
16.150	0.1892	3.21	. . . V . Q .				
16.167	0.1939	3.43	. . . V . Q				
16.183	0.1982	3.09	. . . V . Q	.			
16.200	0.2020	2.78	. . . V . Q	.			
16.217	0.2054	2.47	. . . Q .	.			
16.233	0.2084	2.17	. . . Q V .	.			
16.250	0.2110	1.86	. . .Q	V.	.		
16.267	0.2131	1.56	. . Q .	V.	.		
16.283	0.2148	1.25	. . Q	. V.	.		
16.300	0.2161	0.95	. .Q	. V.	.		
16.317	0.2170	0.65	. Q .	. V.	.		
16.333	0.2178	0.55	. Q .	. V.	.		
16.350	0.2185	0.53	. Q .	. V	.		
16.367	0.2192	0.52	. Q .	. V	.		
16.383	0.2199	0.50	. Q .	. V	.		
16.400	0.2206	0.48	. Q .	. V	.		
16.417	0.2212	0.46	. Q .	. V	.		

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
16.433	0.2218	0.44	Q		V		
16.450	0.2224	0.42	Q		V		
16.467	0.2230	0.40	Q		V		
16.483	0.2235	0.39	Q		V		
16.500	0.2240	0.38	Q		V		
16.517	0.2245	0.38	Q		V		
16.533	0.2250	0.37	Q		V		
16.550	0.2255	0.36	Q		.V		
16.567	0.2260	0.36	Q		.V		
16.583	0.2265	0.35	Q		.V		
16.600	0.2270	0.34	Q		.V		
16.617	0.2274	0.33	Q		.V		
16.633	0.2279	0.33	Q		.V		
16.650	0.2283	0.32	Q		.V		
16.667	0.2288	0.32	Q		.V		
16.683	0.2292	0.31	Q		.V		
16.700	0.2296	0.31	Q		.V		
16.717	0.2300	0.30	Q		.V		
16.733	0.2305	0.30	Q		.V		
16.750	0.2309	0.29	Q		.V		
16.767	0.2313	0.29	Q		.V		
16.783	0.2316	0.28	Q		.V		
16.800	0.2320	0.28	Q		.V		
16.817	0.2324	0.28	Q		.V		
16.833	0.2328	0.27	Q		. V		
16.850	0.2332	0.27	Q		. V		
16.867	0.2335	0.27	Q		. V		
16.883	0.2339	0.26	Q		. V		
16.900	0.2343	0.26	Q		. V		
16.917	0.2346	0.26	Q		. V		
16.933	0.2350	0.25	Q		. V		
16.950	0.2353	0.25	Q		. V		
16.967	0.2357	0.25	Q		. V		
16.983	0.2360	0.25	Q		. V		
17.000	0.2363	0.24	Q		. V		
17.017	0.2367	0.24	Q		. V		
17.033	0.2370	0.24	Q		. V		
17.050	0.2373	0.24	Q		. V		
17.067	0.2376	0.23	Q		. V		
17.083	0.2380	0.23	Q		. V		
17.100	0.2383	0.23	Q		. V		
17.117	0.2386	0.23	Q		. V		
17.133	0.2389	0.22	Q		. V		
17.150	0.2392	0.22	Q		. V		
17.167	0.2395	0.22	Q		. V		
17.183	0.2398	0.22	Q		. V		
17.200	0.2401	0.21	Q		. V		
17.217	0.2404	0.21	Q		. V		
17.233	0.2407	0.21	Q		. V		
17.250	0.2410	0.21	Q		. V		

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
17.267	0.2412	0.20	. Q	.	.	. V	.
17.283	0.2415	0.20	. Q	.	.	. V	.
17.300	0.2418	0.20	. Q	.	.	. V	.
17.317	0.2421	0.20	. Q	.	.	. V	.
17.333	0.2423	0.20	. Q	.	.	. V	.
17.350	0.2426	0.20	. Q	.	.	. V	.
17.367	0.2429	0.19	. Q	.	.	. V	.
17.383	0.2431	0.19	. Q	.	.	. V	.
17.400	0.2434	0.19	. Q	.	.	. V	.
17.417	0.2437	0.19	. Q	.	.	. V	.
17.433	0.2439	0.19	. Q	.	.	. V	.
17.450	0.2442	0.19	. Q	.	.	. V	.
17.467	0.2444	0.19	. Q	.	.	. V	.
17.483	0.2447	0.19	. Q	.	.	. V	.
17.500	0.2450	0.18	. Q	.	.	. V	.
17.517	0.2452	0.18	. Q	.	.	. V	.
17.533	0.2455	0.18	. Q	.	.	. V	.
17.550	0.2457	0.18	. Q	.	.	. V	.
17.567	0.2459	0.18	. Q	.	.	. V	.
17.583	0.2462	0.18	. Q	.	.	. V	.
17.600	0.2464	0.18	. Q	.	.	. V	.
17.617	0.2467	0.18	. Q	.	.	. V	.
17.633	0.2469	0.17	. Q	.	.	. V	.
17.650	0.2472	0.17	. Q	.	.	. V	.
17.667	0.2474	0.17	. Q	.	.	. V	.
17.683	0.2476	0.17	.Q	.	.	. V	.
17.700	0.2479	0.17	.Q	.	.	. V	.
17.717	0.2481	0.17	.Q	.	.	. V	.
17.733	0.2483	0.17	.Q	.	.	. V	.
17.750	0.2486	0.17	.Q	.	.	. V	.
17.767	0.2488	0.17	.Q	.	.	. V	.
17.783	0.2490	0.17	.Q	.	.	. V	.
17.800	0.2492	0.16	.Q	.	.	. V	.
17.817	0.2495	0.16	.Q	.	.	. V	.
17.833	0.2497	0.16	.Q	.	.	. V	.
17.850	0.2499	0.16	.Q	.	.	. V	.
17.867	0.2501	0.16	.Q	.	.	. V	.
17.883	0.2504	0.16	.Q	.	.	. V	.
17.900	0.2506	0.16	.Q	.	.	. V	.
17.917	0.2508	0.16	.Q	.	.	. V	.
17.933	0.2510	0.16	.Q	.	.	. V	.
17.950	0.2512	0.16	.Q	.	.	. V	.
17.967	0.2515	0.16	.Q	.	.	. V	.
17.983	0.2517	0.16	.Q	.	.	. V	.
18.000	0.2519	0.15	.Q	.	.	. V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	420.0
20%	145.0
30%	90.0
40%	75.0
50%	60.0
60%	50.0

70%	40.0
80%	25.0
90%	10.0

```
 ****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   7
 ----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
 ============================================================================
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****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE = 5.1
----------------------------------------------------------------------------
 >>>>>MODEL CHANNEL ROUTING OF STREAM #1 BY THE TRANSLATION METHOD<<<<<
============================================================================

      THE TRANSLATION MODEL NEGLECTS ALL STORAGE ATTENUATION EFFECTS,
      AND MOVES THE STREAM 1 RUNOFF HYDROGRAPH FORWARD IN TIME.

      ASSUMED REGULAR CHANNEL INFORMATION:
        BASEWIDTH(FT) =   26.00     CHANNEL Z = 10.00
        UPSTREAM ELEVATION(FT) =     131.70
        DOWNSTREAM ELEVATION(FT) =     128.00
        CHANNEL LENGTH(FT) =     755.00     MANNING'S FACTOR = 0.015
        CONSTANT LOSS RATE(CFS) =    0.00

      MEAN-FLOW RATE NORMAL-DEPTH FLOW VELOCITIES(FPS) ARE AS FOLLOWS:
                        (FLOW RATE (CFS)) [FLOW VELOCITY (FPS)]
        AVERAGED PEAK  5-MINUTE: (       9.5).......[  1.96]
        AVERAGED PEAK 15-MINUTE: (       7.2).......[  1.82]
        AVERAGED PEAK 30-MINUTE: (       4.9).......[  1.58]
        AVERAGED PEAK  1-HOUR:   (       3.1).......[  1.38]
        AVERAGED PEAK  3-HOUR:   (       1.6).......[  1.11]
        AVERAGED PEAK  6-HOUR:   (       1.0).......[  1.03]
        AVERAGED PEAK 24-HOUR:   (       0.4).......[  0.69]
      USER-SPECIFIED CHANNEL AVERAGE FLOW VELOCITY(FPS) =   3.540
      HYDROGRAPH TRANSLATION TIME
      = (CHANNEL LENGTH)/(AVERAGE FLOW  VELOCITY)
      = (    755.00)/(  3.540) =   0.059 HRS

      TRANSLATION METHOD CHANNEL ROUTING RESULTS:
                                OUTFLOW LESS
       MODEL       INFLOW     ROUTED     LOSS
        TIME     (STREAM 1)    FLOW     (STREAM 1)
       (HRS)       (CFS)      (CFS)      (CFS)
       14.000        0.59       0.58       0.58
       14.017        0.59       0.59       0.59
       14.033        0.59       0.59       0.59
       14.050        0.59       0.59       0.59
       14.067        0.59       0.59       0.59
       14.083        0.60       0.59       0.59
       14.100        0.60       0.59       0.59
       14.117        0.61       0.59       0.59
       14.133        0.62       0.59       0.59
       14.150        0.63       0.60       0.60
       14.167        0.64       0.60       0.60
       14.183        0.66       0.62       0.62
       14.200        0.65       0.63       0.63
       14.217        0.65       0.64       0.64
       14.233        0.66       0.65       0.65
```

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
14.250	0.65	0.65	0.65
14.267	0.65	0.65	0.65
14.283	0.66	0.65	0.65
14.300	0.66	0.65	0.65
14.317	0.66	0.65	0.65
14.333	0.66	0.65	0.65
14.350	0.66	0.66	0.66
14.367	0.67	0.66	0.66
14.383	0.67	0.66	0.66
14.400	0.68	0.66	0.66
14.417	0.69	0.67	0.67
14.433	0.69	0.67	0.67
14.450	0.69	0.68	0.68
14.467	0.70	0.68	0.68
14.483	0.70	0.69	0.69
14.500	0.71	0.69	0.69
14.517	0.71	0.69	0.69
14.533	0.71	0.70	0.70
14.550	0.71	0.70	0.70
14.567	0.72	0.71	0.71
14.583	0.72	0.71	0.71
14.600	0.72	0.71	0.71
14.617	0.73	0.71	0.71
14.633	0.73	0.72	0.72
14.650	0.73	0.72	0.72
14.667	0.74	0.72	0.72
14.683	0.75	0.73	0.73
14.700	0.76	0.73	0.73
14.717	0.77	0.73	0.73
14.733	0.76	0.74	0.74
14.750	0.77	0.75	0.75
14.767	0.78	0.77	0.77
14.783	0.78	0.77	0.77
14.800	0.78	0.77	0.77
14.817	0.79	0.77	0.77
14.833	0.79	0.78	0.78
14.850	0.79	0.78	0.78
14.867	0.80	0.78	0.78
14.883	0.80	0.79	0.79
14.900	0.81	0.79	0.79
14.917	0.81	0.80	0.80
14.933	0.82	0.80	0.80
14.950	0.84	0.81	0.81
14.967	0.84	0.81	0.81
14.983	0.85	0.82	0.82
15.000	0.86	0.83	0.83
15.017	0.86	0.84	0.84
15.033	0.87	0.85	0.85
15.050	0.88	0.85	0.85
15.067	0.88	0.86	0.86

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.083	0.89	0.87	0.87
15.100	0.89	0.87	0.87
15.117	0.90	0.88	0.88
15.133	0.91	0.89	0.89
15.150	0.91	0.89	0.89
15.167	0.92	0.90	0.90
15.183	0.93	0.90	0.90
15.200	0.94	0.91	0.91
15.217	0.96	0.92	0.92
15.233	0.99	0.93	0.93
15.250	0.99	0.93	0.93
15.267	1.00	0.95	0.95
15.283	1.01	0.97	0.97
15.300	1.02	0.99	0.99
15.317	1.03	0.99	0.99
15.333	1.05	1.00	1.00
15.350	1.05	1.02	1.02
15.367	1.06	1.03	1.03
15.383	1.07	1.04	1.04
15.400	1.08	1.05	1.05
15.417	1.09	1.06	1.06
15.433	1.09	1.07	1.07
15.450	1.10	1.07	1.07
15.467	1.11	1.08	1.08
15.483	1.12	1.09	1.09
15.500	1.12	1.10	1.10
15.517	1.12	1.10	1.10
15.533	1.13	1.11	1.11
15.550	1.13	1.12	1.12
15.567	1.15	1.12	1.12
15.583	1.16	1.12	1.12
15.600	1.17	1.13	1.13
15.617	1.18	1.14	1.14
15.633	1.20	1.15	1.15
15.650	1.26	1.16	1.16
15.667	1.31	1.17	1.17
15.683	1.32	1.19	1.19
15.700	1.30	1.23	1.23
15.717	1.34	1.28	1.28
15.733	1.39	1.32	1.32
15.750	1.44	1.31	1.31
15.767	1.51	1.32	1.32
15.783	1.61	1.36	1.36
15.800	1.71	1.41	1.41
15.817	1.81	1.47	1.47
15.833	1.91	1.55	1.55
15.850	2.01	1.65	1.65
15.867	2.12	1.76	1.76
15.883	2.23	1.86	1.86
15.900	2.33	1.96	1.96

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.917	2.45	2.06	2.06
15.933	2.57	2.17	2.17
15.950	2.67	2.27	2.27
15.967	2.79	2.39	2.39
15.983	2.91	2.50	2.50
16.000	3.02	2.62	2.62
16.017	3.25	2.73	2.73
16.033	3.59	2.84	2.84
16.050	4.39	2.96	2.96
16.067	5.64	3.12	3.12
16.083	6.26	3.40	3.40
16.100	7.16	3.95	3.95
16.117	7.95	4.95	4.95
16.133	8.84	5.92	5.92
16.150	9.71	6.66	6.66
16.167	10.54	7.51	7.51
16.183	9.83	8.34	8.34
16.200	8.80	9.23	9.23
16.217	7.83	10.08	10.08
16.233	6.80	10.23	10.23
16.250	5.79	9.37	9.37
16.267	4.83	8.37	8.37
16.283	4.22	7.37	7.37
16.300	2.89	6.35	6.35
16.317	1.93	5.36	5.36
16.333	1.54	4.56	4.56
16.350	1.57	3.63	3.63
16.367	1.51	2.46	2.46
16.383	1.44	1.76	1.76
16.400	1.37	1.56	1.56
16.417	1.30	1.54	1.54
16.433	1.18	1.48	1.48
16.450	1.15	1.41	1.41
16.467	0.96	1.34	1.34
16.483	0.90	1.25	1.25
16.500	0.98	1.17	1.17
16.517	1.01	1.07	1.07
16.533	1.00	0.93	0.93
16.550	0.99	0.94	0.94
16.567	0.97	0.99	0.99
16.583	0.96	1.00	1.00
16.600	0.95	0.99	0.99
16.617	0.94	0.98	0.98
16.633	0.92	0.97	0.97
16.650	0.90	0.96	0.96
16.667	0.88	0.95	0.95
16.683	0.88	0.93	0.93
16.700	0.88	0.91	0.91
16.717	0.84	0.89	0.89
16.733	0.83	0.88	0.88

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
16.750	0.81	0.88	0.88
16.767	0.80	0.86	0.86
16.783	0.78	0.83	0.83
16.800	0.78	0.82	0.82
16.817	0.77	0.80	0.80
16.833	0.76	0.79	0.79
16.850	0.75	0.78	0.78
16.867	0.74	0.78	0.78
16.883	0.73	0.77	0.77
16.900	0.72	0.76	0.76
16.917	0.71	0.75	0.75
16.933	0.70	0.74	0.74
16.950	0.71	0.73	0.73
16.967	0.71	0.72	0.72
16.983	0.69	0.71	0.71
17.000	0.68	0.70	0.70
17.017	0.67	0.71	0.71
17.033	0.67	0.70	0.70
17.050	0.66	0.68	0.68
17.067	0.65	0.68	0.68
17.083	0.64	0.67	0.67
17.100	0.63	0.66	0.66
17.117	0.62	0.65	0.65
17.133	0.62	0.65	0.65
17.150	0.61	0.64	0.64
17.167	0.60	0.63	0.63
17.183	0.59	0.62	0.62
17.200	0.58	0.61	0.61
17.217	0.58	0.60	0.60
17.233	0.59	0.60	0.60
17.250	0.56	0.59	0.59
17.267	0.56	0.58	0.58
17.283	0.56	0.59	0.59
17.300	0.56	0.58	0.58
17.317	0.55	0.56	0.56
17.333	0.55	0.56	0.56
17.350	0.54	0.56	0.56
17.367	0.54	0.56	0.56
17.383	0.54	0.55	0.55
17.400	0.53	0.55	0.55
17.417	0.53	0.54	0.54
17.433	0.53	0.54	0.54
17.450	0.52	0.53	0.53
17.467	0.52	0.53	0.53
17.483	0.52	0.53	0.53
17.500	0.51	0.52	0.52
17.517	0.51	0.52	0.52
17.533	0.50	0.52	0.52
17.550	0.51	0.51	0.51
17.567	0.51	0.51	0.51

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
17.583	0.50	0.51	0.51
17.600	0.49	0.51	0.51
17.617	0.49	0.51	0.51
17.633	0.49	0.50	0.50
17.650	0.48	0.49	0.49
17.667	0.48	0.49	0.49
17.683	0.48	0.49	0.49
17.700	0.47	0.49	0.49
17.717	0.47	0.48	0.48
17.733	0.47	0.48	0.48
17.750	0.47	0.48	0.48
17.767	0.46	0.47	0.47
17.783	0.46	0.47	0.47
17.800	0.46	0.47	0.47
17.817	0.46	0.47	0.47
17.833	0.45	0.46	0.46
17.850	0.45	0.46	0.46
17.867	0.45	0.46	0.46
17.883	0.45	0.46	0.46
17.900	0.45	0.45	0.45
17.917	0.44	0.45	0.45
17.933	0.45	0.45	0.45
17.950	0.44	0.45	0.45
17.967	0.44	0.44	0.44
17.983	0.43	0.44	0.44
18.000	0.43	0.45	0.45

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PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.823 AF
OUTFLOW VOLUME = 0.823 AF
LOSS VOLUME = 0.000 AF

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FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<
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STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
14.000	0.2761	0.58	.Q	. V	.	.	.
14.017	0.2769	0.59	.Q	. V	.	.	.
14.033	0.2777	0.59	.Q	. V	.	.	.
14.050	0.2785	0.59	.Q	. V	.	.	.
14.067	0.2794	0.59	.Q	. V	.	.	.
14.083	0.2802	0.59	.Q	. V	.	.	.
14.100	0.2810	0.59	.Q	. V	.	.	.
14.117	0.2818	0.59	.Q	. V	.	.	.
14.133	0.2826	0.59	.Q	. V	.	.	.
14.150	0.2834	0.60	.Q	. V	.	.	.
14.167	0.2843	0.60	.Q	. V	.	.	.
14.183	0.2851	0.62	.Q	. V	.	.	.
14.200	0.2860	0.63	.Q	. V	.	.	.
14.217	0.2869	0.64	.Q	. V	.	.	.
14.233	0.2877	0.65	.Q	. V	.	.	.
14.250	0.2886	0.65	.Q	. V	.	.	.
14.267	0.2895	0.65	.Q	. V	.	.	.
14.283	0.2904	0.65	.Q	. V	.	.	.
14.300	0.2913	0.65	.Q	. V	.	.	.
14.317	0.2922	0.65	.Q	. V	.	.	.
14.333	0.2931	0.65	.Q	. V	.	.	.
14.350	0.2940	0.66	.Q	. V	.	.	.
14.367	0.2950	0.66	.Q	. V	.	.	.
14.383	0.2959	0.66	.Q	. V	.	.	.
14.400	0.2968	0.66	.Q	. V	.	.	.
14.417	0.2977	0.67	.Q	. V	.	.	.
14.433	0.2986	0.67	.Q	. V	.	.	.
14.450	0.2996	0.68	.Q	. V	.	.	.
14.467	0.3005	0.68	.Q	. V	.	.	.
14.483	0.3014	0.69	.Q	. V	.	.	.
14.500	0.3024	0.69	.Q	. V	.	.	.
14.517	0.3033	0.69	.Q	. V	.	.	.
14.533	0.3043	0.70	.Q	. V	.	.	.
14.550	0.3053	0.70	.Q	. V	.	.	.
14.567	0.3063	0.71	.Q	. V	.	.	.
14.583	0.3072	0.71	.Q	. V	.	.	.
14.600	0.3082	0.71	.Q	. V	.	.	.
14.617	0.3092	0.71	.Q	. V	.	.	.
14.633	0.3102	0.72	.Q	. V	.	.	.
14.650	0.3112	0.72	.Q	. V	.	.	.
14.667	0.3122	0.72	.Q	. V	.	.	.
14.683	0.3132	0.73	.Q	. V	.	.	.
14.700	0.3142	0.73	.Q	. V	.	.	.
14.717	0.3152	0.73	.Q	. V	.	.	.
14.733	0.3162	0.74	.Q	. V	.	.	.
14.750	0.3173	0.75	.Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
14.767	0.3183	0.77	.Q .	V .	.	.	
14.783	0.3194	0.77	.Q .	V .	.	.	
14.800	0.3204	0.77	.Q .	V .	.	.	
14.817	0.3215	0.77	.Q .	V .	.	.	
14.833	0.3226	0.78	.Q .	V .	.	.	
14.850	0.3236	0.78	.Q .	V .	.	.	
14.867	0.3247	0.78	.Q .	V .	.	.	
14.883	0.3258	0.79	.Q .	V .	.	.	
14.900	0.3269	0.79	.Q .	V .	.	.	
14.917	0.3280	0.80	.Q .	V .	.	.	
14.933	0.3291	0.80	.Q .	V .	.	.	
14.950	0.3302	0.81	.Q .	V .	.	.	
14.967	0.3313	0.81	.Q .	V .	.	.	
14.983	0.3325	0.82	.Q .	V .	.	.	
15.000	0.3336	0.83	.Q .	V .	.	.	
15.017	0.3348	0.84	.Q .	V .	.	.	
15.033	0.3359	0.85	.Q .	V .	.	.	
15.050	0.3371	0.85	.Q .	V .	.	.	
15.067	0.3383	0.86	.Q .	V .	.	.	
15.083	0.3395	0.87	.Q .	V .	.	.	
15.100	0.3407	0.87	.Q .	V .	.	.	
15.117	0.3419	0.88	.Q .	V .	.	.	
15.133	0.3431	0.89	.Q .	V .	.	.	
15.150	0.3443	0.89	.Q .	V .	.	.	
15.167	0.3456	0.90	.Q .	V .	.	.	
15.183	0.3468	0.90	.Q .	V .	.	.	
15.200	0.3481	0.91	.Q .	V .	.	.	
15.217	0.3493	0.92	.Q .	V .	.	.	
15.233	0.3506	0.93	.Q .	V .	.	.	
15.250	0.3519	0.93	.Q .	V .	.	.	
15.267	0.3532	0.95	.Q .	V .	.	.	
15.283	0.3545	0.97	.Q .	V .	.	.	
15.300	0.3559	0.99	.Q .	V .	.	.	
15.317	0.3573	0.99	.Q .	V .	.	.	
15.333	0.3587	1.00	. Q .	V .	.	.	
15.350	0.3601	1.02	. Q .	V .	.	.	
15.367	0.3615	1.03	. Q .	V .	.	.	
15.383	0.3629	1.04	. Q .	V .	.	.	
15.400	0.3644	1.05	. Q .	V .	.	.	
15.417	0.3658	1.06	. Q .	V .	.	.	
15.433	0.3673	1.07	. Q .	V .	.	.	
15.450	0.3688	1.07	. Q .	V .	.	.	
15.467	0.3702	1.08	. Q .	V .	.	.	
15.483	0.3717	1.09	. Q .	V .	.	.	
15.500	0.3733	1.10	. Q .	V .	.	.	
15.517	0.3748	1.10	. Q .	V .	.	.	
15.533	0.3763	1.11	. Q .	V .	.	.	
15.550	0.3778	1.12	. Q .	V .	.	.	
15.567	0.3794	1.12	. Q .	V .	.	.	
15.583	0.3809	1.12	. Q .	V .	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
15.600	0.3825	1.13	. Q	.	V .	.	.
15.617	0.3841	1.14	. Q	.	V .	.	.
15.633	0.3856	1.15	. Q	.	V .	.	.
15.650	0.3872	1.16	. Q	.	V .	.	.
15.667	0.3889	1.17	. Q	.	V .	.	.
15.683	0.3905	1.19	. Q	.	V .	.	.
15.700	0.3922	1.23	. Q	.	V.	.	.
15.717	0.3939	1.28	. Q	.	V.	.	.
15.733	0.3958	1.32	. Q	.	V.	.	.
15.750	0.3976	1.31	. Q	.	V.	.	.
15.767	0.3994	1.32	. Q	.	V.	.	.
15.783	0.4013	1.36	. Q	.	V.	.	.
15.800	0.4032	1.41	. Q	.	V.	.	.
15.817	0.4052	1.47	. Q	.	V.	.	.
15.833	0.4074	1.55	. Q	.	V.	.	.
15.850	0.4096	1.65	. Q	.	V.	.	.
15.867	0.4121	1.76	. Q	.	V	.	.
15.883	0.4146	1.86	. Q	.	V	.	.
15.900	0.4173	1.96	. Q	.	V	.	.
15.917	0.4201	2.06	. Q	.	V	.	.
15.933	0.4231	2.17	. Q	.	V	.	.
15.950	0.4263	2.27	. Q	.	V	.	.
15.967	0.4296	2.39	. Q	.	V	.	.
15.983	0.4330	2.50	. Q	.	.V	.	.
16.000	0.4366	2.62	. Q	.	.V	.	.
16.017	0.4404	2.73	. Q	.	.V	.	.
16.033	0.4443	2.84	. Q	.	.V	.	.
16.050	0.4483	2.96	. Q	.	.V	.	.
16.067	0.4526	3.12	. Q	.	.V	.	.
16.083	0.4573	3.40	. Q	.	. V	.	.
16.100	0.4628	3.95	. Q	.	. V	.	.
16.117	0.4696	4.95	. Q.	.	. V	.	.
16.133	0.4777	5.92	. .Q	.	. V	.	.
16.150	0.4869	6.66	. . Q	.	. V	.	.
16.167	0.4972	7.51	. . Q	.	V	.	.
16.183	0.5087	8.34	. . Q	.	V	.	.
16.200	0.5214	9.23	. . Q	.	V	.	.
16.217	0.5353	10.08	. .	Q	V	.	.
16.233	0.5494	10.23	. .	Q	V	.	.
16.250	0.5623	9.37	. . Q	.	V	.	.
16.267	0.5739	8.37	. . Q	.	V	.	.
16.283	0.5840	7.37	. . Q	.	V	.	.
16.300	0.5928	6.35	. . Q	.	V	.	.
16.317	0.6001	5.36	. Q	.	V.	.	.
16.333	0.6064	4.56	. Q.	.	V.	.	.
16.350	0.6114	3.63	. Q	.	.	V.	.
16.367	0.6148	2.46	. Q	.	.	V.	.
16.383	0.6172	1.76	. Q	.	.	V.	.
16.400	0.6194	1.56	. Q	.	.	V	.
16.417	0.6215	1.54	. Q	.	.	V	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
16.433	0.6235	1.48	. Q	.	V	.	
16.450	0.6255	1.41	. Q	.	V	.	
16.467	0.6273	1.34	. Q	.	V	.	
16.483	0.6290	1.25	. Q	.	V	.	
16.500	0.6306	1.17	. Q	.	V	.	
16.517	0.6321	1.07	. Q	.	V	.	
16.533	0.6334	0.93	.Q	.	V	.	
16.550	0.6347	0.94	.Q	.	V	.	
16.567	0.6361	0.99	.Q	.	V	.	
16.583	0.6374	1.00	. Q	.	V	.	
16.600	0.6388	0.99	.Q	.	.V	.	
16.617	0.6402	0.98	.Q	.	.V	.	
16.633	0.6415	0.97	.Q	.	.V	.	
16.650	0.6428	0.96	.Q	.	.V	.	
16.667	0.6441	0.95	.Q	.	.V	.	
16.683	0.6454	0.93	.Q	.	.V	.	
16.700	0.6467	0.91	.Q	.	.V	.	
16.717	0.6479	0.89	.Q	.	.V	.	
16.733	0.6491	0.88	.Q	.	.V	.	
16.750	0.6503	0.88	.Q	.	.V	.	
16.767	0.6515	0.86	.Q	.	.V	.	
16.783	0.6526	0.83	.Q	.	.V	.	
16.800	0.6538	0.82	.Q	.	.V	.	
16.817	0.6549	0.80	.Q	.	.V	.	
16.833	0.6560	0.79	.Q	.	.V	.	
16.850	0.6570	0.78	.Q	.	.V	.	
16.867	0.6581	0.78	.Q	.	.V	.	
16.883	0.6592	0.77	.Q	.	. V	.	
16.900	0.6602	0.76	.Q	.	. V	.	
16.917	0.6612	0.75	.Q	.	. V	.	
16.933	0.6623	0.74	.Q	.	. V	.	
16.950	0.6633	0.73	.Q	.	. V	.	
16.967	0.6643	0.72	.Q	.	. V	.	
16.983	0.6652	0.71	.Q	.	. V	.	
17.000	0.6662	0.70	.Q	.	. V	.	
17.017	0.6672	0.71	.Q	.	. V	.	
17.033	0.6681	0.70	.Q	.	. V	.	
17.050	0.6691	0.68	.Q	.	. V	.	
17.067	0.6700	0.68	.Q	.	. V	.	
17.083	0.6709	0.67	.Q	.	. V	.	
17.100	0.6719	0.66	.Q	.	. V	.	
17.117	0.6728	0.65	.Q	.	. V	.	
17.133	0.6736	0.65	.Q	.	. V	.	
17.150	0.6745	0.64	.Q	.	. V	.	
17.167	0.6754	0.63	.Q	.	. V	.	
17.183	0.6762	0.62	.Q	.	. V	.	
17.200	0.6771	0.61	.Q	.	. V	.	
17.217	0.6779	0.60	.Q	.	. V	.	
17.233	0.6787	0.60	.Q	.	. V	.	
17.250	0.6796	0.59	.Q	.	. V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
17.267	0.6804	0.58	.Q	.	. V	.	
17.283	0.6812	0.59	.Q	.	. V	.	
17.300	0.6820	0.58	.Q	.	. V	.	
17.317	0.6827	0.56	.Q	.	. V	.	
17.333	0.6835	0.56	.Q	.	. V	.	
17.350	0.6843	0.56	.Q	.	. V	.	
17.367	0.6851	0.56	.Q	.	. V	.	
17.383	0.6858	0.55	.Q	.	. V	.	
17.400	0.6866	0.55	.Q	.	. V	.	
17.417	0.6873	0.54	.Q	.	. V	.	
17.433	0.6881	0.54	.Q	.	. V	.	
17.450	0.6888	0.53	.Q	.	. V	.	
17.467	0.6895	0.53	.Q	.	. V	.	
17.483	0.6903	0.53	.Q	.	. V	.	
17.500	0.6910	0.52	.Q	.	. V	.	
17.517	0.6917	0.52	.Q	.	. V	.	
17.533	0.6924	0.52	.Q	.	. V	.	
17.550	0.6931	0.51	.Q	.	. V	.	
17.567	0.6938	0.51	.Q	.	. V	.	
17.583	0.6945	0.51	.Q	.	. V	.	
17.600	0.6952	0.51	.Q	.	. V	.	
17.617	0.6959	0.51	.Q	.	. V	.	
17.633	0.6966	0.50	.Q	.	. V	.	
17.650	0.6973	0.49	Q	.	. V	.	
17.667	0.6980	0.49	Q	.	. V	.	
17.683	0.6986	0.49	Q	.	. V	.	
17.700	0.6993	0.49	Q	.	. V	.	
17.717	0.7000	0.48	Q	.	. V	.	
17.733	0.7006	0.48	Q	.	. V	.	
17.750	0.7013	0.48	Q	.	. V	.	
17.767	0.7019	0.47	Q	.	. V	.	
17.783	0.7026	0.47	Q	.	. V	.	
17.800	0.7032	0.47	Q	.	. V	.	
17.817	0.7039	0.47	Q	.	. V	.	
17.833	0.7045	0.46	Q	.	. V	.	
17.850	0.7051	0.46	Q	.	. V	.	
17.867	0.7058	0.46	Q	.	. V	.	
17.883	0.7064	0.46	Q	.	. V	.	
17.900	0.7070	0.45	Q	.	. V	.	
17.917	0.7076	0.45	Q	.	. V	.	
17.933	0.7083	0.45	Q	.	. V	.	
17.950	0.7089	0.45	Q	.	. V	.	
17.967	0.7095	0.44	Q	.	. V	.	
17.983	0.7101	0.44	Q	.	. V	.	
18.000	0.7107	0.45	Q	.	. V	.	

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	350.0
20%	140.0
30%	90.0
40%	70.0
50%	60.0
60%	50.0

70%	40.0
80%	30.0
90%	20.0

==========

END OF FLOODSCx ROUTING ANALYSIS

Existing Conditions

Frequency	DMA	Area (ac)	Rain (in)	Tc (min)	Ap	Fm (in/hr)	Ybar (in/hr)
2-year	A	5.17	2.05	18.1	1	0.3	1
	B	2.46		9.15	0.1	0.03	0.199
10-year	A	5.17	3.68	16.14	1	0.3	0.879
	B	2.46		8.57	0.1	0.03	0.145
25-year	A	5.17	4.49	15.74	1	0.3	0.824
	B	2.46		8.48	0.1	0.03	0.13
100-year	A	5.17	5.63	15.24	1	0.3	0.456
	B	2.46		8.32	0.1	0.03	0.084

Proposed Conditions

Frequency	DMA	Area (ac)	Rain (in)	Tc (min)	Ap	Fm (in/hr)	Ybar (in/hr)
2-year	A	5.12	2.05	8.58	0.294	0.088	0.372
	B	2.51		9.37	0.2	0.06	0.288
10-year	A	5.12	3.68	8.26	0.294	0.088	0.303
	B	2.51		9.28	0.2	0.06	0.227
25-year	A	5.12	4.49	8.18	0.294	0.088	0.279
	B	2.51		9.25	0.2	0.06	0.207
100-year	A	5.12	5.63	8.08	0.294	0.088	0.164
	B	2.51		9.23	0.2	0.06	0.125

At Node 106	Condition		
Frequency	Existing	Proposed	Delta
100-year Q (cfs)	19.41	18.31	-5.67%
25-year Q (cfs)	14.72	12.71	-13.65%
10-year Q (cfs)	11.95	9.00	-24.69%
2-year Q (cfs)	5.88	3.24	-44.90%

CMP Infiltration Gallery Sizing DMA A By: V.Aguirre date: 10/22/2019

diameter (in)	**120**			cover over rock (ft)	3	ft
Length (ft)	**367**			depth to invert	**13.5**	**ft**
base above (in)	**6**			depth to bottom of rock	**14**	**ft**
base below (in)	**6**			area of chamber (sf)	78.50	sf
base at sides (in)	**12**			total width (ft)	12	ft
base at ends (in)	**12**			total depth (ft)	11	ft
porosity	40%			total length (ft)	369	ft
				total volume for rock and chamber	48,708	sf
volume of chamber (CF)	28,810				1,804	cy
volume of rock (CF)	7,959					
total storage (CF)	**36,769**					

CMP Infiltration Gallery Sizing DMA B date: 10/22/2019

diameter (in)	**72**			cover over rock (ft)	4	ft
Length (ft)	**108**			depth to invert	**12**	**ft**
base above (in)	**24**			depth to bottom of rock	**14**	**ft**
base below (in)	**24**			area of chamber (sf)	28.26	sf
base at sides (in)	**12**			total width (ft)	8	ft
base at ends (in)	**12**			total depth (ft)	10	ft
porosity	40%			total length (ft)	110	ft
				total volume for rock and chamber	8,800	sf
volume of chamber (CF)	3,052				326	cy
volume of rock (CF)	2,299					
total storage (CF)	**5,351**					

Proposed Detention Basin -DMA A 120 CMP

Stage-Storage-Discharge Table

Stage (ft)	Surface Area (SQFT)	Storage (AF)	Multiple Outlet Discharge (cfs)
0	4428.00	0.000	0.04
2	4428.00	0.203	0.04
2.42	4428.00	0.246	0.04
5.2	4428.00	0.529	0.04
7	4428.00	0.712	5.11
10	4428.00	1.017	23.64

*Area of chamber only

0.245 DCV (AF)

0.530 2-YR Prop Volume (AF)

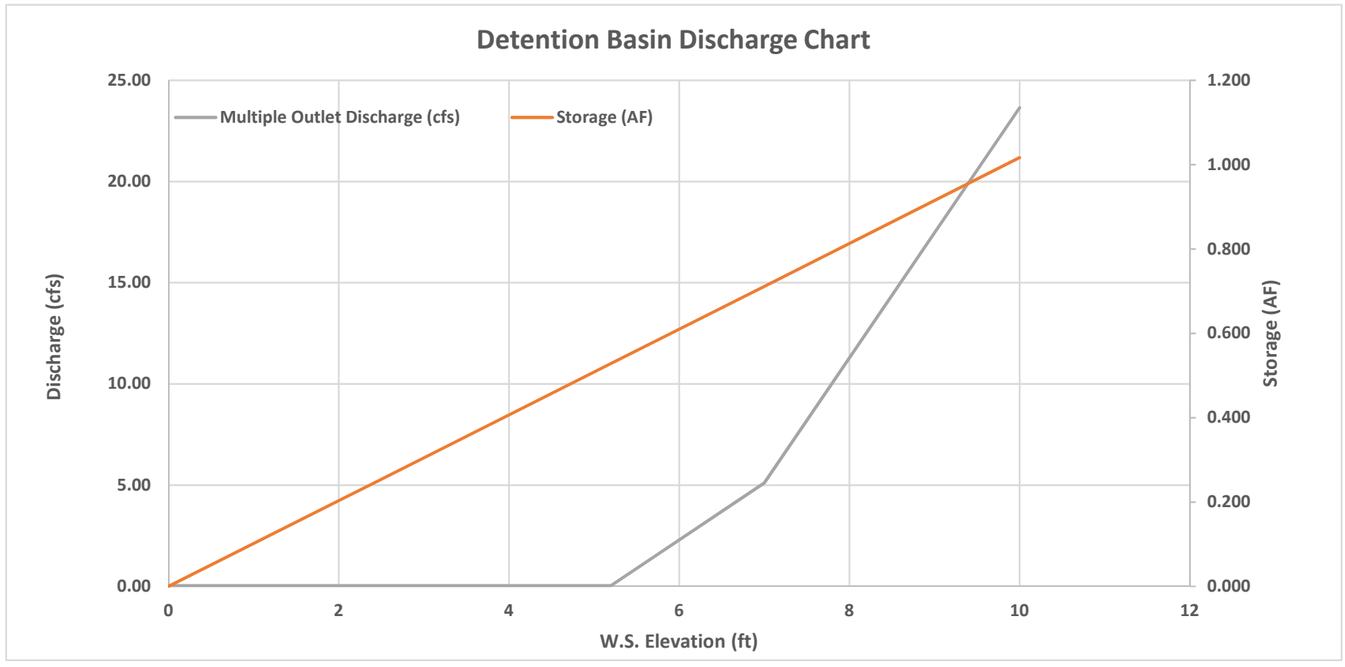
36769 CHAMBER VOLUME (CF)

Upper Basin Parameters

Low Flow Orifice	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Low Flow Orifice #2	
Circular Orifice Invert	5.2
Orifice diameter (in)	12
Coefficient C	0.6
Number orifices	1

Vertical Rectangular Opening	
Invert	8
Width (ft)	1.50
Height (ft)	1.50
Coefficient C	0.6



Proposed Detention Basin - DMA B 72 CMP

Stage-Storage-Discharge Table

Stage (ft)	Surface Area (SQFT)	Storage (AF)	Multiple Outlet Discharge (cfs)
0	880.00	0.000	0.0377
2	880.00	0.040	0.0377
3	880.00	0.061	0.0377
5	880.00	0.101	0.04
6	880.00	0.121	0.04
6.25	880.00	0.126	25.32

*Area of chamber only

0.1200 DCV (AF)

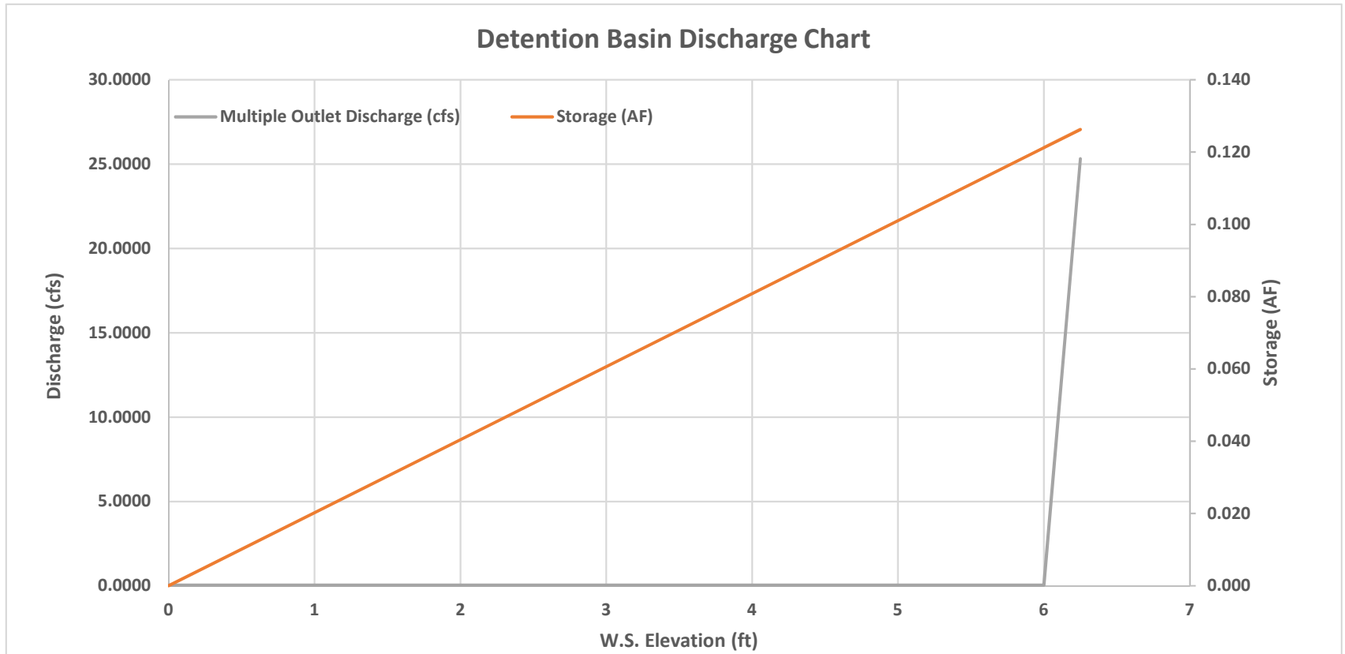
5351 Total Volume (CF)

Upper Basin Parameters

Low Flow Orifice	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Low Flow Orifice #2	
Circular Orifice Invert	0
Orifice diameter (in)	0
Coefficient C	0.6
Number orifices	0

Vertical Rectangular Opening	
Invert	6
Width (ft)	14.00
Height (ft)	0.75
Coefficient C	0.6



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F L O O D R O U T I N G A N A L Y S I S
USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
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Ver. 21.0 Release Date: 06/01/2014 License ID 1202

Analysis prepared by:

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(949)-988-5815

********** DESCRIPTION OF STUDY **********
* SHOPOFF ANAHEIM *
* HYDROGRAPHS & FLOOD ROUTING ANALYSIS - PROPOSED CONDITION DMA A&B *
* 2YR AMC I RC 10/22/2019 *
****

FILE NAME: SHOP2AB.DAT
TIME/DATE OF STUDY: 14:17 10/23/2019

The Small Area Unit Hydrograph Procedures in Section J of the Hydrology Manual provides estimates of runoff hydrograph and runoff volume for watersheds whose time of concentration is less than 25 minutes. The PROGRAM User should check the applicability of using the small area unit hydrograph procedures, and follow the guidelines in Sections J and K.5 in complex watershed modeling.

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 ****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE = 1.2
 ----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
 ============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    5.12
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.088
    LOW LOSS FRACTION = 0.372
    TIME OF CONCENTRATION(MIN.) =  8.58
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

 ----------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.53
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.34

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24-HOUR STORM
RUNOFF HYDROGRAPH

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HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
14.000	0.1818	0.38	. Q .	V	.	.	.
14.017	0.1823	0.38	. Q .	V	.	.	.
14.033	0.1828	0.38	. Q .	V	.	.	.
14.050	0.1834	0.39	. Q .	V	.	.	.
14.067	0.1839	0.39	. Q .	V	.	.	.
14.083	0.1844	0.39	. Q .	V	.	.	.
14.100	0.1850	0.40	. Q .	V	.	.	.
14.117	0.1855	0.40	. Q .	V	.	.	.
14.133	0.1861	0.41	. Q .	V	.	.	.
14.150	0.1867	0.41	. Q .	V	.	.	.
14.167	0.1872	0.41	. Q .	V	.	.	.
14.183	0.1878	0.41	. Q .	V	.	.	.
14.200	0.1884	0.41	. Q .	V	.	.	.
14.217	0.1889	0.42	. Q .	V	.	.	.
14.233	0.1895	0.42	. Q .	V	.	.	.
14.250	0.1901	0.42	. Q .	V	.	.	.
14.267	0.1907	0.42	. Q .	V	.	.	.
14.283	0.1913	0.42	. Q .	V	.	.	.
14.300	0.1918	0.42	. Q .	V	.	.	.
14.317	0.1924	0.43	. Q .	V	.	.	.
14.333	0.1930	0.43	. Q .	V	.	.	.
14.350	0.1936	0.43	. Q .	V	.	.	.
14.367	0.1942	0.43	. Q .	V	.	.	.
14.383	0.1948	0.44	. Q .	V	.	.	.
14.400	0.1954	0.44	. Q .	V	.	.	.
14.417	0.1960	0.44	. Q .	V	.	.	.
14.433	0.1966	0.45	. Q .	V	.	.	.
14.450	0.1972	0.45	. Q .	V	.	.	.
14.467	0.1979	0.45	. Q .	V	.	.	.
14.483	0.1985	0.45	. Q .	V	.	.	.
14.500	0.1991	0.45	. Q .	V	.	.	.
14.517	0.1997	0.45	. Q .	V	.	.	.
14.533	0.2004	0.46	. Q .	V	.	.	.
14.550	0.2010	0.46	. Q .	V	.	.	.
14.567	0.2016	0.46	. Q .	V	.	.	.
14.583	0.2023	0.46	. Q .	V	.	.	.
14.600	0.2029	0.46	. Q .	V	.	.	.
14.617	0.2035	0.47	. Q .	V	.	.	.
14.633	0.2042	0.47	. Q .	V	.	.	.
14.650	0.2049	0.48	. Q .	V	.	.	.
14.667	0.2055	0.48	. Q .	V	.	.	.
14.683	0.2062	0.48	. Q .	V	.	.	.
14.700	0.2069	0.49	. Q .	V	.	.	.
14.717	0.2075	0.49	. Q .	V	.	.	.
14.733	0.2082	0.49	. Q .	V	.	.	.
14.750	0.2089	0.50	. Q .	V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
14.767	0.2096	0.50	. Q	. V	.	.	.
14.783	0.2103	0.50	. Q	. V	.	.	.
14.800	0.2110	0.50	. Q	. V	.	.	.
14.817	0.2117	0.51	. Q	. V	.	.	.
14.833	0.2124	0.51	. Q	. V	.	.	.
14.850	0.2131	0.51	. Q	. V	.	.	.
14.867	0.2138	0.51	. Q	. V	.	.	.
14.883	0.2145	0.52	. Q	. V	.	.	.
14.900	0.2152	0.52	. Q	. V	.	.	.
14.917	0.2159	0.53	. Q	. V	.	.	.
14.933	0.2167	0.53	. Q	. V	.	.	.
14.950	0.2174	0.54	. Q	. V	.	.	.
14.967	0.2181	0.54	. Q	. V	.	.	.
14.983	0.2189	0.55	. Q	. V	.	.	.
15.000	0.2197	0.55	. Q	. V	.	.	.
15.017	0.2204	0.56	. Q	. V	.	.	.
15.033	0.2212	0.56	. Q	. V	.	.	.
15.050	0.2220	0.56	. Q	. V	.	.	.
15.067	0.2228	0.57	. Q	. V	.	.	.
15.083	0.2236	0.57	. Q	. V	.	.	.
15.100	0.2243	0.57	. Q	. V	.	.	.
15.117	0.2251	0.58	. Q	. V	.	.	.
15.133	0.2259	0.58	. Q	. V	.	.	.
15.150	0.2267	0.58	. Q	. V	.	.	.
15.167	0.2276	0.59	. Q	. V	.	.	.
15.183	0.2284	0.60	. Q	. V	.	.	.
15.200	0.2292	0.61	. Q	. V	.	.	.
15.217	0.2301	0.62	. Q	. V	.	.	.
15.233	0.2309	0.62	. Q	. V	.	.	.
15.250	0.2318	0.63	. Q	. V	.	.	.
15.267	0.2327	0.64	. Q	. V	.	.	.
15.283	0.2336	0.65	. Q	. V	.	.	.
15.300	0.2345	0.66	. Q	. V	.	.	.
15.317	0.2354	0.66	. Q	. V	.	.	.
15.333	0.2363	0.67	. Q	. V	.	.	.
15.350	0.2372	0.67	. Q	. V	.	.	.
15.367	0.2382	0.68	. Q	. V	.	.	.
15.383	0.2391	0.69	. Q	. V	.	.	.
15.400	0.2401	0.69	. Q	. V	.	.	.
15.417	0.2410	0.70	. Q	. V	.	.	.
15.433	0.2420	0.70	. Q	. V	.	.	.
15.450	0.2430	0.71	. Q	. V	.	.	.
15.467	0.2440	0.71	. Q	. V	.	.	.
15.483	0.2450	0.72	. Q	. V	.	.	.
15.500	0.2459	0.72	. Q	. V	.	.	.
15.517	0.2469	0.72	. Q	. V	.	.	.
15.533	0.2479	0.73	. Q	. V	.	.	.
15.550	0.2490	0.73	. Q	. V	.	.	.
15.567	0.2500	0.74	. Q	. V	.	.	.
15.583	0.2510	0.74	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
15.600	0.2520	0.76	. Q .	V .	.	.	
15.617	0.2531	0.78	. Q .	V.	.	.	
15.633	0.2542	0.79	. Q .	V.	.	.	
15.650	0.2553	0.81	. Q .	V.	.	.	
15.667	0.2565	0.83	. Q .	V.	.	.	
15.683	0.2576	0.85	. Q .	V.	.	.	
15.700	0.2588	0.86	. Q .	V.	.	.	
15.717	0.2600	0.88	. Q .	V.	.	.	
15.733	0.2613	0.93	. Q .	V.	.	.	
15.750	0.2627	1.00	. Q .	V.	.	.	
15.767	0.2642	1.07	. Q .	V.	.	.	
15.783	0.2657	1.13	. Q .	V.	.	.	
15.800	0.2674	1.20	. Q .	V	.	.	
15.817	0.2691	1.27	. Q .	V	.	.	
15.833	0.2710	1.34	. Q .	V	.	.	
15.850	0.2729	1.41	. Q .	V	.	.	
15.867	0.2749	1.48	. Q .	V	.	.	
15.883	0.2771	1.56	. Q .	V	.	.	
15.900	0.2793	1.64	. Q.	V	.	.	
15.917	0.2817	1.71	. Q.	.V	.	.	
15.933	0.2842	1.79	. Q.	.V	.	.	
15.950	0.2868	1.87	. Q	.V	.	.	
15.967	0.2894	1.95	. Q	.V	.	.	
15.983	0.2922	2.03	. .Q	.V	.	.	
16.000	0.2952	2.11	. .Q	. V	.	.	
16.017	0.2985	2.45	. . Q	. V	.	.	
16.033	0.3027	3.04	. . Q	. V	.	.	
16.050	0.3077	3.64	. .	Q V	.	.	
16.067	0.3136	4.23	. .	. Q	.	.	
16.083	0.3202	4.83	. .	. V Q	.	.	
16.100	0.3277	5.42	. .	. V	Q.	.	
16.117	0.3360	6.02	. .	. V	. Q	.	
16.133	0.3451	6.61	. .	. V	.	Q	.
16.150	0.3551	7.26	. .	. V	.		Q
16.167	0.3642	6.60	. .	. V	.	Q	.
16.183	0.3723	5.88	. .	. V	. Q	.	
16.200	0.3794	5.17	. .	. Q	.	.	
16.217	0.3855	4.45	. .	. Q	V .	.	
16.233	0.3907	3.73	. .	Q	V.	.	
16.250	0.3948	3.02	. .	Q .	V.	.	
16.267	0.3980	2.30	. . Q	.	V.	.	
16.283	0.4002	1.59	. Q .	.	V	.	
16.300	0.4017	1.10	. Q .	.	V	.	
16.317	0.4031	1.04	. Q .	.	V	.	
16.333	0.4045	0.99	. Q .	.	V	.	
16.350	0.4058	0.93	. Q .	.	V	.	
16.367	0.4070	0.88	. Q .	.	V	.	
16.383	0.4081	0.83	. Q .	.	V	.	
16.400	0.4092	0.77	. Q .	.	V	.	
16.417	0.4102	0.72	. Q .	.	V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
16.433	0.4111	0.67	. Q	.	. V	.	
16.450	0.4120	0.65	. Q	.	. V	.	
16.467	0.4129	0.64	. Q	.	. .V	.	
16.483	0.4138	0.64	. Q	.	. .V	.	
16.500	0.4146	0.64	. Q	.	. .V	.	
16.517	0.4155	0.63	. Q	.	. .V	.	
16.533	0.4164	0.63	. Q	.	. .V	.	
16.550	0.4172	0.62	. Q	.	. .V	.	
16.567	0.4181	0.62	. Q	.	. .V	.	
16.583	0.4189	0.61	. Q	.	. .V	.	
16.600	0.4198	0.60	. Q	.	. .V	.	
16.617	0.4206	0.59	. Q	.	. .V	.	
16.633	0.4214	0.58	. Q	.	. .V	.	
16.650	0.4222	0.58	. Q	.	. .V	.	
16.667	0.4230	0.57	. Q	.	. .V	.	
16.683	0.4237	0.56	. Q	.	. .V	.	
16.700	0.4245	0.55	. Q	.	. .V	.	
16.717	0.4252	0.54	. Q	.	. .V	.	
16.733	0.4259	0.53	. Q	.	. .V	.	
16.750	0.4267	0.52	. Q	.	. . V	.	
16.767	0.4274	0.52	. Q	.	. . V	.	
16.783	0.4281	0.51	. Q	.	. . V	.	
16.800	0.4288	0.50	. Q	.	. . V	.	
16.817	0.4294	0.50	. Q	.	. . V	.	
16.833	0.4301	0.49	. Q	.	. . V	.	
16.850	0.4308	0.48	. Q	.	. . V	.	
16.867	0.4314	0.48	. Q	.	. . V	.	
16.883	0.4321	0.47	. Q	.	. . V	.	
16.900	0.4327	0.47	. Q	.	. . V	.	
16.917	0.4334	0.46	. Q	.	. . V	.	
16.933	0.4340	0.46	. Q	.	. . V	.	
16.950	0.4346	0.45	. Q	.	. . V	.	
16.967	0.4352	0.45	. Q	.	. . V	.	
16.983	0.4358	0.44	. Q	.	. . V	.	
17.000	0.4364	0.44	. Q	.	. . V	.	
17.017	0.4370	0.43	. Q	.	. . V	.	
17.033	0.4376	0.42	. Q	.	. . V	.	
17.050	0.4382	0.42	. Q	.	. . V	.	
17.067	0.4387	0.41	. Q	.	. . V	.	
17.083	0.4393	0.41	. Q	.	. . V	.	
17.100	0.4399	0.40	. Q	.	. . V	.	
17.117	0.4404	0.40	. Q	.	. . V	.	
17.133	0.4410	0.39	. Q	.	. . V	.	
17.150	0.4415	0.39	. Q	.	. . V	.	
17.167	0.4420	0.38	. Q	.	. . V	.	
17.183	0.4425	0.38	. Q	.	. . V	.	
17.200	0.4431	0.38	. Q	.	. . V	.	
17.217	0.4436	0.37	. Q	.	. . V	.	
17.233	0.4441	0.37	. Q	.	. . V	.	
17.250	0.4446	0.37	. Q	.	. . V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1.8	3.6	5.4	7.3
17.267	0.4451	0.36	. Q	.	.	. V	.
17.283	0.4456	0.36	.Q	.	.	. V	.
17.300	0.4461	0.36	.Q	.	.	. V	.
17.317	0.4466	0.36	.Q	.	.	. V	.
17.333	0.4471	0.35	.Q	.	.	. V	.
17.350	0.4475	0.35	.Q	.	.	. V	.
17.367	0.4480	0.35	.Q	.	.	. V	.
17.383	0.4485	0.35	.Q	.	.	. V	.
17.400	0.4490	0.34	.Q	.	.	. V	.
17.417	0.4494	0.34	.Q	.	.	. V	.
17.433	0.4499	0.34	.Q	.	.	. V	.
17.450	0.4504	0.34	.Q	.	.	. V	.
17.467	0.4508	0.33	.Q	.	.	. V	.
17.483	0.4513	0.33	.Q	.	.	. V	.
17.500	0.4517	0.33	.Q	.	.	. V	.
17.517	0.4522	0.33	.Q	.	.	. V	.
17.533	0.4526	0.32	.Q	.	.	. V	.
17.550	0.4531	0.32	.Q	.	.	. V	.
17.567	0.4535	0.32	.Q	.	.	. V	.
17.583	0.4540	0.32	.Q	.	.	. V	.
17.600	0.4544	0.32	.Q	.	.	. V	.
17.617	0.4548	0.31	.Q	.	.	. V	.
17.633	0.4553	0.31	.Q	.	.	. V	.
17.650	0.4557	0.31	.Q	.	.	. V	.
17.667	0.4561	0.31	.Q	.	.	. V	.
17.683	0.4565	0.31	.Q	.	.	. V	.
17.700	0.4569	0.31	.Q	.	.	. V	.
17.717	0.4574	0.30	.Q	.	.	. V	.
17.733	0.4578	0.30	.Q	.	.	. V	.
17.750	0.4582	0.30	.Q	.	.	. V	.
17.767	0.4586	0.30	.Q	.	.	. V	.
17.783	0.4590	0.30	.Q	.	.	. V	.
17.800	0.4594	0.30	.Q	.	.	. V	.
17.817	0.4598	0.29	.Q	.	.	. V	.
17.833	0.4602	0.29	.Q	.	.	. V	.
17.850	0.4606	0.29	.Q	.	.	. V	.
17.867	0.4610	0.29	.Q	.	.	. V	.
17.883	0.4614	0.29	.Q	.	.	. V	.
17.900	0.4618	0.29	.Q	.	.	. V	.
17.917	0.4622	0.28	.Q	.	.	. V	.
17.933	0.4626	0.28	.Q	.	.	. V	.
17.950	0.4630	0.28	.Q	.	.	. V	.
17.967	0.4634	0.28	.Q	.	.	. V	.
17.983	0.4638	0.28	.Q	.	.	. V	.
18.000	0.4641	0.28	.Q	.	.	. V	.

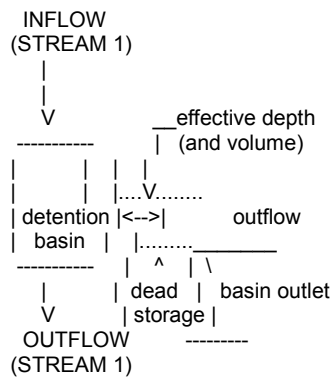
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	265.0
20%	130.0
30%	80.0
40%	70.0
50%	60.0
60%	45.0
70%	35.0

80%	25.0
90%	15.0

****
FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<
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ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.04

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	2.00	0.01	0.203
3	2.42	0.02	0.246
4	5.20	0.03	0.529
5	7.00	5.11	0.712
6	10.00	23.64	1.017

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	0.38	0.04	1.31	0.0	0.133
14.033	0.000	0.38	0.04	1.32	0.0	0.134
14.050	0.000	0.39	0.04	1.32	0.0	0.134
14.067	0.000	0.39	0.04	1.33	0.0	0.135
14.083	0.000	0.39	0.04	1.33	0.0	0.135
14.100	0.000	0.40	0.04	1.34	0.0	0.136
14.117	0.000	0.40	0.04	1.34	0.0	0.136
14.133	0.000	0.41	0.04	1.34	0.0	0.136
14.150	0.000	0.41	0.04	1.35	0.0	0.137
14.167	0.000	0.41	0.04	1.35	0.0	0.137
14.183	0.000	0.41	0.04	1.36	0.0	0.138
14.200	0.000	0.41	0.04	1.36	0.0	0.139
14.217	0.000	0.42	0.04	1.37	0.0	0.139
14.233	0.000	0.42	0.04	1.37	0.0	0.140
14.250	0.000	0.42	0.04	1.38	0.0	0.140
14.267	0.000	0.42	0.04	1.38	0.0	0.141
14.283	0.000	0.42	0.04	1.39	0.0	0.141
14.300	0.000	0.42	0.04	1.39	0.0	0.142
14.317	0.000	0.43	0.04	1.40	0.0	0.142
14.333	0.000	0.43	0.04	1.41	0.0	0.143
14.350	0.000	0.43	0.04	1.41	0.0	0.143
14.367	0.000	0.43	0.04	1.42	0.0	0.144
14.383	0.000	0.44	0.04	1.42	0.0	0.144
14.400	0.000	0.44	0.04	1.43	0.0	0.145
14.417	0.000	0.44	0.04	1.43	0.0	0.145
14.433	0.000	0.45	0.04	1.44	0.0	0.146
14.450	0.000	0.45	0.04	1.44	0.0	0.146
14.467	0.000	0.45	0.04	1.45	0.0	0.147
14.483	0.000	0.45	0.04	1.45	0.0	0.147
14.500	0.000	0.45	0.04	1.46	0.0	0.148
14.517	0.000	0.45	0.04	1.46	0.0	0.149
14.533	0.000	0.46	0.04	1.47	0.0	0.149
14.550	0.000	0.46	0.04	1.48	0.0	0.150
14.567	0.000	0.46	0.04	1.48	0.0	0.150
14.583	0.000	0.46	0.04	1.49	0.0	0.151
14.600	0.000	0.46	0.04	1.49	0.0	0.151
14.617	0.000	0.47	0.04	1.50	0.0	0.152
14.633	0.000	0.47	0.04	1.50	0.0	0.153
14.650	0.000	0.48	0.04	1.51	0.0	0.153
14.667	0.000	0.48	0.04	1.52	0.0	0.154
14.683	0.000	0.48	0.04	1.52	0.0	0.154
14.700	0.000	0.49	0.04	1.53	0.0	0.155
14.717	0.000	0.49	0.04	1.53	0.0	0.156
14.733	0.000	0.49	0.04	1.54	0.0	0.156
14.750	0.000	0.50	0.04	1.55	0.0	0.157
14.767	0.000	0.50	0.04	1.55	0.0	0.157
14.783	0.000	0.50	0.04	1.56	0.0	0.158
14.800	0.000	0.50	0.04	1.56	0.0	0.159
14.817	0.000	0.51	0.04	1.57	0.0	0.159
14.833	0.000	0.51	0.04	1.58	0.0	0.160

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	0.51	0.04	1.58	0.0	0.161
14.867	0.000	0.51	0.04	1.59	0.0	0.161
14.883	0.000	0.52	0.04	1.59	0.0	0.162
14.900	0.000	0.52	0.04	1.60	0.0	0.163
14.917	0.000	0.53	0.04	1.61	0.0	0.163
14.933	0.000	0.53	0.04	1.61	0.0	0.164
14.950	0.000	0.54	0.04	1.62	0.0	0.165
14.967	0.000	0.54	0.04	1.63	0.0	0.165
14.983	0.000	0.55	0.04	1.63	0.0	0.166
15.000	0.000	0.55	0.04	1.64	0.0	0.167
15.017	0.000	0.56	0.04	1.65	0.0	0.167
15.033	0.000	0.56	0.04	1.66	0.0	0.168
15.050	0.000	0.56	0.04	1.66	0.0	0.169
15.067	0.000	0.57	0.04	1.67	0.0	0.169
15.083	0.000	0.57	0.04	1.68	0.0	0.170
15.100	0.000	0.57	0.04	1.68	0.0	0.171
15.117	0.000	0.58	0.04	1.69	0.0	0.172
15.133	0.000	0.58	0.04	1.70	0.0	0.172
15.150	0.000	0.58	0.04	1.71	0.0	0.173
15.167	0.000	0.59	0.04	1.71	0.0	0.174
15.183	0.000	0.60	0.04	1.72	0.0	0.175
15.200	0.000	0.61	0.04	1.73	0.0	0.175
15.217	0.000	0.62	0.04	1.74	0.0	0.176
15.233	0.000	0.62	0.04	1.74	0.0	0.177
15.250	0.000	0.63	0.04	1.75	0.0	0.178
15.267	0.000	0.64	0.04	1.76	0.0	0.179
15.283	0.000	0.65	0.04	1.77	0.0	0.179
15.300	0.000	0.66	0.04	1.78	0.0	0.180
15.317	0.000	0.66	0.04	1.78	0.0	0.181
15.333	0.000	0.67	0.04	1.79	0.0	0.182
15.350	0.000	0.67	0.04	1.80	0.0	0.183
15.367	0.000	0.68	0.04	1.81	0.0	0.184
15.383	0.000	0.69	0.04	1.82	0.0	0.184
15.400	0.000	0.69	0.04	1.83	0.0	0.185
15.417	0.000	0.70	0.04	1.84	0.0	0.186
15.433	0.000	0.70	0.04	1.84	0.0	0.187
15.450	0.000	0.71	0.04	1.85	0.0	0.188
15.467	0.000	0.71	0.04	1.86	0.0	0.189
15.483	0.000	0.72	0.04	1.87	0.0	0.190
15.500	0.000	0.72	0.04	1.88	0.0	0.191
15.517	0.000	0.72	0.04	1.89	0.0	0.192
15.533	0.000	0.73	0.04	1.90	0.0	0.193
15.550	0.000	0.73	0.04	1.91	0.0	0.194
15.567	0.000	0.74	0.04	1.92	0.0	0.195
15.583	0.000	0.74	0.04	1.93	0.0	0.196
15.600	0.000	0.76	0.04	1.94	0.0	0.197
15.617	0.000	0.78	0.04	1.95	0.0	0.198
15.633	0.000	0.79	0.04	1.96	0.0	0.199
15.650	0.000	0.81	0.04	1.97	0.0	0.200
15.667	0.000	0.83	0.04	1.98	0.0	0.201

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	0.85	0.04	1.99	0.0	0.202
15.700	0.000	0.86	0.04	2.00	0.0	0.203
15.717	0.000	0.88	0.04	2.01	0.0	0.204
15.733	0.000	0.93	0.04	2.02	0.0	0.205
15.750	0.000	1.00	0.04	2.03	0.0	0.207
15.767	0.000	1.07	0.04	2.05	0.0	0.208
15.783	0.000	1.13	0.04	2.06	0.0	0.209
15.800	0.000	1.20	0.04	2.08	0.0	0.211
15.817	0.000	1.27	0.04	2.09	0.0	0.213
15.833	0.000	1.34	0.04	2.11	0.0	0.214
15.850	0.000	1.41	0.04	2.13	0.0	0.216
15.867	0.000	1.48	0.04	2.15	0.0	0.218
15.883	0.000	1.56	0.04	2.17	0.0	0.220
15.900	0.000	1.64	0.04	2.19	0.0	0.223
15.917	0.000	1.71	0.04	2.21	0.0	0.225
15.933	0.000	1.79	0.04	2.24	0.0	0.227
15.950	0.000	1.87	0.04	2.26	0.0	0.230
15.967	0.000	1.95	0.04	2.29	0.0	0.232
15.983	0.000	2.03	0.04	2.31	0.0	0.235
16.000	0.000	2.11	0.04	2.34	0.0	0.238
16.017	0.000	2.45	0.04	2.37	0.0	0.241
16.033	0.000	3.04	0.04	2.41	0.0	0.245
16.050	0.000	3.64	0.04	2.46	0.0	0.250
16.067	0.000	4.23	0.04	2.52	0.0	0.256
16.083	0.000	4.83	0.04	2.58	0.0	0.262
16.100	0.000	5.42	0.04	2.65	0.0	0.270
16.117	0.000	6.02	0.04	2.74	0.0	0.278
16.133	0.000	6.61	0.04	2.82	0.0	0.287
16.150	0.000	7.26	0.04	2.92	0.0	0.297
16.167	0.000	6.60	0.04	3.01	0.0	0.306
16.183	0.000	5.88	0.04	3.09	0.0	0.314
16.200	0.000	5.17	0.04	3.16	0.0	0.321
16.217	0.000	4.45	0.04	3.22	0.0	0.327
16.233	0.000	3.73	0.04	3.27	0.0	0.332
16.250	0.000	3.02	0.04	3.31	0.0	0.336
16.267	0.000	2.30	0.04	3.34	0.0	0.339
16.283	0.000	1.59	0.04	3.36	0.0	0.341
16.300	0.000	1.10	0.04	3.37	0.0	0.343
16.317	0.000	1.04	0.04	3.38	0.0	0.344
16.333	0.000	0.99	0.04	3.40	0.0	0.345
16.350	0.000	0.93	0.04	3.41	0.0	0.347
16.367	0.000	0.88	0.04	3.42	0.0	0.348
16.383	0.000	0.83	0.04	3.43	0.0	0.349
16.400	0.000	0.77	0.04	3.44	0.0	0.350
16.417	0.000	0.72	0.04	3.45	0.0	0.351
16.433	0.000	0.67	0.04	3.46	0.0	0.351
16.450	0.000	0.65	0.04	3.46	0.0	0.352
16.467	0.000	0.64	0.04	3.47	0.0	0.353
16.483	0.000	0.64	0.04	3.48	0.0	0.354
16.500	0.000	0.64	0.04	3.49	0.0	0.355

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	0.63	0.04	3.49	0.0	0.355
16.533	0.000	0.63	0.04	3.50	0.0	0.356
16.550	0.000	0.62	0.04	3.51	0.0	0.357
16.567	0.000	0.62	0.04	3.52	0.0	0.358
16.583	0.000	0.61	0.04	3.52	0.0	0.358
16.600	0.000	0.60	0.04	3.53	0.0	0.359
16.617	0.000	0.59	0.04	3.54	0.0	0.360
16.633	0.000	0.58	0.04	3.55	0.0	0.361
16.650	0.000	0.58	0.04	3.55	0.0	0.361
16.667	0.000	0.57	0.04	3.56	0.0	0.362
16.683	0.000	0.56	0.04	3.57	0.0	0.363
16.700	0.000	0.55	0.04	3.57	0.0	0.363
16.717	0.000	0.54	0.04	3.58	0.0	0.364
16.733	0.000	0.53	0.04	3.59	0.0	0.365
16.750	0.000	0.52	0.04	3.59	0.0	0.365
16.767	0.000	0.52	0.04	3.60	0.0	0.366
16.783	0.000	0.51	0.04	3.60	0.0	0.367
16.800	0.000	0.50	0.04	3.61	0.0	0.367
16.817	0.000	0.50	0.04	3.62	0.0	0.368
16.833	0.000	0.49	0.04	3.62	0.0	0.368
16.850	0.000	0.48	0.04	3.63	0.0	0.369
16.867	0.000	0.48	0.04	3.63	0.0	0.369
16.883	0.000	0.47	0.04	3.64	0.0	0.370
16.900	0.000	0.47	0.04	3.64	0.0	0.371
16.917	0.000	0.46	0.04	3.65	0.0	0.371
16.933	0.000	0.46	0.04	3.65	0.0	0.372
16.950	0.000	0.45	0.04	3.66	0.0	0.372
16.967	0.000	0.45	0.04	3.66	0.0	0.373
16.983	0.000	0.44	0.04	3.67	0.0	0.373
17.000	0.000	0.44	0.04	3.67	0.0	0.374
17.017	0.000	0.43	0.04	3.68	0.0	0.374
17.033	0.000	0.42	0.04	3.68	0.0	0.375
17.050	0.000	0.42	0.04	3.69	0.0	0.375
17.067	0.000	0.41	0.04	3.69	0.0	0.376
17.083	0.000	0.41	0.04	3.70	0.0	0.376
17.100	0.000	0.40	0.04	3.70	0.0	0.377
17.117	0.000	0.40	0.04	3.71	0.0	0.377
17.133	0.000	0.39	0.04	3.71	0.0	0.377
17.150	0.000	0.39	0.04	3.72	0.0	0.378
17.167	0.000	0.38	0.04	3.72	0.0	0.378
17.183	0.000	0.38	0.04	3.72	0.0	0.379
17.200	0.000	0.38	0.04	3.73	0.0	0.379
17.217	0.000	0.37	0.04	3.73	0.0	0.380
17.233	0.000	0.37	0.04	3.74	0.0	0.380
17.250	0.000	0.37	0.04	3.74	0.0	0.380
17.267	0.000	0.36	0.04	3.74	0.0	0.381
17.283	0.000	0.36	0.04	3.75	0.0	0.381
17.300	0.000	0.36	0.04	3.75	0.0	0.382
17.317	0.000	0.36	0.04	3.76	0.0	0.382
17.333	0.000	0.35	0.04	3.76	0.0	0.382

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	0.35	0.04	3.76	0.0	0.383
17.367	0.000	0.35	0.04	3.77	0.0	0.383
17.383	0.000	0.35	0.04	3.77	0.0	0.384
17.400	0.000	0.34	0.04	3.78	0.0	0.384
17.417	0.000	0.34	0.04	3.78	0.0	0.384
17.433	0.000	0.34	0.04	3.78	0.0	0.385
17.450	0.000	0.34	0.04	3.79	0.0	0.385
17.467	0.000	0.33	0.04	3.79	0.0	0.385
17.483	0.000	0.33	0.04	3.79	0.0	0.386
17.500	0.000	0.33	0.04	3.80	0.0	0.386
17.517	0.000	0.33	0.04	3.80	0.0	0.387
17.533	0.000	0.32	0.04	3.80	0.0	0.387
17.550	0.000	0.32	0.04	3.81	0.0	0.387
17.567	0.000	0.32	0.04	3.81	0.0	0.388
17.583	0.000	0.32	0.04	3.81	0.0	0.388
17.600	0.000	0.32	0.04	3.82	0.0	0.388
17.617	0.000	0.31	0.04	3.82	0.0	0.389
17.633	0.000	0.31	0.04	3.82	0.0	0.389
17.650	0.000	0.31	0.04	3.83	0.0	0.389
17.667	0.000	0.31	0.04	3.83	0.0	0.390
17.683	0.000	0.31	0.04	3.83	0.0	0.390
17.700	0.000	0.31	0.04	3.84	0.0	0.390
17.717	0.000	0.30	0.04	3.84	0.0	0.391
17.733	0.000	0.30	0.04	3.84	0.0	0.391
17.750	0.000	0.30	0.04	3.85	0.0	0.391
17.767	0.000	0.30	0.04	3.85	0.0	0.392
17.783	0.000	0.30	0.04	3.85	0.0	0.392
17.800	0.000	0.30	0.04	3.86	0.0	0.392
17.817	0.000	0.29	0.04	3.86	0.0	0.393
17.833	0.000	0.29	0.04	3.86	0.0	0.393
17.850	0.000	0.29	0.04	3.87	0.0	0.393
17.867	0.000	0.29	0.04	3.87	0.0	0.393
17.883	0.000	0.29	0.04	3.87	0.0	0.394
17.900	0.000	0.29	0.04	3.87	0.0	0.394
17.917	0.000	0.28	0.04	3.88	0.0	0.394
17.933	0.000	0.28	0.04	3.88	0.0	0.395
17.950	0.000	0.28	0.04	3.88	0.0	0.395
17.967	0.000	0.28	0.04	3.89	0.0	0.395
17.983	0.000	0.28	0.04	3.89	0.0	0.396
18.000	0.000	0.28	0.04	3.89	0.0	0.396

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.533 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.131 AF
LOSS VOLUME = 0.402 AF

****
FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 4

>>>>>MODEL PIPEFLOW ROUTING OF STREAM #1<<<<<
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MODEL PIPEFLOW ROUTING OF STREAM 1 WHERE
STORAGE EFFECTS ARE NEGLECTED WITHIN THE PIPE, FLOW
VELOCITIES ARE ESTIMATED BY ASSUMING STEADY FLOW FOR
EACH UNIT INTERVAL(NORMAL DEPTH, Dn), AND FLOWS IN EXCESS
OF (.82)(DIAMETER) ARE PONDED AT THE UPSTREAM INLET:
UNIT INTERVAL FLOW VELOCITY COMPUTED USING Dn UP TO
(0.938)(DIAMETER):

PIPELENGTH(FT) = 468.00 MANNINGS FACTOR = 0.013
UPSTREAM ELEVATION(FT) = 130.00
DOWNSTREAM ELEVATION(FT) = 127.60
PIPE DIAMETER(FT) = 2.00

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.000	0.01	0.50	0.01	0.000
14.017	0.01	0.50	0.01	0.000
14.033	0.01	0.50	0.01	0.000
14.050	0.01	0.50	0.01	0.000
14.067	0.01	0.50	0.01	0.000
14.083	0.01	0.50	0.01	0.000
14.100	0.01	0.50	0.01	0.000
14.117	0.01	0.50	0.01	0.000
14.133	0.01	0.50	0.01	0.000
14.150	0.01	0.50	0.01	0.000
14.167	0.01	0.50	0.01	0.000
14.183	0.01	0.50	0.01	0.000
14.200	0.01	0.50	0.01	0.000
14.217	0.01	0.50	0.01	0.000
14.233	0.01	0.50	0.01	0.000
14.250	0.01	0.50	0.01	0.000
14.267	0.01	0.50	0.01	0.000
14.283	0.01	0.50	0.01	0.000
14.300	0.01	0.50	0.01	0.000
14.317	0.01	0.50	0.01	0.000
14.333	0.01	0.50	0.01	0.000
14.350	0.01	0.50	0.01	0.000
14.367	0.01	0.50	0.01	0.000
14.383	0.01	0.50	0.01	0.000
14.400	0.01	0.50	0.01	0.000
14.417	0.01	0.50	0.01	0.000
14.433	0.01	0.50	0.01	0.000
14.450	0.01	0.50	0.01	0.000
14.467	0.01	0.50	0.01	0.000
14.483	0.01	0.50	0.01	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
14.500	0.01	0.50	0.01	0.000
14.517	0.01	0.50	0.01	0.000
14.533	0.01	0.50	0.01	0.000
14.550	0.01	0.50	0.01	0.000
14.567	0.01	0.50	0.01	0.000
14.583	0.01	0.50	0.01	0.000
14.600	0.01	0.50	0.01	0.000
14.617	0.01	0.50	0.01	0.000
14.633	0.01	0.50	0.01	0.000
14.650	0.01	0.50	0.01	0.000
14.667	0.01	0.50	0.01	0.000
14.683	0.01	0.50	0.01	0.000
14.700	0.01	0.50	0.01	0.000
14.717	0.01	0.50	0.01	0.000
14.733	0.01	0.50	0.01	0.000
14.750	0.01	0.50	0.01	0.000
14.767	0.01	0.50	0.01	0.000
14.783	0.01	0.50	0.01	0.000
14.800	0.01	0.50	0.01	0.000
14.817	0.01	0.50	0.01	0.000
14.833	0.01	0.50	0.01	0.000
14.850	0.01	0.50	0.01	0.000
14.867	0.01	0.50	0.01	0.000
14.883	0.01	0.50	0.01	0.000
14.900	0.01	0.50	0.01	0.000
14.917	0.01	0.50	0.01	0.000
14.933	0.01	0.50	0.01	0.000
14.950	0.01	0.50	0.01	0.000
14.967	0.01	0.50	0.01	0.000
14.983	0.01	0.50	0.01	0.000
15.000	0.01	0.50	0.01	0.000
15.017	0.01	0.50	0.01	0.000
15.033	0.01	0.50	0.01	0.000
15.050	0.01	0.50	0.01	0.000
15.067	0.01	0.50	0.01	0.000
15.083	0.01	0.50	0.01	0.000
15.100	0.01	0.50	0.01	0.000
15.117	0.01	0.50	0.01	0.000
15.133	0.01	0.50	0.01	0.000
15.150	0.01	0.50	0.01	0.000
15.167	0.01	0.50	0.01	0.000
15.183	0.01	0.50	0.01	0.000
15.200	0.01	0.50	0.01	0.000
15.217	0.01	0.50	0.01	0.000
15.233	0.01	0.50	0.01	0.000
15.250	0.01	0.50	0.01	0.000
15.267	0.01	0.50	0.01	0.000
15.283	0.01	0.50	0.01	0.000
15.300	0.01	0.50	0.01	0.000
15.317	0.01	0.50	0.01	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
15.333	0.01	0.50	0.01	0.000
15.350	0.01	0.50	0.01	0.000
15.367	0.01	0.50	0.01	0.000
15.383	0.01	0.50	0.01	0.000
15.400	0.01	0.50	0.01	0.000
15.417	0.01	0.50	0.01	0.000
15.433	0.01	0.50	0.01	0.000
15.450	0.01	0.50	0.01	0.000
15.467	0.01	0.50	0.01	0.000
15.483	0.01	0.50	0.01	0.000
15.500	0.01	0.50	0.01	0.000
15.517	0.01	0.50	0.01	0.000
15.533	0.01	0.50	0.01	0.000
15.550	0.01	0.50	0.01	0.000
15.567	0.01	0.50	0.01	0.000
15.583	0.01	0.50	0.01	0.000
15.600	0.01	0.50	0.01	0.000
15.617	0.01	0.50	0.01	0.000
15.633	0.01	0.50	0.01	0.000
15.650	0.01	0.50	0.01	0.000
15.667	0.01	0.50	0.01	0.000
15.683	0.01	0.50	0.01	0.000
15.700	0.01	0.50	0.01	0.000
15.717	0.01	0.50	0.01	0.000
15.733	0.01	0.50	0.01	0.000
15.750	0.01	0.50	0.01	0.000
15.767	0.01	0.50	0.01	0.000
15.783	0.01	0.50	0.01	0.000
15.800	0.01	0.50	0.01	0.000
15.817	0.01	0.50	0.01	0.000
15.833	0.01	0.50	0.01	0.000
15.850	0.01	0.50	0.01	0.000
15.867	0.01	0.50	0.01	0.000
15.883	0.02	0.50	0.01	0.000
15.900	0.02	0.50	0.01	0.000
15.917	0.02	0.50	0.01	0.000
15.933	0.02	0.50	0.01	0.000
15.950	0.02	0.50	0.01	0.000
15.967	0.02	0.50	0.01	0.000
15.983	0.02	0.50	0.01	0.000
16.000	0.02	0.50	0.01	0.000
16.017	0.02	0.50	0.01	0.000
16.033	0.02	0.50	0.01	0.000
16.050	0.02	0.50	0.01	0.000
16.067	0.02	0.50	0.01	0.000
16.083	0.02	0.50	0.01	0.000
16.100	0.02	0.50	0.01	0.000
16.117	0.02	0.50	0.01	0.000
16.133	0.02	0.50	0.01	0.000
16.150	0.02	0.50	0.02	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
16.167	0.02	0.50	0.02	0.000
16.183	0.02	0.50	0.02	0.000
16.200	0.02	0.50	0.02	0.000
16.217	0.03	0.50	0.02	0.000
16.233	0.03	0.50	0.02	0.000
16.250	0.03	0.50	0.02	0.000
16.267	0.03	0.50	0.02	0.000
16.283	0.03	0.50	0.02	0.000
16.300	0.03	0.50	0.02	0.000
16.317	0.03	0.50	0.02	0.000
16.333	0.03	0.50	0.02	0.000
16.350	0.03	0.50	0.02	0.000
16.367	0.03	0.50	0.02	0.000
16.383	0.03	0.50	0.02	0.000
16.400	0.03	0.50	0.02	0.000
16.417	0.03	0.50	0.02	0.000
16.433	0.03	0.50	0.02	0.000
16.450	0.03	0.50	0.02	0.000
16.467	0.03	0.50	0.02	0.000
16.483	0.03	0.50	0.03	0.000
16.500	0.03	0.50	0.03	0.000
16.517	0.03	0.50	0.03	0.000
16.533	0.03	0.50	0.03	0.000
16.550	0.03	0.50	0.03	0.000
16.567	0.03	0.50	0.03	0.000
16.583	0.03	0.50	0.03	0.000
16.600	0.03	0.50	0.03	0.000
16.617	0.03	0.50	0.03	0.000
16.633	0.03	0.50	0.03	0.000
16.650	0.03	0.50	0.03	0.000
16.667	0.03	0.50	0.03	0.000
16.683	0.03	0.50	0.03	0.000
16.700	0.03	0.50	0.03	0.000
16.717	0.03	0.50	0.03	0.000
16.733	0.03	0.50	0.03	0.000
16.750	0.03	0.50	0.03	0.000
16.767	0.03	0.50	0.03	0.000
16.783	0.03	0.50	0.03	0.000
16.800	0.03	0.50	0.03	0.000
16.817	0.03	0.50	0.03	0.000
16.833	0.03	0.50	0.03	0.000
16.850	0.03	0.50	0.03	0.000
16.867	0.03	0.50	0.03	0.000
16.883	0.03	0.50	0.03	0.000
16.900	0.03	0.50	0.03	0.000
16.917	0.03	0.50	0.03	0.000
16.933	0.03	0.50	0.03	0.000
16.950	0.03	0.50	0.03	0.000
16.967	0.03	0.50	0.03	0.000
16.983	0.03	0.50	0.03	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.000	0.03	0.50	0.03	0.000
17.017	0.03	0.50	0.03	0.000
17.033	0.03	0.50	0.03	0.000
17.050	0.03	0.50	0.03	0.000
17.067	0.03	0.50	0.03	0.000
17.083	0.03	0.50	0.03	0.000
17.100	0.03	0.50	0.03	0.000
17.117	0.03	0.50	0.03	0.000
17.133	0.03	0.50	0.03	0.000
17.150	0.03	0.50	0.03	0.000
17.167	0.03	0.50	0.03	0.000
17.183	0.03	0.50	0.03	0.000
17.200	0.03	0.50	0.03	0.000
17.217	0.03	0.50	0.03	0.000
17.233	0.03	0.50	0.03	0.000
17.250	0.03	0.50	0.03	0.000
17.267	0.03	0.50	0.03	0.000
17.283	0.03	0.50	0.03	0.000
17.300	0.03	0.50	0.03	0.000
17.317	0.03	0.50	0.03	0.000
17.333	0.03	0.50	0.03	0.000
17.350	0.03	0.50	0.03	0.000
17.367	0.03	0.50	0.03	0.000
17.383	0.03	0.50	0.03	0.000
17.400	0.03	0.50	0.03	0.000
17.417	0.03	0.50	0.03	0.000
17.433	0.03	0.50	0.03	0.000
17.450	0.03	0.50	0.03	0.000
17.467	0.03	0.50	0.03	0.000
17.483	0.03	0.50	0.03	0.000
17.500	0.03	0.50	0.03	0.000
17.517	0.03	0.50	0.03	0.000
17.533	0.03	0.50	0.03	0.000
17.550	0.03	0.50	0.03	0.000
17.567	0.03	0.50	0.03	0.000
17.583	0.03	0.50	0.03	0.000
17.600	0.03	0.50	0.03	0.000
17.617	0.03	0.50	0.03	0.000
17.633	0.03	0.50	0.03	0.000
17.650	0.03	0.50	0.03	0.000
17.667	0.03	0.50	0.03	0.000
17.683	0.03	0.50	0.03	0.000
17.700	0.03	0.50	0.03	0.000
17.717	0.03	0.50	0.03	0.000
17.733	0.03	0.50	0.03	0.000
17.750	0.03	0.50	0.03	0.000
17.767	0.03	0.50	0.03	0.000
17.783	0.03	0.50	0.03	0.000
17.800	0.03	0.50	0.03	0.000
17.817	0.03	0.50	0.03	0.000

NORMAL DEPTH VELOCITY PIPE ROUTING RESULTS:

TIME (HRS)	INFLOW (CFS)	VELOCITY (FPS)	OUTFLOW (CFS)	UPSTREAM PONDING(AF)
17.833	0.03	0.50	0.03	0.000
17.850	0.03	0.50	0.03	0.000
17.867	0.03	0.50	0.03	0.000
17.883	0.03	0.50	0.03	0.000
17.900	0.03	0.50	0.03	0.000
17.917	0.03	0.50	0.03	0.000
17.933	0.03	0.50	0.03	0.000
17.950	0.03	0.50	0.03	0.000
17.967	0.03	0.50	0.03	0.000
17.983	0.03	0.50	0.03	0.000
18.000	0.03	0.50	0.03	0.000

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 ****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE = 1.2
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  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
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  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.51
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.060
    LOW LOSS FRACTION = 0.288
    TIME OF CONCENTRATION(MIN.) =  9.37
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

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    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.29
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.14

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24-HOUR STORM
RUNOFF HYDROGRAPH

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HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
14.000	0.1005	0.21	. Q	. V	.	.	.
14.017	0.1008	0.21	. Q	. V	.	.	.
14.033	0.1011	0.21	. Q	. V	.	.	.
14.050	0.1014	0.21	. Q	. V	.	.	.
14.067	0.1017	0.21	. Q	. V	.	.	.
14.083	0.1020	0.21	. Q	. V	.	.	.
14.100	0.1022	0.22	. Q	. V	.	.	.
14.117	0.1025	0.22	. Q	. V	.	.	.
14.133	0.1028	0.22	. Q	. V	.	.	.
14.150	0.1031	0.22	. Q	. V	.	.	.
14.167	0.1035	0.22	. Q	. V	.	.	.
14.183	0.1038	0.22	. Q	. V	.	.	.
14.200	0.1041	0.23	. Q	. V	.	.	.
14.217	0.1044	0.23	. Q	. V	.	.	.
14.233	0.1047	0.23	. Q	. V	.	.	.
14.250	0.1050	0.23	. Q	. V	.	.	.
14.267	0.1053	0.23	. Q	. V	.	.	.
14.283	0.1057	0.24	. Q	. V	.	.	.
14.300	0.1060	0.24	. Q	. V	.	.	.
14.317	0.1063	0.24	. Q	. V	.	.	.
14.333	0.1066	0.24	. Q	. V	.	.	.
14.350	0.1070	0.24	. Q	. V	.	.	.
14.367	0.1073	0.24	. Q	. V	.	.	.
14.383	0.1076	0.24	. Q	. V	.	.	.
14.400	0.1080	0.24	. Q	. V	.	.	.
14.417	0.1083	0.24	. Q	. V	.	.	.
14.433	0.1086	0.24	. Q	. V	.	.	.
14.450	0.1090	0.24	. Q	. V	.	.	.
14.467	0.1093	0.25	. Q	. V	.	.	.
14.483	0.1097	0.25	. Q	. V	.	.	.
14.500	0.1100	0.25	. Q	. V	.	.	.
14.517	0.1103	0.25	. Q	. V	.	.	.
14.533	0.1107	0.25	. Q	. V	.	.	.
14.550	0.1110	0.26	. Q	. V	.	.	.
14.567	0.1114	0.26	. Q	. V	.	.	.
14.583	0.1118	0.26	. Q	. V	.	.	.
14.600	0.1121	0.26	. Q	. V	.	.	.
14.617	0.1125	0.26	. Q	. V	.	.	.
14.633	0.1128	0.26	. Q	. V	.	.	.
14.650	0.1132	0.26	. Q	. V	.	.	.
14.667	0.1136	0.27	. Q	. V	.	.	.
14.683	0.1139	0.27	. Q	. V	.	.	.
14.700	0.1143	0.27	. Q	. V	.	.	.
14.717	0.1147	0.27	. Q	. V	.	.	.
14.733	0.1151	0.27	. Q	. V	.	.	.
14.750	0.1154	0.27	. Q	. V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
14.767	0.1158	0.27	. Q .	V .	.	.	
14.783	0.1162	0.28	. Q .	V .	.	.	
14.800	0.1166	0.28	. Q .	V .	.	.	
14.817	0.1169	0.28	. Q .	V .	.	.	
14.833	0.1173	0.28	. Q .	V .	.	.	
14.850	0.1177	0.29	. Q .	V .	.	.	
14.867	0.1181	0.29	. Q .	V .	.	.	
14.883	0.1185	0.29	. Q .	V .	.	.	
14.900	0.1189	0.29	. Q .	V .	.	.	
14.917	0.1193	0.30	. Q .	V .	.	.	
14.933	0.1197	0.30	. Q .	V .	.	.	
14.950	0.1202	0.30	. Q .	V .	.	.	
14.967	0.1206	0.30	. Q .	V .	.	.	
14.983	0.1210	0.30	. Q .	V .	.	.	
15.000	0.1214	0.30	. Q .	V .	.	.	
15.017	0.1218	0.30	. Q .	V .	.	.	
15.033	0.1222	0.31	. Q .	V .	.	.	
15.050	0.1227	0.31	. Q .	V .	.	.	
15.067	0.1231	0.31	. Q .	V .	.	.	
15.083	0.1235	0.31	. Q .	V .	.	.	
15.100	0.1240	0.32	. Q .	V .	.	.	
15.117	0.1244	0.32	. Q .	V .	.	.	
15.133	0.1249	0.33	. Q .	V .	.	.	
15.150	0.1253	0.33	. Q .	V .	.	.	
15.167	0.1258	0.34	. Q .	V .	.	.	
15.183	0.1262	0.34	. Q .	V .	.	.	
15.200	0.1267	0.34	. Q .	V .	.	.	
15.217	0.1272	0.35	. Q .	V .	.	.	
15.233	0.1277	0.35	. Q .	V .	.	.	
15.250	0.1282	0.36	. Q .	V .	.	.	
15.267	0.1287	0.36	. Q .	V .	.	.	
15.283	0.1292	0.36	. Q .	V .	.	.	
15.300	0.1297	0.37	. Q .	V .	.	.	
15.317	0.1302	0.37	. Q .	V .	.	.	
15.333	0.1307	0.37	. Q .	V .	.	.	
15.350	0.1312	0.38	. Q .	V .	.	.	
15.367	0.1317	0.38	. Q .	V .	.	.	
15.383	0.1323	0.38	. Q .	V .	.	.	
15.400	0.1328	0.39	. Q .	V .	.	.	
15.417	0.1333	0.39	. Q .	V .	.	.	
15.433	0.1339	0.39	. Q .	V .	.	.	
15.450	0.1344	0.39	. Q .	V .	.	.	
15.467	0.1349	0.39	. Q .	V .	.	.	
15.483	0.1355	0.39	. Q .	V .	.	.	
15.500	0.1360	0.39	. Q .	V .	.	.	
15.517	0.1366	0.40	. Q .	V .	.	.	
15.533	0.1371	0.40	. Q .	V .	.	.	
15.550	0.1377	0.40	. Q .	V .	.	.	
15.567	0.1382	0.41	. Q .	V.	.	.	
15.583	0.1388	0.42	. Q .	V.	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
15.600	0.1394	0.42	Q	V.			
15.617	0.1400	0.43	Q	V.			
15.633	0.1406	0.44	Q	V.			
15.650	0.1412	0.45	Q	V.			
15.667	0.1418	0.45	Q	V.			
15.683	0.1425	0.46	Q	V.			
15.700	0.1431	0.47	Q	V.			
15.717	0.1438	0.50	Q	V.			
15.733	0.1445	0.53	Q	V.			
15.750	0.1453	0.56	Q	V			
15.767	0.1461	0.59	Q	V			
15.783	0.1470	0.62	Q	V			
15.800	0.1478	0.65	Q	V			
15.817	0.1488	0.68	Q	V			
15.833	0.1497	0.70	Q	V			
15.850	0.1508	0.73	Q	V			
15.867	0.1518	0.77	Q	V			
15.883	0.1529	0.80	Q.	.V			
15.900	0.1541	0.83	Q.	.V			
15.917	0.1553	0.87	Q	.V			
15.933	0.1565	0.90	Q	.V			
15.950	0.1578	0.94	Q	.V			
15.967	0.1591	0.97	.Q	.V			
15.983	0.1605	1.00	.Q	. V			
16.000	0.1619	1.04	. Q	. V			
16.017	0.1636	1.18	. Q	. V			
16.033	0.1656	1.44	. Q	. V			
16.050	0.1679	1.69	. Q.	V			
16.067	0.1706	1.94	. QV				
16.083	0.1736	2.20	. V Q				
16.100	0.1770	2.45	. V	Q .			
16.117	0.1807	2.70	. V	.Q			
16.133	0.1848	2.96	. V	. Q			
16.150	0.1892	3.21	. V	. Q			
16.167	0.1939	3.43	. V	. Q			
16.183	0.1982	3.09	. V	. Q			
16.200	0.2020	2.78	. V	. Q			
16.217	0.2054	2.47	. Q	.			
16.233	0.2084	2.17	. Q	V .			
16.250	0.2110	1.86	.Q	V.			
16.267	0.2131	1.56	Q	. V.			
16.283	0.2148	1.25	Q	. V.			
16.300	0.2161	0.95	.Q	. V.			
16.317	0.2170	0.65	Q	. V.			
16.333	0.2178	0.55	Q	. V.			
16.350	0.2185	0.53	Q	. V			
16.367	0.2192	0.52	Q	. V			
16.383	0.2199	0.50	Q	. V			
16.400	0.2206	0.48	Q	. V			
16.417	0.2212	0.46	Q	. V			

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
16.433	0.2218	0.44	. Q	.	. V	.	
16.450	0.2224	0.42	. Q	.	. V	.	
16.467	0.2230	0.40	. Q	.	. V	.	
16.483	0.2235	0.39	. Q	.	. V	.	
16.500	0.2240	0.38	. Q	.	. V	.	
16.517	0.2245	0.38	. Q	.	. V	.	
16.533	0.2250	0.37	. Q	.	. V	.	
16.550	0.2255	0.36	. Q	.	. .V	.	
16.567	0.2260	0.36	. Q	.	. .V	.	
16.583	0.2265	0.35	. Q	.	. .V	.	
16.600	0.2270	0.34	. Q	.	. .V	.	
16.617	0.2274	0.33	. Q	.	. .V	.	
16.633	0.2279	0.33	. Q	.	. .V	.	
16.650	0.2283	0.32	. Q	.	. .V	.	
16.667	0.2288	0.32	. Q	.	. .V	.	
16.683	0.2292	0.31	. Q	.	. .V	.	
16.700	0.2296	0.31	. Q	.	. .V	.	
16.717	0.2300	0.30	. Q	.	. .V	.	
16.733	0.2305	0.30	. Q	.	. .V	.	
16.750	0.2309	0.29	. Q	.	. .V	.	
16.767	0.2313	0.29	. Q	.	. .V	.	
16.783	0.2316	0.28	. Q	.	. .V	.	
16.800	0.2320	0.28	. Q	.	. .V	.	
16.817	0.2324	0.28	. Q	.	. .V	.	
16.833	0.2328	0.27	. Q	.	. . V	.	
16.850	0.2332	0.27	. Q	.	. . V	.	
16.867	0.2335	0.27	. Q	.	. . V	.	
16.883	0.2339	0.26	. Q	.	. . V	.	
16.900	0.2343	0.26	. Q	.	. . V	.	
16.917	0.2346	0.26	. Q	.	. . V	.	
16.933	0.2350	0.25	. Q	.	. . V	.	
16.950	0.2353	0.25	. Q	.	. . V	.	
16.967	0.2357	0.25	. Q	.	. . V	.	
16.983	0.2360	0.25	. Q	.	. . V	.	
17.000	0.2363	0.24	. Q	.	. . V	.	
17.017	0.2367	0.24	. Q	.	. . V	.	
17.033	0.2370	0.24	. Q	.	. . V	.	
17.050	0.2373	0.24	. Q	.	. . V	.	
17.067	0.2376	0.23	. Q	.	. . V	.	
17.083	0.2380	0.23	. Q	.	. . V	.	
17.100	0.2383	0.23	. Q	.	. . V	.	
17.117	0.2386	0.23	. Q	.	. . V	.	
17.133	0.2389	0.22	. Q	.	. . V	.	
17.150	0.2392	0.22	. Q	.	. . V	.	
17.167	0.2395	0.22	. Q	.	. . V	.	
17.183	0.2398	0.22	. Q	.	. . V	.	
17.200	0.2401	0.21	. Q	.	. . V	.	
17.217	0.2404	0.21	. Q	.	. . V	.	
17.233	0.2407	0.21	. Q	.	. . V	.	
17.250	0.2410	0.21	. Q	.	. . V	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	0.9	1.7	2.6	3.4
17.267	0.2412	0.20	. Q	.	.	. V	.
17.283	0.2415	0.20	. Q	.	.	. V	.
17.300	0.2418	0.20	. Q	.	.	. V	.
17.317	0.2421	0.20	. Q	.	.	. V	.
17.333	0.2423	0.20	. Q	.	.	. V	.
17.350	0.2426	0.20	. Q	.	.	. V	.
17.367	0.2429	0.19	. Q	.	.	. V	.
17.383	0.2431	0.19	. Q	.	.	. V	.
17.400	0.2434	0.19	. Q	.	.	. V	.
17.417	0.2437	0.19	. Q	.	.	. V	.
17.433	0.2439	0.19	. Q	.	.	. V	.
17.450	0.2442	0.19	. Q	.	.	. V	.
17.467	0.2444	0.19	. Q	.	.	. V	.
17.483	0.2447	0.19	. Q	.	.	. V	.
17.500	0.2450	0.18	. Q	.	.	. V	.
17.517	0.2452	0.18	. Q	.	.	. V	.
17.533	0.2455	0.18	. Q	.	.	. V	.
17.550	0.2457	0.18	. Q	.	.	. V	.
17.567	0.2459	0.18	. Q	.	.	. V	.
17.583	0.2462	0.18	. Q	.	.	. V	.
17.600	0.2464	0.18	. Q	.	.	. V	.
17.617	0.2467	0.18	. Q	.	.	. V	.
17.633	0.2469	0.17	. Q	.	.	. V	.
17.650	0.2472	0.17	. Q	.	.	. V	.
17.667	0.2474	0.17	. Q	.	.	. V	.
17.683	0.2476	0.17	.Q	.	.	. V	.
17.700	0.2479	0.17	.Q	.	.	. V	.
17.717	0.2481	0.17	.Q	.	.	. V	.
17.733	0.2483	0.17	.Q	.	.	. V	.
17.750	0.2486	0.17	.Q	.	.	. V	.
17.767	0.2488	0.17	.Q	.	.	. V	.
17.783	0.2490	0.17	.Q	.	.	. V	.
17.800	0.2492	0.16	.Q	.	.	. V	.
17.817	0.2495	0.16	.Q	.	.	. V	.
17.833	0.2497	0.16	.Q	.	.	. V	.
17.850	0.2499	0.16	.Q	.	.	. V	.
17.867	0.2501	0.16	.Q	.	.	. V	.
17.883	0.2504	0.16	.Q	.	.	. V	.
17.900	0.2506	0.16	.Q	.	.	. V	.
17.917	0.2508	0.16	.Q	.	.	. V	.
17.933	0.2510	0.16	.Q	.	.	. V	.
17.950	0.2512	0.16	.Q	.	.	. V	.
17.967	0.2515	0.16	.Q	.	.	. V	.
17.983	0.2517	0.16	.Q	.	.	. V	.
18.000	0.2519	0.15	.Q	.	.	. V	.

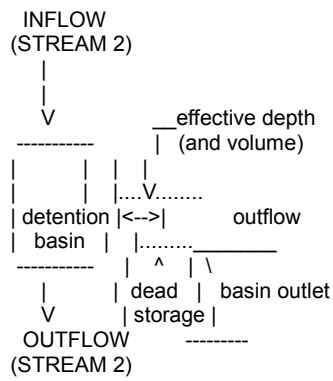
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	420.0
20%	145.0
30%	90.0
40%	75.0
50%	60.0
60%	50.0
70%	40.0

80%	25.0
90%	10.0

****
FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
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ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 2
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.04

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	2.00	0.01	0.040
3	3.00	0.02	0.061
4	5.00	0.04	0.101
5	6.25	25.32	0.126

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	MEAN LOSS (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	0.21	0.04	2.48	0.0	0.050
14.033	0.000	0.21	0.04	2.49	0.0	0.050
14.050	0.000	0.21	0.04	2.50	0.0	0.051
14.067	0.000	0.21	0.04	2.51	0.0	0.051
14.083	0.000	0.21	0.04	2.52	0.0	0.051
14.100	0.000	0.22	0.04	2.53	0.0	0.051
14.117	0.000	0.22	0.04	2.54	0.0	0.051
14.133	0.000	0.22	0.04	2.55	0.0	0.052
14.150	0.000	0.22	0.04	2.56	0.0	0.052
14.167	0.000	0.22	0.04	2.57	0.0	0.052
14.183	0.000	0.22	0.04	2.59	0.0	0.052
14.200	0.000	0.23	0.04	2.60	0.0	0.053
14.217	0.000	0.23	0.04	2.61	0.0	0.053
14.233	0.000	0.23	0.04	2.62	0.0	0.053
14.250	0.000	0.23	0.04	2.63	0.0	0.053
14.267	0.000	0.23	0.04	2.64	0.0	0.053
14.283	0.000	0.24	0.04	2.65	0.0	0.054
14.300	0.000	0.24	0.04	2.67	0.0	0.054
14.317	0.000	0.24	0.04	2.68	0.0	0.054
14.333	0.000	0.24	0.04	2.69	0.0	0.054
14.350	0.000	0.24	0.04	2.70	0.0	0.055
14.367	0.000	0.24	0.04	2.71	0.0	0.055
14.383	0.000	0.24	0.04	2.72	0.0	0.055
14.400	0.000	0.24	0.04	2.74	0.0	0.055
14.417	0.000	0.24	0.04	2.75	0.0	0.056
14.433	0.000	0.24	0.04	2.76	0.0	0.056
14.450	0.000	0.24	0.04	2.77	0.0	0.056
14.467	0.000	0.25	0.04	2.79	0.0	0.056
14.483	0.000	0.25	0.04	2.80	0.0	0.057
14.500	0.000	0.25	0.04	2.81	0.0	0.057
14.517	0.000	0.25	0.04	2.82	0.0	0.057
14.533	0.000	0.25	0.04	2.84	0.0	0.058
14.550	0.000	0.26	0.04	2.85	0.0	0.058
14.567	0.000	0.26	0.04	2.86	0.0	0.058
14.583	0.000	0.26	0.04	2.87	0.0	0.058
14.600	0.000	0.26	0.04	2.89	0.0	0.059
14.617	0.000	0.26	0.04	2.90	0.0	0.059
14.633	0.000	0.26	0.04	2.91	0.0	0.059
14.650	0.000	0.26	0.04	2.93	0.0	0.059
14.667	0.000	0.27	0.04	2.94	0.0	0.060
14.683	0.000	0.27	0.04	2.95	0.0	0.060
14.700	0.000	0.27	0.04	2.97	0.0	0.060
14.717	0.000	0.27	0.04	2.98	0.0	0.061
14.733	0.000	0.27	0.04	2.99	0.0	0.061
14.750	0.000	0.27	0.04	3.01	0.0	0.061
14.767	0.000	0.27	0.04	3.02	0.0	0.061
14.783	0.000	0.28	0.04	3.04	0.0	0.062
14.800	0.000	0.28	0.04	3.05	0.0	0.062
14.817	0.000	0.28	0.04	3.07	0.0	0.062
14.833	0.000	0.28	0.04	3.08	0.0	0.063

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	0.29	0.04	3.10	0.0	0.063
14.867	0.000	0.29	0.04	3.11	0.0	0.063
14.883	0.000	0.29	0.04	3.13	0.0	0.064
14.900	0.000	0.29	0.04	3.14	0.0	0.064
14.917	0.000	0.30	0.04	3.16	0.0	0.064
14.933	0.000	0.30	0.04	3.18	0.0	0.065
14.950	0.000	0.30	0.04	3.19	0.0	0.065
14.967	0.000	0.30	0.04	3.21	0.0	0.065
14.983	0.000	0.30	0.04	3.23	0.0	0.066
15.000	0.000	0.30	0.04	3.24	0.0	0.066
15.017	0.000	0.30	0.04	3.26	0.0	0.066
15.033	0.000	0.31	0.04	3.28	0.0	0.067
15.050	0.000	0.31	0.04	3.29	0.0	0.067
15.067	0.000	0.31	0.04	3.31	0.0	0.067
15.083	0.000	0.31	0.04	3.33	0.0	0.068
15.100	0.000	0.32	0.04	3.34	0.0	0.068
15.117	0.000	0.32	0.04	3.36	0.0	0.068
15.133	0.000	0.33	0.04	3.38	0.0	0.069
15.150	0.000	0.33	0.04	3.40	0.0	0.069
15.167	0.000	0.34	0.04	3.42	0.0	0.069
15.183	0.000	0.34	0.04	3.43	0.0	0.070
15.200	0.000	0.34	0.04	3.45	0.0	0.070
15.217	0.000	0.35	0.04	3.47	0.0	0.070
15.233	0.000	0.35	0.04	3.49	0.0	0.071
15.250	0.000	0.36	0.04	3.51	0.0	0.071
15.267	0.000	0.36	0.04	3.53	0.0	0.072
15.283	0.000	0.36	0.04	3.55	0.0	0.072
15.300	0.000	0.37	0.04	3.57	0.0	0.072
15.317	0.000	0.37	0.04	3.60	0.0	0.073
15.333	0.000	0.37	0.04	3.62	0.0	0.073
15.350	0.000	0.38	0.04	3.64	0.0	0.074
15.367	0.000	0.38	0.04	3.66	0.0	0.074
15.383	0.000	0.38	0.04	3.68	0.0	0.075
15.400	0.000	0.39	0.04	3.70	0.0	0.075
15.417	0.000	0.39	0.04	3.72	0.0	0.075
15.433	0.000	0.39	0.04	3.75	0.0	0.076
15.450	0.000	0.39	0.04	3.77	0.0	0.076
15.467	0.000	0.39	0.04	3.79	0.0	0.077
15.483	0.000	0.39	0.04	3.81	0.0	0.077
15.500	0.000	0.39	0.04	3.84	0.0	0.078
15.517	0.000	0.40	0.04	3.86	0.0	0.078
15.533	0.000	0.40	0.04	3.88	0.0	0.079
15.550	0.000	0.40	0.04	3.90	0.0	0.079
15.567	0.000	0.41	0.04	3.93	0.0	0.080
15.583	0.000	0.42	0.04	3.95	0.0	0.080
15.600	0.000	0.42	0.04	3.97	0.0	0.080
15.617	0.000	0.43	0.04	4.00	0.0	0.081
15.633	0.000	0.44	0.04	4.02	0.0	0.081
15.650	0.000	0.45	0.04	4.05	0.0	0.082
15.667	0.000	0.45	0.04	4.08	0.0	0.083

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	0.46	0.04	4.10	0.0	0.083
15.700	0.000	0.47	0.04	4.13	0.0	0.084
15.717	0.000	0.50	0.04	4.16	0.0	0.084
15.733	0.000	0.53	0.04	4.19	0.0	0.085
15.750	0.000	0.56	0.04	4.23	0.0	0.086
15.767	0.000	0.59	0.04	4.26	0.0	0.086
15.783	0.000	0.62	0.04	4.30	0.0	0.087
15.800	0.000	0.65	0.04	4.34	0.0	0.088
15.817	0.000	0.68	0.04	4.38	0.0	0.089
15.833	0.000	0.70	0.04	4.42	0.0	0.089
15.850	0.000	0.73	0.04	4.47	0.0	0.090
15.867	0.000	0.77	0.04	4.52	0.0	0.091
15.883	0.000	0.80	0.04	4.57	0.0	0.092
15.900	0.000	0.83	0.04	4.62	0.0	0.093
15.917	0.000	0.87	0.04	4.67	0.0	0.094
15.933	0.000	0.90	0.04	4.73	0.0	0.096
15.950	0.000	0.94	0.04	4.79	0.0	0.097
15.967	0.000	0.97	0.04	4.85	0.0	0.098
15.983	0.000	1.00	0.04	4.91	0.0	0.099
16.000	0.000	1.04	0.04	4.98	0.0	0.101
16.017	0.000	1.18	0.04	5.03	0.4	0.102
16.033	0.000	1.44	0.04	5.06	1.0	0.102
16.050	0.000	1.69	0.04	5.08	1.4	0.103
16.067	0.000	1.94	0.04	5.09	1.7	0.103
16.083	0.000	2.20	0.04	5.10	2.0	0.103
16.100	0.000	2.45	0.04	5.11	2.2	0.103
16.117	0.000	2.70	0.04	5.13	2.5	0.104
16.133	0.000	2.96	0.04	5.14	2.7	0.104
16.150	0.000	3.21	0.04	5.15	3.0	0.104
16.167	0.000	3.43	0.04	5.16	3.2	0.104
16.183	0.000	3.09	0.04	5.15	3.2	0.104
16.200	0.000	2.78	0.04	5.14	3.0	0.104
16.217	0.000	2.47	0.04	5.12	2.7	0.103
16.233	0.000	2.17	0.04	5.11	2.3	0.103
16.250	0.000	1.86	0.04	5.09	2.0	0.103
16.267	0.000	1.56	0.04	5.08	1.7	0.103
16.283	0.000	1.25	0.04	5.06	1.4	0.102
16.300	0.000	0.95	0.04	5.05	1.1	0.102
16.317	0.000	0.65	0.04	5.03	0.8	0.102
16.333	0.000	0.55	0.04	5.02	0.6	0.101
16.350	0.000	0.53	0.04	5.02	0.5	0.101
16.367	0.000	0.52	0.04	5.02	0.5	0.101
16.383	0.000	0.50	0.04	5.02	0.5	0.101
16.400	0.000	0.48	0.04	5.02	0.5	0.101
16.417	0.000	0.46	0.04	5.02	0.4	0.101
16.433	0.000	0.44	0.04	5.02	0.4	0.101
16.450	0.000	0.42	0.04	5.02	0.4	0.101
16.467	0.000	0.40	0.04	5.02	0.4	0.101
16.483	0.000	0.39	0.04	5.02	0.4	0.101
16.500	0.000	0.38	0.04	5.02	0.3	0.101

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	MEAN EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	0.38	0.04	5.01	0.3	0.101
16.533	0.000	0.37	0.04	5.01	0.3	0.101
16.550	0.000	0.36	0.04	5.01	0.3	0.101
16.567	0.000	0.36	0.04	5.01	0.3	0.101
16.583	0.000	0.35	0.04	5.01	0.3	0.101
16.600	0.000	0.34	0.04	5.01	0.3	0.101
16.617	0.000	0.33	0.04	5.01	0.3	0.101
16.633	0.000	0.33	0.04	5.01	0.3	0.101
16.650	0.000	0.32	0.04	5.01	0.3	0.101
16.667	0.000	0.32	0.04	5.01	0.3	0.101
16.683	0.000	0.31	0.04	5.01	0.3	0.101
16.700	0.000	0.31	0.04	5.01	0.3	0.101
16.717	0.000	0.30	0.04	5.01	0.3	0.101
16.733	0.000	0.30	0.04	5.01	0.3	0.101
16.750	0.000	0.29	0.04	5.01	0.3	0.101
16.767	0.000	0.29	0.04	5.01	0.3	0.101
16.783	0.000	0.28	0.04	5.01	0.2	0.101
16.800	0.000	0.28	0.04	5.01	0.2	0.101
16.817	0.000	0.28	0.04	5.01	0.2	0.101
16.833	0.000	0.27	0.04	5.01	0.2	0.101
16.850	0.000	0.27	0.04	5.01	0.2	0.101
16.867	0.000	0.27	0.04	5.01	0.2	0.101
16.883	0.000	0.26	0.04	5.01	0.2	0.101
16.900	0.000	0.26	0.04	5.01	0.2	0.101
16.917	0.000	0.26	0.04	5.01	0.2	0.101
16.933	0.000	0.25	0.04	5.01	0.2	0.101
16.950	0.000	0.25	0.04	5.01	0.2	0.101
16.967	0.000	0.25	0.04	5.01	0.2	0.101
16.983	0.000	0.25	0.04	5.01	0.2	0.101
17.000	0.000	0.24	0.04	5.01	0.2	0.101
17.017	0.000	0.24	0.04	5.01	0.2	0.101
17.033	0.000	0.24	0.04	5.01	0.2	0.101
17.050	0.000	0.24	0.04	5.01	0.2	0.101
17.067	0.000	0.23	0.04	5.01	0.2	0.101
17.083	0.000	0.23	0.04	5.01	0.2	0.101
17.100	0.000	0.23	0.04	5.01	0.2	0.101
17.117	0.000	0.23	0.04	5.01	0.2	0.101
17.133	0.000	0.22	0.04	5.01	0.2	0.101
17.150	0.000	0.22	0.04	5.01	0.2	0.101
17.167	0.000	0.22	0.04	5.01	0.2	0.101
17.183	0.000	0.22	0.04	5.01	0.2	0.101
17.200	0.000	0.21	0.04	5.01	0.2	0.101
17.217	0.000	0.21	0.04	5.01	0.2	0.101
17.233	0.000	0.21	0.04	5.01	0.2	0.101
17.250	0.000	0.21	0.04	5.01	0.2	0.101
17.267	0.000	0.20	0.04	5.01	0.2	0.101
17.283	0.000	0.20	0.04	5.01	0.2	0.101
17.300	0.000	0.20	0.04	5.01	0.2	0.101
17.317	0.000	0.20	0.04	5.01	0.2	0.101
17.333	0.000	0.20	0.04	5.01	0.2	0.101

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	0.20	0.04	5.01	0.2	0.101
17.367	0.000	0.19	0.04	5.01	0.2	0.101
17.383	0.000	0.19	0.04	5.01	0.2	0.101
17.400	0.000	0.19	0.04	5.01	0.2	0.101
17.417	0.000	0.19	0.04	5.01	0.2	0.101
17.433	0.000	0.19	0.04	5.01	0.1	0.101
17.450	0.000	0.19	0.04	5.01	0.1	0.101
17.467	0.000	0.19	0.04	5.01	0.1	0.101
17.483	0.000	0.19	0.04	5.01	0.1	0.101
17.500	0.000	0.18	0.04	5.01	0.1	0.101
17.517	0.000	0.18	0.04	5.01	0.1	0.101
17.533	0.000	0.18	0.04	5.01	0.1	0.101
17.550	0.000	0.18	0.04	5.00	0.1	0.101
17.567	0.000	0.18	0.04	5.00	0.1	0.101
17.583	0.000	0.18	0.04	5.00	0.1	0.101
17.600	0.000	0.18	0.04	5.00	0.1	0.101
17.617	0.000	0.18	0.04	5.00	0.1	0.101
17.633	0.000	0.17	0.04	5.00	0.1	0.101
17.650	0.000	0.17	0.04	5.00	0.1	0.101
17.667	0.000	0.17	0.04	5.00	0.1	0.101
17.683	0.000	0.17	0.04	5.00	0.1	0.101
17.700	0.000	0.17	0.04	5.00	0.1	0.101
17.717	0.000	0.17	0.04	5.00	0.1	0.101
17.733	0.000	0.17	0.04	5.00	0.1	0.101
17.750	0.000	0.17	0.04	5.00	0.1	0.101
17.767	0.000	0.17	0.04	5.00	0.1	0.101
17.783	0.000	0.17	0.04	5.00	0.1	0.101
17.800	0.000	0.16	0.04	5.00	0.1	0.101
17.817	0.000	0.16	0.04	5.00	0.1	0.101
17.833	0.000	0.16	0.04	5.00	0.1	0.101
17.850	0.000	0.16	0.04	5.00	0.1	0.101
17.867	0.000	0.16	0.04	5.00	0.1	0.101
17.883	0.000	0.16	0.04	5.00	0.1	0.101
17.900	0.000	0.16	0.04	5.00	0.1	0.101
17.917	0.000	0.16	0.04	5.00	0.1	0.101
17.933	0.000	0.16	0.04	5.00	0.1	0.101
17.950	0.000	0.16	0.04	5.00	0.1	0.101
17.967	0.000	0.16	0.04	5.00	0.1	0.101
17.983	0.000	0.16	0.04	5.00	0.1	0.101
18.000	0.000	0.15	0.04	5.00	0.1	0.101

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.291 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 0.141 AF
LOSS VOLUME = 0.150 AF

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 ***************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   7
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  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
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 FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE = 5.1
----------------------------------------------------------------------------
 >>>>>MODEL CHANNEL ROUTING OF STREAM #1 BY THE TRANSLATION METHOD<<<<<
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      THE TRANSLATION MODEL NEGLECTS ALL STORAGE ATTENUATION EFFECTS,
      AND MOVES THE STREAM 1 RUNOFF HYDROGRAPH FORWARD IN TIME.

      ASSUMED REGULAR CHANNEL INFORMATION:
       BASEWIDTH(FT) =   26.00     CHANNEL Z = 10.00
       UPSTREAM ELEVATION(FT) =     131.70
       DOWNSTREAM ELEVATION(FT) =     128.00
       CHANNEL LENGTH(FT) =     755.00     MANNING'S FACTOR = 0.015
       CONSTANT LOSS RATE(CFS) =    0.00

      MEAN-FLOW RATE NORMAL-DEPTH FLOW VELOCITIES(FPS) ARE AS FOLLOWS:
                        (FLOW RATE (CFS)) [FLOW VELOCITY (FPS)]
       AVERAGED PEAK  5-MINUTE: (       3.0).......[  1.35]
       AVERAGED PEAK 15-MINUTE: (       2.4).......[  1.29]
       AVERAGED PEAK 30-MINUTE: (       1.5).......[  1.03]
       AVERAGED PEAK  1-HOUR:   (       0.9).......[  0.87]
       AVERAGED PEAK  3-HOUR:   (       0.4).......[  0.64]
       AVERAGED PEAK  6-HOUR:   (       0.2).......[  0.38]
       AVERAGED PEAK 24-HOUR:   (       0.1).......[  0.47]
      USER-SPECIFIED CHANNEL AVERAGE FLOW VELOCITY(FPS) =   3.540
      HYDROGRAPH TRANSLATION TIME
      = (CHANNEL LENGTH)/(AVERAGE FLOW  VELOCITY)
      = (    755.00)/(  3.540) =   0.059 HRS

      TRANSLATION METHOD CHANNEL ROUTING RESULTS:
                                OUTFLOW LESS
       MODEL       INFLOW     ROUTED      LOSS
        TIME     (STREAM 1)    FLOW     (STREAM 1)
       (HRS)       (CFS)      (CFS)      (CFS)
       14.000        0.02       0.02       0.02
       14.017        0.02       0.02       0.02
       14.033        0.02       0.02       0.02
       14.050        0.02       0.02       0.02
       14.067        0.02       0.02       0.02
       14.083        0.02       0.02       0.02
       14.100        0.02       0.02       0.02
       14.117        0.02       0.02       0.02
       14.133        0.02       0.02       0.02
       14.150        0.02       0.02       0.02
       14.167        0.02       0.02       0.02
       14.183        0.02       0.02       0.02
       14.200        0.02       0.02       0.02
       14.217        0.02       0.02       0.02
       14.233        0.02       0.02       0.02
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MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
14.250	0.03	0.02	0.02
14.267	0.03	0.02	0.02
14.283	0.03	0.02	0.02
14.300	0.03	0.02	0.02
14.317	0.03	0.03	0.03
14.333	0.03	0.03	0.03
14.350	0.03	0.03	0.03
14.367	0.03	0.03	0.03
14.383	0.03	0.03	0.03
14.400	0.03	0.03	0.03
14.417	0.03	0.03	0.03
14.433	0.03	0.03	0.03
14.450	0.03	0.03	0.03
14.467	0.03	0.03	0.03
14.483	0.03	0.03	0.03
14.500	0.03	0.03	0.03
14.517	0.03	0.03	0.03
14.533	0.03	0.03	0.03
14.550	0.03	0.03	0.03
14.567	0.03	0.03	0.03
14.583	0.03	0.03	0.03
14.600	0.03	0.03	0.03
14.617	0.03	0.03	0.03
14.633	0.03	0.03	0.03
14.650	0.03	0.03	0.03
14.667	0.03	0.03	0.03
14.683	0.03	0.03	0.03
14.700	0.03	0.03	0.03
14.717	0.03	0.03	0.03
14.733	0.03	0.03	0.03
14.750	0.03	0.03	0.03
14.767	0.03	0.03	0.03
14.783	0.03	0.03	0.03
14.800	0.03	0.03	0.03
14.817	0.03	0.03	0.03
14.833	0.03	0.03	0.03
14.850	0.03	0.03	0.03
14.867	0.03	0.03	0.03
14.883	0.03	0.03	0.03
14.900	0.03	0.03	0.03
14.917	0.03	0.03	0.03
14.933	0.03	0.03	0.03
14.950	0.03	0.03	0.03
14.967	0.03	0.03	0.03
14.983	0.03	0.03	0.03
15.000	0.03	0.03	0.03
15.017	0.03	0.03	0.03
15.033	0.03	0.03	0.03
15.050	0.03	0.03	0.03
15.067	0.03	0.03	0.03

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.083	0.03	0.03	0.03
15.100	0.03	0.03	0.03
15.117	0.03	0.03	0.03
15.133	0.03	0.03	0.03
15.150	0.03	0.03	0.03
15.167	0.03	0.03	0.03
15.183	0.03	0.03	0.03
15.200	0.03	0.03	0.03
15.217	0.04	0.03	0.03
15.233	0.04	0.03	0.03
15.250	0.04	0.03	0.03
15.267	0.04	0.03	0.03
15.283	0.04	0.04	0.04
15.300	0.04	0.04	0.04
15.317	0.04	0.04	0.04
15.333	0.04	0.04	0.04
15.350	0.04	0.04	0.04
15.367	0.04	0.04	0.04
15.383	0.04	0.04	0.04
15.400	0.04	0.04	0.04
15.417	0.04	0.04	0.04
15.433	0.04	0.04	0.04
15.450	0.04	0.04	0.04
15.467	0.04	0.04	0.04
15.483	0.04	0.04	0.04
15.500	0.04	0.04	0.04
15.517	0.04	0.04	0.04
15.533	0.04	0.04	0.04
15.550	0.04	0.04	0.04
15.567	0.04	0.04	0.04
15.583	0.04	0.04	0.04
15.600	0.04	0.04	0.04
15.617	0.04	0.04	0.04
15.633	0.04	0.04	0.04
15.650	0.04	0.04	0.04
15.667	0.04	0.04	0.04
15.683	0.04	0.04	0.04
15.700	0.04	0.04	0.04
15.717	0.04	0.04	0.04
15.733	0.04	0.04	0.04
15.750	0.04	0.04	0.04
15.767	0.04	0.04	0.04
15.783	0.04	0.04	0.04
15.800	0.04	0.04	0.04
15.817	0.04	0.04	0.04
15.833	0.05	0.04	0.04
15.850	0.05	0.04	0.04
15.867	0.05	0.04	0.04
15.883	0.05	0.04	0.04
15.900	0.05	0.05	0.05

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
15.917	0.05	0.05	0.05
15.933	0.05	0.05	0.05
15.950	0.05	0.05	0.05
15.967	0.05	0.05	0.05
15.983	0.05	0.05	0.05
16.000	0.05	0.05	0.05
16.017	0.38	0.05	0.05
16.033	1.00	0.05	0.05
16.050	1.44	0.05	0.05
16.067	1.73	0.20	0.20
16.083	1.99	0.66	0.66
16.100	2.24	1.20	1.20
16.117	2.50	1.57	1.57
16.133	2.75	1.84	1.84
16.150	3.00	2.10	2.10
16.167	3.25	2.36	2.36
16.183	3.24	2.61	2.61
16.200	2.97	2.86	2.86
16.217	2.67	3.11	3.11
16.233	2.37	3.24	3.24
16.250	2.06	3.12	3.12
16.267	1.76	2.84	2.84
16.283	1.45	2.54	2.54
16.300	1.15	2.23	2.23
16.317	0.85	1.93	1.93
16.333	0.63	1.62	1.62
16.350	0.54	1.32	1.32
16.367	0.51	1.01	1.01
16.383	0.49	0.75	0.75
16.400	0.48	0.59	0.59
16.417	0.46	0.53	0.53
16.433	0.44	0.50	0.50
16.450	0.42	0.49	0.49
16.467	0.40	0.47	0.47
16.483	0.39	0.45	0.45
16.500	0.37	0.43	0.43
16.517	0.37	0.41	0.41
16.533	0.36	0.40	0.40
16.550	0.35	0.38	0.38
16.567	0.35	0.37	0.37
16.583	0.34	0.36	0.36
16.600	0.33	0.36	0.36
16.617	0.32	0.35	0.35
16.633	0.32	0.34	0.34
16.650	0.31	0.34	0.34
16.667	0.31	0.33	0.33
16.683	0.30	0.32	0.32
16.700	0.30	0.32	0.32
16.717	0.29	0.31	0.31
16.733	0.29	0.30	0.30

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
16.750	0.28	0.30	0.30
16.767	0.28	0.30	0.30
16.783	0.27	0.29	0.29
16.800	0.27	0.29	0.29
16.817	0.27	0.28	0.28
16.833	0.26	0.28	0.28
16.850	0.26	0.27	0.27
16.867	0.26	0.27	0.27
16.883	0.25	0.26	0.26
16.900	0.25	0.26	0.26
16.917	0.25	0.26	0.26
16.933	0.24	0.25	0.25
16.950	0.24	0.25	0.25
16.967	0.24	0.25	0.25
16.983	0.24	0.25	0.25
17.000	0.23	0.24	0.24
17.017	0.23	0.24	0.24
17.033	0.23	0.24	0.24
17.050	0.23	0.23	0.23
17.067	0.22	0.23	0.23
17.083	0.22	0.23	0.23
17.100	0.22	0.23	0.23
17.117	0.22	0.22	0.22
17.133	0.21	0.22	0.22
17.150	0.21	0.22	0.22
17.167	0.21	0.22	0.22
17.183	0.21	0.21	0.21
17.200	0.20	0.21	0.21
17.217	0.20	0.21	0.21
17.233	0.20	0.21	0.21
17.250	0.19	0.20	0.20
17.267	0.19	0.20	0.20
17.283	0.19	0.20	0.20
17.300	0.19	0.20	0.20
17.317	0.19	0.19	0.19
17.333	0.19	0.19	0.19
17.350	0.18	0.19	0.19
17.367	0.18	0.19	0.19
17.383	0.18	0.19	0.19
17.400	0.18	0.18	0.18
17.417	0.18	0.18	0.18
17.433	0.18	0.18	0.18
17.450	0.18	0.18	0.18
17.467	0.17	0.18	0.18
17.483	0.17	0.18	0.18
17.500	0.17	0.18	0.18
17.517	0.17	0.17	0.17
17.533	0.17	0.17	0.17
17.550	0.17	0.17	0.17
17.567	0.17	0.17	0.17

MODEL TIME (HRS)	INFLOW (STREAM 1) (CFS)	OUTFLOW LESS ROUTED FLOW (CFS)	LOSS (STREAM 1) (CFS)
17.583	0.17	0.17	0.17
17.600	0.16	0.17	0.17
17.617	0.16	0.17	0.17
17.633	0.16	0.17	0.17
17.650	0.16	0.17	0.17
17.667	0.16	0.16	0.16
17.683	0.16	0.16	0.16
17.700	0.16	0.16	0.16
17.717	0.16	0.16	0.16
17.733	0.16	0.16	0.16
17.750	0.16	0.16	0.16
17.767	0.15	0.16	0.16
17.783	0.15	0.16	0.16
17.800	0.15	0.16	0.16
17.817	0.15	0.16	0.16
17.833	0.15	0.15	0.15
17.850	0.15	0.15	0.15
17.867	0.15	0.15	0.15
17.883	0.15	0.15	0.15
17.900	0.15	0.15	0.15
17.917	0.15	0.15	0.15
17.933	0.15	0.15	0.15
17.950	0.15	0.15	0.15
17.967	0.14	0.15	0.15
17.983	0.14	0.15	0.15
18.000	0.14	0.15	0.15

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PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 0.272 AF
OUTFLOW VOLUME = 0.272 AF
LOSS VOLUME = 0.000 AF

****
FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<
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STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
14.000	0.0074	0.02	QV	.	.	.	.
14.017	0.0074	0.02	QV	.	.	.	.
14.033	0.0074	0.02	QV	.	.	.	.
14.050	0.0075	0.02	QV	.	.	.	.
14.067	0.0075	0.02	QV	.	.	.	.
14.083	0.0075	0.02	QV	.	.	.	.
14.100	0.0076	0.02	QV	.	.	.	.
14.117	0.0076	0.02	QV	.	.	.	.
14.133	0.0076	0.02	QV	.	.	.	.
14.150	0.0077	0.02	QV	.	.	.	.
14.167	0.0077	0.02	QV	.	.	.	.
14.183	0.0077	0.02	QV	.	.	.	.
14.200	0.0078	0.02	QV	.	.	.	.
14.217	0.0078	0.02	QV	.	.	.	.
14.233	0.0078	0.02	QV	.	.	.	.
14.250	0.0079	0.02	QV	.	.	.	.
14.267	0.0079	0.02	QV	.	.	.	.
14.283	0.0079	0.02	QV	.	.	.	.
14.300	0.0080	0.02	QV	.	.	.	.
14.317	0.0080	0.03	QV	.	.	.	.
14.333	0.0080	0.03	QV	.	.	.	.
14.350	0.0081	0.03	QV	.	.	.	.
14.367	0.0081	0.03	QV	.	.	.	.
14.383	0.0081	0.03	QV	.	.	.	.
14.400	0.0082	0.03	QV	.	.	.	.
14.417	0.0082	0.03	QV	.	.	.	.
14.433	0.0083	0.03	QV	.	.	.	.
14.450	0.0083	0.03	QV	.	.	.	.
14.467	0.0083	0.03	QV	.	.	.	.
14.483	0.0084	0.03	QV	.	.	.	.
14.500	0.0084	0.03	QV	.	.	.	.
14.517	0.0084	0.03	QV	.	.	.	.
14.533	0.0085	0.03	QV	.	.	.	.
14.550	0.0085	0.03	QV	.	.	.	.
14.567	0.0086	0.03	QV	.	.	.	.
14.583	0.0086	0.03	QV	.	.	.	.
14.600	0.0086	0.03	QV	.	.	.	.
14.617	0.0087	0.03	QV	.	.	.	.
14.633	0.0087	0.03	QV	.	.	.	.
14.650	0.0087	0.03	QV	.	.	.	.
14.667	0.0088	0.03	QV	.	.	.	.
14.683	0.0088	0.03	QV	.	.	.	.
14.700	0.0089	0.03	QV	.	.	.	.
14.717	0.0089	0.03	QV	.	.	.	.
14.733	0.0089	0.03	QV	.	.	.	.
14.750	0.0090	0.03	QV	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
14.767	0.0090	0.03 QV	.	.	.	.	
14.783	0.0091	0.03 QV	.	.	.	.	
14.800	0.0091	0.03 QV	.	.	.	.	
14.817	0.0091	0.03 QV	.	.	.	.	
14.833	0.0092	0.03 QV	.	.	.	.	
14.850	0.0092	0.03 QV	.	.	.	.	
14.867	0.0093	0.03 QV	.	.	.	.	
14.883	0.0093	0.03 QV	.	.	.	.	
14.900	0.0094	0.03 QV	.	.	.	.	
14.917	0.0094	0.03 QV	.	.	.	.	
14.933	0.0094	0.03 QV	.	.	.	.	
14.950	0.0095	0.03 QV	.	.	.	.	
14.967	0.0095	0.03 QV	.	.	.	.	
14.983	0.0096	0.03 QV	.	.	.	.	
15.000	0.0096	0.03 QV	.	.	.	.	
15.017	0.0097	0.03 QV	.	.	.	.	
15.033	0.0097	0.03 QV	.	.	.	.	
15.050	0.0098	0.03 QV	.	.	.	.	
15.067	0.0098	0.03 QV	.	.	.	.	
15.083	0.0098	0.03 QV	.	.	.	.	
15.100	0.0099	0.03 QV	.	.	.	.	
15.117	0.0099	0.03 QV	.	.	.	.	
15.133	0.0100	0.03 QV	.	.	.	.	
15.150	0.0100	0.03 QV	.	.	.	.	
15.167	0.0101	0.03 QV	.	.	.	.	
15.183	0.0101	0.03 QV	.	.	.	.	
15.200	0.0102	0.03 QV	.	.	.	.	
15.217	0.0102	0.03 QV	.	.	.	.	
15.233	0.0103	0.03 QV	.	.	.	.	
15.250	0.0103	0.03 QV	.	.	.	.	
15.267	0.0104	0.03 QV	.	.	.	.	
15.283	0.0104	0.04 QV	.	.	.	.	
15.300	0.0105	0.04 QV	.	.	.	.	
15.317	0.0105	0.04 QV	.	.	.	.	
15.333	0.0106	0.04 QV	.	.	.	.	
15.350	0.0106	0.04 QV	.	.	.	.	
15.367	0.0107	0.04 QV	.	.	.	.	
15.383	0.0107	0.04 QV	.	.	.	.	
15.400	0.0108	0.04 QV	.	.	.	.	
15.417	0.0108	0.04 QV	.	.	.	.	
15.433	0.0109	0.04 QV	.	.	.	.	
15.450	0.0109	0.04 QV	.	.	.	.	
15.467	0.0110	0.04 QV	.	.	.	.	
15.483	0.0110	0.04 QV	.	.	.	.	
15.500	0.0111	0.04 QV	.	.	.	.	
15.517	0.0111	0.04 QV	.	.	.	.	
15.533	0.0112	0.04 QV	.	.	.	.	
15.550	0.0112	0.04 QV	.	.	.	.	
15.567	0.0113	0.04 QV	.	.	.	.	
15.583	0.0113	0.04 QV	.	.	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
15.600	0.0114	0.04	QV	.	.	.	.
15.617	0.0114	0.04	QV	.	.	.	.
15.633	0.0115	0.04	QV	.	.	.	.
15.650	0.0116	0.04	QV	.	.	.	.
15.667	0.0116	0.04	QV	.	.	.	.
15.683	0.0117	0.04	QV	.	.	.	.
15.700	0.0117	0.04	QV	.	.	.	.
15.717	0.0118	0.04	QV	.	.	.	.
15.733	0.0118	0.04	QV	.	.	.	.
15.750	0.0119	0.04	QV	.	.	.	.
15.767	0.0120	0.04	QV	.	.	.	.
15.783	0.0120	0.04	QV	.	.	.	.
15.800	0.0121	0.04	QV	.	.	.	.
15.817	0.0121	0.04	QV	.	.	.	.
15.833	0.0122	0.04	QV	.	.	.	.
15.850	0.0122	0.04	QV	.	.	.	.
15.867	0.0123	0.04	QV	.	.	.	.
15.883	0.0124	0.04	QV	.	.	.	.
15.900	0.0124	0.05	QV	.	.	.	.
15.917	0.0125	0.05	QV	.	.	.	.
15.933	0.0126	0.05	QV	.	.	.	.
15.950	0.0126	0.05	QV	.	.	.	.
15.967	0.0127	0.05	QV	.	.	.	.
15.983	0.0128	0.05	QV	.	.	.	.
16.000	0.0128	0.05	QV	.	.	.	.
16.017	0.0129	0.05	QV	.	.	.	.
16.033	0.0130	0.05	QV	.	.	.	.
16.050	0.0130	0.05	QV	.	.	.	.
16.067	0.0133	0.20	QV	.	.	.	.
16.083	0.0142	0.66	. Q	.	.	.	.
16.100	0.0159	1.20	. V Q	.	.	.	.
16.117	0.0180	1.57	. V	Q	.	.	.
16.133	0.0206	1.84	. V	Q	.	.	.
16.150	0.0234	2.10	. V	Q	.	.	.
16.167	0.0267	2.36	. V	Q.	.	.	.
16.183	0.0303	2.61	. V	Q	.	.	.
16.200	0.0342	2.86	. V	.Q	.	.	.
16.217	0.0385	3.11	. V	. Q	.	.	.
16.233	0.0430	3.24	. V	. Q	.	.	.
16.250	0.0473	3.12	. V	. Q	.	.	.
16.267	0.0512	2.84	. V	.Q	.	.	.
16.283	0.0547	2.54	. V Q	.	.	.	.
16.300	0.0578	2.23	. Q	.	.	.	.
16.317	0.0604	1.93	. QV	.	.	.	.
16.333	0.0626	1.62	. Q	V.	.	.	.
16.350	0.0644	1.32	. Q	V.	.	.	.
16.367	0.0658	1.01	. Q	V.	.	.	.
16.383	0.0669	0.75	. Q	V.	.	.	.
16.400	0.0677	0.59	. Q	V.	.	.	.
16.417	0.0684	0.53	. Q	V	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
16.433	0.0691	0.50	. Q V	.	.	.	
16.450	0.0698	0.49	.Q V	.	.	.	
16.467	0.0704	0.47	.Q V	.	.	.	
16.483	0.0710	0.45	.Q V	.	.	.	
16.500	0.0716	0.43	.Q V	.	.	.	
16.517	0.0722	0.41	.Q V	.	.	.	
16.533	0.0728	0.40	.Q V	.	.	.	
16.550	0.0733	0.38	.Q V	.	.	.	
16.567	0.0738	0.37	.Q V	.	.	.	
16.583	0.0743	0.36	.Q V	.	.	.	
16.600	0.0748	0.36	.Q .V	.	.	.	
16.617	0.0753	0.35	.Q .V	.	.	.	
16.633	0.0757	0.34	.Q .V	.	.	.	
16.650	0.0762	0.34	.Q .V	.	.	.	
16.667	0.0767	0.33	.Q .V	.	.	.	
16.683	0.0771	0.32	.Q .V	.	.	.	
16.700	0.0775	0.32	.Q .V	.	.	.	
16.717	0.0780	0.31	.Q .V	.	.	.	
16.733	0.0784	0.30	.Q .V	.	.	.	
16.750	0.0788	0.30	.Q .V	.	.	.	
16.767	0.0792	0.30	.Q .V	.	.	.	
16.783	0.0796	0.29	.Q .V	.	.	.	
16.800	0.0800	0.29	.Q .V	.	.	.	
16.817	0.0804	0.28	.Q .V	.	.	.	
16.833	0.0808	0.28	.Q .V	.	.	.	
16.850	0.0811	0.27	.Q .V	.	.	.	
16.867	0.0815	0.27	.Q . V	.	.	.	
16.883	0.0819	0.26	.Q . V	.	.	.	
16.900	0.0822	0.26	.Q . V	.	.	.	
16.917	0.0826	0.26	.Q . V	.	.	.	
16.933	0.0829	0.25	.Q . V	.	.	.	
16.950	0.0833	0.25	.Q . V	.	.	.	
16.967	0.0836	0.25	Q . V	.	.	.	
16.983	0.0840	0.25	Q . V	.	.	.	
17.000	0.0843	0.24	Q . V	.	.	.	
17.017	0.0846	0.24	Q . V	.	.	.	
17.033	0.0849	0.24	Q . V	.	.	.	
17.050	0.0853	0.23	Q . V	.	.	.	
17.067	0.0856	0.23	Q . V	.	.	.	
17.083	0.0859	0.23	Q . V	.	.	.	
17.100	0.0862	0.23	Q . V	.	.	.	
17.117	0.0865	0.22	Q . V	.	.	.	
17.133	0.0868	0.22	Q . V	.	.	.	
17.150	0.0871	0.22	Q . V	.	.	.	
17.167	0.0874	0.22	Q . V	.	.	.	
17.183	0.0877	0.21	Q . V	.	.	.	
17.200	0.0880	0.21	Q . V	.	.	.	
17.217	0.0883	0.21	Q . V	.	.	.	
17.233	0.0886	0.21	Q . V	.	.	.	
17.250	0.0889	0.20	Q . V	.	.	.	

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
17.267	0.0892	0.20 Q	. V	.	.	.	
17.283	0.0894	0.20 Q	. V	.	.	.	
17.300	0.0897	0.20 Q	. V	.	.	.	
17.317	0.0900	0.19 Q	. V	.	.	.	
17.333	0.0902	0.19 Q	. V	.	.	.	
17.350	0.0905	0.19 Q	. V	.	.	.	
17.367	0.0907	0.19 Q	. V	.	.	.	
17.383	0.0910	0.19 Q	. V	.	.	.	
17.400	0.0913	0.18 Q	. V	.	.	.	
17.417	0.0915	0.18 Q	. V	.	.	.	
17.433	0.0918	0.18 Q	. V	.	.	.	
17.450	0.0920	0.18 Q	. V	.	.	.	
17.467	0.0923	0.18 Q	. V	.	.	.	
17.483	0.0925	0.18 Q	. V	.	.	.	
17.500	0.0927	0.18 Q	. V	.	.	.	
17.517	0.0930	0.17 Q	. V	.	.	.	
17.533	0.0932	0.17 Q	. V	.	.	.	
17.550	0.0935	0.17 Q	. V	.	.	.	
17.567	0.0937	0.17 Q	. V	.	.	.	
17.583	0.0939	0.17 Q	. V	.	.	.	
17.600	0.0942	0.17 Q	. V	.	.	.	
17.617	0.0944	0.17 Q	. V	.	.	.	
17.633	0.0946	0.17 Q	. V	.	.	.	
17.650	0.0949	0.17 Q	. V	.	.	.	
17.667	0.0951	0.16 Q	. V	.	.	.	
17.683	0.0953	0.16 Q	. V	.	.	.	
17.700	0.0955	0.16 Q	. V	.	.	.	
17.717	0.0957	0.16 Q	. V	.	.	.	
17.733	0.0960	0.16 Q	. V	.	.	.	
17.750	0.0962	0.16 Q	. V	.	.	.	
17.767	0.0964	0.16 Q	. V	.	.	.	
17.783	0.0966	0.16 Q	. V	.	.	.	
17.800	0.0968	0.16 Q	. V	.	.	.	
17.817	0.0970	0.16 Q	. V	.	.	.	
17.833	0.0973	0.15 Q	. V	.	.	.	
17.850	0.0975	0.15 Q	. V	.	.	.	
17.867	0.0977	0.15 Q	. V	.	.	.	
17.883	0.0979	0.15 Q	. V	.	.	.	
17.900	0.0981	0.15 Q	. V	.	.	.	
17.917	0.0983	0.15 Q	. V	.	.	.	
17.933	0.0985	0.15 Q	. V	.	.	.	
17.950	0.0987	0.15 Q	. V	.	.	.	
17.967	0.0989	0.15 Q	. V	.	.	.	
17.983	0.0991	0.15 Q	. V	.	.	.	
18.000	0.0993	0.15 Q	. V	.	.	.	

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	180.0
20%	95.0
30%	85.0
40%	75.0
50%	60.0
60%	50.0
70%	40.0

80%	30.0
90%	15.0

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END OF FLOODSCx ROUTING ANALYSIS

Attachment 6 Source Control

Parking Area Maintenance SC-43

Description

Parking lots can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.
- Keep accurate maintenance logs to evaluate BMP implementation.



Good Housekeeping

- Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- Post "No Littering" signs and enforce anti-litter laws.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.



Preventative Maintenance

Inspection

Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.

- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below if water is used to clean surfaces:
  - ✓ Block the storm drain or contain runoff.
  - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
- Follow the procedures below when cleaning heavy oily deposits:
  - ✓ Clean oily spots with absorbent materials.
  - ✓ Use a screen or filter fabric over inlet, then wash surfaces.
  - ✓ Do not allow discharges to the storm drain.
  - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.
  - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- Check local ordinance for SUSMP/LID ordinance.
- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in

place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control during sweeping to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.



Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.



Employee Training Program

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

Maintenance

- Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual.*

California Stormwater Quality Association, 2003. *New Development and Redevelopment Stormwater Best Management Practice Handbook*. Available online at: https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook.

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Pollution from Surface Cleaning Folder, 1996, 2003. Bay Area Stormwater Management Agencies Association. Available online at: http://basmaa.org/Portals/0/documents/pdf/Pollution%20from%20Surface%20Cleaning.pdf.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

The Storm Water Managers Resource Center, http://www.stormwatercenter.net.

US EPA. *Post-Construction Stormwater Management in New Development and Redevelopment*. BMP Fact Sheets. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5.

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.
- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

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- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Road and Street Maintenance SC-70



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.

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- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
  - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
  - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
  - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
  - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
  - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
  - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
  - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
  - Traffic control officers may be required to enforce parking restrictions.
  - Skillful design of cleaning routes is required for program to be productive.
  - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM10). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.
- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.
- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.
- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.
- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

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Landscape Maintenance SC-73



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

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Drainage System Maintenance SC-74



Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Targeted Constituents

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

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

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- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

- Arrangements must be made for proper disposal of collected wastes.

- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to

cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

References and Resources

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Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) Municipal Activities Model Program Guidance. 2001. Project Clean Water. November.

United States Environmental Protection Agency (USEPA). 1999. Stormwater Management Fact Sheet Non-stormwater Discharges to Storm Sewers. EPA 832-F-99-022. Office of Water, Washington, D.C. September.

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United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Illegal Dumping Control. On line: http://www.epa.gov/npdes/menuofbmps/poll_7.htm

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line: http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Efficient Irrigation SD-12



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Attachment 7 O&M

OPERATIONS & MAINTENCE PLAN

Water Quality Management Plan

For

Shopoff Anaheim

APN: 072-110-21-19, 072-110-21 & 072-110-50

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP APPLICABLE? Yes/No	BMP Name and BMp Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	N1-Education for Property Owners, Tenants and Occupants	Educational Materials will be provided to the tenants once a year. HOA/Owner shall distribute appropriate materials to owners and/or occupants via language, mailings, website or meeting. Educational materials can be downloaded from www.ocwatersheds.com	HOA/Owner
Yes	N2-Activity Restrictions	The Owner/HOA will prescribe on-going activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.	HOA/Owner
Yes	N3-Common Area Landscape Management	On-going landscape maintenance requirements that are consistent with the County/City. Landscape waste shall disposed per local regulations. Landcape shall be maintained at a monthly basis.	HOA/Owner
Yes	N4-BMP Maintenance	Scheduled by the future HOA for cleaning of all (structural and non-structural) BMP facilities. Maintenance of BMP's implemented at the project site shall be performed at the frequency prescribed in the Final WQMP. Records of inspections and BMP maintenance shall be maintained by the HOA and documented in the Final WQMP, and shall be available for review upon request. Frquency: Monthly	HOA/Owner
Yes	N11-Common Area Litter Control	Litter patrol, violation inspections, reporting and other litter control activities shall be in conjunction with maintenance activities to ensure good housekeeping of the project's common areas. Litter collection and removal shall be performed on a weekly basis.	HOA/Owner
Yes	N14-Common Area Catch Basin Inspection	On-site catch basin inlets and other drainage facilities shall be inspected at least once per year, prior to the start of the rainy season (October 1st). Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum.	HOA/Owner
Yes	N15-Street Sweeping Private Streets and Parking Lots	Streets and parking areas within the project shall be swept at a minimum frequency quarterly as well as once per year prior to the storm season, no later than October 1 each year.	HOA/Owner
Structural Source Control BMPs			
Yes	S1-Provide storm drain system stencilling and signage	Storm drains shall be inspected for legibility, at a minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible. Storm Drain should be inspected for re-stencil once a year and re-stencil every other year.	HOA/Owner
Yes	S3-Design and construct trash and waste storage areas to reduce pollution introduction	Sweep trash area at least once per week and before October 1st each year. Maintain area clean of trash and debris at all times.	HOA/Owner
Yes	S4-Use irrigation systems & landscape design, water conservation, smart controllers	In conjunction with routine landscaping maintenance activities, inspect irrigation for signs of leaks, overspray and repair or adjust accordingly. Adjust system cycle to accommodate seasonal fluctuations in water demand and temperatures. Ensure use of native or drought tolerant/non-invasive plant species to minimize water consumption.	HOA/Owner
Low Impact Development BMPs			

Yes	Underground Storage Chambers	Sediment and trash is evacuated through an access/ inspection manhole. A record of each inspection is to be maintained for the life of the system. System is to be inspected/maintained a mimimum of once a year.	HOA/Owner
Yes	Drywells	Sediment and trash is evacuated through an access/ inspection manhole. A record of each inspection is to be maintained for the life of the system. System is to cleaned annually and within 48 hours of a significant storm event.	HOA/Owner
Yes	Pre-treatment Device	Sediment and trash is evacuated through an access/ inspection manhole. The procedure to clean the pre-treatment device is done with a standard vacuum truck. A record of each inspection is to be maintained for the life of the system. System should be cleaned at a minimum of twice a year.	HOA/Owner

Required Permits

Permits are not required for the implementation, operation and maintenance of the BMPs

Forms to Record BMP Implementation, Maintenance and Inspection

The form that will be used to record implementation, maintenance and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be available for review upon request.

Waste Management

Any waste generated from the maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Landscape waste such as prunings will be collected and disposed of properly off-site and will not be washed into the streets, local area drains or catch basins.

Exhibit D

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

Company/Individual Name		Contact Person	
Street Address		Title	
City	State	ZIP	Phone

II. Information about Site Transferred

Name of Project (if applicable)	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable)	
Planning Area (PA) and/or Tract Number(s) for Site	Lot Numbers (if Site is a portion of a tract)
Date WQMP Prepared (and revised if applicable)	

III. New Owner/New Responsible Party Information

Company/Individual Name		Contact Person	
Street Address		Title	
City	State	ZIP	Phone

IV. Ownership Transfer Information

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 SiteTransferred 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

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

Contech® CMP Detention Inspection and Maintenance Guide

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, quarterly 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

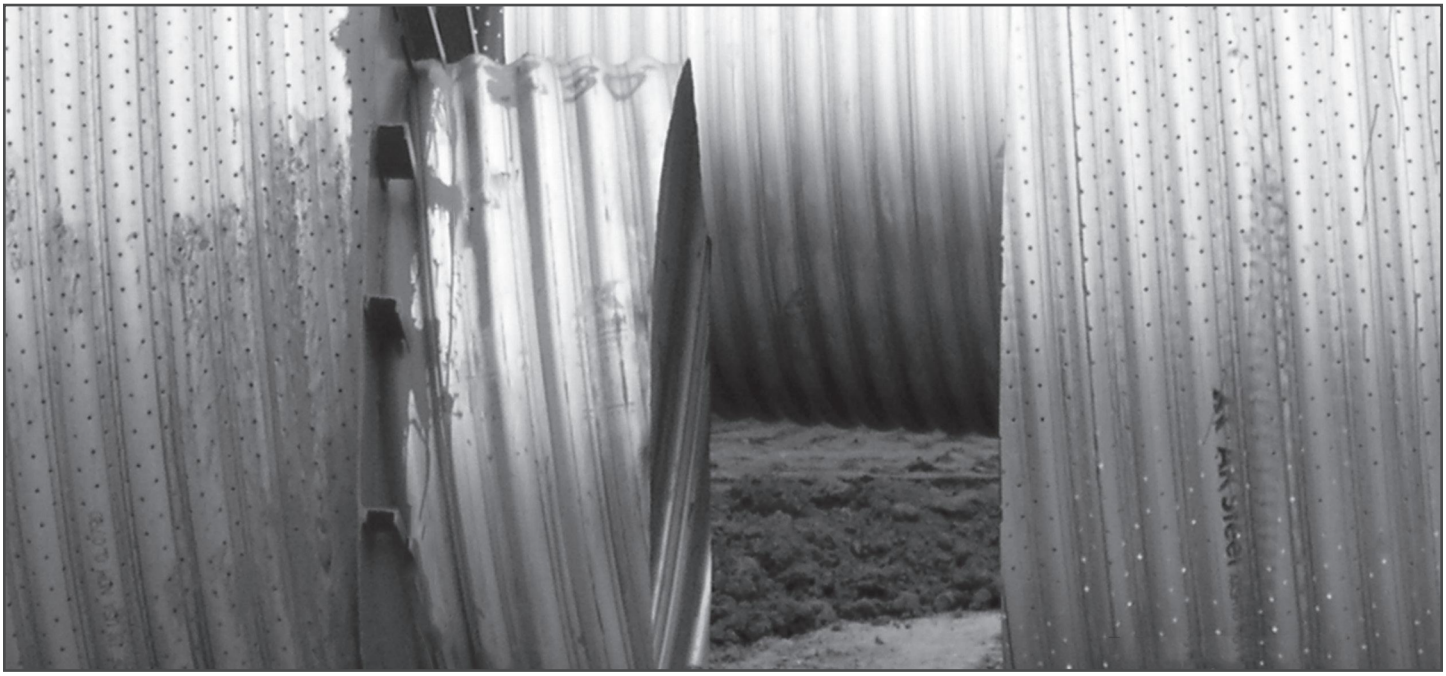
CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice.

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.

Systems are to be rinsed, including above the spring line, annually soon after the spring thaw, and after any additional use of salting agents, as part of the maintenance program for all systems where salting agents may accumulate inside the pipe.

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.



NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION

CONTECH® CMP DETENTION SYSTEMS

CONTECH® ENGINEERED SOLUTIONS

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OPERATION AND MAINTENANCE MANUAL

The ***MaxWell® IV*** Drainage System



TORRENT® RESOURCES

Torrent Resources Incorporated

The watermark for drainage solutions.®

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Company Overview

Torrent Resources Incorporated…an Employee-Owned Company.

First licensed as a drainage contractor, Torrent Resources has evolved into a full-service; drainage solutions partner to address ever-growing customer needs in California, Arizona, New Mexico, Nevada and Texas. The company is headquartered in Phoenix, with an additional office in Fontana, California.

Since 1972, Torrent Resources has set the standard in design and construction of water drainage systems for the mitigation of excess surface water. In 1974, the company revolutionized the industry with its exclusive, patented ***MaxWell***® systems – products unmatched in efficiency and reliability by any other type of stormwater disposal application. To date, more than 80,000 MaxWell drywells have been installed throughout the western United States.

General Purpose

With a greater awareness of the need to address the quality of urban stormwater runoff, on-site drainage systems used for the stormwater elimination have come under closer scrutiny. One such system is the drywell which has been used previously throughout the United States to dispose of retained or surplus surface water. The early versions of this structure were not much more than holes in the ground filled with rocks. This meant that maintenance on these primitive types was impossible, and inundation from silt-loading quickly led to clogging and failure of the drywells.

Fortunately, the introduction of the MaxWell concept provided a solution to this problem by incorporating a deep settling basin to trap out the suspended solids for easy removal during routine cleaning. To that end, all MaxWell drainage systems are designed to remove not only sediment and debris, but also floating hydrocarbons and organic compounds prior to recharging the treated stormwater back into the sub-grade. The water is then further polished by the soil envelope as it passes through the vadose zone to eventually replenish the resource.

The MaxWell is a treatment and infiltration BMP, which recharges cleaned stormwater back into the ground to recharge the aquifer beneath. In most cases, the system will be utilized in one of two applications: mitigation of the entire amount of retained water from a rainfall event of some historic frequency and duration, in which case the product would be considered volume-based; or, removal of only first flush constituents from an incremental portion of a larger rainfall event. In the latter, the system would be considered a flow-based BMP.

The system itself is <u>not intended to provide storage volume</u>, but instead is designed to gradually dispose of accumulated stormwater to ensure maximum pre-treatment efficiency. Therefore, in both applications described above, a means of storing the required capture volume should be provided separately. This can be done in shallow surface basins or planter areas with the drywells incorporated into the low spots, or by interconnecting the drainage systems to underground tanks or vaults. This allows the minimum number of drainage systems to be used to percolate the water into the sub soils, using the total allowable draw-down timeframe. More systems could be used in lieu of storage to increase processing rates, but this is generally not as cost-effective as providing a means or retaining the required volume.

MaxWell® IV Description

Initial treatment is provided in the deep sump of the MaxWell IV, which provides 1,000 gallons of volume to capture sediment and trash. Depending upon the permeability of the soils, the pilot-hole excavations for the drywells may be up to 120 feet deep.

The typical MaxWell IV processes incoming stormwater for the removal of suspended solids and floating hydrocarbons (gasoline and diesel). These chambers are constructed of 4000 PSI pre-cast concrete liner segments that are 48-inches I.D., 54-inches O.D. with a 3-inch wall thickness. In constructing the chambers, these sections are carefully aligned, centered, and stacked in the borehole to maximize bearing surfaces.

Next, a corrugated HDPE drainage pipe with a slotted Schedule 40 PVC drainage screen attached to the lower end is inserted into the pilot-hole excavation. This component is then capped and suspended slightly off the bottom of the borehole. Clean, washed aggregate sized between 3/8" to 1 ½" to best complement site soil conditions is utilized for the backfill material surrounding the drainage pipe in the lower excavation of the main well. The pre-cast concrete chambers are then erected in the 72-inch diameter reamed portions of the upper excavation.

An overflow pipe constructed of Schedule 40 PVC is installed in the main chamber, and is mated to the drainage pipe with a coupling under the chamber bottom. This vertical pipe is supported by a fusion-bonded epoxy-coated galvanized steel bracket attached to the liner wall. Our ***PureFlo***® Debris Shield equipped with an internal screen is then fitted onto the top of the overflow inlet. This cylindrical shield is approximately 24-inches in length, and is fabricated from rolled 16-gauge galvanized steel. The component is coated with fusion-bonded epoxy, and fitted with an anti-siphon vent. In operation, the shield forces water to be drawn into the system from several inches beneath the surface, effectively isolating and containing floating trash, paper, debris and pavement oils within the chambers. The internal screen effectively filters out suspended material, and the vent prevents floating debris from being sucked into the overflow pipe as the water level inside the chamber subsides.

The chamber is equipped with a hydrophobic floating absorbent pillows, which will remove a wide range of hydrocarbons and organic liquids. The sponges are 100% water repellant, and literally "wick" floating petrochemical compounds from the surface of the water. Each pillow has a removal capacity of at least 128 ounces to accommodate effective, long-term treatment.

At the surface of the ground, the inlet structure will be equipped with a 24" or 30" diameter cast-iron grate and ring assembly capable of handling H-20 loads. See Appendix 1-A for MaxWell detail.

Installation

Once the locations of any utilities have been identified, the exact locations of the drywell on the jobsite is laid out and identified by an onsite survey team. When installed with standard inverts, the layout requires a center stake for the chamber, with a 10' offset.

The installation begins with the excavation of a 48" pilot-hole boring down to the bottom of the proposed gravel pack. The upper part of this excavation, where the chamber will sit, must then be enlarged to 72" in order to provide sufficient space to stack the liner segments and place the aggregate backfill in the annular space around the outside of the chamber.

It is vital to the function of the finished drainage system that a 10' minimum penetration into permeable soil is achieved. As the drilling progresses and each load of cuttings is discharged, the composition of the drainage soils is assessed for suitable permeability. Optimum permeability is found in soils comprised of clean sand, gravel, and small cobbles, with an absence of silt, clay or excessive fines. However, other materials may possess acceptable transmissibility, such as clean sand or decomposed granite.

When the drilling is completed, the drilling crew will leave the site protected by covering the open holes with steel plates, and constructing a berm around the immediate well site. Barricades and flagging are

additionally utilized to protect the drilled shafts after the excavation is complete. A construction crew will then arrive within a day or two to finish the installation process.

The actual construction sequence begins with pulling the plates back far enough to allow the placement of a setting platform over the first open boring. The first component lowered into the excavation is the slotted drainage screen, connected to the lower end of the drainage pipe. The material used for the drainage pipe is heavy-duty ADS Highway Grade corrugated polyethylene. This HDPE drainage pipe is lowered into position, and held slightly off the bottom of the pilot-hole. The pipe is then capped and suspended by a chain, which has been secured to the setting platform above the excavation.

As the fabrication progresses, the protective steel plates are pulled completely away so that there is access for the backfill operation. A skip loader is utilized to place the gravelpack into the entire length of the 48-inch pilot hole around the suspended drainage pipe. Next, the lower perforated section of 48-inch precast liner for the main well is lowered into place within the enlarged 6-foot diameter excavation. Additional liner segments are carefully aligned and stacked in the enlarged portion of the shaft to create the settling chamber of the system. The last section to be placed at grade is a modified manhole cone. The opening in the manhole cone is covered to prevent the accidental introduction of gravel as the upper excavation is backfilled with this same washed, graded aggregate.

In order to prevent subsidence and lock all of the components in place, a 1-sack slurry mixture is used to backfill the upper 5’ of annular space and around the cone. This material effectively encapsulates the components and exceeds the compaction of native soil. With the chamber completed, the interior components are installed. The overflow pipe is lowered into position in the main well chamber as assembly progresses.

After securing the grate to the cast-iron ring, a layer of ultraviolet-resistant geotextile fabric is applied over the grate. This UV-resistant fabric layer is banded to the grated inlet, and is intended to prevent incidental introduction of trash or debris before the well goes into service. This fabric will be removed by the General Contractor after final landscaping and paving are completed. Premature fabric removal could result in system damage and may void some, or all warranty conditions.

The metal grates and covers used are embossed with “Torrent Resources”, the MaxWell trade name, and the words “Storm Water Only” as a general reminder to the public as to the intended usage of the structure.

The final step in the installation process is the application of a mortar mix to affix the ring and grate assemblies securely to the manhole cone. This completes the construction sequence.

MaxWell Operation

Influent stormwater enters the system either through the grate at the ground surface or through a piped inlet. Upon entering the drywell chamber, stormwater will accumulate, giving silt and other heavy particles a chance to settle. A vented, screened, and shielded inlet ensures containment of floating debris within the chamber and elimination of petroleum constituents through the floating absorbent pillows. The system is drained as water rises under the PureFlo™ Debris Shield, and spills into the top of the overflow pipe. The drainage assembly returns the cleaned water to the surrounding soil through the FloFast™ Drainage Screen.

All MaxWell IV Systems are equipped with bolted, theft-deterrent cast iron grates as standard security features. Special inset castings are available for use in landscaped applications, which are resistant to loosening from accidental impact. Machined mating surfaces, and “Storm Water Only” wording are standard on these components.

Maintenance

The responsible party, such as a Property Management Company or Homeowners Association, is typically responsible for maintaining the drywell(s).

New systems should receive a thorough visual examination following the first several significant rainfall events. This assessment will assure that there is no standing water, and that runoff or nuisance water flows are being eliminated within the allowable 48 hour draw-down timeframe. Beyond that, the drainage structures should be inspected once a year and within 48 hours of a significant storm event to ensure that there is no standing water in the chambers.

Standing water problems are usually caused by inadequate performance of the existing drainage systems on the property. Reasons are varied but may be due to system aging, reduced soil permeability, pavement settlement, ineffective site maintenance, property expansions and additions, or change in property usage.

If a drywell is draining slowly or leaves water standing over the grate for longer than regulations allow, debris may simply be blocking the inlet. The maintenance guidelines begin with the performance of an annual inspection, which should include assessing the need for cleaning and inspecting the functional and structural continuity of the system. At the same time, surface aspects of the drainage way are evaluated for evidence of staining or standing water.

A typical cleaning is carried out using a truck-mounted hydro-vactor (see below) when accumulated trash, debris, and sediment occupy 15% or more of the original settling chamber capacity. The hydro-vactor utilizes streams of air and high-pressure water to dislodge built-up material, which is then removed via vacuum hose and disposed of off-site.

Inlet grates and covers are removed for this operation and all filters and screens are cleaned during this procedure. At the same time, any obstructions or accumulated debris in remote inlets and connecting pipes is removed by jet-rodding. The cleaning operation also involves replacement of the floating absorbent pillows and changing out the filter fabric at the bottom of the chambers where applicable.

After the initial cleaning, most systems generally will not require subsequent cleaning for 3-5 years. When afforded regularly scheduled maintenance, our records indicate that our MaxWell Drywells will provide decades of efficient, reliable service.

A written log shall be kept of all inspections and maintenance actions performed on the drywell systems.



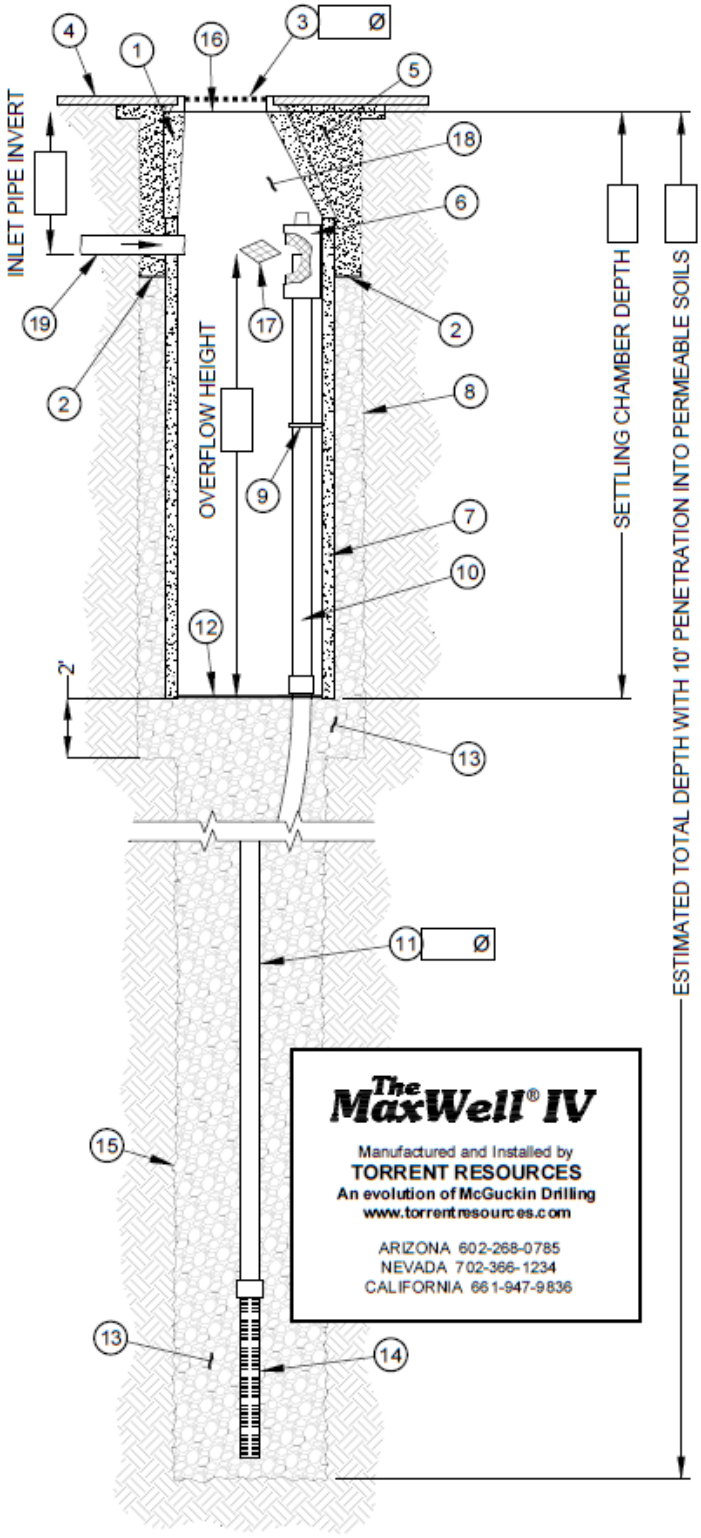
Typical Hydrovactor Truck used for Drywell Maintenance

APPENDIX
1-A

The MaxWell® IV Drainage System Detail And Specifications

NOTES

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **MOISTURE MEMBRANE** - 6 MIL. PLASTIC. APPLIES ONLY WHEN NATIVE MATERIAL IS USED FOR BACKFILL. PLACE MEMBRANE SECURELY AGAINST ECCENTRIC CONE AND HOLE SIDEWALL.
3. **BOLTED RING & GRATE** - DIAMETER AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
4. **GRADED BASIN OR PAVING** (BY OTHERS).
5. **STABILIZED BACKFILL** - 1 SACK SLURRY.
6. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL .265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED.**
7. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS TO **MAXIMIZE BEARING SURFACE**.
8. **MIN. 6' Ø DRILLED SHAFT**.
9. **SUPPORT BRACKET** - FORMED 12 GA. STEEL. **FUSION BONDED EPOXY COATED**.
10. **OVERFLOW PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
11. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
12. **BASE SEAL** - GEOTEXTILE OR CONCRETE SLURRY.
13. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO **BEST COMPLEMENT SOIL CONDITIONS**.
14. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 120" OVERALL LENGTH WITH TRI-B COUPLER.
15. **MIN. 4' Ø SHAFT** - DRILLED TO **MAINTAIN PERMEABILITY** OF DRAINAGE SOILS.
16. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION.
17. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY.
18. **FREEBOARD DEPTH** VARIES WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE OVERFLOW PIPE INLET.
19. **INLET PIPE** (BY OTHERS).



Attachment 8 Educational Materials

(PLACE HOLDER)